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TITLE 04
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17.04.01 - GENERAL SAFETY AND HEALTH STANDARDS CODE 1

000. LEGAL AUTHORITY.
Pursuant to the provisions of Section 72-508, Idaho Code, the Industrial Commission has the authority to promulgate and adopt reasonable rules for effecting the purposes of the Workers' Compensation Act. (7-1-93)

001. TITLE AND SCOPE.
These rules shall be cited as IDAPA 17, Title 04, Chapter 01, "General Safety and Health Standards Code 1," and shall be applicable to places of employment maintained by the State of Idaho and its political subdivisions. (7-1-93)

002. WRITTEN INTERPRETATIONS.
There are no written statements which pertain to the interpretation of these rules. (7-1-93)

003. ADMINISTRATIVE APPEALS.
There are no provisions for administrative appeal of these rules. (7-1-93)

004. (RESERVED).

005. INCLUSIVE GENDER.
For all sections and subsections of these rules, the terms and references used in the masculine include the feminine and vice versa, as appropriate. (7-1-93)

006. SEVERABILITY.
The sections and subsections of these rules are severable. If any rule, or part thereof, or the application of such rule, or the application of such rule to any person or circumstance is declared invalid, that invalidity does not affect the validity of any remaining portion. (7-1-93)

007. -- 009. (RESERVED).

010. DEFINITIONS.

01. Commission. The Industrial Commission of the State of Idaho. (4-7-83)

02. Department. The Department of Labor and Industrial Services (also referred to as DLIS). (4-7-83)

03. Director. The Director of the Department of Labor and Industrial Services. (4-7-83)

04. Approved. Approved or accepted by the Industrial Commission or the Department of Labor and Industrial Services by reasons of tests or investigations conducted by the Commission or the Department based on nationally accepted test standards or principles. (4-7-83)

05. Enforcing Agency. The Idaho Industrial Commission and the Idaho Department of Labor and Industrial Services. (4-7-83)

06. Automatic. Providing a function without the necessity of human intervention. (4-7-83)

07. Authority Having Jurisdiction. The Idaho Industrial Commission and its delegated authority, the Idaho Department of Labor and Industrial Services. (4-7-83)

08. Authorized Person. A person approved or assigned by the employer to perform a specific type of duty or duties or to be at a specific location or locations at the job site. (4-7-83)

09. Competent Person. One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has

authorization to take prompt corrective action to eliminate them. (4-7-83)

10. Employer. Any person, firm, corporation, partnership, business trust, legal representative or other business industry, profession or activity in this state who employs one or more employees or who contracts with one or more person, the essence of which is the personal labor of such person or persons and includes the state, counties, cities, school districts and other municipal corporation, public corporation, political subdivisions of the state and charitable organizations: Provided that any person, partnership or business entity not having employees, and who is covered by the industrial insurance act shall be considered both an employer and an employee. (4-7-83)

11. Exposed to Contact. The location of an object is so accessible that a workman may, in the course of his employment, come into contact with the object and be injured. (4-7-83)

12. Fire Resistance Rating. The time, in minutes or hours, that materials or assemblies have withstood a fire exposure as established in accordance with the test procedures of Standard Methods of Fire Tests of Building Construction and Materials (NFPA 251). (4-7-83)

13. Hazard. That condition, potential or inherent which can cause injury, death, or occupational disease. (4-7-83)

14. Hazardous Areas. Areas of structures, buildings or parts thereof used for purposes that involve highly combustible, highly flammable, or explosive products or materials which are likely to burn with extreme rapidity or which may produce poisonous fumes or gases, including highly toxic or noxious alkalies, acids, or other liquids or chemicals which involve flame, fume, explosive, poisonous or irritant hazards; also uses that cause division of material into fine particles or dust subject to explosion or spontaneous combustion, and uses that constitute a high fire hazard because of the form, character, or volume of material used. (4-7-83)

15. Listed and Listing. Terms which refer to equipment which is shown in a list published by an approved testing agency, qualified and equipped for experimental testing and maintaining an adequate periodic inspection of current productions and whose listing states that the equipment complies with nationally recognized safety standards. (4-7-83)

16. Qualified. One who by possession of a recognized degree, certificate or professional standing or who by extensive knowledge, training and experience has successfully demonstrated his ability to solve or resolve problems relating to the subject matter, the work or the project. (4-7-83)

17. Safety Factor. The ratio of the ultimate breaking strength of a menter or piece of material or equipment to the actual working stress or safe load when in use. (4-7-83)

18. Shall. Mandatory. (4-7-83)

19. Should. Recommended. (4-7-83)

20. Standard Safeguard. A device designated and constructed with the object of removing the hazard of accident incidental to the machine, appliance, tool, building or equipment to which it is attached. Standard safeguards shall be constructed of either metal, wood, plastics, or other suitable material or a combination of these. The final determination of the sufficiency of any safeguard rests with the Director of the Department of Labor and Industrial Services through the Safety and Labor Relations Bureau. (4-7-83)

21. Substantial. Constructed of such strength, of such material and of such workmanship that the object referred to will withstand all normal wear, shock and usage. (4-7-83)

22. Suitable. That which fits, or has the qualities or qualifications to meet a given purpose, occasion, condition, function or circumstance. (4-7-83)

23. Workman, Personnel, Man, Person, Employee and Other Terms of Like Meaning. Unless the context of the provision containing such term indicates otherwise, these terms mean an employee or an employer, whether by way of manual labor or otherwise, and every person in this state who is engaged in the employment of, or

who is working under, the independent contract the essence of which is his personal labor for an employer, whether by manual labor or otherwise. (4-7-83)

24. Workplace. Any plant, yard, premises, room or other place where an employee or employees are employed for the performance of labor or service over which the employer has the right of access or control. (4-7-83)

25. ANSI. American National Standards Institute. (4-7-83)

26. API. American Petroleum Institute. (4-7-83)

27. ASA. American Standards Association. (4-7-83)

28. ASAE. American Society of Agricultural Engineers. (4-7-83)

29. ASHRE. American Society of Heating and Refrigeration Engineers. (4-7-83)

30. ASME. American Society for Mechanical Engineers. (4-7-83)

31. ASTM. American Society for Testing and Materials. (4-7-83)

32. AWS. American Welding Society. (4-7-83)

33. BTU. British thermal unit. (4-7-83)

34. BTUH. British thermal unit per hour. (4-7-83)

35. CFM. Cubic feet per minute. (4-7-83)

36. CFR. Code of Federal Register. (4-7-83)

37. CGA. Compressed Gas Association. (4-7-83)

38. CIE. Commission Internationale de L'Eclairage. (4-7-83)

39. DLIS. Department of Labor and Industrial Services. (4-7-83)

40. DOT. Department of Transportation. (4-7-83)

41. FRP. Fiberglass reinforced plastic. (4-7-83)

42. GFI. Ground-fault circuit interrupter. (4-7-83)

43. GPM. Gallons per minute. (4-7-83)

44. ISC. Idaho Safety Code. (4-7-83)

45. ICC. Interstate Commerce Commission. (4-7-83)

46. IME. Institute of Makers of Explosives. (4-7-83)

47. ID. Inside diameter. (4-7-83)

48. LPG. Liquified petroleum gas. (4-7-83)

49. LSC. Life Safety Code 101. (4-7-83)

50. MCS. Manufacturing Chemist Association. (4-7-83)

51. MSHA. Mine Safety and Health Act. (4-7-83)

52. NBFU. National Board of Fire Underwriters. (4-7-83)

53. NEC. National Electrical Code. (4-7-83)

54. NEMA. National Electrical Manufacturing Association. (4-7-83)

55. NFPA. National Fire Protection Association. (4-7-83)

56. NIOSH. National Institute of Occupational Safety and Health. (4-7-83)

57. NTP. Normal temperature and pressure. (4-7-83)

58. OD. Outside diameter. (4-7-83)

59. OSHA. Occupational Safety and Health Act. (4-7-83)

60. PSI. Pounds per square inch. (4-7-83)

61. PSIA. Pounds per square inch atmospheric. (4-7-83)

62. PSIG. Pounds per square inch gauge. (4-7-83)

63. RMA. Rubber Manufacturers Association. (4-7-83)

64. SAE. Society of Automotive Engineers. (4-7-83)

65. TFI. The Fertilizer Institute. (4-7-83)

66. TSC. Trailer Standard Code. (4-7-83)

67. UBC. Uniform Building Code. (4-7-83)

68. UL. Underwriters Laboratories. (4-7-83)

69. USASI. United States of America Standards Institute. (4-7-83)

70. USC. United States Code. (4-7-83)

71. USCG. United States Coast Guard. (4-7-83)

011. ORDER.

01. Authority to Adopt. Pursuant to the authority vested in the Industrial Commission by Sections 72-508 and 72-720, Idaho Code, the Commission hereby adopts the following regulations as minimum safety and health standards applicable to places of employment maintained by the State of Idaho and its political subdivisions subject to the Idaho Workmen's Compensation Law. (4-7-83)

02. 1974 Code Superceded. This revised safety code supercedes and replaces the Idaho Occupational Safety and Health Standards Code No. 1, edition of January 17, 1974, previously adopted by the Industrial Commission. (4-7-83)

03. Effective Date. Adopted and effective this 7th day of April 1983, by State of Idaho, Industrial Commission: Will S. Defenbach, Chairman, Gerald A. Geddes, Member, Lawrence G. Sirhall, Member; Attest: Patricia S. Ramey, Secretary. (4-7-83)

012. FOREWORD.

01. Purpose. This safety code has been compiled with the purpose of consolidating all safety rules of general application into one book, hereafter referred to as Idaho Safety Code 1, General Safety and Health Standards, by the promulgation of the rules contained herein. It is also the intent that the safety rules of the Idaho Industrial Commission will be at least as effective as those adopted by the Occupational Safety and Health Administration as published in the Code of Federal Regulations. (7-1-93)

02. Designation. This code, designated Idaho General Safety and Health Standards Code No.1 (ISC-1) is intended to replace the Idaho Occupational Safety and Health Standards Code No. 1 adopted by the Industrial Commission on January 17, 1974. (4-7-83)

03. Coverage. The Commission recognizes that state enforcement of occupational safety and health standards has been to a great extent preempted by the federal government as a result of action taken under the Occupational Safety and Health Act of 1970. The regulations adopted herein apply to employment by the State of Idaho and its political subdivisions as noted below: (4-7-83)

a. Every person in the service of the state or of any political subdivision thereof, under any contract of hire, express or implied, and every official or officer thereof, whether elected or appointed, while performing his official duties. (4-7-83)

b. Every person in the service of a county, city or any political subdivision thereof, or of any municipal corporation. (4-7-83)

c. Members of the Idaho National Guard while on duty and participants in Idaho youth conservation project under the supervision of the Idaho State Forester. (4-7-83)

d. Every person who is a member of volunteer fire or police department shall be deemed to be in the employment of the political subdivision or municipality where the department is organized. (4-7-83)

e. Every person who is a regularly enrolled volunteer member or trainee of the Department of Disaster and Civil Defense, or of a civil defense corps, shall be deemed to be in the employment of the state. (4-7-83)

f. Every person who is employed by a public school or school district shall be deemed to be in the employment of the state. (4-7-83)

013. CHAPTER, SECTIONS SUBSECTIONS, SUBDIVISIONS, ITEMS, SUBITEMS AND SEGMENTS.

01. Sections. The last two digits designate the section number. All other numbers correlate to the chapters which are listed alphabetically. Example: Section 101 designates Chapter A (1 correlating to A, the first letter of the alphabet), Section 01; Section 1205 designates Chapter L (L being the twelfth letter of the alphabet), section 05; Section 2805 designates Chapter BB, Section 05. (4-7-83)

02. Subsections. Sections of this Idaho Safety Code may be divided into subsections a., b., c., etc., which in turn may be divided into subdivisions i.,ii., iii., etc., which may be further divided into items (a), (b), (c), etc., which in turn may be further divided into subitems (1), (2), (3), etc., which may be further divided into segments (aa), (bb), (cc), etc., all according to the following: Chapter: 101 = Chapter A; Chapter 1005 = Chapter J; Chapter 2918 = Chapter CC; Section 102 = Section 02; Section 1010 = Section 10; Section 2613 = Section 13; Subsections: a., b.; Subdivisions: i.,ii.; Items: (a), (b); Subitems (1),(2); Segments (aa), (bb). (4-7-83)

014. PURPOSE AND SCOPE.

The rules included in this Safety Code apply throughout the State of Idaho to any and all work places under the jurisdiction of the Idaho Industrial Commission and the Department of Labor and Industrial Services. These rules are minimum safety requirements with which all industries must comply. Special industry rules which will complement or augment rules contained in Chapter A appear as vertical standards in other chapters of Idaho Safety Code 1. By adherence to such rules, industrial accidents may be eliminated or minimized. (7-1-93)

015. EQUIPMENT APPROVAL BY NON-STATE AGENCY OR ORGANIZATION.
Whenever a provision of this code states that only that equipment or those processes approved by an agency or organization other than the idaho Industrial Commission and the Idaho Department of Labor and Industrial Services, such as the underwriters' Laboratories or the Bureau of Mines, shall be utilized, that provision shall be construed to mean that approval of such equipment or process by the designated agency or group shall be prima facie evidence of compliance with the provisions of this chapter. (4-7-83)

016. INCORPORATION OF STANDARDS OF NATIONAL ORGANIZATION.
Whenever a provision of this code incorporates by reference a national code or portion thereof which has been adopted by and is currently administered by another state agency, compliance with those provisions adopted and administered by such other state agency, if from a more recent edition of such national code, will be deemed to be prima facie evidence of compliance with the provisions of this chapter. (4-7-83)

017. EXTENSION OF TIME.
An extension of time to comply with the safety and health requirements of this code and any amendments that may be added from time to time may be granted up to 60 days. Approval of the extension may be granted by the enforcing agency, upon good cause shown. Such extension of time granted shall be limited to the particular case or cases covered in the letter of extension and may be revoked for cause. All requests for an extension of time shall be made in writing to the Director of the Idaho Department of Labor and Industrial Services, 277 North 6th Street, Boise, Idaho 83720. (4-7-83)

018. CONFLICTS.
Where there is a conflict between a general requirement and a specific requirement for an individual occupancy, the specific requirement shall be applicable. (4-7-83)

019.-- 029. (RESERVED).

030. GENERAL FIRST AID REQUIREMENTS AND EQUIPMENT.

01. Safe Place Standards. (4-7-83)

a. Each employer shall furnish to each of his employees a place of employment free from recognized hazards that are causing or likely to cause serious injury or death to his employees. (4-7-83)

b. Every employer shall furnish and use safety devices and safeguards and shall adopt and use practices, means, methods, operations, and processes which are adequate to render such employment and place of employment safe. Every employer shall do every other thing necessary to protect the life and safety of employees. (4-7-83)

c. Every employer shall post "hard hat" signs in areas where employees are exposed to head injury hazards and shall insure that employees wear their hard hats. (4-7-83)

d. No employer shall require any employee to go or be in any employment or place of employment which is not safe. (4-7-83)

e. No employer shall fail or neglect: (4-7-83)

i. To provide and use safety devices and safeguards; (4-7-83)

ii. To adopt and use methods and processes adequate to render the employment and place of employment safe; (4-7-83)

iii. To do every other thing necessary to protect the life and safety of employees. (4-7-83)

f. No employer, owner or lessee of any real property shall construct or cause to be constructed any place of employment which does not meet the minimum safety requirements of this code. (4-7-83)

g. No person shall do any of the following: (4-7-83)

i. Remove, displace, damage, destroy or carry off any safety device, safeguard, notice or warning furnished for use in any employment or place of employment, or interfere in any way with the use thereof by any other person; (4-7-83)

ii. Wear loose or ragged clothing while working around machinery in operation. (4-7-83)

iii. Work around machinery or in locations which present a hair-catching or hair-fire hazard unless hair is restrained; (4-7-83)

iv. Wear metal hats, hats or caps with metal buttons or metal visors around electrical hazards; (4-7-83)

v. Fail or neglect to do every other thing necessary to protect the life and safety of employees. (4-7-83)

vi. Intoxicating beverages and narcotics shall not be permitted or used in our around work sites. Workers under the influence of alcohol or narcotics shall not be permitted on the work site. This rule does not apply to persons taking prescription drugs and/or narcotics as directed by a physician providing such use shall not endanger the worker or others. (4-7-83)

h. No employer shall permit an employee to work alone in an unsafe or hazardous place, unless he is within calling distance of another person who can provide assistance. (4-7-83)

i. Employees shall not indulge in horseplay, scuffling, practical jokes or any activity which creates or constitutes a hazard while on the employer's property or at any time when being transported from or to work in facilities furnished by the employer. (4-7-83)

j. Employees who are assigned to or engaged in the operation of any machinery or equipment, shall see that all guards, hoods, safety devices, etc., that are required are in proper place and properly adjusted. (4-7-83)

k. It is the employer's responsibility to see that the foregoing provisions are complied with. (4-7-83)

l. Every employer shall keep a record of all cases of injuries his employees receive at their work. This record shall be kept in such a manner as to enable representatives of the Industrial Commission and/or designated agents to determine by examining the record, the injury rate of the employee force for the periods covered by the record. (4-7-83)

m. Every employer shall calculate the incidence rate injuries to his employee force at least annually, for the calendar year, and shall report same to the Industrial Commission and/or its designated agents on forms furnished by the Industrial Commission for the purpose. (4-7-83)

n. Every employer shall investigate or cause to be investigated every accident resulting in a disabling injury that his employees suffer in connection with their employment. He shall promptly take action thus found to be advisable. Employees shall assist in the investigation by giving any information and facts they have concerning the incident. Fatalities shall be reported to the Industrial Commission and/or to its designated agents within 24 hours. (4-7-83)

02. Transportation of Employees on the Job. (4-7-83)

a. Transportation of crews on the job whether by speeder or motor vehicle, shall be in equipment that is adequate and properly equipped for the purpose. (4-7-83)

b. Braking and lighting facilities shall be adequate. (4-7-83)

c. Equipment shall be operated in a safe manner and in compliance with traffic regulations. Safe

speeds shall be maintained at all times. (4-7-83)

d. Vehicles used for the transportation of employees shall have seats which shall be properly secured and shall be provided in each vehicle to accommodate the total number of men transported, except in case of emergency situations and conditions. (4-7-83)

e. When it is necessary, under emergency conditions, to transport more than the seating capacity in the vehicle, all employees not having seats must ride within the vehicle. Transportation of men shall be in vehicles with safe floors and adequate ventilation. (4-7-83)

f. Under no circumstances shall employees ride on fenders or running boards. (4-7-83)

g. An employee shall not ride in or on any vehicle with his legs hanging over the end or sides. (4-7-83)

h. If tools and/or material are transported in vehicles used for transportation of employees at the same time employees are being transported, the tools and/or material shall be adequately secured to present no hazard to passengers. (4-7-83)

i. No one shall board or leave moving equipment except those whose duties require such. (4-7-83)

j. When a stake bed truck is used as a man-haul, it shall be equipped with seats and tail gate. (4-7-83)

k. Only qualified drivers shall be permitted to operate motor vehicle trucks and each shall possess a current motor vehicle operator's license. (4-7-83)

l. All motor vehicles shall meet the requirements of Title 49, Chapter 8, Idaho Code. (4-7-83)

m. The above rules shall exclude fire trucks and other similar emergency vehicles. (4-7-83)

03. Education and First Aid Standards. It shall be the duty of every employer to comply with such standards and systems of education for safety as shall be, from time to time, prescribed for such employer by the Director of the Department of Labor and Industrial Services through the Safety and Labor Relations Bureau or by statute. (4-7-83)

04. Employer's Responsibility. It shall be the responsibility of the employer to establish and supervise a safe and healthful working environment, an accident-prevention program as required by these standards, and training programs to improve the skill and competency of all employees in the field of occupational safety and health. Such training shall include on-the-job instruction on the safe use of powered materials handling equipment, machine tool operations, use of toxic materials and operation of utility systems prior to assignments to jobs involving such exposures. (4-7-83)

05. Employee's Responsibility. (4-7-83)

a. Employees shall coordinate and cooperate with all other employees in an attempt to eliminate accidents. (4-7-83)

b. Employees shall study and observe all safe practices governing their work. (4-7-83)

c. Employees should offer safety suggestions, wherein such suggestions may contribute to a safer work environment. (4-7-83)

d. Employees shall apply the principles of accident prevention in their daily work and shall use proper safety devices and protective equipment as required by their employment or employer. (4-7-83)

e. Employees shall properly care for all personal protective equipment. (4-7-83)

f. Employees shall make a prompt report to their immediate supervisor of each industrial injury or occupational illness, regardless of the degree of severity. (4-7-83)

06. First aid requirements and equipment. (4-7-83)

a. First aid kits shall be made available and accessible to all employees. (4-7-83)

b. Employees shall seek first aid or medical treatment immediately upon receiving an injury, even though it be minor. Employees shall report all injuries to their supervisor promptly. (4-7-83)

c. Suitable means of transportation shall be available in the event any employee is injured; said transportation to be equipped with appropriate facilities and first aid supplies. (4-7-83)

d. Every employer shall arrange suitable telephone or radio communication at the nearest reasonable point and shall work out a definite procedure to be followed in the event of serious injury to any employee. Instructions covering this procedure shall be made available to all work crews. When practicable, a poster shall be fastened and maintained either on or in the cover of each first aid cabinet, and at or near all phones, plainly stating the phone numbers of available doctors, hospital, and ambulance services within the district of the employer. Employees should be informed of the emergency telephone number 911. (4-7-83)

e. A sufficient number of employees and supervisors, such as foremen, assistant foremen, or persons in direct charge of crews shall be trained in first aid treatment of injuries and shall hold a current first aid card. Any crew shall have at least a minimum of two (2) persons trained in first aid. (4-7-83)

f. When one or more workmen are exposed to remote or isolated jobs where first aid supplies, first aid stations and their equivalent are not readily accessible and available, workmen shall have immediate accessibility to not less than a 10-package first aid kit. It is recommended that all state, city and county vehicles have a first aid kit. (4-7-83)

g. All crew vehicles used for transporting workmen shall be equipped with not less than a 10-package first aid kit. When more than five employees are being transported on any one trip, the kit shall be increased in size to comply with a 16, 24 or 36-package kit, depending upon the number of personnel normally being transported. (4-7-83)

h. At least one first aid kit shall be available on construction jobs, line crews and other transient or short duration jobs. The size and quantity of first aid kits required to be located at any site shall be determined by the number of personnel normally dependent upon each kit as outlined in the following table. (4-7-83)

No. of personnel normally assigned to work site	Minimum first aid supplies required at work site
1 - 5	10 package kit
6 - 15	16 package kit
16 - 30	24 package kit
31 - 50	36 package kit
51 - 75	one 36 and one 10 pkg kit
76 - 100	one 36 and one 16 pkg kit
101 - 150	one 36 and one 24 pkg kit
151 - 200	two 36 package kits

i. Employers shall establish a procedure to assure that first aid kits and required contents are maintained in a serviceable condition. (4-7-83)

j. First aid kits shall contain at least the following items or an approved equivalent: (4-7-83)

i. 10 package kit: 1 package adhesive bandages, 1 " (16 per package); 1 package bandage compress, 4" (1 per package); 1 package scissors and tweezers (1 each per package); 1 package triangular bandage, 40" (1 per package); 1 package antiseptic soap or pads (3 per package); 5 packages of consulting physician's choice. (4-7-83)

ii. 16-package kit: 1 package absorbent gauze, 24" x 72" (1 per package); 1 package adhesive bandages, 1" (16 per package); 2 packages bandage compresses, 4" (1 per package); 1 package eye dressing (1 per package); 1 package scissors and tweezers (1 each per package); 2 packages triangular bandages, 40" (1 per package); 1 package antiseptic soap or pads (3 per package); 7 packages of consulting physicians choice. (4-7-83)

iii. 24-package kit: 2 packages absorbent gauze, 24" x 72" (1 per package); 2 packages adhesive bandages, 1" (16 per package); 2 packages bandage compresses, 4" (1 per package); 1 package eye dressing (1 per package); 1 package scissors and tweezers (1 each per package); 6 packages triangular bandages (1 per package) 1 package antiseptic soap or pads (3 per package); 9 packages of consulting physician's choice. (4-7-83)

iv. 36-package kit: 4 packages absorbent gauze, 24" x 72" (1 per package); 2 packages adhesive bandages, 1" (16 per package); 5 packages bandage compresses, 4" (1 per package); 2 packages eye dressing (1 per package); 8 packages triangular bandages, 40" (1 per package); 1 package antiseptic soap or pads (3 per package); 13 packages of consulting physician's choice. (4-7-83)

k. Where the eyes or body of any person may be exposed to injurious chemicals and/or materials, suitable facilities for quick drenching or flushing of the eyes and body shall be provided, within the work areas, for emergency use. (4-7-83)

l. First aid kits shall be in metal or other sanitary containers. Such containers shall be so designed and so constructed as to be impervious to any existing conditions of weather, dust, dirt or other foreign matter. Contents shall be sterile and drugs, if any, shall be labeled with their common name and the use for which they are intended. (4-7-83)

m. The Industrial Commission and/or the Idaho Department of Labor and Industrial Services may require the installation of a first aid room or first aid station on operations where a study of various factors involved indicates the need therefor. Factors to be considered are the number of workmen employed, location and nature of the work being performed, and the availability of established medical facilities. (4-7-83)

n. First aid rooms and first aid stations shall be well lighted and ventilated, clean and orderly. (4-7-83)

o. First aid rooms shall be equipped with hot and cold running water or a means to heat water, and with a cot, blankets and pillows. If both men and women are employed, a means shall be provided to furnish privacy for each sex. (4-7-83)

p. A stretcher, designed for and/or adaptable to the work locations and terrain, and two blankets kept in sanitary and serviceable condition shall be available where such conditions are a factor in the transportation of, and first aid to, an injured workman, inmate, or volunteer worker, subject to workmen's compensation. (4-7-83)

q. The employer is responsible for reporting all injuries causing absence from work of one day or more to the Industrial Commission on its form I. C. #1 as soon as possible, but not later than 10 days of knowledge of the injury, and the employer is also responsible for caring for all injured employees as required by the Workmen's Compensation Law. (4-7-83)

r. Note: First aid kits shall be maintained at the ten (10), sixteen (16), twenty-four (24) or thirty-six (36) package level. If there is any question as to the suitability of some of the foregoing items in relation to injuries which are common to a specific occupation, the employer should seek the advice of a physician for recommended

substitutes. (4-7-83)

031. -- 039. (RESERVED).

040. MEANS OF EGRESS, GENERAL.

01. Scope. Every building or portion thereof shall be provided with exits as required by this rule. Where there is a conflict between a general requirement and a specific requirement for an individual occupancy, the specific requirement shall be applicable. (4-7-83)

02. Definitions. (4-7-83)

a. Means of Egress. A means of egress is a continuous and unobstructed way of exit travel from any point in a building or structure to a public way and consists of three separate and distinct parts: the way of exit access, the exit and the way of exit discharge. A means of egress comprises the vertical and horizontal ways of travel and shall include intervening room spaces, doorways, hallways, corridors, passageways, balconies, ramps, stairs, enclosures, lobbies, escalators, horizontal exits, courts and yards. (4-7-83)

b. Exit Access. Exit access is that portion of a means of egress which leads to an entrance or an exit. (4-7-83)

c. Exit. Exit is that portion of a means of egress which is separated from all other spaces of the building or structure by construction or equipment as required in these standards to provide a protected way of travel to the exit of discharge. (4-7-83)

d. Exit Discharge. Exit discharge is that portion of a means of egress between the termination of an exit and a public way. (4-7-83)

e. Horizontal Exit. Horizontal exit is a way of passage from one building into another building on approximately the same level or is a way of passage through or around a wall constructed as required for a two-hour occupancy separation and which completely divides a floor into two or more separate areas so as to establish an area of refuge affording safety from fire or smoke coming from the area from which escape is made. (4-7-83)

f. Occupant Load. Occupant load is the total number of persons that may occupy a building or portion thereof at any one time. (4-7-83)

g. Panic Hardware. Panic hardware is a door latching assembly incorporating an unlatching device, the activating portion of which extends across at least one half the width of the door leaf on which it is installed. (4-7-83)

h. Low Hazard Contents. Low Hazard contents shall be classified as those of such low combustibility that no self-propagating fire therein can occur and that consequently the only probable danger requiring the use of emergency exits will be from panic, fumes or smoke, or fire from some external source. (4-7-83)

i. High-Hazard Contents. High-hazard contents shall be classified as those which are liable to burn with extreme rapidity or from which poisonous fumes or explosives are to be feared in the event of fire. (4-7-83)

j. Ordinary Hazard Contents. Ordinary hazard contents shall be classified as those which are liable to burn with moderate rapidity and to give off a considerable volume of smoke but from which neither poisonous fumes nor explosives are to be feared in case of fire. (4-7-83)

k. Approved. For the purpose of these standards, approved shall mean listed or approved equipment by a nationally recognized testing laboratory. (4-7-83)

03. Application. This chapter contains general fundamental requirements essential to providing a safe means of egress from fire and like emergencies. Nothing in the standards shall be construed to prohibit a better type of building construction, more exits, or otherwise safer conditions than the minimum requirements specified in these

standards. Exits from vehicles, vessels, or other mobile structures are not covered by these standards. (4-7-83)

04. Fundamental Requirements. (4-7-83)

a. Every building or structure, new or old, designed for human occupancy shall be provided with exits sufficient to permit the prompt escape of occupants in case of fire or other emergency. The design of exits and other safeguards shall be such that reliance for safety to life in case of fire or other emergency will not depend solely on any single safeguard. Additional safeguards shall be provided for life safety in case any single safeguard is ineffective due to some human or mechanical failure. (4-7-83)

b. Every building or structure shall be so constructed, arranged, equipped, maintained and operated as to avoid undue danger to the lives and safety of its occupants from fire, smoke, fumes or resulting panic during the period of time reasonably necessary for escape from the building or structure in case of fire or other emergency. (4-7-83)

c. Every building or structure shall be provided with exits of kinds, numbers, location and capacity appropriate to the individual building or structure, with due regard to the character of the occupancy, the number of persons exposed, the fire protection available, and the height and type of construction of the building or structure, to afford all occupants convenient facilities for escape. (4-7-83)

d. In every building or structure exits shall be so arranged and maintained as to provide free and unobstructed egress from all parts of the building or structure at all times when it is occupied. No lock or fastening to prevent free escape from the inside of any building shall be installed except in mental, penal or corrective institutions where supervisory personnel are continually on duty and effective provisions are made to remove occupants in case of fire or other emergency. (4-7-83)

e. Every exit shall be clearly visible, or the route to reach it shall be conspicuously indicated in such a manner that every occupant of every building or structure who is physically and mentally capable will readily know the direction of escape from any point; and each path of escape, in its entirety, shall be so arranged or marked that the way to a place of safety outside is unmistakable. Any doorway or passageway not constituting an exit or way to reach an exit, but of such a character as to be so arranged or marked as to minimize its possible confusion with an exit and the resultant danger of persons endeavoring to escape from fire finding themselves trapped in a dead-end space, such as a cellar or storeroom, from which there is no other way out. (4-7-83)

f. In every building or structure equipped for artificial illumination, adequate and reliable illumination shall be provided for all exit facilities. (4-7-83)

g. In every building or structure of such size, arrangement or occupancy that a fire may not itself provide adequate warning to occupants, fire alarm facilities shall be provided, where necessary, to warn occupants of the existence of fire so that they may escape, or to facilitate the orderly conduct of fire exit drills. (4-7-83)

h. Every building or structure, section or area thereof of such size, occupancy, and arrangement that the reasonable safety of numbers of occupants may be endangered by the blocking of any single means of egress due to fire or smoke, shall have at least two means of egress remote from each other, so arranged as to minimize any possibility that both may be blocked by any one fire or other emergency conditions. (4-7-83)

i. Compliance with 040.01 through 040.04 of this Chapter shall not be construed as eliminating or reducing the necessity for other provisions for safety of persons using a structure under normal occupancy conditions, or shall any provisions of these standards be construed as requiring or permitting any condition that may be hazardous under normal occupancy conditions. (4-7-83)

j. Freezer Rooms, Vaults, Safes and Storage Rooms. The opening device on all doors of walk-in refrigerated freezers, vaults, safes and storage rooms must be the type that when locked from the outside with a lock, can be opened from the inside. (4-7-83)

05. Protection of Employees Exposed by Construction and Repair Operations. (4-7-83)

a. No building or structure under construction shall be occupied in total or in part until all exit facilities required for the part occupied are completed and ready for use. (4-7-83)

b. No existing building shall be occupied during repairs or alterations unless all existing exits and any existing fire protection are continuously maintained, or in lieu thereof, other measures are taken which provide equivalent safety. (4-7-83)

c. No flammable or explosive substances or equipment for repairs or alterations shall be introduced in a building of normally low or ordinary hazard classification while the building is occupied, unless the condition of use and safeguards provided are such as not to create any additional danger or handicap to egress beyond the normally permissible conditions in the building. (4-7-83)

06. Maintenance. (4-7-83)

a. Every required exit, way of travel from the exit into the street or open space, shall be continuously maintained free of all obstructions or impediments to full instant use in the case of fire or other emergency. (4-7-83)

b. Every automatic sprinkler system, fire detection and alarm system, exit lighting, fire door and other item of equipment, where provided, shall be continuously in proper operating condition. (4-7-83)

07. Permissible Exit Components. An exit shall consist only of the approved components. Exit components shall be constructed as an integral part of the building or shall be permanently affixed thereto. (4-7-83)

08. Protective Enclosure of Exits. When an exit is protected by separation from other parts of the building, the separating construction shall meet the following requirements: (4-7-83)

a. The separation shall have at least a 1-hour fire resistance rating when the exit connects three stories or less. This applies whether the stories connected are above or below the story at which exit discharge begins. (4-7-83)

b. The separation shall have at least one 2-hour fire resistance rating when the exit connects four or more stories whether above or below the floor of discharge. It shall be constructed of non-combustible materials, and shall be supported by construction having at least one 2-hour resistance rating. (4-7-83)

c. Any opening therein shall be protected by an approved self-closing fire door or shall be automatic closing by actuation of a smoke detector. (4-7-83)

d. Openings in exit enclosures shall be confined to those necessary for access to the enclosure from normally occupied spaces and for egress from the enclosure. (4-7-83)

09. Width and Capacity of Means of Egress. (4-7-83)

a. The capacity in number of persons per unit of exit width for approved components of means of egress shall be as follows: (4-7-83)

i. Level Egress Components (including Class A ramps) 100 persons. (4-7-83)

ii. Inclined Egress Components (including Class B ramps) 60 persons. (4-7-83)

iii. A ramp shall be designated as Class A or Class B in accordance with the following Table 040.09.a. (4-7-83)

TABLE 040.09.a.

Width 44" and Greater	30 to 40 inches
Slope 1 to 12 inches	1 to 12 inches
Maximum height between landings no limit	12 feet

b. The total width of exits in feet shall be not less than the total occupant load served divided by 50. Such width of exits shall be divided approximately equally among the separate exits. (4-7-83)

c. Units of exit width shall be measured in the clear at the narrowest point of the means of egress except that a handrail may project inside the measured width on each side not more than 5 inches and a stringer may project inside the measured width not more than 1 1/2 inches. An exit or exit access door swinging into an aisle or passageway shall not restrict the effective width thereof at any point during its swing to less than the minimum widths hereafter specified. (4-7-83)

10. Egress Capacity and Occupant Load. (4-7-83)

a. The capacity of means of egress for any floor, balcony, tier or other occupied space shall be sufficient for the occupant load thereof. The occupant load shall be the maximum number of persons that may be in the space at any time. (4-7-83)

b. Where exits serve more than one floor, only the occupant load of each floor considered individually need be used in computing the capacity of the exits at that floor, provided that exit capacity shall not be decreased in the direction of exit travel. (4-7-83)

11. Arrangement of Exits. (4-7-83)

a. When more than point exit is required from a story, at least two of the exits shall be remote from each other and so arranged as to minimize any possibility that both may be blocked by any one fire or other emergency conditions or shall be placed a distance apart equal to not less than one-half of the length of the maximum overall diagonal dimension of the building or area to be served measured in a straight line between exits. (4-7-83)

b. Where three or more exits are required, they shall be arranged a reasonable distance apart so that as one becomes blocked, the others will be available. (4-7-83)

12. Access to Exits. (4-7-83)

a. Exits shall be so located and exit access shall be so arranged that exits ar readily accessible at all times. Where exits are not immediately accessible from an open floor area, safe and continuous passageways, aisles or corridors leading directly to every exit and so arranged as to provide convenient access for each occupant to at least two exits by separate ways of travel, except as a single exit or limited dead ends are permitted by other provisions of these standards shall be maintained. (4-7-83)

b. A door from a room to an exit or to a way of exit access shall be of the side-hinged, swinging type. It shall swing with exit travel when the room is occupied by more than 50 persons or used for a high hazard occupancy. (4-7-83)

c. In no case shall access to an exit be through a bathroom or other room subject to locking, except where the exit is required to service only the room subject to locking. (4-7-83)

d. Ways of exit access and the doors to exits to which they lead shall be so designed and arranged as to be clearly recognizable as such. Hangings or draperies should not be located to conceal or obscure any exit. Mirrors shall not be placed in or adjacent to any exit in such a manner as to confuse the direction of exit. (4-7-83)

e. Exit access shall be so arranged that it will not be necessary to travel toward any area of high hazard occupancy in order to reach the nearest exit, unless the path of travel is effectively shielded from the high hazard location by suitable partitions or other physical barriers of not less than a one-hour fire resistive separation. Except in dwellings and lodging houses, any room containing a boiler, furnace, incinerator or other fuel-fired equipment must be provided with two means of egress when both of the following conditions exits: (4-7-83)

i. The area of the room exceeds 500 square feet; and, (4-7-83)

ii. The largest piece of fuel-fired equipment exceeds 400,000 BTU per hour input capacity. (4-7-83)

f. If two means of egress are provided, one may be a fixed ladder, remote from the other exit. (4-7-83)

g. Exits from a room may open into an adjoining or intervening room or area, provided such adjoining room is accessory to the area served and provides a direct means of egress to an exit corridor, exit stairway, exterior exit, horizontal exit, exterior exit balcony or exit passageway. (4-7-83)

h. Foyers, lobbies and reception rooms construction as required for corridors shall not be construed as intervening rooms. Each mezzanine used for other than storage purposes, if greater in area than 2,000 square feet or if more than 560 feet in any dimension, shall have not less than two stairways to an adjacent floor. (4-7-83)

i. Every corridor shall be not less than 44 inches in width. (4-7-83)

i. Every aisle shall b not less than 28 inches in width. (4-7-83)

ii. The minimum width of any way of exit access shall in no case be less than 28 inches. Where a single way of exit access leads to an exit, its capacity in terms of width shall be at least equal to the required capacity of the exit to which it leads. Where more than one way of exit access leads to an exit, each shall have a width adequate for the number of persons it must accommodate. (4-7-83)

13. Exit Doors. (4-7-83)

a. No single door in a doorway shall be less than 28 inches wide. No single door in a doorway shall be more than 48 inches wide. NOTE: Main exit doors shall be of size to permit the installation of a door not less than 3 feet in width and not less than 6 feet 8 inches in height. (4-7-83)

b. When installed in exit doorways, exit doors shall be capable of opening at least 90 degrees and shall be so mounted that the clear width of the exit way is not less than 32 inches. (4-7-83)

c. Double acting doors shall not be used as exits serving a tributary occupant load of more than 100, nor shall they be used as part of a fire assembly nor equipped with panic hardware. A double-acting door shall be provided with a view panel of not less than 200 square inches. (4-7-83)

d. No screen door or storm door in connection with any required exit shall swing against the direction of exit travel in any case where doors are required to swing with the exit travel. (4-7-83)

14. Panic Hardware. (4-7-83)

a. When a door is required to be equipped with panic hardware by some other provision of this Code, the panic hardware shall cause the door latch to release when a force of not to exceed 15 pounds is applied to the releasing devices in the direction of exit travel. (4-7-83)

b. Such releasing devices shall be bars or panels, the actuating portion of which shall be not less than one-half of the width of the door leaf, and placed at heights suitable for the service required, not less than 30 nor more than 44 inches above the floor. (4-7-83)

c. Only approved panic hardware shall be used. (4-7-83)

d. Required panic hardware shall not be equipped with any locking or dogging device, set screw or other arrangement which can be used to prevent the release of the latch when pressure is applied to the bar. (4-7-83)

15. Dead End. Means of egress shall be so arranged that there are no dead end pockets, hallways, corridors, passageways or courts whose depth exceeds 20 feet in assembly in educational occupancies; 30 feet in all residential and health care occupancies; 50 feet in mercantile, business and industrial occupancies. (4-7-83)

16. Distance to exits. (4-7-83)

a. The maximum distance of travel from any point to an exterior exit door, horizontal exit, exit passageway or an enclosed stairway in a building not equipped with an automatic sprinkler system throughout shall not exceed 150 feet or 200 feet in a building equipped with an automatic sprinkler system throughout. These distances may be increased 100 feet when the last 150 feet is within a corridor. (4-7-83)

b. In a one-story factory, warehouse or airplane hangar, the exit travel distance may be increased to 400 feet if the building is equipped with an automatic sprinkler system throughout and provided with smoke and heat ventilation. (4-7-83)

c. In an open parking garage, the exit travel distance may be increased to 250 feet. (4-7-83)

d. In high hazard storage, the exit travel distance may be 100 feet from any point where a person might be present. (4-7-83)

17. Exterior Ways of Exit Access. (4-7-83)

a. Access to any exit may be by means of any exterior balcony, porch, gallery, or roof that conforms to the requirements of this section. (4-7-83)

b. Exterior ways of exit access shall have smooth, solid floors, substantially level, and shall have guards on the unenclosed sides. (4-7-83)

c. Where accumulation of snow or ice is likely because of the climate, the exterior way or exit access shall be protected by a roof unless it serves as the sole normal means of access to the rooms or spaces served, in which case it may be assumed that snow and ice will be regularly removed in the course of normal occupancy. (4-7-83)

d. A permanent, reasonably straight path of travel shall be maintained over the required exterior way of exit access. There shall be no obstruction by railings, barriers or gates that divide the open space into sections appurtenant to individual rooms, apartments or other uses. Where the Director or the Director's duly authorized representative finds the required path of travel to be obstructed by furniture or other movable objects, the Director may require that the objects be fastened out of the way, or that railings or other permanent barriers be installed to protect the path of travel against encroachment. (4-7-83)

e. An exterior way of exit areas shall be so arranged that there are no dead ends in excess of 20 feet. Any unenclosed exit served by an exterior way of exit access shall be so located that no part of the exit extends past a vertical plane 20 feet and one-half the required width of the exit from the end of, and at right angles to, the way of exit access. (4-7-83)

f. Any gallery, balcony, bridge, porch or other exterior exit access that projects beyond the outside wall of the building shall comply with the requirements of this section as to width and arrangement. (4-7-83)

18. Discharge from Exits. (4-7-83)

a. All exits shall discharge directly to the street or to a yard, court or other open space that gives safe access to a public way. The streets to which the exits discharge shall be of width adequate to accommodate all persons

leaving the building. Yards, courts or other open spaces to which exits discharge shall also be of adequate width and size to provide all persons leaving the building with ready access to the street. (4-7-83)

b. Stairs and other exits shall be so arranged as to make clear the direction of egress to the street. Exit stairs that continue beyond the floor of discharge shall be interrupted at the floor of discharge by partitions, doors or other effective means. (4-7-83)

c. When a doorway or corner of a building is located near a roadway, alley, railroad or trolley track, etc., so that the occupants are liable to walk upon the roadway or track in front of an approaching vehicle, engine or trolley car, a standard safeguard shall be installed with a warning sign. (4-7-83)

19. Headroom. Means of egress shall be so designed and maintained as to provide adequate headroom, but in no case shall the ceiling height be less than 7 feet 6 inches nor any projection from the ceiling be less than feet 8 inches from the floor. (4-7-83)

20. Changes in Elevation. Where a means of egress is not substantially level, such differences in elevation shall be negotiated by stairs or ramps. (4-7-83)

21. Changes in Floor Level at Doors. Regardless of the occupant load, the floor on both sides of a door shall be substantially level and shall have the same elevation on both sides of the door, for a distance on each side at least equal to the width of the widest single door. When the door discharges to the outside or to an exterior balcony, exterior exit or exterior exit access, the floor level outside the door may be one step lower than the inside but not more than 8 inches lower. (4-7-83)

22. Maintenance and Workmanship. (4-7-83)

a. Doors, stairs, ramps, passages, signs and all other components of means of egress shall be of substantial, reliable construction and shall be built or installed in a workmanlike manner. (4-7-83)

b. Means of egress shall be continuously maintained free from all obstructions or impediments to full instant use in the case of fire or other emergency. (4-7-83)

c. Any device or alarm installed to restrict the improper use of an exit shall be so designed and installed that it cannot, even in cases of failure, impede or prevent emergency use of such exit. (4-7-83)

23. Glazing. (4-7-83)

a. Glazing in locations subject to human impact such as doors, glazing immediately adjacent to such doors, glazing adjacent to any surface normally used as a walking surface, sliding glass door units, including fixed glass panels which are normally part of such units; shower doors, tub enclosures and storm doors shall be fully tempered, laminated safety glass or approved plastic. (4-7-83)

b. Plastics used in doors and panels of shower and bathtub enclosures shall be of a shatter-resistant type. (4-7-83)

c. Exceptions: (4-7-83)

i. When glass is located more than 18 inches (18") above any surface normally used as a walking surface or where there is a wall impermeable to light between such surface and the glass. (4-7-83)

ii. Glass when the least dimension is no greater than 18 inches (18"). (4-7-83)

iii. When glass is protected by a guardrail, handrail or other approved barrier. (4-7-83)

iv. Glass directly attached to wall or wardrobe closet doors in an approved manner. (4-7-83)

24. Furnishings and Decorations. (4-7-83)

a. No furnishings, decorations or other objects shall be so placed as to obstruct exits, access thereto, egress therefrom or visibility thereof. (4-7-83)

b. No furnishings or decorations of an explosive or highly flammable character shall be used in any occupancy. (4-7-83)

25. Fire Escapes and Doors. (4-7-83)

a. Fire escapes to be provided for certain structures. In existing buildings and structures over two stories in height, an din the case of school buildings, above one story in height except that any story above the first which, because of the contour of the site, has direct ground-floor exits shall be exempt from the requirement herein set forth, to provide and furnish such building with safe and suitable metallic, iron or fireproof ladders of sufficient strength, and to permanently and securely attach the same to the outside or outer walls of such buildings, in such manner and in such position as to be adjacent to the windows, and convenient and easy of access to the occupants of such buildings in case of fire, or fire escape stairs located in such a manner as to be convenient and easy of access from each floor to the occupants of such buildings in case of fire. A fire escape stair shall consist of a continuous stairway enclosed from the highest point to the lowest point by walls of noncombustible materials. Access to the fire escape stair shall be by means of self-closing fire doors that open in the direction of exit travel. A fire escape stair shall exit into a public way or directly to the exterior of the building at ground level. (4-7-83)

b. How attached: Such metallic iron or fireproof ladders, if used, must connect with each floor above the first, and be well fastened and secure and of sufficient strength, and must extend from the first story to the upper stories of such building or to the cornice thereof. (4-7-83)

041. ILLUMINATION OF MEANS OF EGRESS.

01. General. (4-7-83)

a. Illumination of means of egress shall be provided in accordance with this section for every building and structure. (4-7-83)

b. Illumination of means of egress shall be continuous during the time that the conditions of occupancy require that the means of egress be available for use. Artificial lighting shall be employed at such places and for such periods of time as required to maintain the illumination to the minimum foot-candle values herein specified. (4-7-83)

c. The floors of means of egress shall be illuminated at all points including angles and intersections of corridors and passageways, stairways, landings of stairs and exit doors to values of not less than 1.0 foot-candle measured at the floor. Exception: In auditoriums, theaters, concert or opera halls and other places of assembly, the illumination of the floors of exit access may be reduced during such periods of the performance to values not less than one-fifth foot candle. (4-7-83)

d. Any required illumination shall be so arranged that the failure of any single lighting unit, such as the burning out of an electric bulb, will not leave any area in darkness. (4-7-83)

e. The same equipment or units installed to meet the requirements of exit marking may also serve the function of illumination of means of egress, provided that all applicable requirements of this section for such illumination are also met. (4-7-83)

042. EMERGENCY LIGHTING.

01. General. (4-7-83)

a. Emergency lighting facilities for means of egress shall be provided for every building or structure in accordance with this section. (4-7-83)

b. Where maintenance of illumination depends upon changing from one energy source to another, there shall be no appreciable interruption of illumination during the changeover. Where emergency lighting is provided by a prime mover-operated electric generator, a delay of not more than 10 seconds shall be permitted. (4-7-83)

02. Performance of System. (4-7-83)

a. Emergency lighting facilities shall be arranged to maintain the specified degree of illumination for a period of one and one-half hours in the event of failure of the normal lighting, except as listed below. (See exceptions). (4-7-83)

b. Electric batter-operated emergency lights shall use only reliable types of storage batteries, provided with suitable facilities for maintenance in properly charged condition. Dry batteries shall not be used to satisfy these requirements. Electric storage batteries used in such lights or units shall be approved for their intended use and shall comply with the National Electrical Code NDPA 70. (4-7-83)

c. An emergency lighting system shall be so arranged as to provide the required illumination automatically in the event of any interruption of normal lighting, such as any failure of public utility or other outside electrical power supply, opening of a circuit breaker or fuse, or any manual act(s), including accidental opening of a switch controlling normal lighting facilities. (4-7-83)

d. An emergency lighting system either shall be continuously in operation or shall be capable of repeated automatic operation without manual intervention. (4-7-83)

e. Exceptions: (4-7-83)

i. Churches with adequate natural lighting, and less than 300 persons; (4-7-83)

ii. Hotels, dormitories and apartments with 25 or less rooms, or when each guest room has a direct exit to the outside at grade-level; (4-7-83)

iii. Mercantile occupancies. All stores with 3,000 square feet or less at street floor only; (4-7-83)

iv. Health Care, Emergency Lighting for at least one hour in existing health care facilities shall be provided; (4-7-83)

v. Business occupancies less than three stories, less than 1,000 occupancy, less than 100 persons above or below the exit discharge level; (4-7-83)

vi. Industrial occupancies when not normally occupied or when operating in daylight hours only with minimum natural light on all portions of the means of egress. (4-7-83)

vii. Storage occupancies when not normally occupied or when operating in daylight hours only with minimum natural light on all portions of the means of egress. (4-7-83)

03. Location of Emergency Lighting. In every building or structure used for night occupancy, all portions of building that are interior and windowless, such as rooms, stairs, areas or corridors shall have emergency lighting. (See Exceptions above). (4-7-83)

04. Automatic Sprinkler Systems. All automatic sprinkler systems shall be continuously maintained in reliable operating condition at all times, and such periodic inspections and tests shall be made as are necessary to assure proper maintenance. (4-7-83)

05. Alarm and Fire Detection System. (4-7-83)

a. Systems shall be under the supervision of a responsible person who shall cause proper tests to be made at weekly intervals and have general charge of all alterations and additions. (4-7-83)

b. Fire alarm signaling equipment shall be restored to service as promptly as possible after each test or alarm, and shall be kept in normal condition for operation. Equipment requiring rewinding or replenishing shall be rewound or replenished as promptly as possible after each test or alarm. (4-7-83)

06. Fire Retardant Paints. Fire retardant paints or solutions shall be renewed at such intervals as necessary to maintain the necessary flame retardant properties. (4-7-83)

07. Exit Marking. (4-7-83)

a. Exits shall be marked by a readily visible sign. Access to exits shall be marked by readily visible signs in all cases where the exit to reach it is not immediately visible to the occupants. (4-7-83)

b. Exceptions: (4-7-83)

i. Main exterior exit doors which obviously and clearly are identifiable as exits need no sign posted - 50 occupants or less. (4-7-83)

ii. Assembly occupancies, health care occupancies and penal institutions do not need a sign posted when serving an occupant load of less than 50. (4-7-83)

iii. All other occupancies do not need a sign posted when serving an occupant load of less than 100. (4-7-83)

iv. Any door, passage or stairway which is neither an exit nor a way of exit access and which is so located or arranged as to be mistaken for an exit shall be identified by a sign reading, "Not an exit" or similar designation, or shall be identified by a sign indicating its actual character, such as, "To basement", "storeroom", "linen closet" or the like. A door designed to be normally closed shall bear a sign reading substantially as follows: FIRE EXIT, Please keep door closed. (4-7-83)

c. Every required sign designating an exit or way of exit access shall be so located and of such size and color and design as to be readily visible. No decorations, furnishings or equipment which impair visibility of an exit sign shall be permitted, nor shall there be any brightly illuminated sign (for other than exit purposes), display or object in or near the line of vision to the required exit sign of such a character as to so detract attention from the exit sign that it may not be noticed. (4-7-83)

d. Every exit sign shall be distinctive in color and shall and shall provide contrast with decorations, interior finish or other signs. (4-7-83)

e. A sign reading "Exit" or similar designation, with an arrow indicating the direction, shall be placed in every location where the direction of travel to reach the nearest exit is not immediately apparent. (4-7-83)

f. Every exit sign shall be suitably illuminated by a reliable light source giving a value of not less than 5-foot candles on the illuminated surface. (4-7-83)

g. Each internally illuminated exit sign shall be provided in all occupancies where reduction of normal illumination is permitted. (4-7-83)

h. Every exit sign shall have the word "Exit" in plainly legible letters not less than 6 inches high, with the principal strokes of letter not less than 3/4 inch wide. (4-7-83)

043. -- 049. (RESERVED).

050. PERSONAL PROTECTIVE EQUIPMENT, GENERAL REQUIREMENTS.

01. Application. Protective equipment, including personal protective equipment for eyes, face, head and extremities, protective clothing, respiratory devices and protective shields and barriers shall be provided, used

and maintained in a sanitary and reliable condition wherever it is necessary by reason of hazards of processes or environment, chemical hazards, radiological hazards or mechanical irritants encountered in a manner capable of causing injury or impairment in the function of any part of the body through absorption, inhalation or physical contact. (4-7-83)

02. Equipment. Personal safety equipment of clothing such as non-prescription safety glasses, prescription safety glasses, hard hats, ear protection, respirators, rubber gloves, rubber boots, safety shoes, leggings, aprons, safety belts, lie lines, and buoyant vests when exposed to hazards where such devices may be expected o prevent injury; all of which equipment, except safety shoes and prescription safety glasses, shall be made without cost to the employee, and where safety shoes and prescription safety glasses are made available by the employer, the same shall be provided at cost price to the employee. (4-7-83)

03. Employer-owned Equipment. Any safety equipment or apparel so furnished by the employer as required above shall, upon termination of employment of any employee, be immediately returned to the employer. Should any item of equipment or apparel be not so returned, the same shall be charged to such employee. (4-7-83)

04. Employee-owned Equipment. Where employees provide their own protective equipment, the employer shall be responsible to assure its adequacy, including proper maintenance and sanitation of such equipment. (4-7-83)

05. Design. All personal protective equipment shall be of safe design and construction for the work to be performed. (4-7-83)

051. EYE AND FACE PROTECTION.

01. General. (4-7-83)

a. Protective eye and face equipment shall be required where there is a reasonable probability of injury that can be prevented by such equipment. In such cases, employers shall make conveniently available a type of protector suitable for the work to be performed, and employees shall use such protectors. No unprotected person shall knowingly be subjected to a hazardous environmental condition. Suitable eye protectors shall be provided where machines or operations present the hazard of flying objects, glare, liquids, injurious radiation, or a combination of these hazards. (4-7-83)

b. Protectors shall: (4-7-83)

i. Provide adequate protection against the particular hazards for which they are designed. (4-7-83)

ii. Be reasonably comfortable when worn under the designated conditions. (4-7-83)

iii. Fit snugly and shall not unduly interfere with the movement of the wearer. (4-7-83)

iv. Be durable. (4-7-83)

v. Be capable of being disinfected. (4-7-83)

vi. Be easily cleanable. (4-7-83)

c. Protectors should be kept clean and in good repair. (4-7-83)

d. Persons whose vision requires the use of corrective lenses in spectacles, and who are required by this standard to wear eye protection, shall wear goggles or spectacles of one of the following types: (4-7-83)

i. Spectacles whose protective lenses provide optical correction. (4-7-83)

ii. Goggles that can be worn over corrective spectacles without disturbing the adjustment of the spectacles. (4-7-83)

iii. Goggles that incorporate corrective lenses mounted behind the protective lenses. (4-7-83)

e. Every protector shall be distinctly marked to facilitate identification of the manufacturer. (4-7-83)

f. When limitations or precautions are indicated by the manufacturer, they shall be transmitted to the user and care taken to see that such limitations and precautions are strictly observed. (4-7-83)

g. Design, construction, testing and use of devices for eye and face protection shall be in accordance with American National Standard for Occupational and Educational Eye and Face Protection, Z87.1-1968. (4-7-83)

052. RESPIRATORY PROTECTION.

01. Permissible practice. (4-7-83)

a. In the control of those occupational diseases caused by breathing air contaminated with harmful dusts, fogs, fumes, mists, gases, smokes, sprays, or vapors, the primary objective shall be to prevent atmospheric contamination. This shall be accomplished as far as feasible by accepted engineering control measures (for example, enclosure or confinement of the operation, general and local ventilation, and substitution of less toxic materials.)When effective engineering controls are not feasible, or while they are being instituted, appropriate respirators shall be used pursuant to the following requirements: (4-7-83)

b. Respirators shall be provided by the employer when such equipment is necessary to protect the health of the employee. The employer shall provide the respirators which are applicable and suitable for the purpose intended. The employer shall provide the respirators which are applicable and suitable for the purpose intended. The employer shall be responsible for the establishment and maintenance of a respiratory protective program which shall include the requirements outlined in 304. (4-7-83)

c. The employee shall use the provided respiratory protection in accordance with instructions and training received. (4-7-83)

02. Requirements for a Minimally Acceptable Program. (4-7-83)

a. Written standard operating procedures governing the selection and use of respirators shall be established. (4-7-83)

b. Respirators shall be selected on the basis of hazards to which the worker is exposed. (4-7-83)

c. The user shall be instructed and trained in the proper use of respirators and their limitations. (4-7-83)

d. Where practicable, the respirators should be assigned to individual workers for their exclusive use. (4-7-83)

e. Respirators shall be regularly cleaned and disinfected. Those issued for the exclusive use of one worker should be cleaned after each day's use, or more often if necessary. Those used by more than one worker shall be thoroughly cleaned and disinfected after each use. (4-7-83)

f. Respirators shall be stored in a convenient, clean and sanitary location. (4-7-83)

g. Respirators used routinely shall be inspected during cleaning. Worn or deteriorated parts shall be replaced. Respirators for emergency use such as self-contained deice shall be thoroughly inspected at least once a month and after each use. (4-7-83)

h. Appropriate surveillance of work area conditions and degree of employee exposure or stress shall be maintained. (4-7-83)

i. There shall be regular inspection and evaluation to determine the continued effectiveness of the program. (4-7-83)

j. Persons should not be assigned to tasks requiring use of respirators unless it as been determined that they are physically able to perform the work and use the equipment. The local physician should determine what health and physical conditions are pertinent. The respirator user's medical status should be reviewed periodically (for instance, annually). (4-7-83)

k. Approved or accepted respirators shall be used. The respirator furnished shall provide adequate respiratory protection against the particular hazard for which it is designed in accordance with standards established by competent authorities. NOTE: The U. S. Department of Interior, Bureau of Mines and the U. S. Department of Agriculture are recognized as such authorities. Although respirators listed by the U. S. Department of Agriculture continue to be acceptable for protection against specified pesticides, the U. S. Department of Interior, Bureau of Mines, is the agency now responsible for testing and approving pesticide respirators. (4-7-83)

03. Selection of Respirators. Proper selection of respirators shall be made according to the guidance of American National Standard Practices for Respiratory Protection Z88.2-1969. (4-7-83)

04. Air Quality. (4-7-83)

a. Compressed air, compressed oxygen, liquid air and liquid oxygen used for respiration shall be of high purity. Oxygen shall meet the requirements of the United States Pharmacopoeia for medical or breathing oxygen. Breathing Air shall meet at least the requirements of the specification for grade d breathing air as described in Compressed Gas Association Commodity Specification G-7.1-1966. (See Table 052.04-A). Compressed oxygen shall not be used in supplied-air respirators or in open circuit self-contained breathing apparatus that have previously used compressed air. Oxygen shall not be used with air line respirators. (4-7-83)

TABLE 052.04-A available at Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone (208) 334-6000.

This document describes the specification requirements for air, including atmospheric air and air synthesized by blending oxygen and nitrogen in the proper proportions. It is different from other gas specifications because atmospheric air is not a manufactured product but is naturally occurring. Atmospheric air contains a large variety of trace constituents on many of which it is impractical to set individual limits. However, this specification qualifies certain grades of air by limiting the concentrations of specific trace constituents. (4-7-83)

i. TYPES: Gaseous air is denoted as Type I and liquid air as Type II. (4-7-83)

ii. GRADES: Table 052.04-A presents the component maxima, in ppm (v/v) unless shown otherwise, for the types and grades of air. A blank indicates no maximum limiting characteristic. (4-7-83)

TABLE 052.04-A available at Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone (208) 334-6000.

iii. Note: The term "atm" (Atmospheric) denotes the oxygen content normally present in atmospheric air; the numerical values denote the oxygen limits for synthesized air. (4-7-83)

iv. The water content of compressed air required for any particular grade may vary with the intended use from saturated to very dry. If a specific water limit is required, it should be specified as a limiting dewpoint or concentration in ppm (v/v). Dewpoint is expressed in temperature F at one atmosphere absolute pressure (760 mmHg). (4-7-83)

v. No limits are given for condensed hydrocarbons beyond grade E since the gaseous hydrocarbon limits could not be met if condensed hydrocarbons were present. (4-7-83)

b. Breathing air may be supplied to respirators from cylinders or air compressors. (4-7-83)

i. Cylinders shall be tested and maintained as prescribed in the Shipping Container Specification Regulations of the Department of Transportation (49 CFT Part 178) dated October 1, 1972. (4-7-83)

ii. The compressor for supplying air shall be equipped with necessary safety and standby devices described in this item. A breathing air-type compressor shall be used. Compressors shall be constructed and situated so as to avoid entry of contaminated air into the system and suitable in line air purifying sorbet beds and filters installed to further assure breathing air quality. A receiver of sufficient capacity to enable the respirator wearer to escape from a contaminated atmosphere in the event of compressor failure and overheating shall be installed in the system. If an oil-lubricated compressor is used, it shall have a high-temperature or carbon monoxide alarm, or both. If only a high-temperature alarm is used, the air from the compressor shall be frequently tested for carbon monoxide to insure that it meets the specifications in a. of this section. (4-7-83)

c. Air lines couplings shall be incompatible with outlets for other gas systems to prevent inadvertent servicing of air line respirators with nonrespirable gases or oxygen. (4-7-83)

d. Breathing gas containers shall be marked in accordance with American National Standard Method of Marking Portable Compressed Gas Containers to Identify the Material Contained, Z48. A-1954; Federal Specification BB-A-1034a, June 21, 1968, Air, Compressed for Breathing Purposes; or Interim Federal Specification GG-B-00675b, April 27, 1965, Breathing Apparatus, Self-Contained. (4-7-83)

05. Use of Respirators. (4-7-83)

a. Standard procedures shall be developed for respirator use. These shall include all information and guidance necessary for their proper selection, use and care. Possible emergency and routine uses of respirators shall be anticipated and planned for. (4-7-83)

b. The correct respirator shall be specified for each job. The respirator type is usually specified in the work procedures by a qualified individual supervising the respiratory protective program. The individual issuing them shall be adequately instructed to insure that the corrective respirator is issued. Each respirator permanently assigned to an individual should be durably marked to indicate to whom it was assigned. This mark shall not affect the respirator performance in any way. The date of issuance should be recorded. (4-7-83)

c. Written procedures shall be prepared covering safe use of respirators in dangerous atmospheres that might be encountered in normal operations or in emergencies. Personnel shall be familiar with these procedures and the available respirators. (4-7-83)

i. In areas where the wearer, with failure of the respirator, could be overcome by a toxic or oxygen-deficient atmosphere, at least one additional man shall be present. Communications (visual, voice or signal line) shall be maintained between both or all individuals present. Planning shall be such that one individual will be unaffected by any likely incident and have the proper rescue equipment to be able to assist the other(s) in case of emergency. (4-7-83)

ii. When self-contained breathing apparatus or hose masks with blowers are used in atmospheres immediately dangerous to life or health, standby men must be present at the nearest fresh air base with suitable rescue equipment. (4-7-83)

iii. Persons using air line respirators in atmospheres immediately hazardous to life or health shall be equipped with safety harnesses and safety lines for lifting or removing persons from hazardous atmospheres or other and equivalent provisions for the rescue of persons from hazardous atmospheres shall be used. A standby man or men with suitable self-contained breathing apparatus shall be at the nearest fresh air base for emergency rescue. (4-7-83)

d. Respiratory protection is no better than the respirator in use, even though it is worn conscientiously. Random inspections shall be conducted by a qualified individual to assure that respirators are properly selected, used, cleaned and maintained. (4-7-83)

e. For safe use of respirators, it is essential that both supervisors and workers be properly instructed in its selection, use and maintenance and shall be instructed by persons trained to so instruct. Training shall provide the

workers an opportunity to handle the respirator, have it fitted properly, test its face piece-to-face seal, wear it in normal air for a long familiarity period, and finally, to war it in a test atmosphere. (4-7-83)

i. The employer shall provide fitting instructions including demonstrations and practice in how the respirator should be worn, how to adjust it, and how to determine if it fits properly. Respirators shall not be worn when conditions may be a growth of beard, sideburns, a skull cap that projects under the face-piece or temple pieces of glasses. Also, the absence of one or both dentures can seriously affect the fit of a face-piece. The worker's diligence in observing these factors shall be evaluated by periodic check. To assure the proper protection, the face-piece shall be checked by the wearer each time he puts on the respirator. This may be done by following the manufacturer's face-piece fitting instructions. (4-7-83)

ii. Providing respiratory protection for individuals wearing corrective glasses is a serious problem. A proper seal cannot be established if the temple bars of eye glasses extend through the sealing edge of the full face-piece. As a temporary measure, glasses with short temple bars or without temple bars may be taped to the wearer's head. Wearing of contact lenses in contaminated atmospheres with a respirator shall not be allowed. Systems have been developed for mounting corrective lenses inside full face-pieces. When a worker must wear corrective lenses as part of the face-piece, the face-piece and lenses shall be fitted by qualified individuals to provide good vision comfort and a gas-tight seal. (4-7-83)

iii. If corrective spectacles or goggles are required, they shall be worn so as not to affect the fit of the face-piece. (4-7-83)

06. Maintenance and Care of Respirators. (4-7-83)

a. A program for maintenance and care of respirators shall be adjusted to the type of plant, working conditions and hazards involved and shall include the following basic services: (4-7-83)

i. Inspection for defects (including a leak check); (4-7-83)

ii. Cleaning and disinfecting; (4-7-83)

iii. Repair; and (4-7-83)

iv. Storage. (4-7-83)

b. Equipment shall be properly maintained to retain its original effectiveness. (4-7-83)

i. All respirators shall be inspected routinely before and after each use. A respirator that is not routinely used but is kept ready for emergency use shall be inspected after each use and at least monthly to assure that it is in satisfactory working condition. (4-7-83)

ii. Self-contained breathing apparatus shall be inspected monthly. Air and oxygen cylinders shall be fully charged according to the manufacturer's instructions. It shall be determined that the regulator and warning devices function properly. (4-7-83)

iii. Respirator inspection shall include a check of the tightness of the connections and the condition of the face-piece, head bands, valves, connecting tube and canisters. Rubber or elastomer parts shall be inspected for pliability and signs of deterioration. Stretching and manipulating rubber or elastomer parts with a massaging action will keep them pliable and flexible and prevent them from taking a set during storage. (4-7-83)

iv. A record shall be kept of inspection dates and findings for respirators maintained for emergency use. (4-7-83)

c. Routinely used respirators shall be collected, cleaned and disinfected as frequently as necessary to insure that proper protection is provided for the wearer. Each worker should be briefed on the cleaning procedure and be assured tat he will always receive a clean and disinfected respirator. Respirators maintained for emergency use shall be cleaned and disinfected after each use. (4-7-83)

d. Replacement or repairs shall be done only by experienced person with parts designed for the respirator. No attempt shall be made to replace components or to make adjustments or repairs beyond the manufacturer's recommendations. Reducing or admission valves or regulators shall be returned to the manufacturer or to a trained technician for adjustments or repair. (4-7-83)

e. After inspection, cleaning and necessary repair, respirators shall be stored to protect against dust, sunlight, heat, extreme cold, excessive moisture or damaging chemicals. (4-7-83)

i. Respirators placed at stations and work areas for emergency use should be quickly accessible at all times and should be stored in compartments built for the purpose. The compartments should be clearly marked. Routinely used respirators, such as dust respirators, may be placed in plastic bags. Respirators should not be stored in such places as lockers or tool boxes unless they are in carrying cases or cartons. (4-7-83)

ii. Respirators should be packed or stored so tat the face-piece and exhalation valve will rest in a normal position and function will not be impaired by the elastomer setting in an abnormal position. NOTE: Instructions for proper storage of emergency respirators, such as gas masks and self-contained breathing apparatus, are found in "use and care" instructions usually mounted inside the carrying case lid. (4-7-83)

07. Identifications of Gas Mask Canisters. (4-7-83)

a. The primary means of identifying a gas mask canister shall be by means of properly worded labels. The secondary means of identifying a gas mask canister shall be by a color code. (4-7-83)

b. Employers or their representative who issue or use gas masks falling within the scope of this section shall see that all gas mask canisters purchased or used by them are properly labeled and colored in accordance with these requirements before they are placed in service and that the labels and colors are properly maintained at all times thereafter until the canisters have completely served their purpose. (4-7-83)

c. On each canister shall appear in bold letters the following: (4-7-83)

i. Canister for (Name for atmospheric contaminant) or Type N Gas Mask Canister. (4-7-83)

ii. In addition, essentially the following wording shall appear beneath the appropriate phrase on the canister label: "For respiratory protection in atmospheres containing not more than percent by volume of (name of atmospheric contaminant). (4-7-83)

iii. All of the markings specified above should be placed on the most conspicuous surface or surfaces of the canister. (4-7-83)

d. Canisters having a special high-efficiency filter for protection against radio-nuclide and other highly toxic particles shall be labeled with a statement of the type and degree of protection afforded by the filter. The label shall be affixed to the neck end of, or to the gray stripe which is around and near the top of the canister. The degree of protection shall be marked as the percent of penetration of the canister by a 0.3-micron diameter dioctylphthalate (DOP) smoke at a flow rate of 85 liters per minute. (4-7-83)

e. Each canister shall have a label warning that gas masks should be used only in atmospheres contained sufficient oxygen to support life (at least 16 percent by volume), since gas mask canisters are only designed to neutralize or remove contaminants from the air. (4-7-83)

f. Each gas mask canister shall be painted a distinctive color or combination of colors indicated in Table 052.07-A. All colors used shall be such that they are clearly identifiable by the user and clearly distinguishable from one another. The color coating used shall offer a high degree of resistance to chipping, scaling, peeling, blistering, facing and the effects of the ordinary atmospheres to which they may be exposed under normal conditions of storage and use. Appropriately colored pressure sensitive tape may be used for the stripes. (4-7-83)

TABLE 052.07-A available at Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone

(208) 334-6000.

NOTE: Orange shall be used as a complete body, or stripe color to represent gases not included in this table. The user will need to refer to the canister label to determine the degree of protection the canister will afford. (4-7-83)

08. Occupational Head Protection. (4-7-83)

a. Helmet for the protection of employees against impact and penetration of falling and flying objects shall meet the specifications contained in American National Standards Institute, Z89.1-1969, Safety Requirement for Industrial Head Protection. (4-7-83)

b. Helmets for the head protection of employees exposed to high voltage electrical shock and burns shall meet the specifications contained in American National Standards Institute, Z89.2-1970. (4-7-83)

c. Persons working in the shops around machinery or in locations which present a hair catching or fire hazard shall wear caps or other types of head covering which completely covers the hair. Caps with metal buttons or metal visors shall not be worn around electrical hazards. (4-7-83)

d. Hard hats shall be worn by employees who work around or under scaffolds or other overhead structures or who are otherwise exposed to the hazards of falling materials and propelled objects. (4-7-83)

09. Personal Flotation Devices. (4-7-83)

a. Employees working on, over or along water where the danger of drowning exists shall be provide with and shall wear approved personal flotation devices. (4-7-83)

i. Employees are not considered exposed to danger of drowning when: (a) the water depth is known to b less than chest deep on the exposed individual; (b) working behind standard height and strength guardrails; (c) working inside operating cabs or stations which eliminate the possibility of accidentally falling into the water; (d) wearing approved safety belts with lifeline attached so as to preclude the possibility of falling into the water. (4-7-83)

ii. Prior to an after each use, personal flotation devices shall be inspected for defects which would reduce their designed effectiveness. Defective personal flotation devices shall not be used. (4-7-83)

iii. To meet the approved criteria required by subdivision a., a personal flotation device shall be approved by the United States Coast Guard as a Type I PFD, Type II PFD, Type III Pfd, or Type V PFD, or their equivalent, pursuant to 46 CFT 160 (Coast Guard Lifesaving Equipment Specifications) and 33 CFR 175.23 (Coast Guard Table of Devices equivalent to personal flotation devices). Ski belt or inflatable type personal flotation devices are specifically prohibited. (4-7-83)

b. Life Ring. (4-7-83)

i. Along docks, walkways or other fixed installations or on adjacent to open water more than five feet deep, approved life rings with line attached shall be provided. The life rings shall be spaced at intervals not to exceed 200 feet and shall be kept in easily visible and readily accessible locations. (4-7-83)

ii. When employees are assigned work at other casual locations where the exposure to drowning exists, at least one approved life ring with line attached shall be provided in the immediate vicinity of the work assigned. (4-7-83)

iii. Work assigned over water where the vertical drop from an accidental fall would exceed 25 feet, shall be subject to specific procedures as outlined in this section. (4-7-83)

iv. Lines attached to life rings shall be at least 90 feet in length, at least ? inches in diameter and have a minimum breaking strength of 500 pounds. (4-7-83)

v. Life rings must be Untied States Coast Guard approved 30-inch size. (4-7-83)

vi. Life rings and attached lines must be maintained to retain at least 75% of their designed buoyancy and strength. (4-7-83)

10. Safety Belts, Lifelines, Lanyards, Nets and Life Jackets. (4-7-83)

a. Lifelines, safety belts and lanyards. (4-7-83)

i. Lifelines, safety belts and lanyards shall be used only for employee safety guarding. (4-7-83)

ii. Lifelines shall be secured above the point of operations to an anchorage or structural member capable of supporting a minimal dead weight of 5,400 pounds. (4-7-83)

iii. Lifelines used on rock-scaling operations, or in areas where the lifeline may be subjected to cutting or abrasive, shall be a minimum of 7/8 inch wire core manila rope. For all other lifeline applications, a minimum, braking strength of 5,400 lbs. shall be used. (4-7-83)

iv. Safety belt lanyard shall be a minimum of 1/2 inch nylon or equivalent with a maximum length to provide for a fall of not greater than 6 feet. The rope shall have a nominal breaking strength of 2,400 pounds. (4-7-83)

v. All safety belt and lanyard hardware shall be drop forged or pressed steel cadmium plated in accordance with Type L, Class B plating specified in Federal Specification QQ-P-416. Surfaces shall be smooth and free of sharp edges. (4-7-83)

vi. All safety belt and lanyard hardware, except rivets, shall be capable of withstanding a tensile loading of 4,000 lbs. without cracking, breaking or taking a permanent deformation. (4-7-83)

b. Safety Nets. (4-7-83)

i. Safety nets shall be provided when work places are more than 25 feet above the ground or water surface, or other surfaces where the use of ladders, scaffolds, catch platforms, temporary floors, safety lines or safety belts are impractical. (4-7-83)

ii. Where safety net protection is required by this part, operations shall not be undertaken until the net is in place and has been tested. (4-7-83)

iii. Nets shall extend 8 feet beyond the edge of the work surface as practical but i no case more than 25 feet below such work surface. Nets shall be hung with sufficient clearance to prevent users contact wit the surface or structures below. Such clearance shall be determined by impact load testing. It is intended that only one level of nets be required for bridge construction. (4-7-83)

iv. The mesh size of nets shall not exceed 6 inches. All new nets shall meet accepted performance standards of 17,500 foot pound minimum impact resistance as determined and certified by the manufacturer, and shall bear a label of proof test. Edge ropes shall provide a minimum breaking strength of 5,000 pounds. (4-7-83)

v. Forged steel safety hooks or shackles shall be used to fasten the net to its support. (4-7-83)

vi. Connections between the net panels shall develop the full strength of the net. (4-7-83)

c. Employees working over or near water where the danger of drowning exists, shall be provided with a United States Coast Guard approved life jacket or buoyant work vest. (4-7-83)

11. Occupational Foot Protection. (4-7-83)

a. Calks or other suitable footwear which will afford reasonable protection from slipping shall be worn while working on logs. Safety-toe footwear for employees shall meet the requirements and specifications in

American National Standard for Men's Safety-toe Footwear, Z41.1-1967. (4-7-83)

b. Workers who work in areas where there is a possibility of foot injury due to falling or falling objects shall wear safety-type footwear. Where safety shoes are made available by the employer, the same shall be provided at cost price to the employee. (4-7-83)

12. Electrical Protective Devices. (4-7-83)

a. Rubber protective equipment shall conform to the requirements established in the American National Standards Institute Standards as specified in the following list:

ITEM	STANDARD
Rubber insulating gloves	J6.6-1971
Rubber matting for use around	J6.7-1935
Electric apparatus	(R1971)
Rubber insulating blankets	J6.4-1971
Rubber insulating hoods	J6.2-1950 (R1971)
Rubber insulating line hose	J6.1-1950
Rubber insulating sleeves	J6.5-1971

b. Where switches or fuses of more than 150 volts to ground are not guarded during ordinary operations, suitable insulating floors, mats or platforms shall be provided on which the operator must stand while handling the switches. (4-7-83)

053. -- 059. (RESERVED).

060. FIRE PROTECTION AND SUPPRESSION EQUIPMENT.

01. Fires. (4-7-83)

a. "Class A Fires" are fires of ordinary combustible materials such as wood, cloth, paper, and rubber. (4-7-83)

b. "Class B Fires" are fires in flammable liquids, gases, and greases. (4-7-83)

c. "Class C Fires" are fires which involved energized electrical equipment where the electrical non conductivity of the extinguishing media is of importance. (When electrical equipment is deenergized, extinguisher for Class A or B fires may be used safely). (4-7-83)

d. "Class D Fires" are fires in combustible metals, such as magnesium, titanium, zirconium, sodium, and potassium. (4-7-83)

02. Fire Extinguishers. (4-7-83)

a. Classification of portable fire extinguishers: "Portable Fire Extinguishers" are classified for use on certain classes of fire and rated for relative extinguishing effectiveness at a temperature of plus 70 F. by nationally recognized testing laboratories. This is based upon the preceding classification of fires and the fire extinguishment potentials as determined by fire tests. (4-7-83)

b. The classification and rating system described in this section is that used by Underwriters' Laboratories, Inc. and Underwriters Laboratories of Canada and is based on extinguishing preplanned fires of

determined size and description as follows: (4-7-83)

i. Class A rating - wood and excelsior fires excluding deep-seated conditions. (4-7-83)

ii. Class B rating - two inch depth gasoline fires in square pans. (4-7-83)

iii. Class C rating - no fire test. Agent must be a nonconductor of electricity. (4-7-83)

iv. Class D rating -special tests on specific combustible metal fires. (4-7-83)

03. Hazards. (4-7-83)

a. A "Light hazard" is a situation where the amount of combustibles or flammable liquids present is such that fires of small size may be expected. These may include offices, schoolrooms, churches, assembly halls, telephone exchanges, etc. (4-7-83)

b. An "ordinary hazard" is a situation where the amount of combustibles or flammable liquids present is such that fires of moderate size may be expected. These may include mercantile storage and display, auto showrooms, parking garages, light manufacturing, warehouses not classified as extra hazard, school shop areas, etc. (4-7-83)

c. An "extra hazard" is a situation where the amount of combustibles or flammable liquids present is such that fires of severe magnitude may be expected. These may include woodworking, auto repair, aircraft servicing, warehouses with high piled (14 feet or higher) combustibles, and processes such as flammable liquid handling, painting, dipping, etc. (4-7-83)

04. Sprinklers. (4-7-83)

a. Sprinkler system: A "sprinkler system" for fire protection purposes, is an integrated system of underground and overhead piping designed in accordance with fire protection engineering standards. The system includes a suitable water supply, such as a gravity tank, fire pump, reservoir, or pressure tank and/or connection by underground piping to a city main. The portion of the sprinkler system above ground is a network of specifically sized or hydraulically designed piping installed in a building, structure, or area, generally overhead, and to which sprinklers are connected in a systematic pattern. The system includes a controlling valve and a device for actuating an alarm when the system is in operation. The system is usually activated by heat from a fire and discharges water over the fire area. NOTE: The design and installation of water supply facilities such as gravity tanks, fire pumps, reservoirs, or pressure tanks, and underground piping are covered by NFPA Standards No. 22-1970, Water Tanks for Private Fire Protection; No. 20-1970, Installation of Centrifugal Fire Pumps and No. 24-1970 Outside Protection. (4-7-83)

b. Sprinkler alarms: A "Sprinkler Alarm" unit is an assembly of apparatus approved for the service and so constructed and installed that any flow of water from a sprinkler system equal to or greater than that from a single automatic sprinkler will result in an audible alarm signal on the premises. (4-7-83)

05. Standpipes. (4-7-83)

a. Class of service-standpipe systems: "Standpipe systems" are grouped into three general classes of service for the intended use in the extinguishment of fire. (4-7-83)

i. Class I: For use by fire departments and those trained in handling heavy fire streams (2 1/2 inch hose). (4-7-83)

ii. Class II: For use primarily by the building occupants until the arrival of the fire department (small hose). (4-7-83)

iii. Class III: For use by either fire departments and those trained in handling heavy hose streams or by the building occupants. (4-7-83)

b. Class I service: "Class I Service" is a standpipe system capable of furnishing the effective fire streams required during the more advanced stages of fire on the inside of buildings or for exposure fire. (4-7-83)

c. Class II service: "Class II Service" is a standpipe system which affords a ready means for the control of incipient fires by the occupants of buildings during working hours and by watchmen and those present during the night time and holidays. (4-7-83)

d. Class III service: "Class III Service" is a standpipe system capable of furnishing the effective fire streams required during the more advanced stages of fire on the inside of buildings as well as providing a ready means for the control of fires by the occupants of the building. (4-7-83)

e. Standpipe system: "Standpipe Systems" are usually of the following types: (4-7-83)

i. A wet standpipe system having a supply valve open and water pressure maintained at all times. (4-7-83)

ii. A standpipe system so arranged through the use of approved devices as to admit water to the system automatically by opening a hose valve. (4-7-83)

iii. A standpipe system arranged to admit water to the system through manual operation of approved remote control devices located at each hose station. (4-7-83)

iv. Dry standpipe having no permanent water supply. See also "a" of this section. (4-7-83)

06. Storage types. (4-7-83)

a. Type I storage: "Type I Storage" is that in which combustible commodities or noncombustible commodities involving combustible packaging or storage aids are stored over 15 feet but not more than 21 feet high in solid piles or over 12 feet but not more than 21 feet high in piles that contain horizontal channels. Minor quantities of commodities of hazard greater than ordinary combustibles may be included without affecting this general classification. (4-7-83)

b. Type II storage: "Type II Storage" is that in which combustible commodities or noncombustible commodities involving combustible packaging or storage aids are stored not over 15 feet high in solid piles or not over 12 feet high in piles that contain horizontal channels. Minor quantities of commodities of hazard greater than ordinary combustibles may be included without affecting this general classification. (4-7-83)

c. Type III storage: "Type III Storage" is that in which the stored commodities, packaging, and storage aids are noncombustible or contain only a small concentration of combustibles which are incapable of producing a fire that would cause appreciable damage to the commodities stored or to noncombustible wall, floor, or roof construction. Ordinary combustible commodities in completely sealed noncombustible containers may qualify in this classification. General commodity storage that is subject to frequent changing and storage of combustible packaging and storage aids is excluded from this category. (4-7-83)

07. Approval of fire Suppressant equipment. (4-7-83)

a. Approved: "Approved" means listed or approved by at least one of the following nationally recognized testing laboratories: (4-7-83)

i. Factory Mutual Engineering Corp.; (4-7-83)

ii. Underwriters Laboratories, Inc., or (4-7-83)

b. Federal agencies such as Bureau of Mines, Dept. of the Interior, Dept. of Transportation, or U. S. Coast Guard, which issue approvals for such equipment. (4-7-83)

061. PORTABLE FIRE SUPPRESSION EQUIPMENT AND PORTABLE FIRE EXTINGUISHERS.

01. General requirements. (4-7-83)

a. Operable Condition. Portable extinguishers shall be maintained in a fully charged and operable condition and kept in their designated places at all times when they are not being used. (4-7-83)

b. Location. Extinguishers shall be conspicuously located where they will be readily accessible and immediately available in the event of fire. They shall be located along normal paths of travel. (4-7-83)

c. Marking of Location. Extinguishers shall not be obstructed or obscured from view. In large rooms, and in certain locations where visual obstruction cannot be completely avoided, means shall be provided to indicate the location and intended use of extinguishers conspicuously. (4-7-83)

d. Marking of Extinguishers. If extinguishers intended for different classes of fire are grouped, their intended use shall be marked conspicuously to insure choice of the proper extinguisher at the time of a fire. (4-7-83)

e. Mounting of Extinguishers. Extinguishers shall be installed on the hangers or in the brackets supplied, mounted in cabinets, or set on shelves unless the extinguishers are of the wheeled type. (4-7-83)

f. Height of Mounting. Extinguishers having a gross weight not exceeding 40 pounds shall be installed so that the top of the extinguisher is not more than 5 feet above the floor. Extinguishers having a gross weight greater than 40 pounds (except wheeled types) shall be so installed that the top of the extinguisher is not more than 3 1/2 feet above the floor. (4-7-83)

g. Cabinet Mounting. Extinguisher mounted in cabinets or wall recesses or set on shelves shall be placed in a manner such that the extinguisher operating instructions face outward. The location of such extinguishes shall be marked conspicuously. (4-7-83)

h. Vibrating Location. Extinguishers installed under conditions where they are subject to severe vibration shall be installed in brackets specifically designed to withstand the impact of vibration and to prevent the extinguisher from becoming dislodged. (4-7-83)

i. Temperature Range. Extinguishers shall be suitable for use within a temperature range of at least plus 40 F to 120 F. (4-7-83)

j. Extreme Temperature Exposure. When extinguishers are installed in locations subject to temperatures outside the range prescribed in i. above they shall be of a type approved or listed for the temperature to which they will be exposed or placed in an enclosure capable of maintaining the temperature within the range prescribed in i. above. (4-7-83)

02. Selection of Extinguishers. (4-7-83)

a. General. The selection of extinguishers for a given situation will depend upon the character of the fires anticipated, the construction and occupancy of the individual property, the vehicle or hazard to be protected, ambient-temperature conditions, and other factors. The number of extinguishers required shall be determined by reference to Section 404 of this chapter. Approved fire extinguishers shall be used to meet the requirements of this section. (4-7-83)

b. Selection by Hazard: (4-7-83)

i. Extinguishers shall be selected for the specific classes of hazards to be protected in accordance with the following sections. (4-7-83)

ii. Extinguishers for protecting Class A hazards shall be selected from among the following: foam, loaded stream, multipurpose dry chemical, and water types. Certain smaller extinguishers which are charged with multipurpose dry chemicals are rated on Class B and Class C fires, but have insufficient effectiveness to earn the

minimum 1-A rating even though they have value in extinguishing smaller Class A fires. (4-7-83)

iii. Such smaller extinguishers shall not be used to meet the requirements of Section 061.03.a.i. of this Code. (4-7-83)

iv. Extinguishers for protection of Class B hazards shall be selected from the following: Bromotrifluoromethane, carbon dioxide, dry chemical, foam, loaded stream, and multipurpose dry chemical. Extinguishers with ratings less than 1-B shall not be considered in determining suitability. (4-7-83)

v. Extinguishers for protection of Class C hazards shall be selected from the following: Bromotrifluoromethane, carbon dioxide, dry chemicals, and multipurpose dry chemicals. NOTE: Carbon dioxide extinguishers equipped with metal horns are not considered safe for use on fires in energized electrical equipment, and therefore, are not classified for use on Class C hazards. (4-7-83)

vi. Extinguishers and extinguishing agents for the protection of Class D hazards shall be of types approved for use on the specific combustible-metal hazard. (4-7-83)

03. Distribution of portable fire extinguishers. (4-7-83)

a. General. (4-7-83)

i. The number of fire extinguishers needed to protect a property shall be determined as prescribed herein, considering the area and arrangement of the building or occupancy, the severity of the hazard, the anticipated classes of fires, and the distances to be traveled to reach extinguishers. (4-7-83)

ii. Fire extinguishers shall be provided for the protection of both the building structure, if combustible, and the occupancy hazards contained therein. (4-7-83)

iii. Required building protection shall be provided by fire extinguishers suitable for Class A fires. (4-7-83)

iv. Occupancy hazard protection shall be provided by fire extinguishers suitable for such Class A, B, C, or D fire potentials as may be present. (4-7-83)

v. Extinguishers provided for building protection may be considered also for the protection of occupancies having a Class A fire potential. (4-7-83)

vi. Combustible buildings having an occupancy hazard subject to Class B, and/or Class C fires, shall have a standard complement of Class A fire extinguishers as required by Table 404-A for building protection, plus additional Class B and/or Class C extinguishers. Where fire extinguishers have more than one letter classification (such as 2-A, 20-B, c) they may be considered to satisfy the requirements of each letter class. (4-7-83)

vii. Rooms or areas shall be graded generally as light hazard, ordinary hazard or extra hazard. Limited areas of greater or lesser hazard shall be protected as required. (4-7-83)

b. Fire Extinguisher Size and Placement for Class A Hazards. (4-7-83)

i. Minimal sizes of fire extinguishers for the listed grades of hazard shall be provided on the basis of Table 404-A. Extinguishers shall be located so that the maximum travel distances shall not exceed those specified in Table 061.03-A. (4-7-83)

TABLE 061.03-A available at Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone (208) 334-6000.

ii. The protection requirements specified in Table 404-A may be fulfilled by several extinguishers of lower ratings for ordinary or extra-hazard occupancies. (4-7-83)

iii. Where the floor area of a building is less than that specified in Table 061.03-A, at least one extinguisher or the minimum size recommended shall be provided. (4-7-83)

iv. The protection requirements may be fulfilled with extinguishers of higher rating provided the travel distance to such large extinguishers shall not exceed 75 feet. (4-7-83)

c. Fire Extinguisher Size and Placement for Class B Fire or Other Than for Fire in Flammable Liquids of Appreciable Depth. (4-7-83)

i. Minimal sizes of fire extinguishers for the listed grades of hazard shall be provided on the basis of Table 404-A. Extinguishers shall be located so that the maximum travel distances shall not exceed those specified in Table 061.03-B. (4-7-83)

TABLE 061.03-B, available at Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone (208) 334-6000.

NOTE: Where this section calls for a minimum extinguisher ratings of 4-B, 8-B or 12-B, the requirements may be met by existing extinguishers of multiple foam extinguishers as allowed by c.ii. of this section. However, if a single extinguisher must be purchased to fulfill such requirements, the next higher rating shall be used. (4-7-83)

ii. Two or more extinguishers of lower rating, except for foam extinguishes, shall not be used to fulfill the protection requirements of Table 061.03-B up to three foam extinguishers may be used to fulfill these requirements. (4-7-83)

iii. The protection requirements may be fulfilled with extinguishers of higher ratings provided the travel distance to such larger extinguishers shall not exceed 50 feet. (4-7-83)

d. Fire Extinguisher Size and Placement for Class B fires inflammable Liquids of Appreciable Depth. (4-7-83)

i. For flammable liquid hazards of appreciable depth (Class B), such as in dip or quench tanks, Class B fire extinguishers shall be provided on the basis of one numerical unit of Class B extinguishing potential per square foot of flammable liquid surface of the largest tank hazard within the area. NOTE: Appreciable depth is defined as a depth of a liquid greater than inch. (4-7-83)

ii. Two or more extinguishers of lower ratings except for foam extinguishers, shall not be used in lieu of the extinguisher required for the largest tank. Up to three foam extinguishers may be used to fulfill these requirements. (4-7-83)

iii. Scattered or widely separated hazards shall be individually protected if the specified travel distances in c.i. and ii. of this section are exceeded. Likewise, extinguishers in the proximity of a hazard shall be carefully located so as to be accessible in the presence of a fire without undue danger to the operator. (4-7-83)

e. Fire Extinguisher Size and Placement for Class C Hazards. Extinguishers with Class C ratings shall be required where energized electrical equipment may be encountered which would require a nonconducting extinguishing media. This will include fire either directly involving or surrounding electrical equipment. Since the fire itself is a Class A or Class B hazard, the extinguishers are sized and located on the basis of the anticipated Class A or B hazard. (4-7-83)

04. Inspection, Maintenance and Use of Hydrostatic Tests. (4-7-83)

a. General. (4-7-83)

i. The owner or occupant of a property in which extinguishes are located shall be responsible for such inspection, maintenance, and testing. (4-7-83)

ii. For details of conducting needed inspection, proper maintenance operations, and required test, see

NFPA No. 10A-1970, Maintenance and Use of Portable Fire Extinguishers. (4-7-83)

b. Inspection. (4-7-83)

i. Extinguishers shall be inspected monthly, or at more frequent intervals when circumstances require, to insure they are in their designated places, to insure they have not been actuated or tampered with, and to detect any obvious physical damage, corrosion, or other impairments. (4-7-83)

ii. Any extinguishers showing defects shall be given a complete maintenance check. (4-7-83)

c. Maintenance. (4-7-83)

i. At regular intervals, not more than 1 year apart, or when specifically indicated by an inspection, extinguishers shall be thoroughly examined and/or recharged or repaired to insure operability and safety or replaced as needed. (4-7-83)

ii. Extinguishers removed from the premises to be recharged shall be replaced by spare extinguishers during the period they are gone. (4-7-83)

iii. Pails or drums of powder extinguishing agents for scoop or shovel application to metal fires shall be kept full at all times. (4-7-83)

iv. Each extinguisher shall have a durable tag securely attached to show the maintenance or recharge date and the initials or signature of the person who performs this service. (4-7-83)

d. Hydrostatic Tests. (4-7-83)

i. If, at any time, an extinguisher shows evidence of corrosion or mechanical injury, it shall be subjected to a hydrostatic pressure test, or replaced. (4-7-83)

ii. For evaluating the condition of extinguisher cylinders made to Department of Transportation specifications (cf. 49 CFR Chapter I) see the Standard for Visual Inspection of Compressed Gas Cylinders (CGA C-6), published by the Compressed Gas Association, 500 Fifth Avenue, New York, NY10036. (4-7-83)

iii. At intervals not exceeding those specified in Table 061.04-A and Section iv. of this section, extinguishers shall be hydrostatically tested. The first hydrostatic retest may be conducted between the fifth and sixth years for those with a designated test interval of 5 years. NOTE: Cylinders under the jurisdiction of the U. S. Department of Transportation (formerly Interstate Commerce Commission) may require hydrostatic testing at more frequent periods. (4-7-83)

TABLE 061.04-A, available at Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone (208) 334-6000.

iv. Nitrogen cylinders (or other cylinders used for inert-gas storage), such as found on wheeled extinguishers, shall be tested at a 5 year interval. (4-7-83)

v. On those extinguishers which are equipped with a shut-off nozzle at the outlet end of the hose, a hydrostatic test shall be performed on the hose with its couplings (but not without the discharge nozzle) at the test interval specified for the unit on which the hose is installed. (4-7-83)

vi. The test pressure for dry chemical and dry powder hose assemblies requiring a hydrostatic test shall be at a test pressure of 300 pounds per square inch for assemblies requiring a hydrostatic test shall be at test pressure of 1,250 p.s.i. for a one minute period. (4-7-83)

vii. The hydrostatic test date shall be recorded on a record tag of metal or equally durable material, or a suitable metallic decal which shall be affixed by a heated process to the shell of the extinguisher which passes the hydrostatic test. The record tag shall contain the following information: Date of the test, test pressure, and name or

initials of person or agency making the test. (4-7-83)

viii. For fire extinguishers subject to an original factory test pressure of 350 p.s.i. or greater, the test pressure shall be 75% of the factory test pressure (as noted on the extinguisher nameplate), but in no case less than 300 p.s.i., See Table 405-B. Pressure shall be applied at a rate of rise to reach the test pressure in approximately 1 minute, and the pressure shall be held for 1 minute, after which it shall be released. (4-7-83)

TABLE 061.04-B, HYDROSTATIC TEST PRESSURE REQUIREMENTS, NON-ICC SHELLS, SHELLS NOT SPECIFIED IN U. S. DEPARTMENT OF TRANSPORTATION REGULATIONS (FORMERLY INTERSTATE COMMERCE COMMISSION) available at Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone (208) 334-6000.

ix. Carbon dioxide extinguishers, nitrogen cylinders, and other cylinders or cartridges used for the storage of inert, compressed gases shall be hydrostatically tested in accordance with the requirements of the U. S. Dept. of Transportation (formerly Interstate Commerce Commission see 49CFR Oct. 1, 1972, parts 171-190). (4-7-83)

x. Extinguisher shells, cartridges, or cylinders which slow leakage or permanent distortions in excess of specified limits, or which rupture shall be removed from service. (4-7-83)

062. STANDPIPE AND HOSE SYSTEMS.

01. General. (4-7-83)

a. Application. Where standpipe and hose systems are provided they shall meet the design requirements of the National Fire Protection Association's Standard for the Installation of Standpipe and Hose Systems NFPA 14-1970 and the requirements of 406 through 409 of this chapter. (4-7-83)

b. Closets and Cabinets. Closets and cabinets used to contain fire hose shall be of sufficient size to permit the installation of the necessary equipment at those stations, and so designed as not to interfere with the prompt handling of the hose and equipment at time of fire. They shall be used for fire equipment only. (4-7-83)

c. Protection of Standpipes. Standpipes shall be so located that they are protected against mechanical and fire damage. (4-7-83)

02. Hose Outlets. (4-7-83)

a. Location of Hose. (4-7-83)

i. Hose outlets shall be within easy reach of a person standing on the floor and in no case shall be over 6 feet from the floor. Hose stations shall be located conspicuously within the immediate area and where not likely to be obstructed. Hose may be located at one side of the standpipe and supplied by short lateral connections to the standpipe where necessary to avoid obstructions. (4-7-83)

ii. For Class III service, the outlets for large hose shall be located in a stairway enclosure, and for small hose the outlets shall be located in the corridor or space adjacent to the stairway enclosure. (4-7-83)

b. Hose Connections. (4-7-83)

i. Standpipes for Class I service shall be provided with 2 1/2 inch hose connections on each floor. (4-7-83)

ii. Standpipes for Class II service shall be provided with 1 1/2 inch hose connections on each floor. (4-7-83)

iii. Standpipes for Class III service shall be provided with both a 2 1/2 inch and 1 1/2 inch hose

connection on each floor. The hose connections may be through one 2 1/2 inch hose valve and an easily removable 2 1/2 inch by 1 1/2 inch adapter. (4-7-83)

c. Hose. Each hose outlet provided for the use of building occupants (Class II and III services) shall be equipped with approved small fire hose attached and ready for use. The maximum total length of unlined hose shall be 75 feet. The maximum total length of lined hose shall be 100 feet. (4-7-83)

d. Hose Racks or Reels. Each station provided with small hose shall be equipped with an approved rack, or an approved reel, securely fastened in position; provided that an employer may continue to use a reel acquired prior to May 20, 1974, even though it is not approved, so long as it is in good working condition. (4-7-83)

e. Hose Valves. (4-7-83)

i. An approved hose valve shall be provided at each outlet for attachment of hose. (4-7-83)

ii. Where the static pressure at any standpipe outlet for small hose exceeds 100 pounds per square inch, an approved device shall be installed at the outlet to reduce the pressure so that the nozzle pressure will be approximately 80 pounds per square inch. NOTE: Pressure reducers are not required on standpipe outlets for 2 1/2 inch hose because it is assumed 2 1/2 inch hose will be attached only when the persons likely to use it are trained in handling large streams. (4-7-83)

iii. National (American) Standard Fire Hose Coupling Screw Threads shall be used whenever they will fit existing equipment; (see Standard for Screw Threads Gaskets for Fire Hose Couplings, NFPA No. 194-1968). (4-7-83)

f. Nozzles. Nozzles shall be of an approved type. Size of nozzles for small hose shall not be larger than 1/2 inch. (4-7-83)

g. Dry Standpipe Identification. Each hose connection on dry standpipes shall be provided with a conspicuous, durable, and permanently legible sign reading "Dry Standpipe for Fire Department Use Only." (4-7-83)

03. Water Supplies. (4-7-83)

a. Minimum Supply for Class I Service. (4-7-83)

i. The minimum supply for Class I service shall be sufficient to provide 500 gallons per minute for a period of at least thirty (30) minutes. (4-7-83)

ii. Where more than one standpipe is required, the minimum supply shall be 500 gallons per minute for the first standpipe and 250 gallons per minute for each additional standpipe, the total supply not to exceed 2,500 gallons a minute, for a period of at least thirty (30) minutes. (4-7-83)

iii. The supply shall be sufficient to maintain a residual pressure of 65 pounds per square inch at the top-most outlet of each standpipe (including the roof outlet) with 500 gallons per minute flowing. (4-7-83)

b. Minimum Supply for Class II Service. The minimum supply for Class II service shall be sufficient to provide 100 gallons per minute for a period of at least thirty (30) minutes. The supply shall be sufficient to maintain a residual pressure of 65 pounds per square inch at the top-most outlet of each standpipe (including the roof outlet) with 100 gallons per minute flowing. (4-7-83)

c. Minimum Supply for Class III Service. The minimum supply for Class III service shall be the same as for Class I Service. (4-7-83)

d. Fire Department Connections. (4-7-83)

i. One or more fire department connections shall be provided for each Class I or Class III standpipe system. (4-7-83)

ii. In high-rise buildings having two or more zones, a fire department connection shall be provided for each zone. (4-7-83)

iii. Fire department connections shall be properly supported. (4-7-83)

iv. There shall be no shutoff valve in the fire department connection. (4-7-83)

v. An approved straightway check valve shall be installed in each fire department connection, located as near as practicable to the point where it joins the system. (4-7-83)

vi. The pipe between the check valve and the outside hose coupling shall be equipped with an approved automatic drip, arranged to discharge to a proper place. (4-7-83)

vii. Hose connections shall be approved type and shall be equipped with standard caps, properly secured and arranged for easy removal by fire departments. (4-7-83)

viii. Hose coupling threads shall conform to those used by the local fire department. (American) National Standard Fire-Hose Coupling Screw Threads shall be used whenever they will fit the local fire department hose threads; (see Standard for Screw Threads and Gaskets for Fire Hose Coupling NFPA No. 194-1968). (4-7-83)

ix. Hose connections should be on the street side of buildings and shall be located and arranged so that hose lines can be readily and conveniently attached to the inlets without interference from any nearby objects including buildings, fences, posts, or other fire department connections. (4-7-83)

x. Hose connections shall be designated by a sign having raised letters at least one inch in size cast on a plate or fitting, reading "Standpipe". (4-7-83)

xi. If hose connection does not serve all of the building an appropriate and durable sign shall be attached indicating the portions of the building served. (4-7-83)

04. Tests and Maintenance. (4-7-83)

a. Tests. All new systems including yard piping shall be tested hydrostatically at not less than 200 pounds per square inch pressure for 2 hours, or at 50 pounds per square inch in excess of the normal pressure when the normal pressure is in excess of 150 pounds per square inch. (4-7-83)

b. Periodic Inspection. (4-7-83)

i. The tanks shall be kept properly filled, and where pressure tanks are employed, a pressure of at least 75 pounds per square inch shall be maintained at all times. NOTE: For further details, see Standard for Water Tanks for Private Fire Protection, NFPA No.22-1971. (4-7-83)

ii. The valves in the main connection to the automatic sources of water supply shall be open at all times. The hose valves should be frequently examined to see that they are tight. NOTE: For further details, see Care of Fire Hose, NFPA No. 198-1972. (4-7-83)

063. FIXED FIRE SUPPRESSION EQUIPMENT AUTOMATIC, SPRINKLER SYSTEMS.

01. General Requirements. (4-7-83)

a. Design. When automatic sprinkler systems are provided they shall meet design requirements of the National Fire Protection Association's Standard for the Installation of Sprinkler Systems, NFPA no. 13-1969 and the requirements of 063.01 through 063.04 of this Code. (4-7-83)

b. Water Supply. Every automatic sprinkler system shall have at least one automatic water supply of adequate pressure capacity and reliability. (4-7-83)

c. Fire Department Connection. A connection through which a fire department can pump water into the sprinkler system makes a desirable auxiliary supply. For this purpose, one or more fire department connections shall be provided in all cases. (4-7-83)

02. Fire Department Connections. (4-7-83)

a. Size. Pipe size shall not be less than 4 inches for fire engine connections and not less than 6 inches for fireboat connections, except that 3-inch pipe may be used to connect a single hose connection to a 3-inch or smaller riser. (4-7-83)

b. Valves. (4-7-83)

i. An approved straightaway check valve shall be installed in each fire department connection, located as near as practicable to the point where it joins the system. (4-7-83)

ii. There shall be no shutoff valve in the fire department connection. (4-7-83)

c. Hose Connections. (4-7-83)

i. Hose connections shall be of approved type. (4-7-83)

ii. Hose coupling threads shall conform to those used by the local fire department. National (American) Standard Fire Hose Coupling Screw Threads shall be used whenever they will fit the local fire department hose. (4-7-83)

iii. Hose connections shall be equipped with caps, properly secured and arranged for easy removal by fire departments. (4-7-83)

iv. Hose connections shall be located and arranged so that hose lines can be readily and conveniently attached to the inlets without interference from any nearby objects including buildings, fences, posts, or other fire department connections. (4-7-83)

v. Hose connections shall be designated by a sign having raised letters at least 1 inch in size case on plate or fitting reading for service designated: Viz -- "AUTO SPKR" or "OPEN SPKR". (4-7-83)

03. Sprinkler Alarms. (4-7-83)

a. General. (4-7-83)

i. Water flow alarms shall be provided on all sprinkler installations. (4-7-83)

ii. An alarm unit shall include an approved mechanical alarm, horn, or siren, or an approved weatherproof electric gong, bell, horn, or siren on the outside of the building or approved electric gongs, bells, horns, or sirens inside the building, or a combination of such devices. (4-7-83)

iii. All alarm apparatus shall be so located and installed that all parts are readily accessible for inspection, removal and repair, and shall be substantially supported. Outdoor mechanical or electrically operated bells shall be of weatherproof and guarded type. On each alarm check valve used under conditions of variable water pressure, a retarding device shall be installed. Suitable valves shall be provided in the connections to retarding chambers, to permit repair or removal without shutting off sprinkler; these valves shall be so arranged that they may be locked or sealed in the open position. (4-7-83)

b. Water Flow Detecting Devices. (4-7-83)

i. The alarm apparatus for a wet-pipe system shall consist of an approved alarm check valve or other approved water flow detecting alarm device with the necessary attachments required to give an alarm. (4-7-83)

ii. The alarm apparatus for a dry pipe system shall consist of approved alarm attachments to the dry-pipe valve. When a dry-pipe valve is located on the system side of an alarm valve, the actuating device of the alarms for the dry-pipe valve may be connected to the alarms on the wet-pipe system. (4-7-83)

iii. The alarm apparatus for preaction and deluge systems shall consist of approved electric alarm attachments, actuated by a thermostatic system independently of flow of water in the system. (4-7-83)

c. Drains. Drains from alarm devices shall be so arranged that there will be no danger of freezing, and so that there will be no overflowing at the alarm apparatus, at domestic connections or elsewhere with the sprinkler drains wide open and under pressure. (4-7-83)

04. Maintenance of Sprinkler System. A sprinkler system installed under this standard shall be properly maintained for efficient service. The employer is responsible for the condition of his sprinkler system and must use due diligence in keeping the system in good operating condition. (4-7-83)

05. Sprinkler Head Clearance. (4-7-83)

a. Type I Storage. Clearance of at least 36 inches shall be maintained between sprinkler deflectors and top of storage to reduce the possibility of obstruction to the distribution of water. (4-7-83)

b. Type II Storage. Clearance of at least 18 inches shall be maintained between sprinkler deflectors and top of storage to reduce the possibility of obstruction to the distribution of water. (4-7-83)

c. Type III Storage. In buildings with sprinkler systems, at least 18 inches clearance between sprinkler deflectors and top of storage shall be maintained. (4-7-83)

064. FIXED DRY CHEMICAL EXTINGUISHING SYSTEM.

01. General Requirements. (4-7-83)

a. Design. When dry chemical extinguishing systems are provided they shall meet the design requirements of the National Fire Protection Association's "Standard for Dry Chemical Extinguishing Systems" NFPA No. 17-1972 and the requirements of this section. (4-7-83)

b. Safety Requirements. Where there is a possibility that personnel may be exposed to a dry chemical discharge, suitable safeguards shall be provided to insure prompt evacuation of such locations, and also to provide means for prompt rescue of any trapped personnel. (4-7-83)

02. Alarm and Indicators. (4-7-83)

a. General. Alarms and/or indicators are used to indicate the operation of the system, hazard to personnel, or failure of any supervised device or equipment. The devices may be audible or visual. The type, number, and location of the devices shall be such that their purpose is satisfactorily accomplished. (4-7-83)

b. Operation Alarm. (4-7-83)

i. An alarm or indicator shall be provided to show that the system has operated, that personnel response may be needed, and that the system should be charged. (4-7-83)

ii. Alarms indicating failure of supervised devices or equipment shall give prompt and positive indication of any failure and shall be distinctive from alarms indicating operation or hazardous conditions. (4-7-83)

03. Inspection and Maintenance. (4-7-83)

a. Inspection and Tests. (4-7-83)

i. At least annually, all dry chemical systems including alarms, shutdowns, and other associated equipment, shall be thoroughly inspected and checked for proper operation by a competent inspector. (4-7-83)

ii. The purpose of the inspection and testing prescribed by subsection iii. of this section shall be not only to insure that the system is in full operating condition but also to indicate the probable continuance of that condition until the next inspection. Attention at this inspection shall be given to any extension of the hazard protected by the system. (4-7-83)

iii. The inspector's report, with recommendations, if any, shall be filed with the employer or with whomever is designated by the employer. (4-7-83)

iv. Between the regular annual inspection or tests, the system shall be inspected visually or otherwise by competent personnel, following a predetermined schedule. (4-7-83)

v. At least semiannually, all expellant gas containers shall be checked by pressure or weight against the required minimums. (4-7-83)

vi. Except for stored pressure systems, at least annually the dry chemical in the system storage container shall be sampled from the top center and also near the wall to determine the existence of lumps harder than will be fireable when dropped from a height of 4 inches. (4-7-83)

b. Maintenance. (4-7-83)

i. These fixed dry chemical systems shall be maintained in full operating condition at all times. Use, impairment and restoration of this protection shall be reported promptly to the employer. (4-7-83)

ii. Any troubles or impairments shall be corrected at once by competent personnel. (4-7-83)

065. CARBON DIOXIDE EXTINGUISHING SYSTEMS.

01. General Requirements. (4-7-83)

a. Design. When carbon dioxide extinguishing systems are provided, they shall meet the design requirements of the National Fire Protection Association's "Standard on Carbon Dioxide Extinguishing Systems" NFPA No. 12-1972 and the requirements of 064.04 through 064.05 of this Code. (4-7-83)

b. Safety Requirements. In any use of carbon dioxide where there is a possibility that employees may be trapped in, or enter into atmospheres made hazardous by a carbon dioxide discharge, suitable safeguards shall be provided to insure prompt evacuation of and to prevent entry into such atmospheres and also to provide means for prompt rescue of any trapped personnel. Such safety items as personnel training, warning signs, discharge alarms, predischarge alarms, and breathing apparatus shall be considered. (4-7-83)

02. Inspection and Maintenance. (4-7-83)

a. Inspection and Tests. (4-7-83)

i. At least annually, all carbon dioxide systems shall be thoroughly inspected and tested for proper operation by a competent engineer or inspector. (4-7-83)

ii. The goal of this inspection and testing shall be not only to insure that the system is in full operating condition but shall indicate the probable continuance of that condition until the next inspection. (4-7-83)

iii. Suitable discharge tests shall be made when any inspection indicates their advisability. (4-7-83)

iv. Between the regular service contract inspection or tests, the system shall be inspected visually or otherwise by competent personnel, following a predetermined schedule. (4-7-83)

v. At least semiannually, all high pressure cylinders shall be weighed. If at any time, a container shows a loss in net content of more than 10 percent, it shall be refilled or replaced. (4-7-83)

vi. If, at any time, a low pressure container shows a loss of more than 10%, it shall be refilled, unless the minimum gas requirements are still provided. (4-7-83)

b. Maintenance. (4-7-83)

i. These carbon dioxide systems shall be maintained in full operating condition at all times. (4-7-83)

ii. Any troubles or impairments shall be corrected at once by competent personnel. (4-7-83)

03. Local Fire Alarm Signaling System. (4-7-83)

a. General Requirements. Where local fire alarm signaling systems are provided, they shall meet the design requirements of the National Fire Protection Association's "Standard for the Installation, Maintenance, and Use of Local Protective Signaling Systems for Watchmen, Fire Alarm and Supervisory Service". NFPA No. 72A-1967 and the requirements of this section. (4-7-83)

b. Fire Alarm Boxes. (4-7-83)

i. General. Manual fire alarm boxes shall be approved for the particular application and shall be used only for the fire protective signaling purposes. Combined fire alarm and watchman's signaling boxes are acceptable. (4-7-83)

ii. Mounting. Each box shall be securely mounted. (4-7-83)

iii. Distribution. Manual fire alarm boxes shall be distributed throughout the protected area so that they are unobstructed, readily accessible, and located in the normal path of exit from the area. Additional boxes shall be provided on each floor to obtain a maximum horizontal travel distance of 200 feet to the nearest box. (4-7-83)

c. Maintenance. All systems shall be under the supervision of qualified persons. These persons shall cause tests and inspections to be made at weekly intervals, and shall have general charge of all alterations and additions to the systems under their supervision. (4-7-83)

04. Carbon-Tetrachloride or Chlorobromomethane. (4-7-83)

a. Carbon-Tetrachloride or Chlorobromomethane shall not be used as a fire suppressant agent in any fire extinguishers. Vaporizing liquid extinguishers (Carbon tetrachloride or chlorobromomethane base) are not recognized in this code and reference to them has thus been deleted. NOTE: FIRE PROTECTION EQUIPMENT NOT RECOMMENDED. (4-7-83)

b. Inverting Types of Extinguishers. It is recommended that all inverting types of fire extinguishers utilizing soda-acid, foam, water cartridge and loaded stream cartridge be discontinued from use. (4-7-83)

c. Inverting types of extinguishers are not pressure vessels, but because they are not under pressure at all times, they were not designated to meet pressure vessel codes, as are other extinguishers. (4-7-83)

d. Old inverting types of extinguishers are being stressed very close to their actual yield point, which means there is virtually no built-in reserve strength. (4-7-83)

05. Commercial cooking equipment inspection. (4-7-83)

a. An inspection and servicing of the fire extinguishing system by properly trained and qualified persons shall be made at least every six months. (It is recommended that such training and qualification be by the manufacturer of the equipment being inspected and serviced.) (4-7-83)

b. All actuation components including remote manual pull stations, mechanical or electrical devices, detectors, actuators, etc., shall be checked for proper operation during the inspection in accordance with the manufacturer's listed procedures. In addition to these requirements, specific inspection requirements in the applicable NFPA Standard shall also be followed. (4-7-83)

c. Fusible links and automatic sprinkler heads shall be replaced at least annually or more frequently if necessary to assure proper operation of the system. Other detection devices shall be serviced or replaced in accordance with the manufacturer's recommendations. (4-7-83)

d. If required, certificates of inspection and maintenance performed shall be forwarded to the authority having jurisdiction. (4-7-83)

066. -- 069. (RESERVED).

070. WALKING-WORKING SURFACES.

01. General Requirements. This section applies to all permanent places of employment, except where domestic, mining, or agricultural work only is performed. Construction work is not to be deemed as a permanent place of employment. Measures for the control of toxic materials are considered to be outside the scope of this section. (4-7-83)

02. Housekeeping. (4-7-83)

a. All places of employment, passageways, storerooms and service rooms shall be kept clean, orderly and in sanitary condition. (4-7-83)

b. The floor of every workroom shall be maintained in a clean, and so far as possible, a dry condition. Where wet processes are used, drainage shall be maintained and false floors, platforms, mats or other dry standing places shall be provided where practicable. (4-7-83)

c. To facilitate cleaning, every floor, working place and passageway shall be kept free from protruding nails, splinters, holes or loose boards. (4-7-83)

d. All materials stored in tiers shall be stacked, racked, blocked, interlocked or otherwise secured to prevent sliding, falling or collapse. (4-7-83)

03. Aisles and Passageways. (4-7-83)

a. Where mechanical handling equipment is used, sufficient safe clearances shall be allowed for aisles, at loading docks, through doorways and wherever turns or passage must be made. Aisles and passageways shall be kept clear and in good repairs, with no obstruction across or in aisles that could create a hazard. (4-7-83)

b. Permanent aisles and passageways shall be appropriately marked. (4-7-83)

c. All trestles in connection with industrial plants on which cars run, which are also used as walkways for workmen, shall be equipped with a walkway on the outer edge, so located as to give a safe minimum clearance of three feet to cars. Such walkways shall be equipped with standard rails. Where a trestle crosses a driveway or passageway, the trestle over such points shall be solidly boarded over. (4-7-83)

04. Covers and Guardrails. (4-7-83)

a. All open vats and tanks into which workers may fall shall be guarded with railings or screen guards. (4-7-83)

b. All open vats and tanks where workers are employed shall have a platform or walkway 36 to 42 inches below the top of the vat or tank or where the walkway is flush with the top of the vat or tank, a standard safeguard of 36 to 42 inches high shall be constructed. (4-7-83)

c. Every tank over 5 feet deep, excepting where agitators are used or where products may be damaged by ladders, shall have a ladder fixed on the inside so placed as to connect with means of access from the outside. Rungs shall have a clearance of at least 6 inches measured between the rung and the side of the tank. (4-7-83)

05. Floor Loading Protection. (4-7-83)

a. In every building or structure, or part thereof, used for mercantile, business, industrial, or storage purposes, the loads approved by the building official shall be marked on plates of approved design which shall be supplied and securely affixed by the owner of the building, or his duly authorized agent, in a conspicuous place in each space to which they relate. Such plates shall not be removed or defaced but, if lost, removed, or defaced, shall be replaced by the owner or his agent. (4-7-83)

b. It shall be unlawful to place, or cause or permit to be placed, on any floor or roof of a building or other structure a load greater than that for which such floor or roof is approved by the building official. (4-7-83)

06. Steam Pipes. (4-7-83)

a. All steam pipes are pipes heated by any other means to a sufficient temperature to burn a person (other than coil pipes, radiators, for heating rooms or building, or pipes on portable steam engines and boilers) and which are within seven feet of a floor or platform, if exposed to contact, shall be guarded with a standard safeguard. (4-7-83)

b. Protection from Hot Pipes. All exposed hot pipes within seven feet of the floor or working platform, or within 15 inches measured horizontally from stairways ramps or fixed ladders, shall be covered with an insulating material or be guarded in such a manner as to prevent contact. (4-7-83)

07. Buildings and Floors. (4-7-83)

a. All buildings, docks, tramways, walkways, log dumps and other structures shall be so designed, constructed and maintained as to provide a safety factor of 4. This means that all members shall be capable of supporting four times the maximum strain to be imposed. This provision refers to buildings, docks, etc., designed and constructed subsequent to the effective date of these standards and also refers in all cases where either complete or major changes or repairs are made to such buildings, docks, tramways, walkways, log dumps and other structures. (4-7-83)

b. The floors of all buildings, platforms, walks and driveways, storage yards, docks, etc., and all parts thereof, and all supporting members shall be of substantial construction and kept in good repair and free from accumulations of debris. Floors which are maintained in a polished condition shall be polished with a non-slip preparation of an approved type. (4-7-83)

c. Flooring of buildings, ramps, docks, trestles and other structures required to support motive equipment shall be of not less than full two and one-half (2 1/2) inch material. However, where flooring is covered by steel floor plates, 2 inch material may be used. (4-7-83)

071. GUARDING FLOOR AND WALL OPENINGS.

01. Terms. The following terms shall have the meaning ascribed in this section when referred to in sections 509 through 514 of this Chapter unless the context requires otherwise. (4-7-83)

a. Floor Hole. An opening measuring less than 12 inches but more than 1 inch in its least dimension, in any floor, platform, pavement, or yard, through which materials but not persons may fall; such as a belt hole, pipe opening, or slot opening. (4-7-83)

b. Floor Opening. An opening measuring 12 inches or more in its least dimension, in any floor, platform, pavement, or yard, through which persons may fall; such as a hatchway, stair or ladder opening, pit, or large manhole. Floor openings occupied by elevators, dumbwaiters, conveyors, machinery, or containers are excluded from

this subpart. (4-7-83)

c. Handrail. A single bar or pipe supported on brackets from a wall or partition, as on a stairway or ramp, to furnish persons with a handhold in case of tripping. (4-7-83)

d. Platform. A working space for persons, elevated above the surrounding floor or ground; such as a balcony or platform for the operation of machinery and equipment. (4-7-83)

e. Runway. A passageway for persons, elevated above the surrounding floor or ground level, such as a footwalk along shafting or a walkway between buildings. (4-7-83)

f. Standard Railing. A vertical barrier erected along exposed edges of a floor opening, wall opening, ramp, platform, or runway to prevent falls of persons. (4-7-83)

g. Standard Strength and Construction. Any construction of railings, covers, or other guards that meets the requirements of Sections 071.01 through 071.07 of this Code. (4-7-83)

h. Stair Railing. A vertical barrier erected along exposed sides of a stairway to prevent falls of persons. (4-7-83)

i. Toeboard. A vertical barrier erected along exposed edges of a floor opening, wall opening, platform, runway or ramp to prevent falls of materials. (4-7-83)

j. Wall Hole. An opening less than 30 inches but more than 1 inch high, of unrestricted width, in any wall or partition; such as a ventilation hole or drainage scupper. (4-7-83)

k. Wall Opening. An opening at least 30 inches high and 18 inches wide, in any wall or partition, through which persons may fall; such as a yard arm doorway or chute opening. (4-7-83)

02. Protection for floor openings. (4-7-83)

a. Every stairway floor opening shall be guarded by a standard railing constructed in accordance with Section 514 of this Chapter. The railing shall be provided on all exposed sides (except at entrance to stairway). For infrequently used stairways where traffic across the opening prevents the use of fixed standard railing (as when located in aisle spaces, etc.) the guard shall consist of a hinged floor opening cover of standard strength and construction and removable standard railings on all exposed sides (except at entrance to stairway). (4-7-83)

b. Every ladder way floor opening or platform shall be guarded by a standard railing with standard toeboard on all exposed sides (except at entrance to opening), with the passage through the railing either provided with a swinging gate or so offset that a person cannot walk directly into the opening. (4-7-83)

c. Every hatchway and chute floor opening shall be guarded by one of the following: (4-7-83)

i. Hinged floor opening cover of standard strength and construction equipped with standard railings or permanently attached thereto so as to leave only one exposed side. When the opening is not in use, the cover shall be closed or the exposed side shall be guarded at both top and intermediate positions by removable standard railings. (4-7-83)

ii. A removable railing with toeboard on not more than two sides of the opening and fixed standard railings with toeboards on all other exposed sides. The removable railings shall be kept in place when the opening is not in use and should preferably be hinged or otherwise mounted so as to be conveniently replaceable. Where operating conditions necessitate the feeding of material into any hatchway or chute opening, protection shall be provided to prevent a person from falling through the opening. (4-7-83)

iii. The area under floor openings shall, where practical, be fenced off. When this is not practical, the areas shall be plainly marked with yellow lines and telltales shall be installed (4-7-83)

iv. Where floor openings are used to drop materials from one level to another, audible warning systems shall be installed and used to indicate to employees on the lower level that material is to be dropped. (4-7-83)

d. Every skylight opening and hole shall be guarded by a standard skylight screen or a fixed standard railing on all exposed sides. (4-7-83)

e. Every pit and trap door floor opening, infrequently used, shall be guarded by a floor opening cover of standard strength and construction which should be hinged in place. While the cover is not in place, the pit or trap opening shall be constantly attended by someone or shall be protected on all sides by removable standard railings. (4-7-83)

f. Every manhole floor opening shall be guarded by a standard manhole cover which need not be hinged in place. While the cover is not in place, the man hole opening shall be constantly attended by someone or shall be protected by removable standard railings. (4-7-83)

g. Every temporary floor opening shall have standard railings, or shall be constantly attended by someone. (4-7-83)

h. Every floor hole into which persons can accidentally walk shall be guarded by either: (4-7-83)

i. A standard railing with standard toeboard on all exposed sides, or (4-7-83)

ii. A floor hole cover of standard strength and construction that should be hinged in place. While the cover is not in place, the floor hole shall be constantly attended by someone or shall be protected by a removable standard railing. (4-7-83)

i. Every floor hole into which persons cannot accidentally walk (on account of fixed machinery, equipment, or walls) shall be protected by a cover that leaves no openings more than 1 inch wide. The cover shall be securely held in place to prevent tools or materials from falling through. (4-7-83)

j. Where doors or gates open directly on a stairway, a platform shall be provided and the swing of the door shall not reduce the effective width to less than 20 inches. (4-7-83)

03. Protection for Wall Openings and Holes. (4-7-83)

a. Every wall opening from which there is a drop of more than 4 feet shall be guarded by one of the following: (4-7-83)

i. Rail, roller, picket fence, half door, or equivalent barrier. The guard may be removable but should preferably be hinged or otherwise mounted so as to be conveniently replaceable. where there is exposure below to falling materials, a removable toeboard or the equivalent shall also be provided. When the opening is not in use for handling materials, the guard shall be kept in position regardless of a door on the opening. In addition, a grab handle shall be provided on each side of the opening with its center approximately 4 feet above the floor level and of standard strength and mounting. (4-7-83)

ii. Extension platform onto which materials can be hoisted for handling, and which shall have side rails or equivalent guards of standard specifications. (4-7-83)

b. Every chute wall opening from which there is a drop of more than 4 feet shall be guarded by one or more of the barriers specified in Sections 071.03.a.i. and ii. or as required by the conditions. (4-7-83)

c. Every window wall opening at a stairway landing, floor, platform, or balcony, from which there is a drop of more than 4 feet, and where the bottom of the opening is less than 3 feet above the platform or landing, shall be guarded by standard slats, standard grillwork (as specified in Section 071.07.k., or standard railing. Where the window opening is below the landing or platform, a standard toeboard shall be provided. (4-7-83)

d. Every temporary wall opening shall have adequate guards but these need not be of standard construction. (4-7-83)

e. Where there is a hazard of materials falling through a wall hole, and the lower edge of the near side of the hole is less than 4 inches above the floor, and the far side of the hole more than 5 feet above the next lower level, the hole shall be protected by a standard toeboard, or an enclosing screen either of solid construction or as specified in section 071.07.k. (4-7-83)

04. Protection of open - sided floors, platforms and runways. (4-7-83)

a. Every open-sided floor or platform 4 feet or more above adjacent floor or ground level shall be guarded by a standard railing (or the equivalent as specified in Section 071.07.c on all open sides, except where there is entrance to a ramp, stairway, or fixed ladder. The railing shall be provided with a toeboard wherever, beneath the open sides, persons can pass, here is moving machinery, or there is equipment with which falling materials could create a hazard. (4-7-83)

b. Every runway shall be guarded by a standard railing or the equivalent as specified in Section 071.07.c. on all open sides 4 feet or more above floor or ground level. Wherever tools, machine parts, or materials are likely to be used on the runway, a toeboard shall also be provided on each exposed side. (4-7-83)

c. Runways used exclusively for special purposes (such as oiling, shafting, or filling tank cars) may have the railing on one side omitted where operating conditions necessitate such omission, providing the falling hazard is minimized by using a runway of not less than 18 inches wide. Where persons entering upon runways become thereby exposed to machinery, electrical equipment, or other danger not a falling hazard, additional guarding than is here specified may be essential for protection. (4-7-83)

d. Regardless of height, open sided floors, walkways, platforms, or runways above or adjacent to dangerous equipment, pickling or galvanizing tanks, degreasing units and similar hazards shall be guarded with a standard railing and toeboard. (4-7-83)

e. Tools and loose materials shall not be left on overhead platforms and scaffolds. (4-7-83)

05. Guard Railing Details. (4-7-83)

a. Guard railings shall be not less than 42 inches high except that guards protecting changes in level one step or less on interior balconies and mezzanines shall be not less than 36 inches high. Exception: Balconies located in assembly occupancies. See Figure 071.05-A. (4-7-83)

b. Guards shall be so constructed that the area in the plane of the guard from the top of floor, riser, or curb to the minimum required height of guard shall be subdivided or filled in one of the following manners. (4-7-83)

c. A sufficient number of intermediate longitudinal rails so that the clear distance between rails measured at right angles to the run of rail does not exceed 10 inches. The bottom rails shall not be more than 10 inches from the top of floor tread or curb measured vertically. (4-7-83)

d. Areas filled wholly or partially by panels of solid wire mesh, by expanded metal construction or by ornamental grills which provide protection against falling through the guard equivalent to that provided by the intermediate rails or vertical balusters specified in the two preceding paragraphs. (4-7-83)

e. The lower part of the area may consist of a continuous substantial curb, the top of which is parallel to the run of stairs or level areas and the height of which is not less than 3 inches on stairs (measured at right angles to the curb from its top to the nosing of the tread) and not less than 6 inches for level areas. (4-7-83)

f. Enclosure walls and guards consisting of masonry, railings, or other construction either shall be designed for loads transmitted by attached handrails or shall be designed to resist a horizontal force of 50 pounds per level foot applied at the top of the guard, whichever condition produces maximum stresses. For walls or guards higher than minimum height the specified force shall be applied at a height 42 inches above the floor or tread. (4-7-83)

g. Intermediate rails, balusters and panel fillers shall be designed for a uniform load of not less than 25 pounds per square foot over the gross area of the guard. See Figure 071.05-B for guard details in public buildings. See Figure 071.05-A or 071.05-C for railings in front of fixed seats in public assemblies. (4-7-83)

06. Stairway Railings and Guards. (4-7-83)

a. Every flight of stairs having four or more risers shall be equipped with standard stair railings or standard handrails as specified in i. through v. of this rule, the width of the stair to be measured clear of all obstructions except handrails: (4-7-83)

i. On stairways less than 44 inches wide having both sides enclosed, at least one handrail, preferably on the right side descending. (4-7-83)

ii. On stairways less than 44 inches wide having one side open, at least one stair railing on open side. (4-7-83)

iii. On stairways less than 44 inches wide having both sides open, one stair railing on each side. (4-7-83)

iv. On stairways more than 44 inches wide but less than 88 inches wide, one handrail on each enclosed side and one stair railing on each open side. (4-7-83)

v. On stairways 88 or more inches wide, one handrail on each enclosed side, one stair railing on each open side and one intermediate stair railing located approximately midway of the width. (4-7-83)

b. Winding stairs shall be equipped with a handrail off set to prevent walking on all portions of the treads having width less than 6 inches. (4-7-83)

FIGURE 071.05-A available at Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone (208) 334-6000.

FIGURE 071.05-B, available at Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone (208) 334-6000.

FIGURE 071.05-C, available at Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone (208) 334-6000.

07. Railing, Toeboards and Cover Specifications. (4-7-83)

a. A standard railing shall consist of top rail, intermediate rail and posts, and shall have a vertical height of 42 inches nominal from upper surface of top rail to floor, platform, runway, or ramp level. The top rail shall be smooth surfaced throughout the length of the railing. The intermediate rail shall be approximately halfway between the top rail and the floor, platform, runway, or ramp. The ends of the rails shall not overhang the terminal posts except where such overhang does not constitute a projection hazard. (4-7-83)

b. A stair railing shall be of construction similar to a standard railing but the vertical height shall be not more than 34 inches nor less than 30 inches from upper surface of top rail to surface of tread in line with face of riser at forward edge of tread. (4-7-83)

c. Minimum requirements for standard railings under various types of construction are specified in this subsection. Dimensions specified are based on the U. S. Department of Agriculture Wood Handbook, No. 73, 1955 (No. 1 (S4S) Southern Yellow Pine (modules of rupture 7,4000 p.s.i.) for wood; ANSI G 41. 5-1970, American National Standard Specifications for Structural Steel, for structural steel; and ANSI B 125. 1-1970, American National Standard Specifications for Welded and Seamless Steel Pipe, for pipe. (4-7-83)

i. For wood railings, the posts shall be of at least 2-inch by 4-inch nominal stock spaced not to exceed

6 feet; the top and intermediate rails shall be of at least 2-inch by 4-inch nominal stock. If top rail is made of two right-angle pieces of 1-inch by 4-inch stock, posts may be spaced on 8-foot centers, with 2-inch by 4-inch intermediate rails. (4-7-83)

ii. For pipe railings, posts and top and intermediate railings shall be at least 1? inches nominal diameter with posts spaced not more than 8 feet on centers. (4-7-83)

iii. For structural steel railings, posts and top and intermediate rails shall be of 2-inch by 2-inch by 3/8 inch angles or other metal shapes of equivalent bending strength with posts spaced not more than 8 feet on centers. (4-7-83)

iv. The anchoring of posts and framing of members for railings of all types shall be of such construction that the completed structure shall be capable of withstanding a load of at least 200 pounds applied in any direction at any point on the top rail. (4-7-83)

v. Other types, sizes and arrangements of railing construction are acceptable provided they meet the following conditions. (a) A smooth-surfaced top rail at a height above floor, platform, runway, or ramp level of from 36 to 42 inches nominal; (b) A strength to withstand at least the minimum requirement of 200 pounds top rail pressure; (c) Protection between top rail and floor, platform, runway, ramp, or stair treads, equivalent to at least that afforded by a standard intermediate rail; (d) Elimination of overhang of rail ends unless such overhang does not constitute a hazard; such as, baluster railings, scrollwork railings, paneled railings. (4-7-83)

d. A standard toeboard shall be a minimum of 4 inches nominal in vertical height from its top edge to the level of the floor, platform, runway or ramp. It shall be securely fastened in place and with not more than 1/4 inch clearance above floor level. It may be made of any substantial material either solid or with openings not over 1 inch in greatest dimension. Where material is piled to such height that a standard toeboard does not provide protection, paneling from floor to intermediate rail, or to top rail shall be provided. (4-7-83)

e. A handrail shall consist of a length-wise member mounted directly on a wall or partition by means of brackets attached to the lower side of the handrail so as to offer no obstruction to a smooth surface along the top and both sides of the handrail. (4-7-83)

f. The handrail shall be of rounded or other section that will furnish an adequate handhold for anyone grasping it to avoid falling. The ends of the handrail should be turned in to the supporting wall or otherwise arranged so as not to constitute a projection hazard. (4-7-83)

i. The height of handrails shall be not more than 34 inches nor less than 30 inches from upper surface of handrail to surface of tread in line with face of riser or to surface of ramp. (4-7-83)

ii. The size of handrails shall be: When of hardwood, at least 2 inches in diameter; when of metal pipe, at least 1 inches in diameter. The length of brackets shall be such as will give a clearance between handrail and wall or any projection thereon of at least 1? inches. The spacing of brackets shall not exceed 8 feet. (4-7-83)

iii. The mounting of handrails shall be such that the completed structure is capable of withstanding a load of at least 200 pounds applied in any direction at any point on the rail. (4-7-83)

g. All handrails and railings shall be provided with a clearance of not less than 1? inches between the hand rail or railing and any other object. (4-7-83)

h. Floor opening covers may be of any material that meets the following strength requirements: (4-7-83)

i. Trench or conduit covers and their supports, when located in plant roadways, shall be designed to carry a truck rear axle load of at least 20,000 pounds. (4-7-83)

ii. Manhole covers and their supports when located in plant roadways, shall comply with local standard highway requirements, if any; otherwise, they shall be designed to carry a truck rear axle of at least 20,000

pounds. (4-7-83)

iii. The construction of floor opening covers may be of any material that meets the strength requirements. Covers projecting not more than 1 inch above the floor level may be used providing all edges are chamfered to an angle with the horizontal of not over 30 degrees. All hinges, handles, bolts, or other parts shall set flush with the floor or cover surface. (4-7-83)

i. Skylight screens shall be of such construction and mounting that they are capable of withstanding a load of at least 200 pounds applied perpendicularly at anyone area on the screen. They shall also be of such construction and mounting that under ordinary loads or impacts, they will not deflect downward sufficiently to break the glass below them. The construction shall be of grillwork with openings not more than 4 inches long or of slat work with openings not more than 2 inches wide with length unrestricted. (4-7-83)

j. Wall opening barriers (rails, rollers, picket fences and half doors) shall be of such construction and mounting that, when in place at the opening, the barrier is capable of withstanding a load of at least 200 pounds applied in any direction (except upward) at any point on the top rail or corresponding member. (4-7-83)

k. Wall openings grab handles shall be not less than 12 inches in length and shall be so mounted as to give 1? inches clearance from the side framing of the wall opening. The size, material and anchoring of the grab handle shall be such that the completed structure is capable of withstanding a load of at least 200 pounds applied in any direction at any point of the handle. (4-7-83)

l. Wall opening screens shall be of such construction and mounting that they are capable of withstanding a load of at least 200 pounds applied horizontally at any point on the near side of the screen. They may be of solid construction, of grill work with openings not more than 8 inches long, or of slatwork with openings not more than 4 inches wide with length unrestricted. (4-7-83)

072. FIXED INDUSTRIAL STAIRS.

01. Terms. The following terms shall have the meaning ascribed in this section when referred to in Sections 516 through 526 unless the context requires otherwise. (4-7-83)

a. Handrail. A single bar or pipe supported on brackets from a wall or partition to provide a continuous handhold for persons using a stair. (4-7-83)

b. Nose, Nosing. That portion of a tread projecting beyond the face of the riser immediately below. (4-7-83)

c. Open Riser. The air space between the treads of stairways without upright members (risers). (4-7-83)

d. Platform. An extended step or landing breaking a continuous run of stairs. (4-7-83)

e. Railing. A vertical barrier erected along exposed sides of stairways and platforms to prevent falls of persons. The top member of railing usually serves as a handrail. (4-7-83)

f. Rise. The vertical distance from the top of a tread to the top of the next higher tread. (4-7-83)

g. Riser. The upright member of a step situated at the back of a lower tread and near the leading edge of the next higher tread. (4-7-83)

h. Stairs, Stairway. A series of steps leading from one leveler floor to another, or leading to platforms, pits, boiler rooms, crossovers or around machinery, tanks and other equipment that are used more or less continuously or routinely by employees, or only occasionally by specific individuals. A series of steps and landings having three or more risers constitutes stairs or stairway. (4-7-83)

i. Tread. The horizontal distance from the leading edge of a tread to the leading edge of an adjacent

tread. (4-7-83)

j. Tread Run. The horizontal distance from the leading edge of a tread to the leading edge of an adjacent tread. (4-7-83)

k. Tread Width. The horizontal distance from front to back of tread including nosing when used. (4-7-83)

02. Application of Requirements. This section contains specifications for the safe design and construction of fixed general industrial stairs. This classification includes interior and exterior stairs around machinery, tanks and other equipment, and stairs leading to or from floors, platforms, or pits. This section does not apply to stairs used for fire exit purposes, to construction operations, to private residences, or to articulated stairs, such as may be installed on floating roof tanks or on dock facilities, the angle of which changes with the rise and fall of the base support. (4-7-83)

03. Where Fixed Stairs are Required. Fixed stairs shall be provided for access from one structure level to another where operations necessitate regular travel between levels, and for access to operating platforms at any equipment which requires attention routinely during operations. Fixed stairs shall also be provided where access to elevations is daily or at each shift for such purposes as gauging, inspection, regular maintenance, etc., where such work may expose employees to acids, caustics, gases, or to the harmful substances, or for which purposes the carrying of tools or equipment by hand is normally required. (It is not the intent of this section to preclude the use of fixed ladders for access to elevated tanks, towers and similar structures, overhead traveling cranes, etc., where the use of fixed ladders is common practice.) Spiral stairways shall not be permitted except for special limited usage and secondary access situations where it is not practical to provide a conventional stairway. Winding stairways may be installed on tanks and similar round structures where the diameter of the structure is not less than five (5) feet. (4-7-83)

04. Stair Strength. Fixed stairways shall be designed and constructed to carry a load of five times the normal live load anticipated but never of less strength than to carry safely a moving concentrated load of 1,000 pounds. (4-7-83)

05. Stair Width. Fixed stairways shall have a minimum width of 22 inches. (4-7-83)

06. Angle of Stairway Rise. Fixed stairs shall be installed at angles to the horizontal of between 30 and 50. Any uniform combination of rise/tread dimensions may be used that will result in a stairway at any angle to the horizontal within the permissible range. Table 072.07-A gives rise/tread dimensions which will produce a stairway within the permissible range, stating the angle to the horizontal produced by each combination. However, the rise/tread combinations are not limited to those given in Table 072.07-A. (4-7-83)

07. Stair Treads. Each tread and the top landing of a stairway, where risers are used, should have a nose which expands one-half inch to 1 inch beyond the face of the lower riser. Noses should have an even leading edge. All treads shall be reasonably slip-resistant and the nosings shall be of nonslip finish. Welded bar grating treads without nosings are acceptable providing the leading edge can be readily identified by personnel descending the stairway and provided the tread is serrated or is of definite nonslip design. Rise height and tread width shall be uniform throughout any flight of stairs including any foundation structure used as one or more treads of the stairs. (4-7-83)

TABLE 072.07-A

Angle to Horizontal	Rise (in inches)	Tread run (In inches)
30Deg 35'	6 1/2	11
32Deg 08'	6 3/4	10 3/4
33Deg 41'	7	10 1/2
35Deg 16'	7 1/4	10 1/4
36Deg 52'	7 1/2	10
38Deg 29'	7 3/4	9 3/4
40Deg 08'	8	9 1/2
41Deg 44'	8 1/4	91/4
43Deg 22'	8 1/2	9
45Deg 00'	8 3/4	8 3/4
46Deg 38'	9	8 1/2
48Deg 16'	9 1/4	8 1/4
49Deg 54'	9 1/2	8

08. Length of Stairways. Long flights of stairs, unbroken by landings or intermediate platforms, should be avoided. Consideration should be given to providing intermediate platforms where practical and where such stairways are in frequent use. Stairway platforms shall be no less than the width of a stairway and a minimum of 30 inches in length measured in the direction of travel. (4-7-83)

09. Railings and Handrails. Standard railings shall be provided on the open sides of all exposed stairways and stair platforms. Handrails shall be provided on at least one side of closed stairways, preferably on the right side descending. Stair railings and handrails shall b installed in accordance with the provisions of Sections 071.01 through 071.07 of this Code. (4-7-83)

10. Vertical Clearance. Vertical clearance above any stair tread to an overhead obstruction shall be at least seven (7) feet measured from the leading edge of the tread. (4-7-83)

11. Open Riser. Stairs having treads of less than 9-inch width should have open risers. (4-7-83)

12. General. Open grating type treads are desirable for outside stairs. (4-7-83)

073. OTHER WORKING SURFACES.

01. Dockboards (bridge plates). (4-7-83)

a. Portable and powered dockboards shall be strong enough to carry the load imposed on them. (4-7-83)

b. Portable dockboards shall be secured in position, either by being anchored or equipped with devices which will prevent their slipping. (4-7-83)

c. Powered dockboards shall be designed and constructed in accordance with Commercial Standard CS202-56 (1961) "Industrial Lifts and Hinged Loading Ramps: published by the U. S. Department of Commerce.

(4-7-83)

d. Handholds, or other effective means, shall be provided on portable dockboards to permit safe handling. (4-7-83)

e. Positive protection shall be provided to prevent railroad cars from being moved while dockboards or bridge plates are in position. (4-7-83)

02. Forging Machine Area. (7-1-93)

a. Machines shall be so located as to give enough clearance between machines so that the movement of one operator will not interfere with the work of another, and ample room for cleaning machines and handling the work, including material and scrap. (4-7-83)

b. The arrangement of machines shall be such that operators will not stand in aisles. (4-7-83)

c. Aisles shall be provided of sufficient width to permit the free movement of employees bringing and removing material. This aisle space is to be independent of working and storage space and should be defined by marking. (4-7-83)

d. Wood platforms used on the floor in front of machines shall be substantially constructed with nonslip surfaces. (4-7-83)

03. Veneer Machinery. (4-7-83)

a. Sides of steam vats shall extend to a height of not less than 36 inches above the floor, working platform, or ground. (4-7-83)

b. Large steam vats divided into section shall be provided with substantial walkways between sections. Each walkway shall be provided with a standard handrail on each exposed side. These handrails may be removable, if necessary. (4-7-83)

c. Covers shall be removed only from that portion of steaming vats on which men are working and a portable railing shall be placed at this point to protect the operators. (4-7-83)

d. Workmen shall not ride or step on logs in steam vats. (4-7-83)

074. -- 079. (RESERVED)

080. WORKPLACES, SANITATION AND VENTILATION.

01. Sanitation. (4-7-83)

a. Note: Rules and regulations of the State Board of Health Governing Sanitation of Places of Work shall be complied with by every employer and shall be enforced as provided for by statute law. (4-7-83)

02. Scope. This chapter includes and applies to all permanent places of employment except where domestic, mining, or agricultural work only is performed. Measures for the control of toxic materials are considered to be outside the scope of this section. (4-7-83)

03. Definitions. The following definitions are applicable to all sections of this chapter. (4-7-83)

a. "Lavatory" means a basin or similar vessel used exclusively for washing of the hands, arms, face and head. (4-7-83)

b. "Nonwater carriage toilet facility" means a toilet facility not connected to a sewer. (4-7-83)

c. "Number of employees" means, unless otherwise specified, the maximum number of employees present at any one time on a regular shift. (4-7-83)

d. "Personal service room" means a room used for activities not directly connected with the production or service function performed by the establishment. Such activities include but are not limited to, first aid, medical services, dressing, showering, toilet use, washing and eating. (4-7-83)

e. "Potable water" means water which meets the quality standards prescribed in the U. S. Public Health Service Drinking Standards, published in 42 CFR Part 72 or water which is approved for drinking purposes by the State or local authority having jurisdiction. (4-7-83)

f. "Toilet facility" means a fixture maintained within a toilet room for the purpose of defecation or urination, or both. (4-7-83)

g. "Toilet room" means a room maintained within or on the premises of any place of employment containing toilet facilities for use by employees. (4-7-83)

h. "Toxic material" means a material in concentration or amount which exceeds the applicable limit established by a standard, or, in the absence of an applicable standard, which is of such toxicity so as to constitute a recognized hazard that is causing or is likely to cause death or serious physical harm. (4-7-83)

i. "Urinal" means a toilet facility maintained within a toilet room for the sole purpose of urination. (4-7-83)

j. "Water closet" means a toilet facility maintained within a toilet room for the purpose of both defecation and urination and which is flushed with water. (4-7-83)

k. "Wet process" means any process or operation in a workroom which normally results in surfaces upon which employees may walk or stand becoming wet. (4-7-83)

04. General Requirements. Housekeeping. (4-7-83)

a. All places of employment shall be kept clean to the extent that the nature of the work allows. (4-7-83)

b. The floor of every work room shall be maintained so far as practicable in a dry condition. Where wet processes are used, drainage shall be maintained and false floors, platforms, mats, or other dry standing places shall be provided, where practicable, or appropriate waterproof footgear shall be provided. (4-7-83)

c. To facilitate cleaning, every floor, working place and passageway shall be kept free from protruding nails, splinters, loose boards and unnecessary articles, holes and openings. (4-7-83)

d. Cleaning and sweeping shall be done in such a manner as to minimize the contamination of the air with dust and so far as is practicable, shall be done outside of working hours. (4-7-83)

05. Water Supply. (4-7-83)

a. Potable Water. (4-7-83)

i. Potable water shall be provided in all places of employment for drinking, washing of the person, cooking, washing of foods, washing of cooking or eating utensils, washing of food preparation or processing premises and personal service rooms. (4-7-83)

ii. Drinking fountain surfaces which become wet during fountain operation shall be constructed of materials impervious to water and not subject to oxidation. The nozzle of the fountain shall be at an angle and so located to prevent the return of water in the jet or bowl to the nozzle orifice. A guard shall be provided over the nozzle to prevent contact with the nozzle by the mouth or nose of persons using the drinking fountain. The drain from the

bowl of the fountain shall not have a direct physical connection with a waste pipe, unless it is trapped. (4-7-83)

iii. Portable drinking water dispensers shall be designed, constructed and serviced so that sanitary conditions are maintained, shall be capable of being closed, and shall be equipped with a tap. (4-7-83)

iv. Ice in contact with drinking water shall be made of potable water and maintained in a sanitary condition. (4-7-83)

v. Open containers such as barrels, pails, or tanks for drinking water from which the water must be dipped or poured, whether or not they are fitted with a cover, are prohibited. (4-7-83)

vi. A common drinking cup and other common utensils are prohibited. (4-7-83)

vii. Where single service cups (to be used but one) are supplied, both a sanitary container for the unused cups and a receptacle for disposing of the used cups shall be provided. NOTE: Drinking water should be made available within 200 feet of any location at which employees are regularly engaged in work. (4-7-83)

b. Nonpotable Water. (4-7-83)

i. Outlets for nonpotable water, such as water for industrial or fire fighting purposes shall be posted or otherwise marked in a manner that will indicate clearly that the water is unsafe and is not to be used for drinking, washing of the person, cooking, washing of food, washing of cooking or eating utensils, washing of food preparation or processing premises or personal service rooms, or for washing clothes. (4-7-83)

ii. Construction of nonpotable water systems carrying any other nonpotable substance shall be such as to prevent backflow or back siphonage into a potable water system. (4-7-83)

iii. Nonpotable water shall not be used for washing any portion of the person, cooking or eating utensils, or clothing. Nonpotable water may be used for cleaning work premises, other than food processing and preparation premises and personal service rooms, provided, that this nonpotable water does not contain concentrations of chemicals, fecal coliform, or other substances which could create unsanitary conditions or be harmful to employees. (4-7-83)

06. Toilet Facilities. (4-7-83)

a. General. (4-7-83)

i. Except as otherwise indicated in this subsection, toilet facilities, in toilet rooms separate for each sex, shall be provided in all places of employment in accordance with Table 606-A. The number of facilities to be provided for each sex shall be based on the number of employees of that sex for whom the facilities are furnished. Where toilet rooms will be occupied by no more than one person at a time, can be locked from the inside and contain at least one water closet, separate toilet rooms for each sex need not be provided. Where such single-occupancy rooms have more than one toilet facility only one such facility in each toilet room shall be counted for the purpose to Table 606-A. (4-7-83)

ii. Where toilet facilities will not be used by women, urinals may be provided instead of water closets in such cases shall not be reduced to less than 2/3 of the minimum specified.

Table 606-A

NUMBER OF EMPLOYEES	MINIMUM NUMBER OF WATER CLOSETS
1 to 15	1
16 to 35	2

NUMBER OF EMPLOYEES	MINIMUM NUMBER OF WATER CLOSETS
36 to 55	3
56 to 80	4
81 to 110	5
111 to 150	6
Over 150	One additional fixture for each 40 additional employees

iii. The requirements of subsection i, of this section do not apply to mobile crews or to normally unattended work locations so long as employees working at these locations have transportation immediately available to nearby toilet facilities which meet the other requirements of this section. (4-7-83)

iv. The sewage disposal method shall not endanger the health of employees. (4-7-83)

v. When persons other than employees are permitted the use of toilet facilities on the premise, the number of such facilities shall be appropriately increased in accordance with Table 606-A of this section in determining the minimum number of toilet facilities required. (4-7-83)

vi. Toilet paper with holder shall be provided for every water closet. (4-7-83)

vii. Covered receptacles shall be kept in all toilet rooms used by women. (4-7-83)

viii. For each three required toilet facilities at least one lavatory shall be located either in the toilet room or adjacent thereto. Where only one or two toilet facilities are provided at least one lavatory so located shall be provided. (4-7-83)

b. Construction of toilet rooms. (4-7-83)

i. Each water closet shall occupy a separate compartment with a door and walls or partitions between fixtures sufficiently high to assure privacy. (4-7-83)

ii. The floors, walls, ceilings partitions and doors of all toilet rooms shall be of a finish that can be easily cleaned. In installations made on or after August 31, 1980, cove bases shall be provided to facilitate cleaning. (4-7-83)

c. Construction and installation of toilet facilities. (4-7-83)

i. Every water carriage toilet facility shall be set entirely free and open from all enclosing structures and shall be so installed that the space around the facility can be easily cleaned. This provision does not prohibit the use of wall-hung-type water closets or urinals. (4-7-83)

ii. Every water closet shall have a hinged seat made of substantial material having a nonabsorbent finish. (4-7-83)

iii. Nonwater carriage toilet facilities and disposal systems shall be in accordance with Sections 1713 through 1719 in Chapter P of this Code. (4-7-83)

07. Washing Facilities. (4-7-83)

a. General. Facilities for maintaining personal cleanliness shall be provided in every place of employment pursuant to the provisions of this section. These shall be convenient for the employees for whom they are provided and shall be maintained in a sanitary condition. (4-7-83)

b. Lavatories. (4-7-83)

i. Lavatories shall be made available in all places of employment in accordance with the requirements for lavatories as set forth in Table 607-A. In a multiple-use lavatory, 24 lineal inches of wash sink or 20 inches of a circular basin, when provided with water outlets for each space, shall be considered equivalent to one lavatory. The requirements of this subsection do not apply to mobile crews or to normally unattended work locations if employees working at these locations have transportation readily available to nearby washing facilities which meet the other requirements of this section. (4-7-83)

Table 607-A

Type of Employment	Number of employees	Minimum number of lavatories
Nonindustrial: office buildings public buildings and similar establishments Over 125	1 to 15	1
	16 to 35	2
	36 to 60	3
	61 to 90	4
	91 to 125	5
	for each additional 45 employees	1 additional fixture
Industrial: factories warehouses, loft buildings and similar establishments	1 to 100	1 fixture for. Each 10 employees
	Over 125	1 fixture for each additional 15 employees.

ii. Each lavatory shall be provided with hot and cold running water, or tepid running water. (4-7-83)

iv. Individual hand towels or sections thereof, of cloth or paper, warm air blowers or clean individual sections of continuous cloth toweling, convenient to the lavatories, shall be provided. (4-7-83)

v. Receptacles shall be provided for disposal of used towels. (4-7-83)

vi. Warm air blowers shall provide air at not less than 90 F and shall have means to automatically prevent the discharge of air exceeding 140 F. (4-7-83)

vii. Electrical components of warm air blowers shall meet the requirements of the National Electrical Code. (4-7-83)

c. Showers. (4-7-83)

i. Whenever showers are required by a particular standard, the showers shall be provided, in accordance with subdivision ii. through v. of this section. (4-7-83)

ii. One shower shall be provided for each 10 employees of each sex or numerical fraction thereof, who are required to shower during the same shift. (4-7-83)

iii. Body soap or other appropriate cleansing agents convenient to the showers shall be provided as specified in this section. (4-7-83)

iv. Showers shall be provided with hot and cold water feeding a common discharge line. (4-7-83)

v. Employees who use showers shall be provided with individual clean towels. (4-7-83)

08. Change rooms. (4-7-83)

a. Whenever employees are required by a particular standard to wear protective clothing because of the possibility of contamination with toxic materials, change rooms equipped with storage facilities for street clothes and separate storage facilities for the protective clothing shall be provided. (4-7-83)

b. Clothes drying Facilities. Where working clothes are provided by the employer and become wet or are washed between shifts, provisions shall be made to insure that such clothing is dry before reuse. (4-7-83)

09. Consumption of Food and Beverages on the Premises. (4-7-83)

a. Application. This section shall apply only where employees are permitted to consume food or beverages, or both, on the premises. (4-7-83)

b. Eating and Drinking areas. No employee shall be allowed to consume food or beverages in a toilet room nor in any area exposed to a toxic material. (4-7-83)

c. In every establishment where there is exposure to injurious dusts or other toxic materials, a separate lunch room shall be maintained unless it is convenient for the employees to lunch away from the premises. (4-7-83)

d. Waste Disposal Containers. Receptacles, constructed of smooth, corrosion resistant, easily cleanable, or disposable materials, shall be provided and used for the disposal of waste food. The number, size and location of such receptacles shall encourage their use and not result in overfilling. They shall be emptied not less frequently than once each working day, unless unused, and shall be maintained in a clean and sanitary condition. Receptacles shall be provided with a solid tight fitting cover unless sanitary conditions can be maintained without use of a cover. (4-7-83)

e. Sanitary Storage. No food or beverages shall be stored in toilet rooms or in an area exposed to a toxic material. (4-7-83)

f. Food Handling. All employee food service facilities and operations shall be carried out in accordance with regulations and Standard for Food Service Establishments. In all places of employment where all or part of the food service is provided, the food dispensed shall be wholesome, free from spoilage, and shall be processed, prepared, handled and stored in such a manner as to be protected against contamination. (4-7-83)

10. Waste Disposal. (4-7-83)

a. Any receptacle used for putrescible solid or liquid waste or refuse shall be so constructed that it does not leak and may be thoroughly cleaned and maintained in a sanitary condition. Such a receptacle shall be equipped with a solid tight-fitting cover, unless it can be maintained in a sanitary condition without a cover. This requirement does not prohibit the use of receptacles which are designed to permit the maintenance of a sanitary condition without regard to the aforementioned requirements. (4-7-83)

b. All Sweepings solid or liquid wastes, refuse and garbage shall be removed in such a manner as to avoid creating a menace to health and as often as necessary or appropriate to maintain the place of employment in a sanitary condition. (4-7-83)

11. Vermin Control. Every building shall be so constructed, equipped and maintained so as to restrict the entrance or harborage of rodents, insects and other vermin. A continuing and effective extermination program shall be instituted where their presence is detected. (4-7-83)

12. Ventilation. (4-7-83)

a. Ventilation shall be adequately provided for in all building and structures customarily used by human beings. Both natural ventilation or mechanically operated ventilating systems shall be utilized. In areas where toxic and noxious and/or objectionable fumes are present, ventilation shall be to the outside of the building. (4-7-83)

b. In the control of those occupational diseases caused by breathing air contaminated with harmful dusts, fogs, fumes, mists, gases, smokes, sprays or vapors, the primary objective shall be to prevent atmospheric contamination. This shall be accomplished as far as feasible by accepted engineering control measures (for example, enclosure or confinement of the operation, general and local ventilation, and substitution of less toxic materials). (4-7-83)

c. For proper ventilation in specific occupancies, refer to UBC 1979 for minimum air changes as required. (4-7-83)

d. Ventilation shall be required to remove carbon-monoxide fumes from any area within a building in which motor vehicles are being operated under their own power. Carbon-monoxide levels within a building or area thereof shall not exceed the TLV in Table 1805-A in Chapter R of this Code. (4-7-83)

13. Lighting and Illumination. Windows, skylights and light reflectors shall be maintained in reasonably clean condition, and work places shall be illuminated in accordance with the nature of the operation. See Table 613-A. (4-7-83)

TABLE 613-A
LEVELS OF ILLUMINATION RECOMMENDED FOR SAMPLE OCCUPATIONAL TASKS

Area	Foot-Candles
Assembly - rough, easy seeing	30
Assembly - medium	100
Building Construction - general	10
Electrical equipment, testing	100
Elevators	20
Garages - repair areas	100
Garages - traffic areas	20
Inspection, ordinary	50
Inspection, highly difficult	200
Loading platforms	20
Machine shops - medium work	100
Materials - loading, trucking	20
Offices - general areas	100
Drafting rooms - details	200
Corridors	20

Area	Foot-Candles
Paint dipping, spraying	50
Service spaces - wash rooms, etc.	30
Sheet metal - presses, shears	50
Storage Rooms - inactive	5
Storage rooms - active, medium	20
Welding - general	50
Woodworking - rough sawing	30

081. -- 089. (RESERVED).

090. ASSEMBLY OCCUPANCIES, GENERAL.

01. General Assembly Occupancies Shall Conform to all Other Applicable Requirements of this Code, as well as the Following Provisions. (4-7-83)

02. Application. (4-7-83)

a. Places of assembly include, but are not limited to, all buildings or portions of buildings used for gathering together 50 or more persons for such purposes as deliberation, worship, entertainment, amusement, or awaiting transportation. (4-7-83)

b. Assembly occupancies include: (4-7-83)

i. Theaters. (4-7-83)

ii. Motion picture theaters. (4-7-83)

iii. Assembly halls. (4-7-83)

iv. Auditoriums. (4-7-83)

v. Exhibition halls. (4-7-83)

vi. Museums. (4-7-83)

vii. Skating rinks. (4-7-83)

viii. Gymnasiums. (4-7-83)

ix. Bowling lanes. (4-7-83)

x. Pool rooms. (4-7-83)

xi. Armories. (4-7-83)

xii. Restaurants. (4-7-83)

xiii. Churches. (4-7-83)

xiv. Dance halls. (4-7-83)

xv. Club rooms. (4-7-83)

xvi. Passenger stations and terminals. (4-7-83)

xvii. Recreation piers. (4-7-83)

xviii. Courtrooms. (4-7-83)

xvix. Conference rooms. (4-7-83)

xx. Drinking establishments. (4-7-83)

xxi. Mortuary chapels. (4-7-83)

03. Exits. (7-1-93)

a. The main exit shall be of sufficient width to accommodate one-half of the total occupant load but shall be not less than the total required width of all aisles, exit passageways and stairways leading thereto and shall connect to a stairway or ramp leading to a public way. (4-7-83)

b. Balcony Exits. Every balcony having an occupant load of more than 10 shall be provided with a minimum of two exits. (4-7-83)

04. Panic Hardware. (4-7-83)

a. Exit doors in an assembly occupancy having an occupant load of more than 50 shall not be provided with a latch or lock unless it is panic hardware. (4-7-83)

b. Exception: Such occupancies as restaurants, bars, bowling alleys, auditoriums and similar commercial uses, and in churches, panic hardware may be omitted from the main exit when the main exit consists of a single door or one pair of doors. A key locking device may be used in place of the panic hardware, provided there is a readily visible metallic sign adjacent to the doorway stating, "THIS DOOR MUST REMAIN UNLOCKED DURING BUSINESS HOURS." (4-7-83)

05. Protection of Vertical Openings. (4-7-83)

a. All interior stairways and other vertical openings shall be enclosed and protected as provided in Chapter E of this code. (4-7-83)

b. Exception: Stairs may be open between balconies and main assembly floors in theaters, churches, or auditoriums where the travel distance is within the allowable limits. (4-7-83)

06. Protection from Hazards. (7-1-93)

a. All exterior openings in a boiler room or room containing central heating equipment if located below openings in another story or if less than 10 feet from other doors or windows of the same building shall be protected by a fire assembly having a three-fourths hour fire-protection rating. Such fire assemblies shall be fixed, automatic, or self-closing. Every room containing a boiler or central heating plant shall be separated from the rest of the building by not less than a one-hour fire-resistive occupancy separation. (4-7-83)

b. Exception: Boilers or central heating plants where the largest piece of fuel equipment does not exceed 400,000 BUT per hour input. (4-7-83)

07. Emergency Lighting. All places of assembly and their means of egress shall be provided with emergency lighting in accordance with Chapter B of this code. (4-7-83)

08. Special Hazards. (4-7-83)

a. Motion Picture Projection Rooms. The provisions of this section shall apply where ribbon-type cellulose acetate or other safety film is used in conjunction with electric arc, Xenon, or other light source projection equipment which develops hazardous gases, dust or radiation. Where cellulose nitrate film is used, projection rooms shall comply with the following: (4-7-83)

b. Projection Room Required. Every motion picture machine projecting film as mentioned within the scope of this chapter shall be enclosed in a projection room. Appurtenant electrical equipment, used in as rheostats, transformers and generators, may be within the projection room or in an adjacent room of equivalent construction. (4-7-83)

c. Construction. Every projection room shall be of permanent construction consistent with the construction requirements for the type of building in which the projection room is located. Openings need not be protected. (4-7-83)

d. The room shall have a floor area of not less than 80 square feet for a single machine and at least 40 square feet for each additional machine. Each motion picture projector, floodlight, spotlight or similar piece of equipment shall not be used unless approved and shall have a clear working space not less than 30 inches by 30 inches on each side and at the rear thereof, but only one such space shall be required between two adjacent projectors. (4-7-83)

e. The projection room and the rooms appurtenant thereto shall have a ceiling height of not less than 7 feet 6 inches. (4-7-83)

f. Projection Ports and Openings. The aggregate of openings for projection equipment shall not exceed 25% of the area of the wall between the projection room and the auditorium. All openings shall be provided with glass or other approved materials so as to completely close the opening. (4-7-83)

09. Ventilation. Ventilation shall be provided in accordance with the provisions of this section. (4-7-83)

a. Projection Booth. Supply Air. Each projection room shall be provided with two or more separate fresh-air inlet ducts with screened openings terminating within 12 inches of the floor and located at opposite ends of the room. Such air inlets shall be of sufficient size to permit an air change every three minutes. Fresh air may be supplied from the general building air-conditioning system, but when this is done, it shall be so arranged that the projection booth will continue to receive one change of air every three minutes, regardless of the status of the general air-conditioning system. (4-7-83)

b. Exhaust Air. Each projection room shall be provided with one or more exhaust-air outlets which may be manifolded into a single duct outside the booth. Such outlets shall be so located as to insure circulation throughout the room. Projection rooms exhaust air systems shall be independent of any other air systems in the buildings. Exhaust air ducts shall terminate at the exterior of the building in such a location that the exhaust air cannot be readily recirculated into the supply air system. The exhaust system shall be mechanically operated and of such a capacity as to provide a minimum of one change of air every three minutes. The blower motor shall be outside the duct system. The projection room ventilation system may also serve appurtenant rooms, such as the generator room and the rewind room. (4-7-83)

c. Projection Equipment Ventilation. Each projection machine shall be provided with an exhaust duct which will draw air from each lamp and exhaust it directly to the outside of the building in such a fashion that it will not be picked up by supply inlets. Such a duct shall be of rigid materials, except for a continuous flexible connector approved for the purpose. The lamp exhaust system shall not be interconnected with any other system. (4-7-83)

d. Electric Arc Projection Equipment. The exhaust capacity shall be 2000 cubic feet per minute for each lamp connected to the lamp exhaust system, or as recommended by the equipment manufacturer. Auxiliary air may be introduced into the system through a screened opening to stabilize the arc. (4-7-83)

e. Xenon Projection Equipment. The lamp exhaust system shall exhaust not less than 300 cubic feet

per minute per lamp nor less than that exhaust volume required or recommended by the equipment manufacturer, whichever is the greater. The external temperature of the lamp housing shall not exceed 130 F when operating. (4-7-83)

091. -- 099. (RESERVED).

100. DORMITORIES.
Dormitories shall conform to all other applicable requirements of this Code as well as the following provisions. (4-7-83)

01. Application. Dormitories include buildings or spaces in buildings where group sleeping accommodations are provided for persons not members of the same family group in one room or in a series of closely associated rooms under joint occupancy and single management, as in college dormitories, fraternity houses, military barracks, ski lodges; with or without meals, but without individual cooking facilities. (4-7-83)

02. Corridors and Doors. (4-7-83)

a. Each guest room shall be provided with a door and frame each having a fire protection rating of 20 minutes, and shall be equipped with a self-closing device. Exception: In existing buildings, previously approved 1 3/4 inch solid bonded wood core doors and frames may remain in use. (4-7-83)

b. No transom shall be installed in partitions of sleeping rooms in new buildings. In existing buildings, transoms shall be fixed in the closed position and shall be covered or otherwise protected to provide a fire resistance rating at least equivalent to that of the wall in which they are installed. (4-7-83)

03. Rescue and Ventilation. (4-7-83)

a. Every sleeping room below the fourth story shall have at least one operable window or exterior door approved for emergency egress or rescue. The units shall be operable from the inside to provide a full clear opening without the use of separate tools. (4-7-83)

b. All egress windows from sleeping rooms shall have a minimum net clearance opening of 5.7 square feet. The minimum net clear opening width dimension shall be 20 inches. Where windows are provided as a means of egress or rescue, they shall have a finished sill height not more than 44 inches above the floor. (4-7-83)

04. Protection of Vertical Openings. (4-7-83)

a. Every exit stair and other vertical openings shall be enclosed or protected in accordance with Chapter A of this Code. Exceptions: (4-7-83)

i. In existing buildings not more than two stories in height of any type of construction, the unprotected openings may be permitted if the building is protected by an automatic sprinkling system. (4-7-83)

ii. If every sleeping room or area has direct access to an outside exit without the necessity of passing through any corridor or other space exposed to any unprotected vertical opening and the building is equipped with an automatic fire detection system, unprotected openings may be permitted. (4-7-83)

05. Protection from Hazards. Every hazardous area shall be separated from other parts of the building by construction having a fire resistance rating of at least one hour and communicating openings shall be protected by approved automatic or self-closing fire doors, or such area shall be equipped with automatic fire protection. Hazardous areas include, but are not limited to: boiler and furnace rooms, laundries, repair shops, room or space used for storage of combustible supplies and equipment in quantities deemed hazardous by the authority having jurisdiction. (4-7-83)

06. Emergency Lighting. Any dormitory with over 25 rooms shall be equipped with emergency lighting in accordance with Chapter B. Exception: Where each guest room has a direct exit to the outside of the building at ground level. (4-7-83)

07. Fire Alarms. (4-7-83)

a. Every dormitory three stories or more in height and containing more than 15 sleeping rooms shall have an approved fire alarm system. (4-7-83)

b. Every dormitory and every room in a dormitory used for sleeping purposes shall be provided with smoke detectors. When actuated, the detector shall provide an alarm in the sleeping room. Exception: Where each sleeping room has a direct exit to the outside of the building and the building is 3 or less stories in height. (4-7-83)

101. -- 109. (RESERVED).

110. EDUCATIONAL OCCUPANCIES.

01. General. Educational occupancies shall conform to all other applicable requirements of this Code, as well as the following provisions. (4-7-83)

02. Application. Educational occupancies include all buildings used for the gathering of groups of 6 or more persons for purposes of instruction. Education occupancies include: schools, universities, colleges, academies, nursery schools, kindergartens, and child day care facilities. (4-7-83)

03. Special Provisions. Rooms used for kindergarten or first grade pupils shall not be located above or below the floor of exit discharge. Rooms used for second grade pupils shall not be located more than one story above the floor of exit discharge. (4-7-83)

04. Corridors. (4-7-83)

a. Width. The width of a corridor in an Educational Occupancy shall be no less than 6 feet wide. Exception: When the number of occupants served is less than 100, the corridor may be 44 inches wide. (4-7-83)

b. Drinking fountains or other equipment, fixed or movable, shall not be so placed as to obstruct the required minimum 6 foot corridor width. (4-7-83)

c. Doors which swing into an exit access corridor shall be recessed to prevent interference with corridor traffic; any doors not so recessed shall open 180 degrees to stop against the wall. Doors in any position shall not reduce the required corridor width by more than one-half. (4-7-83)

d. Length. Any interior corridor more than 300 feet in length shall be divided into reasonably equal sections not exceeding 300 feet in length by smoke partitions. (4-7-83)

e. Construction. Corridor walls and ceilings shall be of not less than one-hour fire-resistive construction with openings protected as required in Chapter B. (4-7-83)

f. Exception: When each room used for instruction has at least one exit door directly to the exterior at ground level and when rooms used for assembly purposes have at least one-half of the required exits directly to the exterior at ground level, one-hour fire-resistive construction of corridor walls and ceilings is not required. (4-7-83)

05. Protection From Hazards. (4-7-83)

a. Storage and janitor closets shall be of one-hour fire-resistive construction. (4-7-83)

b. Rooms or groups of rooms in which flammable liquids, combustible dust or similar hazardous materials are used, stored, developed or handled shall be separated from other portions of the building by not less than a one-hour fire-resistive occupancy separation. (4-7-83)

c. All exterior openings in a boiler room or rooms containing central heating equipment, if located below openings in another story or if less than 10 feet from other doors or windows of the same building, shall be

protected by a fire assembly having a three-fourths-hour fire-protection rating. Such fire assemblies shall be fixed, automatic, or self-closing. Every room containing a boiler or central heating plant shall be separated from the rest of the building by not less than a one-hour fire-resistive occupancy separation. Exception: Boilers are central heating plants where the largest piece of fuel equipment does not exceed 400,000 BTU per hour input. (4-7-83)

d. Classes of instruction are not permitted to be conducted in areas deemed to be hazardous and not designed for classes of instruction such as, but not limited to boiler or furnace rooms, mechanical rooms, electrical rooms, kitchens, janitor closets., etc. (4-7-83)

06. Exits. (4-7-83)

a. Exits shall be so arranged that at least 2 separate exits will be available from every floor area. Exits shall be remote from each other as practicable. (4-7-83)

b. Open plan schools shall have furniture, fixtures, or low height partitions so arranged that exits will be clearly visible and unobstructed, and exit paths are direct, not circuitous. If paths or corridors are established, they shall be not less than 6 feet wide. Exception: When the number of occupants served is less than 100, the corridor may be 44 inches wide. (4-7-83)

c. Exits through adjoining rooms.interior rooms may exit through adjoining or intervening rooms, provided the total distance of travel does not exceed 150 feet in an unsprinklered building or 225 feet in a fully sprinklered building, and is a direct, obvious and unobstructed means of travel. Such paths of exit travel shall not pass through kitchens, storerooms, rest rooms, closets, laboratories using hazardous materials, industrial shops or other similar spaces. (4-7-83)

d. Foyers and lobbies constructed as required for exit corridors shall not be construed as adjoining or intervening rooms. (4-7-83)

e. Where the only means of exit from a room is through an adjoining or intervening room, smoke detectors shall be installed in the area of the common atmosphere through which the exit must pass. The detectors shall actuate alarms audible in the interior room and shall be connected to the school fire alarm system. Exceptions: (4-7-83)

i. Where the aggregate occupant load of the interior room or rooms is less than 10. (4-7-83)

ii. Where the enclosures forming interior rooms are less than two-thirds of the floor-to-ceiling height and do not exceed 8 feet. (4-7-83)

iii. Rooms used exclusively for mechanical and public utility service to the buildings. (4-7-83)

f. Each room having an occupant load of more than 100 shall be located at the floor of exit discharge. Exceptions: Buildings of fire-resistive construction. (4-7-83)

07. Exit stairs. There shall be no enclosed usable space under stairs in an exit enclosure nor shall the open space within the enclosure either under or adjacent to the stairs be used for any purpose. (4-7-83)

08. Panic Hardware. Exit doors from rooms having an occupant load of more than 50 and from corridors shall not be provided with a latch or lock unless it is panic hardware. (4-7-83)

09. Fences and Gates. School grounds may be fenced in and gates equipped with locks, provided safe dispersal areas located not less than 50 feet from the buildings are available for persons between buildings and fence. Dispersal areas shall be based upon an area of not less than 3 square feet per occupant. Gates shall not be permitted across corridors or passageways leading to such dispersal areas unless they comply with exit requirements. (4-7-83)

10. Windows for Rescue and Ventilation. (4-7-83)

a. Every room or space used for classroom or other educational purposes, or normally subject to

student occupancy, shall have at least one outside window used for emergency rescue or ventilation. Such window shall be operable from the inside without the use of tools, and providing a clear opening of not less than 20 inches in width, 24 inches in height and 5.7 square feet in area. The bottom of the opening shall be not more than 44 inches above the floor. (4-7-83)

b. Exceptions: (7-1-93)

i. In buildings with a complete approved extinguishing system. (4-7-83)

ii. Where the room or space has a door leading directly to the outside of the building. (4-7-83)

11. Emergency Lighting. In every building or structure used for night occupancy, all portion of the building that are interior and windowless, such as rooms, stairs, areas, or corridors, shall be provided with emergency lighting in accordance with Chapter B, Means of Egress, Section 229. (4-7-83)

12. Fire Alarms. (4-7-83)

a. Approved fire alarms shall be provided for all Educational Occupancies with an occupant load of more than 50 persons. In every Educational Occupancy provided with an automatic sprinkler or detection system shall automatically activate the school fire alarm system, which shall include an alarm mounted on the exterior of the building. (4-7-83)

b. There shall be at least 8 fire exit drills a year in schools through grade 12. (4-7-83)

c. Drills shall be executed at different hours of the day or evening; during the changing of classes, when the schools are at assembly, during the recess or gymnastic periods, etc., so as to avoid distinction between drills and actual fires. (4-7-83)

13. Signals. (4-7-83)

a. All fire exit drill alarms shall be sounded on the fire alarm system and not on the signal system used to dismiss classes. (4-7-83)

b. In order that pupils will not be returned to a building which is burning, the recall signal shall be one that is separate and distinct from and cannot be mistaken for any other signal. (4-7-83)

14. Science Room Safety, Rules and Regulations. (4-7-83)

a. Unlabeled, contaminated or undesirable chemicals shall be disposed of in accordance with approved practices. Chemicals shall be disposed of upon expiration of their shelf life. (4-7-83)

b. Students should not work in the laboratory without an instructor or laboratory assistance present. (4-7-83)

c. Laboratories should not be used as eating places. Chemicals, food, drink or other materials shall not be sampled. Refrigerators shall not be used for food storage. (4-7-83)

d. Laboratories shall have a fire blanket, and approved fire extinguisher(s). (4-7-83)

e. Laboratories should have a spill control center equipped with commercial spill control products, fine clay, kitty litter, or vermiculite. The storeroom floor should be equipped with a drain of sufficient capacity to provide fast and thorough flushing of spilled reagents. (4-7-83)

f. The storeroom floor should not be used as a storage area. (4-7-83)

g. The chemical storage cabinets or storage room should be kept under lock and key and controlled by the instructor. (4-7-83)

h. Poisons should be marked with a skull and crossbones and the word "Poison". (4-7-83)

i. Heavy bottles and large bottles of acids should be stored near the floor and protected from breakage. (4-7-83)

j. Chemicals should not be stored above eye level. (4-7-83)

k. Chemicals which react with each other should not be stored in close proximity. (4-7-83)

l. Adequate shelving shall be provided to prevent the chemicals from becoming overcrowded and inaccessible. (4-7-83)

m. An inventory, which is updated periodically, of all chemicals should be maintained. (4-7-83)

n. Only small amounts of hazardous, explosive or dangerous chemicals should be kept on hand. (4-7-83)

o. Laboratory storage rooms should have manual ventilation. (4-7-83)

p. Every chemical laboratory shall also be equipped with the following: (4-7-83)

i. Fume hood. (4-7-83)

ii. Emergency eye wash. (4-7-83)

iii. Emergency overhead shower. (4-7-83)

iv. Protective lip in chemical shelving. (4-7-83)

111. -- 119. (RESERVED).

120. HEALTH CARE OCCUPANCIES.

01. General. Proof or documentation that health care facilities have been inspected by the authorities having jurisdiction and meeting the requirement of NFPA-56A or other rules or regulations shall be made available. Health care occupancies shall conform to all other applicable requirements of this Code, as well as the following provisions. (4-7-83)

02. Application. (4-7-83)

a. Health care occupancies are those used for purposes such as medical or other treatment or care of persons suffering from physical or mental illness, disease or infirmity; for the care of infants, convalescents or aged persons. Health care occupancies provide sleeping facilities for the occupants and are occupied by persons who are mostly incapable of self-preservation because of age, physical or mental disability or because of security measures not under the occupants control. (4-7-83)

b. Health care occupancies are treated in the Code in the following groups: (4-7-83)

i. Health Care Facilities: Hospitals, Nursing Homes. (4-7-83)

ii. Residential-custodial care: Nurseries, Homes for the aged, mentally retarded care institutions. (4-7-83)

03. Total Concept. All health care facilities shall be so designed, constructed, maintained, and operated as to minimize the possibility of a fire emergency requiring the evacuation of occupants. Because the safety of occupants of health care facilities cannot be assured adequately by dependence on evacuation of the building, their

protection from fire shall be provided by appropriate arrangement of facilities, adequate staffing, and careful development of operating and maintenance procedures composed of the following: (4-7-83)

a. Proper design, construction, and compartmentation. (4-7-83)

c. Fire prevention and the planning, training, and drilling in programs for the isolation of fire, transfer of occupants to areas of refuge or evacuation of the building. (4-7-83)

04. Special Definitions. (4-7-83)

a. Hospital: A building or part thereof used for the medical, psychiatric, obstetrical or surgical care, on a 24-hour basis of 4 or more inpatients. Hospital, wherever used in this code shall include general hospitals, mental hospitals, tuberculosis hospitals, children's hospitals and any such facilities providing inpatient care. (4-7-83)

b. Nursing Home: A building or part thereof used for the lodging, boarding and nursing care, on a 24-hour basis, of 4 or more persons who, because of mental or physical incapacity, may be unable to provide the assistance of another person. Nursing home, wherever used in this Code, shall include nursing facilities, intermediate care facilities, and infirmaries or homes for the aged. (4-7-83)

c. Residential-Custodial Care Facility: A building or part thereof, used for the lodging or boarding of 4 or more persons who are incapable of self-preservation because of age, or physical or mental limitation. This includes facilities such as homes for the aged, nurseries (custodial care for children under 6 years of age), and mentally retarded care institutions. Day care facilities that do not provide lodging or boarding for institutional occupants are not covered in this section of the Code. (4-7-83)

05. Doors. (4-7-83)

a. Exterior Doors: All required exterior doors shall open in the direction of exit travel, regardless of occupant load. (4-7-83)

b. Panic Hardware: Exit doors serving an occupant load of more than 50 shall not be provided with a latch or lock unless it is panic hardware. (4-7-83)

c. Locks installed on patient sleeping room doors shall be so arranged that they can be locked only from the corridor side. All such locks shall be arranged to permit exit from the rooms by a simple operation without the use of a key. Exception: Doors in homes for the aged may be lockable by the occupant, if they can be unlocked from the opposite side and keys are carried by attendants at all times. (4-7-83)

d. Width: Every exit opening through which patients are transported in wheelchairs, stretchers or beds shall be of sufficient width to permit the ready passage of such equipment but shall have a clear width of not less than 44 inches. (4-7-83)

06. Corridors. The minimum clear width of a corridor shall be 44 inches, except that corridors serving any area housing one or more non-ambulatory persons shall be not less than 8 feet in width. There shall be no change of elevation in a corridor serving persons who are not ambulatory, unless ramps are used. (4-7-83)

07. Protection from Hazards. (4-7-83)

a. Any hazardous area shall be safeguarded in accordance with Section 208 in Chapter B of this code. Hazardous areas include, but are not limited to: Boiler and furnace rooms, laundries, kitchens, repair shops, handicraft shops, employees locker rooms, soiled linen rooms, print shops, rooms or spaces used for the storage of combustible supplies and equipment in quantities deemed hazardous, trash collection rooms, and gift rooms. (4-7-83)

b. All exterior openings in a boiler room containing central heating equipment if located below openings in another story, or if less than 10 feet from other doors or windows of the same building, shall be protected by a fire assembly having a three-fourths hour fire protection rating. Such fire assemblies shall be fixed, automatic, or self-closing. Every room containing a boiler or central heating equipment shall be separated from the rest of the

building by not less than a one-hour fire resistive occupancy separation. Exception: Boilers or central heating plants where the largest piece of fuel equipment does not exceed 400,000 BTU's per hour input. (4-7-83)

08. Rescue and Ventilation. Every patient sleeping room shall have an outside window or door arranged and located to permit the venting of products of combustion and to permit any occupant to have access to fresh air in case of emergency. Exceptions: (4-7-83)

a. Rooms intended for occupancy of less than 24 hours, such as those housing obstetrical labor beds, recovery beds, observation beds in the emergency department and newborn nurseries. (4-7-83)

b. Buildings designed with an engineered smoke control system. (4-7-83)

09. Emergency lighting. Each health care facility shall be provided with emergency lighting. (4-7-83)

10. Fire alarms. An approved fire alarm system shall be provided for all Health Care Occupancies. Audible alarm devices shall be used in all non-patient areas. Visible alarm devices may be used in lieu of audible devices in patient occupied areas. (4-7-83)

121. -- 129. (RESERVED).

130. PENAL OCCUPANCIES.

01. General. Penal occupancies shall conform to all other applicable requirements of this Code, as well as the following provisions. (4-7-83)

02. Application. (4-7-83)

a. Penal Occupancies are those used to house occupants under some degree of restraint or security. Penal occupancies are occupied by persons who are mostly incapable of self preservation because of security measures not under the occupants' control. (4-7-83)

b. Penal occupancies are treated in the Code in the following groups: (4-7-83)

i. Penal institutions. (4-7-83)

ii. Reformatories. (4-7-83)

iii. Jails. (4-7-83)

iv. Prisons. (4-7-83)

v. Houses of correction. (4-7-83)

03. Total concept. (4-7-83)

a. All penal institutions shall be so designed, constructed, maintained and operated as to minimize the possibility of a fire emergency requiring the evacuation of occupants. Because the safety of occupants of penal facilities cannot be assured adequately by dependence on evacuation of the building, their protection from fire shall be provided by appropriate arrangement of facilities, adequate staffing, and careful development of operating and maintenance procedures composed of the following: (4-7-83)

iii. Fire prevention and the planning, training, and drilling in programs for the isolation of fire, transfer of occupants to areas of refuge or evacuation of the building. (4-7-83)

b. It shall be recognized that in buildings housing various types of psychiatric patients, or used as penal facilities, it may be necessary to lock doors and bar windows to confine and protect building inhabitants. (4-7-83)

c. In buildings in which doors are locked or windows are barred, provisions shall be made, on a 24-hour basis, for the rapid removal of occupants by such reliable means as the remote control of locks or by keying all locks to keys readily available to guards or attendants on duty. (4-7-83)

04. Doors. All required exterior exit doors shall open in the direction of exit travel, regardless of the occupant load. (4-7-83)

05. Corridors. In penal occupancies where open barred cells form corridor walls, the corridors and cell doors need not be fire resistive. (4-7-83)

06. Protection from Hazards. (4-7-83)

a. All exterior openings in a boiler room or room containing central heating equipment if located below openings in another story, or if less than 10 feet from other doors or windows of the same buildings, shall be protected by a fire assembly having a three-fourths-hour fire protection rating. Such fire assemblies shall be fixed, automatic or self-closing. Every room containing a boiler or central heating plant shall be separated from the rest of the building by not less than a one-hour fire-resistive occupancy separation. Exception: Boilers or central heating plants where the largest piece of fuel equipment does not exceed 400,000 BTU per hour input. (4-7-83)

07. Emergency Lighting. Emergency lighting shall be provided in all penal occupancies where inmates are housed overnight. (4-7-83)

08. Fire Alarms. An approved fire alarm system shall be provided for all penal occupancies. (4-7-83)

131. -- 139. (RESERVED).

140. PLAYGROUNDS: EQUIPMENT, FACILITIES AND GROUNDS.
All playground equipment, facilities and grounds shall be maintained in a safe and sanitary condition. They shall adhere to the applicable safety codes in Idaho Safety Code 1. Every person, firm, corporation, agency, subdivision, or unit of government who is the operator, owner, lessee, permittee, or licensee of any playground shall use safety devices and safeguards and shall adopt and use practices, means, methods, operations, and processes which are adequate to render such playgrounds safe. (4-7-83)

141. -- 149. (RESERVED).

150. ELECTRICAL.
Idaho Safety Code 1 adopts the Electrical Safety Requirements for Employee Workplaces. (1981 NFPA 70E) (4-7-83)

151. -- 159. (RESERVED).

160. OCCUPATIONAL NOISE EXPOSURE.

01. General. Protection against the effect of noise exposure shall be provided when the sound levels exceed those shown in Table 1401-A, when measured on the A scale of a standard sound level meter at slow response. When noise levels are determined by octave band analysis, the equivalent A-weighted sound level may be determined as follows: (4-7-83)

BAND CENTER FREQUENCY IN VCYCLES PER SECOND chart available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

02. Equivalent Sound Level Contours. Octave band sound pressure levels may be converted to the equivalent A-weighted sound level corresponding to the point of highest penetration into the sound level contours. This equivalent A-weighted sound level, which may differ from the actual A-weighted sound level of the noise, is used to determine exposure limits from Table 1401.A. (4-7-83)

03. Engineering Controls. When employees are subjected to sound exceeding those listed in Table 1401-A, feasible administrative or engineering controls shall be utilized. If such controls fail to reduce sound levels within the levels of Table 1401-A, proper protective equipment shall be provided and used to reduce sound levels within the levels of the Table. (4-7-83)

04. Variations in Level. If the variations in noise level involve maxima at intervals of 1 second or less, it is to be considered continuous. (4-7-83)

05. Hearing Conservation Program. In all cases where the sound levels exceed the values shown herein, a continuing effective hearing conservation program shall be administered. (4-7-83)

TABLE 1401-A
Permissible Noise Exposures*

Duration per day, hour	Sound Level dba slow response
8	90
6	92
4	95
3	97
2	100
1 1/2	102
1	105
1/2	110
1/4 or less	115

* When the daily noise exposure is composed of two or more periods of noise exposure of difference levels, their combined effect should be considered, rather than the individual effect of each. If the sum of the following fractions:C1/T1 + C2/T2 Cn/Tn exceeds unity, then the mixed exposure should be considered to exceed the limit value. Cn indicates the total time of exposure at a specified noise level, and Tn indicates the total time of exposure permitted at that level. (4-7-83)

06. Exposure to impulsive or impact noise should not exceed 140 dB peak sound pressure level. (4-7-83)

161. -- 169. (RESERVED).

170. SAFETY COLOR CODE FOR MARKING PHYSICAL HAZARDS.

01. Color Identification. (4-7-83)

a. Red. Red shall be the basic color for the identification of: (4-7-83)

i. Fire protection equipment and apparatus: (a) Fire alarm boxes (pull boxes). (b) Fire blanket boxes. (c)Fire buckets or pails. (d) Fire exit signs. (e) Fire extinguishers (if painting the extinguisher is impractical or undesirable, color should be used on the housing, wall, or support to identify the location). (f) Fire hydrants (industrial). (g) Fire pumps. (h) Fire sirens. (i) Post indicator valves for sprinkler system (it is suggested that if a traffic hazard is involved, the top should be colored red, and the barrel or post yellow and black stripes.) (j) Sprinkler piping. (see ANSI Standard Scheme for the identification of Pipe Systems, A13. 1-1956). (4-7-83)

ii. Danger. Safety cans or other portable containers of flammable liquids having a flashpoint at or below 80 F. Table containers of flammable liquids (open cup tester), excluding shipping containers, shall be painted red with some additional clearly visible identification either in the form of a yellow band around the can or the name of the contents conspicuously stenciled or painted on the can in yellow. Red lights shall be provided at barricades and at temporary obstruction, as specified in ANSI Safety Code for Building Construction, A10. 2-1944. Danger Signs shall be painted Red. (4-7-83)

iii. Stop. Emergency stop bars on hazardous machines such as rubber mills, wire blocks, flat work ironers, etc., shall be red. Stop buttons or electrical switches used for emergency stopping of machinery shall be red. (4-7-83)

b. Orange. Orange shall be used as the basic color for designating dangerous parts of machines or energized equipment which may cut, crush, shock, or otherwise injure and to emphasize such hazards when enclosure doors are open or when gear belt, or other guards around moving equipment are open or removed, exposing unguarded hazards. (4-7-83)

c. Yellow. Yellow shall be the basic color for designating caution and for marking physical hazards such as: striking against, stumbling, falling, tripping, and "Caught in between". Solid yellow, yellow and black stripes, yellow and black checkers (or yellow with suitable contrasting background) should be used interchangeably, using the combination which will attract the most attention in the particular environment. Yellow shall be the basic color for designating caution, limited to warning against the starting, the use of, or the movement of equipment under repair or being worked upon. (4-7-83)

d. Green. Green shall be used as the basic color for designating "safety" and the location of first aid equipment (other than firefighting equipment). (4-7-83)

e. Purple. Purple shall be the basic color for designating radiation hazards."Radiation" as used in this subdivision refers to radiation types such as x-rays, alpha, beta, gama, neutron, proton, deutron, and meson. Yellow should be used in combination with purple for markers such as tags, labels, signs and floor markers. (4-7-83)

f. Black, White, or Combinations of Black and White. Black, White or combination of these two, shall be the basic colors for the designation of traffic and housekeeping markings. Solid white, solid black, single color striping, alternate stripes of black and white, or black and white checkers should be used in accordance with local conditions. (4-7-83)

02. Color Specifications. Colors shall meet the tests specified in Section 3, Color Definitions, of ANSO Z53.1-1971, Safety Color Code for Marking Physical Hazards. (4-7-83)

171. SPECIFICATIONS FOR ACCIDENT PREVENTION SIGNS AND TAGS.

01. Scope. (4-7-83)

a. These specifications apply to the design, application and use of signs or symbols (as included in Sections 171.03 through 171.05 of this Code) intended to indicate and, insofar as possible, to define specific hazards of a nature such that failure to designate them may lead to accidental injury to workers. These specifications are intended to cover all safety signs except those designed for streets, highways, railroads, and marine regulations. These specifications do not apply to plant bulletin boards or to safety posters. (4-7-83)

b. All new signs and replacements of old signs after (4-7-83)

02. Definitions. As used in this section, the word "sign" refers to a surface on which letters or other markings appear, prepared for the warning of, or safety instructions of, industrial workers who may be exposed to hazards. Excluded from this definition, however, are news releases, displays commonly known as safety posters and bulletins used for employee education. (4-7-83)

03. Classification of Signs According to Use. (4-7-83)

a. Danger Signs. (4-7-83)

i. Danger signs should be used only where an immediate hazard exists. There shall be no variation in the type of design or signs posted to warn of specific dangers and radiation hazards. (4-7-83)

ii. All employees shall be instructed that danger signs indicate immediate danger and that special precautions are necessary. (4-7-83)

b. Caution Signs. (4-7-83)

i. Caution signs shall be used only to warn against potential hazards or to caution against unsafe practices. (4-7-83)

ii. All employees shall be instructed that caution signs indicate a possible hazard against which proper precaution should be taken. (4-7-83)

c. Safety Instruction Signs. Safety instruction signs shall be used where there is a need for general instructions and suggestions relative to safety measures. (4-7-83)

04. Sign Design and Colors. (4-7-83)

a. Design Features. The colors, proportions, and location of the identification panels on each sign shall be in accordance with this section. All signs shall be furnished with rounded or blunt corners and shall be free from sharp edges, burrs, splinters, or other sharp projections. The ends or heads of bolts or other fastening devices shall be located in such a way that they do not constitute a hazard. When conditions warrant the use of a sign size not covered in the following tables, the ratio of the depth of the identifying panel (Danger, Caution, Etc.) to the width of the sign shall be as established in Tables 171.06-A through 171.06-D. (4-7-83)

b. Danger Signs. (4-7-83)

i. The colors red, black, and white shall be those of opaque glossy samples as specified in Table 1 of Fundamental specification of Safety Colors for CIE Standard Source "C", American National Standard Z53.1-1971. (4-7-83)

ii. Standard proportions shall be as indicated in Table 171.06-A and format shall be as in Figure 171.06-A. (4-7-83)

c. Radiation Warning Signs. (4-7-83)

i. Standard color for the background shall be yellow; the panel, reddish purple with yellow letters; the symbol, reddish purple, any letters used against the yellow background shall be black. The colors shall be those of opaque glossy samples as specified in Table 1 of American National Standard Z53.1-1971. (4-7-83)

ii. The standard symbol shall be as in Figure 171.06-C. Method of dimensioning, design, and orientation of the standard symbol (one blade pointed downward and centered on the vertical axis) shall be executed as illustrated. The symbol shall be prominently displayed, and of a size consistent with the size of the equipment, material or area to which it is attached. (4-7-83)

iii. Format shall be as in Figure 171.06-B. Sign proportions shall be the same as those for danger signs in Table 171.06-A. (4-7-83)

d. Caution Signs. (4-7-83)

i. Standard color of the background shall be yellow; and the panel black with yellow letters. Any letters used against the yellow background shall be black. The colors shall be those of opaque glossy samples as specified in Table 1 of American National Standard Z53.1-1971. (4-7-83)

ii. Standard proportions shall be as indicated in Table 171.06-B and format shall be as in Figure 171.06-D. (4-7-83)

e. Exit Signs. Exit signs shall be in accordance with Section 233 in Chapter B of this Code. (4-7-83)

f. Safety Instruction Signs. (4-7-83)

i. Standard color of the background shall be white; and the panel, green with white letters. Any letters used against the white background shall be black. The colors shall be those of opaque glossy samples as specified in Table 1 of American National Standard Z53.1-1971. (4-7-83)

ii. Standard proportions shall be as indicated in Table 171.06-C and format shall be as in Figure 171.06-E. (4-7-83)

g. Directional Signs. (4-7-83)

i. Standard color of the background shall be white; and the panel, black with white directional symbol. Any letters used against the white background shall be black the colors shall be those of opaque glossy samples as specified in Table 1 of American National Standard Z53.1-1971. (4-7-83)

ii. Standard proportions shall be as indicated in Table 171.06-D and format shall be as in Figure 171.06-F. (4-7-83)

h. In-plant Traffic Signs. Regulatory and control signs required for the safe movement of vehicles and pedestrians on thoroughfares on plant property shall conform to the standards established in American National Standard Manual on Uniform Traffic Control Devices for Streets and Highways, D6.1-1971. (4-7-83)

i. Informational Signs. Blue shall be the standard color for informational signs.it may be used as the background color for the complete sign or as a panel at the top of such types of "Notice" signs, which have a white background. The colors shall be those of opaque glossy samples as specified in Table 1 of American National Standard Z53.1-1971. (4-7-83)

j. Slow-moving Vehicle Emblem. This emblem (see Figure 171.06-G) consists of a fluorescent yellow-orange triangle with a dark red reflective border. The yellow-orange fluorescent triangle is a highly visible color for daylight exposure. The reflective border defines the shape of the fluorescent color in daylight and creates a hollow red triangle in the path of motor vehicle headlights at night. The emblem is intended as a unique identification for, and it shall be used only, on vehicles which by design move slowly (25 mph or less) on the public roads. The emblem is not a clearance marker for wide machinery nor is it intended to replace required lighting or marking of slow moving vehicles. Neither the color film pattern and its dimensions nor the backing shall be altered to permit use of advertising or other markings. The material, location, mounting, etc., of the emblem shall be in accordance with the American Society of Agricultural Engineers Emblem for Identifying slow-moving vehicles, ASAE R276, 1967, or ASAE S276.2 (ANSI B115.1-1971). (4-7-83)

k. Symbols. Symbols used on signs shall follow recognized practices, such as in Figure 171.06-H. For radioactive materials, see symbol in Figure 171.06-C. (4-7-83)

05. Sign Wordings. (4-7-83)

a. Examples of Wordings. The lists in c. through g. of this section are intended to serve as a guide for choosing the correct sign design for the message to be displayed. (4-7-83)

b. Nature of Wording. The wording of any sign should be easily read and concise. The sign should contain sufficient information to be easily understood. The wording should make a positive, rather than negative suggestion and should be accurate in fact. (4-7-83)

c. Danger Signs. (7-1-93)

Danger Keep Off, Electric Current
Danger No Smoking, Matches or Open Lights
Danger Men Working Above
Danger Not Room enough Here to Clear Men on Cars
Danger Keep Away
Danger Men in Boiler
Danger Insufficient Clearance
Danger 2,300 Volts
Danger Keep Out
Danger Crane Overhead
Danger Keep Off

(4-7-83)

d. Biological Hazard Signs. The biological hazard warning shall be used to signify the actual or potential presence of a biohazard and to identify equipment containers, rooms, materials, experimental animals, or combinations thereof, which contain, or are contaminated with viable hazardous agents. For the purpose of this subdivision the term "Biological Hazard or, Biohazard" shall include only those infectious agents presenting a risk or potential risk to the well being of man. The biohazard symbol shall be designed and proportioned as illustrated in Figure 171.06-I. The symbol design shall be a fluorescent orange or orange-red color. Background color is optional as long as there is sufficient contrast for the symbol to be clearly defined. Appropriate wording may be used in association with the symbol to indicate the nature or identity of the hazard, name of individual responsible for its control, precautionary information, etc., but never should this information be superimposed on the symbol.

(4-7-83)

e. Caution Signs. (4-7-83)

Caution -Do not operate, men working on repairs.
Caution -Hands off switch, men working on line.
Caution -Working on machines, do not start.
Caution -Goggles must be worn when operating this machine.
Caution -This door must be kept closed.
Caution -Electric trucks go slow.
Caution -This space must be kept clear at all times.
Caution -Stop machinery to clean, oil, or repair.
Caution -Keep aisles clear.
Caution -Operators of this machine shall wear snug fitting clothing - no gloves.
Caution -Close clearance.
Caution -Electric Fence.

(4-7-83)

f. Safety Instruction Signs. (4-7-83)

Report All Injuries to the First-Aid Room at Once.
Walk - Don't Run.
Report All Injuries No Matter How Slight.
Think, if safe go ahead.
Make your work place safe before starting the job.
Report all unsafe conditions to your foreman.
Help keep this plant safe and clean.

(4-7-83)

g. Directional Signs. (4-7-83)

This way out (below arrow panel)
This way (inside arrow) out (below arrow panel)
Fire exit (below arrow panel)
Fire (inside arrow) extinguisher (below arrow panel)
To the (inside arrow) Fire Escape (below arrow panel)
To the (inside arrow) First Aid (below arrow panel)
Manway (below arrow panel)
This way to (inside arrow panel) First-Aid Room (below arrow panel)

(4-7-83)

h. Information signs. (4-7-83)

This elevator is for freight only, not for passengers

No admittance except to employees on duty.

No admittance.
No admittance, apply at office.

No trespassing.

Men.
Women.

For employees only.

Office.

(4-7-83)

i. Note: when sign wordings such as those listed in this section are contemplated, care should be taken to be sure that they are suitable for the particular location at which the sign is to be placed and that wording meets the requirements of the intended purpose. When there is a reasonable doubt, a sign of a standard design should be used. (4-7-83)

06. Accident Prevention Tags. (4-7-83)

a. Scope and Purpose. (4-7-83)

i. The tags are a temporary means of warning all concerned of a hazardous condition, defective equipment, radiation hazards, etc. The tags are not to be considered as a complete warning method, but should be used until a positive means can be employed to eliminate the hazard; for example, a "Do not start" tag on power equipment shall be used for a few moments or a very short time until the switch in the system can be locked out; a

"Defective equipment" tag shall be placed on a damaged ladder and immediate arrangements made for the ladder to be taken out of service and sent to the repair shop. (4-7-83)

ii. The purpose of this section is to establish a set of specifications for tags based on experience and previous use. The tags are to be used in industry, mercantile establishments, or wherever such tags can be utilized to help prevent accidental injury to personnel or damage to property, or both. (4-7-83)

b. Definitions. The word "Tag" as used in this section refers to a surface (usually card, paper, pasteboard, or some temporary or nonpermanent material) on which letters or markings, or both, appear. These letters or markings, or both, are for warning (cautioning) or safety instruction of employees who may be exposed to hazards. Tags are to be affixed to device in question by string, wire, or adhesive. (4-7-83)

c. Do not Start Tags. (4-7-83)

i. The standard background color for Do Not Start Tags shall be red. (see Figure 171.06-J). (4-7-83)

ii. Letters shall be white or grey or etched, provided that long lasting and sharp contrast results. (4-7-83)

iii. Do Not Start Tags shall be placed in a conspicuous location or shall be placed in such a manner that they effectively block the starting mechanism which would cause hazardous conditions should the equipment be energized. (4-7-83)

d. Danger Tags. (4-7-83)

i. Danger tags should be used only where an immediate hazard exists. There should be no variation in the type of design of tags posted or hung to warn of specific dangers. (see Figure 171.06-K) (4-7-83)

ii. All employees should be instructed that Danger tags indicate immediate danger and that special precautions are necessary. (4-7-83)

e. Caution Tags. (4-7-83)

i. Caution tags should be used only to warn against potential hazards or to caution against unsafe practices. (see Figure 171.06-L). (4-7-83)

ii. All employees should be instructed that Caution tags indicate a possible hazard against which proper precautions should be taken. (4-7-83)

f. Out of Order Tags. Out of order tags should be used only for the specific purpose of indicating that a piece of equipment, machinery, etc., is out of order and to attempt to use it might present a hazard. (See Figure 171.06-M) (4-7-83)

g. Radiation Tags. (4-7-83)

i. The standard background for Radiation tags shall be yellow; the panel shall be reddish-purple. Any letters used against the yellow background shall be black. The colors shall be those of opaque glossy samples as specified in Table 1, Fundamental Specification of Safety Colors for CIE Standard Source "C" American National Standard Safety Color Code for Marking Physical Hazards and the Identification of Certain Equipment, Z53.1-1971. (4-7-83)

ii. The method of dimension, design, and orientation of the standard symbol (one blade pointed downward and centered on the vertical axis) shall be executed as illustrated in Figure 171.06-N. The symbol shall be prominently displayed and of a size consistent with the size of the equipment or area in which it is to be used. (4-7-83)

h. Biological Hazard Tags. (4-7-83)

i. The standard background color for the Biological Hazard symbol is optional as long as there is sufficient contrast for the symbol to be clearly defined. The symbol design (see Figure 171.06-D) shall be a fluorescent orange or orange-red color. (4-7-83)

ii. The biological hazard tag shall be used to signify the actual or potential presence of a biohazard, to identify equipment, containers, rooms, materials, experimental animals, or combinations thereof which contain or are contaminated with viable hazardous agents. (4-7-83)

iii. For the purpose of this section, the term "biological hazard" shall include only those infectious agents presenting a risk to the well-being of man. (4-7-83)

Figure 171.06-A Danger Sign (Available at Idaho Industrial Commission 317 East Main Boise,Id83720 Telephone (208) 334-6000)

Figure 171.06-B Radiation Warning Sign (Available at Idaho Industrial Commission 317 East Main Boise,Id83720 Telephone (208) 334-6000)

Figure 171.06-C Standard Radiation Symbol (Available at Idaho Industrial Commission 317 East Main Telephone (208) 334-6000)

Figure 171.06-D Caution Sign (Available at Idaho Industrial Commission 317 East Main Boise,Id83720 Telephone (208) 334-6000)

Figure 171.06-E Safety Instruction Signs (Note: The words "Think" and "Be careful" are only illustrations. Other wordings may be used.) (Available at Idaho Industrial Commission 317 East Main Boise,Id83720 Telephone (208) 334-6000)

Figure 171.06-F Directional Signs (Available at Idaho Industrial Commission 317 East Main Boise,Id83720 Telephone (208) 334-6000)

Figure 171.06-G Slow-Moving Vehicle Emblem (Note: All dimensions are in inches) (Available at Idaho Industrial Commission 317 East Main Boise,Id83720 Telephone (208) 334-6000)

Figure 171.06-H Symbols used on signs (Available at Idaho Industrial Commission 317 East Main Boise,Id83720 Telephone (208) 334-6000)

Figure 171.06-I Symbol for Biological Hazard (Available at Idaho Industrial Commission 317 East Main Boise,Id83720 Telephone (208) 334-6000)

Figure 171.06-J Do Not Start Tag (Available at Idaho Industrial Commission 317 East Main Boise,Id83720 Telephone (208) 334-6000)

Figure 171.06-K Danger Tag (Available at Idaho Industrial Commission 317 East Main Boise,Id83720 Telephone (208) 334-6000)

Figure 171.06-L Caution Tag (Available at Idaho Industrial Commission 317 East Main Boise,Id83720 Telephone (208) 334-6000)

Figure 171.06-M Out of Order Tag (Available at Idaho Industrial Commission 317 East Main Boise,Id83720 Telephone (208) 334-6000)

Figure 171.06-N Radiation Tag (Available at Idaho Industrial Commission 317 East Main Boise,Id83720 Telephone (208) 334-6000)

Figure 171.06-O Biological Hazard Tag (Available at Idaho Industrial Commission 317 East Main Boise,Id83720 Telephone (208) 334-6000)

TABLE 171.06-A STANDARD PROPORTIONS FOR DANGER SIGNS (Available at Idaho Industrial Commission 317 East Main Boise,Id83720 Telephone (208) 334-6000)

TABLE 171.06-B STANDARD PROPORTIONS FOR CAUTION SIGNS (Available at Idaho Industrial Commission 317 East Main Boise,Id83720 Telephone (208) 334-6000)

TABLE 171.06-C1 STANDARD PROPORTIONS FOR SAFETY INSTRUCTION SIGNS (Part 1 - "Think" Safety Sign) (Available at Idaho Industrial Commission 317 East Main Boise,Id83720 Telephone (208) 334-6000)

TABLE 171.06-C STANDARD PROPORTIONS FOR SAFETY INSTRUCTION SIGNS (Part 2 - "Be Careful" Safety Sign) (Available at Idaho Industrial Commission 317 East Main Boise,Id83720 Telephone (208) 334-6000)

TABLE 171.06-D STANDARD PROPORTIONS FOR DIRECTIONAL SIGNS (Part 2 - "Be Careful" Safety Sign) (Available at Idaho Industrial Commission 317 East Main Boise, Id 83720 Telephone (208) 334-000)

07. Additional rules. Refer to: American National Standards Institute ANSI Z35.1, 1972, "Specifications for Accident Prevention Signs" and Z35.2, 1968, with respect to rules not specifically prescribed in this subpart. (4-7-83)

08. Flagmen. (4-7-83)

a. When operations are such that signs, signals and barricades do not provide the necessary protection on or adjacent to a highway or street, flagmen or other appropriate traffic controls shall be provided. (4-7-83)

b. Signaling directions by flagmen shall conform to ANSI D.6.1, 1971, "Manual on Uniform Traffic Control Devices for Streets and Highways." (4-7-83)

c. Hand signaling by flagmen shall be by use of red flags at least 18 inches square or sign paddles, and in periods of darkness, red lights. Flagmen shall be provided with and shall wear red or orange warning garment while flagging. Warning garments worn at night shall be of reflectorized material. (4-7-83)

09. Barricades. Barricades for protection of employees shall conform to the portions of the American National Standards Institute D.2.1971, "Manual on Uniform Traffic Control Devices for Streets and Highways" relating to barricades. (4-7-83)

172. -- 179. (RESERVED).

180. IONIZING RADIATION.

Note: Rules and regulations of the State Board of Health governing Idaho Radiation Control Regulations shall be complied with by every employer and shall be enforced as provided for by statute law. (4-7-83)

01. General definitions. (4-7-83)

a. "Radiation" includes alpha rays, beta rays, gamma rays, x-rays, neutrons, high-speed electrons, high-speed protons and other atomic particles; but such term does not include sound or radio waves, or visible light, or infrared or ultraviolet light. (4-7-83)

b. "Radioactive material" means any material which emits, by spontaneous nuclear disintegration, corpuscular or electromagnetic emanations. (4-7-83)

c. "Restricted area" means any area access to which is controlled by the employer for purposes of protection of individuals from exposure to radiation or radioactive materials. (4-7-83)

d. "Unrestricted area" means any area access to which is not controlled by the employer for purposes of protection of individuals from exposure to radiation or radioactive materials. (4-7-83)

e. "Dose" means the quantity of ionizing radiation absorbed, per unit of mass, by the body or by any portion of the body. When the provisions of this section specify a dose during a period of time, the dose is the total quantity of radiation absorbed per unit of mass, by the body or by any portion of the body during such period of time. Several different units of dose are in current use. Definitions of units used in this section are set forth in paragraphs F and G of this section. (4-7-83)

f. "Rad" means a measure of the dose of any ionizing radiation to body tissues in terms of the energy absorbed per unit of mass of the tissue. One rad is the dose corresponding to the absorption of 100 ergs per gram of tissue (1 millirad [mrad] = 0.001 rad). (4-7-83)

g. "Rem" means a measure of the dose of any ionizing radiation to body tissue in terms of its estimated biological effect relative to a dose of 1 roentgen (r) of x-rays (1 millirem (mrem) - 0.001 rem). The relation of the rem to other dose units depends upon the biological effect under consideration and upon the conditions for irradiation. Each of the following is considered to be equivalent to a dose of 1 rem: (4-7-83)

i. A dose of 1 roentgen due to x- or gamma radiation; (4-7-83)

ii. A dose of 1 rad due to x-, gamma, or beta radiation; (4-7-83)

iii. A dose of 0.1 rad due to neutrons or high energy protons; (4-7-83)

iv. A dose of 0.05 rad due to particles heavier than protons and with sufficient energy to reach the lens of the eye. (4-7-83)

v. If it is more convenient to measure the neutron flux, or equivalent, than to determine the neutron dose in rads, as provided in subdivision iii. of this subparagraph, 1 rem of neutron radiation may for purpose of the provisions in this section be assumed to be equivalent to 14 million neutrons per square centimeter incident upon the body; or, if there is sufficient information to estimate with reasonable accuracy the approximate distribution in energy of the neutrons, the incident number of neutrons per square centimeter equivalent to 1 rem may be estimated from Table 1601-A. (4-7-83)

TABLE 1601-A, Neutron Flux Dose Equivalents, available at Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone (208) 334-6000.

h. For determining exposures to x- or gamma rays up to 3 Mev., the dose limits specified in this section may be assumed to be equivalent to the "air dose" means that the dose is measured by a properly calibrated appropriate instrument in the air at or near the body surface in the region of the highest dosage rate. (4-7-83)

02. Exposure of individuals to radiation in restricted areas. (4-7-83)

a. Except as provided in paragraph b of this section, no employer shall possess, use, or transfer sources of ionizing radiation in such a manner as to cause any individual in a restricted area to receive in any period of one calendar quarter from sources in the employer's possession or control a dose in excess of the limits specified in Table 1602-A. (4-7-83)

TABLE 1602-A, Rems per Calendar Quarter, available at Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone (208) 334-6000.

b. An employer may permit an individual in a restricted area to receive doses to the whole body greater than those permitted under subparagraph a. of this paragraph, so long as: (4-7-83)

i. During any calendar quarter the dose to the whole body shall not exceed 3 rems, and (4-7-83)

ii. The dose to the whole body, when added to the accumulated occupational dose to the whole body,

shall not exceed 5 (N-18) rems, where "N" equals the individual's age in years at his last birthday; and, (4-7-83)

iii. The employer maintains adequate past and current exposure records which show the addition of such a dose will not cause the individual to exceed the amount authorized in this subparagraph. As used in this subparagraph "dose to the whole body" shall be deemed to include any dose to the whole body, gonad, active blood-forming organs, head and trunk or lens of the eye. (4-7-83)

c. No employer shall permit any employee who is under 18 years of age to receive in any period of one calendar quarter a dose in excess of 10 percent of the limits specified in Table 1602-A. (4-7-83)

d. "Calendar Quarter" means any 3-month period determined as follows: (4-7-83)

i. The first period of any year may begin on any date in January; PROVIDED, that the second, third and fourth periods accordingly begin on the same date in April, July and October, respectively, and that the fourth period extends into January of the succeeding year, if necessary to complete a 3-month quarter. During the first year of use of this method of determination, the first period for that year shall also include any additional days in January preceding the starting date for the first period; or (4-7-83)

ii. The first period in a calendar year of 13 complete, consecutive calendar weeks; the second period in a calendar year of 13 complete consecutive weeks; the third period in a calendar year of 13 complete consecutive calendar weeks; the fourth period in a calendar year of 13 complete consecutive calendar weeks. If at the end of a calendar year there are any days not falling within a complete calendar week of that year, such days shall be included within the last complete calendar week of that year. If at the beginning of any calendar year there are days not falling within a complete calendar week of that year, such days shall be included within the last complete calendar week of the previous year; or (4-7-83)

iii. The four periods in a calendar year may consist of the first 14 complete, consecutive calendar weeks; the next 12 complete consecutive calendar weeks; the next 14 complete, consecutive calendar weeks, and the last 12 complete, consecutive calendar weeks. If at the end of a calendar year there are any days not falling within a complete calendar week of that year, such days shall be included (for purposes of this section) within the last complete calendar week of the year. If at the beginning of any calendar year there are days not falling within the complete calendar week of that year, such days shall be included (for purposes of this section) within the last complete week of the previous year. (4-7-83)

03. Exposure to airborne radioactive material. (4-7-83)

a. No employer shall possess, use or transport radioactive material in such a manner as to cause any employee, within a restricted area, to be exposed to airborne radioactive material in an average concentration in excess of the limits specified in Table 1 of Appendix B to 10 CFR Part 20. The limits given in Table 1 are for exposure to the concentrations specified for 40 hours in any work-week of 7 consecutive days. In any such period where the number of hours of exposure is less than 40, the limits specified in the table may be increased proportionately. In any such period where the number of hours of exposure is greater than 40, the limits specified in the table shall be decreased proportionately. (4-7-83)

b. No employer shall possess, use or transfer radioactive material in such a manner as to cause any individual within a restricted area, who is under 18 years of age to be exposed to airborne radioactive material in an average concentration in excess of the limits specified in Table II of Appendix B to 10 CFR Part 20. For the purpose of this subparagraph, concentrations may be averaged over periods not greater than 1 week. (4-7-83)

c. "Exposed" as used in this paragraph means that the individual is present in an airborne concentration. No allowance shall be made for the use of protective clothing or equipment, or particle size. (4-7-83)

04. Precautionary procedures and personal monitoring. (4-7-83)

a. Every employer shall make such surveys as may be necessary for him to comply with the provisions in this section. "Survey" means an evaluation of the radiation hazards incident to the production, use, release, disposal or presence of radioactive materials or other sources of radiation under a specific set of conditions.

When appropriate, such evaluation includes a physical survey of the location of materials and equipment, and measurements of levels of radiation or concentrations of radioactive material present. (4-7-83)

b. Every employer shall supply appropriate personnel monitoring equipment, such as film badges, pocket chambers, pocket dosimeters, or film rings to, and shall require the use of such equipment, by: (4-7-83)

i. Each employee who enters a restricted area under such circumstances that he receives, or is likely to receive a dose in any calendar quarter in excess of 24 percent of the applicable value specified in 1602.a. of this section; and (4-7-83)

ii. Each employee under 18 years of age who enters a restricted area under such circumstances that he receives, or is likely to receive, a dose in any calendar quarter in excess of 5% of the applicable value specified in 1602.a. of this section; and (4-7-83)

iii. Each employee who enters a high radiation area. (4-7-83)

c. As used in this Section: (4-7-83)

i. "Personnel monitoring equipment" means devices designed to be worn or carried by an individual for the purpose of measuring the dose received (e.g., film badges, pocket chambers, pocket dosimeters, film rings, etc.); (4-7-83)

ii. "Radiation area" means any area accessible to personnel, in which there exists radiation in such levels that a major portion of the body could receive in any 1 hour a dose in excess of 5 millirem, or in any 5 consecutive days a dose in excess of 100 millirem; and (4-7-83)

iii. "High radiation area" means any area, accessible to personnel, in which there exists radiation at such levels that a major portion of the body could receive in any one hour a dose in excess of 100 millirem. (4-7-83)

05. Caution signs, labels and signals. (4-7-83)

a. General. (4-7-83)

i. Symbols prescribed by this paragraph shall use the conventional radiation caution colors (magenta or purple on yellow background). The symbol prescribed by this paragraph is the conventional three-bladed design: (4-7-83)

RADIATION SYMBOL available at Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone (208) 334-6000.

b. Radiation Area. Each radiation area shall be conspicuously posted with a sign or signs bearing the radiation caution symbol described in subparagraph a. of this paragraph and the words: CAUTION - RADIATION AREA. (4-7-83)

c. High Radiation Area. (4-7-83)

i. Each high radiation area shall be conspicuously posted with a sign bearing the radiation caution symbol and the words: CAUTION: HIGH RADIATION AREA. (4-7-83)

ii. Each high radiation area shall be equipped with a control device which shall either cause the level of radiation to be received below that at which an individual might receive a dose of 100 millirems in 1 hour upon entry into the area or shall energize a conspicuous visible or audible alarm signal in such a manner that the individual entering and the employer or a supervisor of the activity are made aware of the entry. In the case of a high radiation area established for a period of 30 days or less, such control device is not required. (4-7-83)

d. Airborne Radioactivity Area. (4-7-83)

i. As used in the provisions of this section, "Airborne radioactivity area" means any room, enclosure or operating area in which airborne radioactive materials, composed wholly or partly of radioactive material, exist in concentrations in excess of the amounts specified in column 1 or Table 1 of Appendix B to 10 CFR Part 20; or any room, enclosure or operating area in which airborne radioactive materials exist in concentrations which averaged over the number of hours in any week during which individuals are in the area, exceed 25% of the amounts specified in Column 1 of Table 1 of Appendix B to 10 CFR Part 20. (4-7-83)

ii. Each airborne radioactivity area shall be conspicuously posted with a sign or signs bearing the radiation caution symbol described in a. of this section and the words: CAUTION: AIRBORNE RADIOACTIVITY AREA. (4-7-83)

e. Additional Requirement. (4-7-83)

i. Each area or room in which radioactive material is used or stored and which contains any radioactive material (other than natural uranium or thorium) in any amount exceeding 10 times the quantity of such material specified in Appendix C of 10 CFR Part 20 shall be conspicuously posted with a sign or signs bearing the radiation caution symbol described in a.i. of this Section and the words: CAUTION: RADIOACTIVE MATERIALS. (4-7-83)

ii. Each container in which natural uranium or thorium is transported, stored, or used in a quantity greater than 10 times the quantity specified in Appendix C to 10 CFR Part 20 shall bear a durable, clearly visible label bearing the radiation caution symbol described in a. of this section and the words: CAUTION: RADIOACTIVE MATERIALS. (4-7-83)

iii. Notwithstanding the provisions of e. i. and ii. of this section a label shall not be required if the concentration of the material in the container does not exceed that specified in column 2 of Table 1 of Appendix B to 10 CFR Part 20; or for laboratory containers, such as beakers, flasks and test tubes, used transiently in laboratory procedures, when the user is present. (4-7-83)

iv. Where containers are used for storage, the labels require in this subparagraph shall state also the quantities and kinds of radioactive materials in the containers and the date of measurement of the quantities. (4-7-83)

06. Immediate evacuation warning signal. (4-7-83)

a. Signal Characteristics. (4-7-83)

i. The signal shall be mid-frequency complex sound wave amplitude modulated at a subsonic frequency. The complex sound wave in free space shall have a fundamental frequency (f 1) between 450 and 500 hertz (Hz) modulated at a subsonic rate between 4 and 5 hertz. (4-7-83)

ii. The signal generator shall not be less than 75 decibels at every location where an individual may be present whose immediate, rapid and complete evacuation is essential. (4-7-83)

iii. A sufficient number of signal units shall be installed such that the requirements of 1606.a.i. of this section are met at every location where an individual may be present whose immediate, rapid and complete evacuation is essential. (4-7-83)

iv. The signal shall be unique in the plant or facility in which it is installed. (4-7-83)

v. The minimum duration of the signal shall be sufficient to insure that all affected persons hear the signal. (4-7-83)

vi. The signal-generating system shall respond automatically to an initiating event without requiring any human action to sound the signal. (4-7-83)

b. Design Objectives. (4-7-83)

i. The signal-generating systems shall be designed to incorporate components which enable the system to produce the desired signal each time it is activated within one-half second of activation. (4-7-83)

ii. The signal-generating system shall be provided with an automatically activated secondary power supply which is adequate to simultaneously power all emergency equipment to which it is connected, if operation during power failure is necessary, except in those systems using batteries as the primary source of power. (4-7-83)

iii. All components of the signal-generating system shall be located to provide maximum practicable protection against damage in case of fire, explosion, corrosive atmosphere, or other environmental extremes consistent with adequate system performance. (4-7-83)

iv. The signal-generating system shall be designed with the minimum number of components necessary to make it function as intended, and should utilize components which do not require frequent servicing such as lubrication or cleaning. (4-7-83)

v. Where several activating devices feed activating information to a central signal generator, failure of any activating device shall not render the signal-generator system inoperable to activating information from the remaining devices. (4-7-83)

vi. The signal-generating system shall be designed to enhance the probability that alarm occurs only when immediate evacuation is warranted. The number of false alarms shall not be so great that the signal will come to be disregarded and shall be low enough to minimize personal injuries or excessive property damage that might result from such evacuation. (4-7-83)

c. Testing. (4-7-83)

i. Initial tests, inspections and checks of the signal generating systems shall be made to verify that the fabrication and installation were made in accordance with design plans and specifications and to develop a thorough knowledge of the performance of the system and all components under normal and hostile conditions. (4-7-83)

ii. Once the system has been placed in service, periodic tests, inspections and checks shall be made to minimize the possibility of malfunction. (4-7-83)

iii. Following significant alterations or revisions to the system, tests and checks similar to the initial installation tests shall be made. (4-7-83)

iv. Tests shall be designed to minimize hazards while conducting the tests. (4-7-83)

v. Prior to normal operation the signal-generating system shall be checked physically and functionally to assure reliability and to demonstrate accuracy and performance. Specific tests shall include: All power sources; Calibration and calibration stability; Trip levels and stability; Continuity of function with loss and return of required services such as AC or DC power air pressure, etc.; All indicators; Trouble indicator circuits and signals, where used; Air pressure (if used); Determine that sound level of the signal is within the limit of a.ii. of this section at all points that require immediate evacuation. (4-7-83)

vi. In addition to the initial startup and operating tests, periodic scheduled performance tests and status checks must be made to insure that the system is at all times operating within design limits and capable of the required response. Specific periodic tests or check or both shall include: Adequacy of signal activation device; All power sources; Function of all alarm circuits and trouble indicator circuits including trip levels; Air pressure (if used); Function of entire system including operation without power where required; Complete operational tests including sounding of the signal and determination that sound levels are adequate. (4-7-83)

vii. Periodic tests shall be scheduled on the basis of need, experience difficulty and disruption of operations. The entire system should be operationally tested at least quarterly. (4-7-83)

viii. All employees whose work may necessitate their presence in an area covered by the signal shall be made familiar with the actual sound of the signal - preferably as it sounds at their work location. Before placing the

system into operation, all employees normally working in the area shall be made acquainted with the signal by actual demonstration at their work location. (4-7-83)

07. Exceptions from posting requirements. Notwithstanding the provisions of 180.05 of the Chapter: (4-7-83)

a. A room or area is not required to be posted with a caution sign because of the presence of a sealed source, provided the radiation level 12 inches from the surface of the source contain or housing does not exceed 5 millirem per hour. (4-7-83)

b. Rooms or other areas in on site medical facilities are not required to be posted with caution signs because of the presence of patients containing radioactive material, provided that there are personnel in attendance who shall take the precautions necessary to prevent the exposure of any individual to radiation or radioactive material in excess of the limits established in the provisions of this section. (4-7-83)

c. Caution signs are not required to be posted at areas or rooms containing radioactive materials for periods of less than 8 hours: PROVIDED THAT: The materials are constantly attended during such periods by an individual who shall take the precautions necessary to prevent the exposure of any individual to radiation or radioactive materials in excess of the limits established in the provisions of this section; and (4-7-83)

08. Exemptions for radioactive materials packaged for shipment. Radioactive materials packaged and labeled in accordance with regulations of the Department of Transportation published in 49 CFR Chapter I, are exempt from the labeling and posting requirements of this subpart during shipment, provided that the inside containers are labeled in accordance with the provisions of 1605 of this Chapter. (4-7-83)

09. Instruction of personnel, posting. Employers regulated by the Nuclear Regulatory Commission shall be governed by 10 CFR Part 20 Standards. Employer's in the State of Idaho shall be governed by the requirements of the laws and regulations of the State. All other employers shall be regulated by the following: (4-7-83)

a. All individuals working in or frequenting any portion of a radiation area shall be informed of the occurrence of radioactive materials or of radiation in such portions of the radiation area; shall be instructed in the safety problems associated with exposure to such materials or radiation and in precautions or devices to minimize exposure; shall be instructed in the applicable provisions of this section for the protection of employees from exposure to radiation or radioactive materials; and shall be advised of reports of radiation exposure which employees may request pursuant to the regulations of this section. (4-7-83)

b. Each employer to whom this section applies shall post a current copy of its provisions and a copy of the operating procedures applicable to the work conspicuously in such locations as to insure that employees working in or frequenting radiation areas will observe these documents on the way to and from their place of employment, or shall keep such documents available for examination of employees upon request. (4-7-83)

10. Storage of radioactive materials. Radioactive materials stored in a non-radiation area shall be secured against unauthorized removal from the place of storage. (4-7-83)

11. Waste disposal. No employer shall dispose of radioactive material except by transfer to an authorized recipient, or in a manner approved by the Nuclear Regulatory Commission and the State of Idaho. (4-7-83)

12. Notification of incidents. (4-7-83)

a. Immediate Notification. Each employer shall immediately notify the Assistant Secretary of Labor or his duly authorized representative, for employees not protected by the Atomic Energy Commission by means of 10 CFR Part 20, paragraph 1616.a. of this section, or the requirements of the laws and regulations of States named in paragraph 1616.c. of this section, by telephone or telegraph of any incident involving radiation which may have caused or threatens to cause: (4-7-83)

i. Exposure of the whole body of any individual to 25 rems or more of radiation; exposure of the skin of the whole body of any individual to 150 rems or more of radiation; or exposure of the feet, ankles, hands or forearms of any individual to 375 rems or more of radiation; or (4-7-83)

ii. The release of radioactive material in concentrations which, if averaged over a period of the limit specified for such materials in Table II of appendix B to 10 CFR Part 20. (4-7-83)

b. Twenty-four hour notification. Each employer shall, within 24 hours following its occurrence, notify the Assistance Secretary of Labor or his duly authorized representative for employees not protected by the Atomic Energy Commission by means of 10 CFr Part 2, paragraph 1616 of this section, or the requirements of the laws and applicable regulations of States named in paragraph 1616 of this section, by telephone or telegraph of any incident involving radiation which may have caused or threatens to cause: Exposure of the whole body of any individual to 4 rems or more of radiation; exposure of the skin of the whole body of any individual to 30 rems or more of radiation; or exposure of the feet, ankles, hands or forearms to 75 rems or more of radiation. (7-1-93)

13. Reports of overexposure and excessive levels and Concentrations. (4-7-83)

a. In addition to any notification required by Paragraph a. of this section each employer shall make a report in writing within 30 days to the Assistant Secretary of Labor or his duly authorized representative, for employees not protected by the Nuclear Regulatory Commission by means of 10 CFR Part 20; or under paragraph 1616.b. of this section, or the requirements of the laws and regulations of the State of Idaho, of each exposure of an individual to radiation or concentrations of radioactive material in excess of any applicable limit in this section. Each report required under this paragraph shall describe the extent of exposure of persons to radiation or to radioactive material; levels of radiation and concentration of radioactive material involved, the cause of the exposure, levels of concentrations; and corrective steps taken or planned to assure against a recurrence. (4-7-83)

b. In any case where an employer is required pursuant to the provisions of this paragraph to report to the U. S. Department of Labor any exposure of an individual to radiation or to concentrations of radioactive material, the employer shall also notify such individual of the nature and extent of exposure. Such notice shall be in writing and shall contain the following statement: "You should preserve this report for future reference." (4-7-83)

14. Records. (4-7-83)

a. Every employer shall maintain records of the radiation exposure of all employees for whom personnel monitoring is required under Paragraph 1604 of this Section and advise each of his employees of his individual exposure on at least an annual basis. (4-7-83)

b. Every employer shall maintain records in the same units used in tables in paragraph 1602 of this section and Appendix B to 10 CFR Part 20. (4-7-83)

15 Disclosure to former employee of individual employee's record. At the request of a former employee an employer shall furnish to the employee a report of the employee's exposure to radiation as shown in records maintained by the employer pursuant to paragraph 1614 of this section. Such report shall be furnished within 30 days from the time the request is made, and shall cover each calendar quarter of the individual's employment involving exposure to radiation or such lesser period as may be requested by the employee. The report shall also include the results of any calculations and analysis of radioactive material deposited in the body of the employee. The report shall be in writing and contain the following statement: "You should preserve this report for future reference." (4-7-83)

16. Nuclear regulatory commission doe contractors operating doe plants and facilities -- doe agreement, state licenses or registrants. (4-7-83)

a. Any employer who possesses or uses source material, byproduct material, or special nuclear material, as defined in the Atomic Energy Act of 1954, as amended, under a license issued by the Nuclear Regulatory Commission and in accordance with the requirements of 10 CFR Part 20 shall be deemed to be in compliance with the requirements of this section with respect to such possession and use. (4-7-83)

b. DOE Contractors operating DOE plants and facilities: Any employer who possesses or uses source material, byproduct material, special nuclear material, or other radiation sources under a contract with the Department of Energy for the operation of DOE plants and facilities and in accordance with the standards, procedures and other requirements for radiation protection established by the Commission for such contract pursuant to the Atomic Energy Act of 1954 as amended (42 U. S. C. 2011 et seq.) shall be deemed to be in compliance with the requirements of this section with respect to such possession and use. (4-7-83)

c. NRC-Agreement State Licenses or Registrants: (4-7-83)

i. Atomic Energy Act Sources. Any employer who possesses or uses source material, byproduct material, or special nuclear material, as defined in the Atomic Energy Act of 1954, as amended (42 U. S. C. 2011 et seq.), and has either registered such sources with, or is operating under a license issued by a State which has an agreement in effect with the Nuclear Regulatory Commission pursuant to Section 274 (b) (42 U. S. C. 2021 (b)) of the Atomic Energy Act of 1954, as amended, and in accordance with the requirements of the State's laws and regulations shall be deemed to be in compliance with the radiation requirements of this section, insofar as his possession and use of such material is concerned, unless the Secretary of Labor, after conference with the Nuclear Regulatory Commission shall determine that the State's program for control of these radiation sources is incompatible with the requirements of this section. Such an agreement is currently in effect in the State of Idaho. (4-7-83)

ii. Other sources. Any employer who possesses or uses radiation sources other than source material, byproduct material, or special nuclear material, as defined in the Atomic Energy Act of 1954, as amended (42 U. S. C. 2011 et seq.), and has either registered such sources with, or is operating under a license issued by a State which has an agreement in effect with the Nuclear Regulatory Commission and to section 274(b) (42 U. S. C. 20201 (b)) of the Atomic Energy Act of 1954, as amended, and in accordance with the requirements of that State's laws and regulations shall be deemed to be in compliance with the radiation requirements of this section, insofar as his possession and use of such material is concerned, provided the State's program for control of these radiation sources is the subject of a currently effective determination by the Assistant Secretary of Labor that such program is compatible with the requirements of this section. Such determinations are in effect in the State of Idaho. (4-7-83)

181. NONIONIZING RADIATION.

01. Electromagnetic radiation. (4-7-83)

a. Definitions applicable to this paragraph. (4-7-83)

i. The term "electromagnetic radiation" is restricted to that portion of the spectrum commonly defined as the radio frequency region, which for the purpose of this specification shall include the microwave frequency region. (4-7-83)

ii. Partial Body Irradiation. Pertains to the case in which part of the body is exposed to the incident electromagnetic energy. (4-7-83)

iii. Radiation Protection Guide. Radiation level which should not be exceeded without careful consideration of the reasons for doing so. (4-7-83)

iv. The word "symbol", as used in this specification, refers to the overall design, shape and coloring of the rf radiation sign shown in Figure 1617-A. (4-7-83)

v. Whole Body Irradiation. Pertains to the case in which the entire body is exposed to the incident electromagnetic energy or in which the cross section of the body is smaller than the cross section of the incident radiation beam. (4-7-83)

b. Radiation Protection Guide. (4-7-83)

i. For normal environmental conditions and for incident electromagnetic energy of frequencies from 10 MHz to 100 GHz, the radiation protection guide is 10 mW/cm.2 (milliwatt per square centimeter) as averaged over any possible 0.1-hour period. This means the following: Power Density: 10 mW/cm.2 for period of 0.1-hour or more;

Energy Density:1 mW.-hr/cm.2 (milliwatt hour per square centimeter) during any 0.1-hour period. This guide applies whether the radiation is continuous or intermittent. (4-7-83)

ii. These formulated recommendations pertain to both whole body irradiation and partial body irradiation. Partial body irradiation must be included since it has been shown that some parts of the human body (e.g. eyes, testicles) may be harmed if exposed to incident radiation levels significantly in excess of the recommended levels. (4-7-83)

c. Warning Symbol. (4-7-83)

i. The warning symbol for radio frequency radiation hazards shall consist of a red isosceles triangle above an inverted black isosceles triangle, separated and outlined by an aluminum color border. The words: "Warning -- Radio-Frequency Radiation Hazard" shall appear in the upper triangle. See Figure 1617-A. (4-7-83)

ii. American National Standard Safety Color Code for Marking Physical Hazards and the Identification for Certain Equipment, Z53.1-1953, shall be used for color specification. All lettering and the border shall be in aluminum color. (4-7-83)

iii. The inclusion and choice of warning information or precautionary instructions is at the discretion of the user. If such information is included it shall appear in the lower triangle of the warning symbol. (4-7-83)

d. Scope. This section applies to all radiations originating from radio stations, radar equipment and other possible sources of electromagnetic radiation such as used for communication, radio navigation and industrial and scientific purposes. This section does not apply to the deliberate exposure of patients by, or under the direction of, practitioners of the healing arts. (4-7-83)

FIGURE 1617-A

Place handling and mounting instructions on reverse side.

D = Scaling unit

Lettering: Ratio of letter height to thickness of letter lines.

Upper triangle: 5 to 1 large

6 to 1 medium
Lower triangle: 4 to 1 small
6 to 1 medium

Symbol is square, triangles are right-angle isosceles.

RADIO-FREQUENCY RADIATION HAZARD WARNING SYMBOL, available at Idaho Industrial Commission,317 Main, Boise, Idaho 83720, Telephone (208) 334-6000.

182. RADIATION AND NUCLEAR MATERIAL.

01. Declaration of policy. (4-7-83)

a. It is the policy of the State of Idaho in furtherance of its responsibility to encourage the industrial and economic growth of the state to the maximum extent consistent with the health and safety of the public: (4-7-83)

i. To institute and maintain programs to encourage widespread participation in the development and utilization of peaceful uses of nuclear science and atomic energy, and (4-7-83)

ii. To institute and maintain a regulatory program for sources of radiation so as to provide for: (a)

compatibility with the standards and regulatory programs of the federal government, (b) a single, effective system of regulation within the State, and (c) a system consistent insofar as possible with those of other states. (4-7-83)

02. Purpose. (4-7-83)

a. It is the purpose of this act to effectuate the policies set forth in 1618 by providing for: (4-7-83)

i. A program for the development, promotion and coordination of the State's nuclear energy resources; (4-7-83)

ii. A program of effective regulation of sources of radiation for the protection of the occupational and public health and safety. (4-7-83)

iii. A program to promote an orderly regulatory pattern within the state, among the states and between the federal government and the State and facilitate inter-governmental cooperation with respect to use and regulation of sources of radiation to the end that duplication of regulation may be minimized; (4-7-83)

iv. A program to establish procedures for assumption and performance of certain regulatory responsibilities with respect to byproduct, source and special nuclear materials; (4-7-83)

v. A program to permit maximum utilization of sources or radiation consistent with the health and safety of the public. (4-7-83)

03. Definitions. (4-7-83)

a. "Byproduct material" means any radioactive material (except special nuclear material) yielded in or made radioactive by exposure to the radiation incident to the process of producing or utilizing special nuclear material. (4-7-83)

b. "Electronic product" means any manufactured product or device or component part of such a product or device that has an electronic circuit which during operation can generate or emit a physical field of radiation. (4-7-83)

c. "General License" means a license effective pursuant to regulations promulgated by the state radiation control agency, without the filing of an application, to transfer, acquire, own, possess, or use quantities of, or devices or equipment utilizing byproduct, source, special nuclear materials, or other radioactive material occurring naturally or produced artificially. (4-7-83)

d. "Specific License" means a license, issued after application to use, manufacture, produce, transfer, receive, acquire, own or possess quantities of, or devices or equipment utilizing byproduct, source, special nuclear materials, or other radioactive materials occurring naturally or produced artificially. (4-7-83)

e. "Person" means any individual, corporation, partnership, firm, association, trust, estate, public or private institution, group, agency, political subdivision of this state, any other state or political subdivision or agency thereof and any legal successor, representative, agent, or agency of the foregoing, other than the United States Atomic Energy Commission, or any successor thereto. (4-7-83)

f. "Source material" means: (4-7-83)

i. Uranium thorium, or any other material which the governor declares by order to be source material after the United States Atomic Energy Commission, or any successor thereto, has determined the material to be such; or (4-7-83)

ii. Ores containing one or more of the foregoing materials, in such concentration as the governor declares by order to be source material after the United States Atomic Energy Commission or any successor thereto, has determined the material in such concentration to be source material. (4-7-83)

g. "Special nuclear material" means: (4-7-83)

i. Plutonium, uranium 233, uranium enriched in the isotope 233 or in the isotope 235, and any other material which the governor declares by order to be special nuclear material after the United States Atomic Energy Commission, or any successor thereto, has determined that material to be such, but does not include source material; or (4-7-83)

ii. Any material artificially enriched by any of the foregoing but does not include source material. (4-7-83)

h. "Registration" means registration with the state board of health by any person possessing a source of radiation in accordance with rules, regulations and standards adopted by the state board of health and welfare. (4-7-83)

i. "Radiation" means: (4-7-83)

i. Ionizing radiation including gamma rays, x-rays, alpha. (4-7-83)

ii. Any electromagnetic radiation which can be generated during the operation of electronic products. (4-7-83)

iii. Any sonic, ultrasonic, or infrasonic waves which are emitted from an electronic product as a result of the operation of an electronic circuit in such product. (4-7-83)

j. "Radiation source" means any type of device or substance which is capable of producing or emitting radiation. (4-7-83)

183. -- 189. (RESERVED).

190. NONWATER CARRIAGE DISPOSAL SYSTEMS, GENERAL.

01. Definitions. "Temporary Labor Camp" means living quarters/dormitories for families and/or single persons that are either moved from area to area periodically or housing not utilized on a year-round basis. (4-7-83)

02. Written Evidence. Written evidence by State and Local Health Departments, and Department of Employment, annually or prior to each occupancy, must be obtained. This information shall be readily accessible, for the authority having jurisdiction, reflecting approval in terms of food preparation, solid wastes, water supply and vermin control. (4-7-83)

03. Construction. (4-7-83)

a. All construction commencing on or after the effective date of this code must conform to local building codes and evidence of conformance must be maintained readily accessible for the authority having jurisdiction (i.e. - building permits and approval for occupancy). (4-7-83)

b. In areas having no building codes, conformance will be to the Uniform Building Code currently adopted by the Idaho Building Code Advisory Act. (4-7-83)

c. Building permits may be issued by any local government having adopted a building code recognized by the authority having jurisdiction or by the Idaho Department of Labor and Industrial Services Uniform Building Bureau. (4-7-83)

d. Building inspections may be made by any current State of Idaho certified building inspector. (4-7-83)

04. Existing facilities. (4-7-83)

a. Existing facilities (Construction completed prior to the effective date of this code) will obtain an inspection and approval from the local building official that the facility meets minimum codes in effect at the time of construction and that there exist no known imminent safety hazards. (4-7-83)

b. Where no codes exist, the provisions of 190.03.b. shall apply. (4-7-83)

191. TEMPORARY LABOR CAMPS.

01. Site. (4-7-83)

a. All sites used for camps shall be adequately drained. They shall not be subject to periodic flooding, nor located within 200 feet of swamps, pools, sink holes, or other surface collections of water unless such quiescent water surfaces can be subjected to mosquito control measures. The camp shall be located so the drainage from and through the camp will not endanger any domestic or public water supply. All sites shall be graded, ditched, and rendered free from depressions in which water may become a nuisance. (4-7-83)

b. All sites shall be adequate in size to prevent overcrowding of necessary structures. The principal camp area in which food is prepared and served and where sleeping quarters are located shall be at least 500 feet from any area in which livestock is kept. (4-7-83)

c. The grounds and open areas surrounding the shelters shall be maintained in a clean and sanitary condition free from rubbish, debris, waste paper, garbage, or other refuge. (4-7-83)

d. Whenever the camp is closed for the season or permanently, all garbage, manure, and other refuse shall be collected and so disposed of as to prevent nuisance. All abandoned privy pits shall be filled with dirt and the grounds and buildings left in a clean and sanitary condition. If privy buildings remain, they shall be locked or otherwise secured to prevent entrance. (4-7-83)

02. Shelter. (4-7-83)

a. Every shelter in the camp shall be constructed in a manner which will provide protection against the elements. (4-7-83)

b. Each room used for sleeping purposes shall contain at least 70 square feet of floor space for each occupant. At least a 7' 6" ceiling shall be provided. (4-7-83)

c. Beds, cots, or bunks, and suitable storage facilities such as wall lockers for clothing and personal articles shall be provided in every room used for sleeping purposes. Such beds or similar facilities shall be spaced not closer than 36 inches both laterally and end to end, and shall be elevated at least 12 inches from the floor. If double-deck bunks are used, they shall be spaced not less than 48 inches both laterally and end to end. The minimum clear space between the lower and upper bunk shall be not less than 27 inches. Triple-deck bunks are prohibited. (4-7-83)

d. The floors of each shelter shall be constructed of wood, asphalt, or concrete. Wooden floors shall be of smooth and tight construction. The floors shall be kept in good repair. (4-7-83)

e. All untreated wooden floors shall be elevated not less than 18" above the ground level at all points to prevent dampness and to permit free circulation of air beneath. Untreated wood girders must be maintained at least 1 inches above ground level. (4-7-83)

f. Nothing in this section shall be construed to prohibit "banking" with earth or other suitable material around the outside walls in areas subject to extreme low temperatures. "Banking" is not permitted against wood. Wood siding is required to have 6" clearance above adjacent grade. (4-7-83)

g. All living quarters shall be provided with windows the total of which shall be not less than one-tenth of the floor area. At least one-half of each window shall be so constructed that it can be opened for purposes of ventilation. (4-7-83)

h. Exits - Each sleeping room shall have an emergency egress window having a minimum net clear opening of 5.7 square feet. The minimum net clear opening height dimension shall be 24 inches. The minimum net clear opening width dimension shall be 20 inches. Such egress windows shall have a finished sill height not more than 44 inches above the floor. An approved door discharging immediately to the outside of a sleeping room can be used in lieu of the above egress window. (4-7-83)

i. All exterior openings shall be effectively screened with 16-mesh material. All screen doors shall be equipped with self-closing devices. (4-7-83)

j. Each dwelling unit shall have at least 70 square feet of floor space for the first occupant and at least 50 square feet of floor space for each additional occupant. A separate sleeping area shall be provided for the husband and wife in all family units in which one or more children over six years of age are housed. (4-7-83)

k. In camps where cooking facilities are used in common, stoves (in ratio of one stove to 10 persons or one stove to two families) shall be provided in an enclosed and screened shelter. Sanitary facilities shall be provided for storing and preparing food. (4-7-83)

l. If a camp is used during cold weather, adequate heating equipment shall be provided. NOTE: All heating, cooking, and water heating equipment shall be installed in accordance with State and Local ordinances, codes, and regulations governing such installation. (4-7-83)

03. Water supply. (4-7-83)

a. An adequate and convenient water supply, approved by the appropriate health authority, shall be provided in each camp for drinking, cooking, bathing, and laundry purposes. (4-7-83)

b. A water supply shall be deemed adequate if it is capable of delivering 35 gallons per person per day to the campsite at a peak rate of 1 1/2 times the average hourly demand. (4-7-83)

c. The distribution lines shall be capable of supplying water at normal operating pressures to all fixtures for simultaneous operation. Water outlets shall be distributed throughout the camp in such a manner that no shelter is more than 100 feet from a yard hydrant if water is not piped to the shelters. (4-7-83)

d. Where water under pressure is available, one or more drinking fountains shall be provided for each 100 occupants or fraction thereof. The construction of drinking fountains shall comply with ANSI Standard Specifications for Drinking Fountains. Z4.21942. Common drinking cups are prohibited. (4-7-83)

04. Toilet facilities. (4-7-83)

a. Toilet facilities adequate for the capacity of the camp shall be provide. (4-7-83)

b. Each toilet room shall be located so as to be accessible without any individual passing through any sleeping room. Toilet rooms shall have a window not less than 6 square feet in area opening directly to the outside area or otherwise be satisfactorily ventilated. All outside openings shall be screened with 16-mesh material. No fixture, water closet, chemical toilet, or urinal shall be located in a room used for other than toilet purposes. (4-7-83)

c. A toilet room shall be located within 200 feet of the door of each sleeping room. No privy shall be closer than 100 feet to any sleeping room, dining room, lunch area, or kitchen. (4-7-83)

d. Where the toilet rooms are shared, such as in multi-family shelters, and in barracks type facilities, separate toilet rooms shall be provided for each sex. These rooms shall be distinctly marked for "men" and "women" by signs printed in English and in the native language of the persons occupying the camp, or marked with easily understood pictures or symbols. If the facilities for each sex are in the same building, they shall be separated by solid walls or partitions extending from the floor to the roof or ceiling. (4-7-83)

e. Where toilet facilities are shared, the number of water closets or privy seats provided for each sex shall be based on the maximum number of persons of that sex which the camp is designed to house at any one time, in

the ratio of one such unit to each 15 persons, with a minimum of two units for each shared facility. (4-7-83)

f. Urinals shall be provided on the basis of one unit or 2 linear feet of urinal trough for each 25 men. The floor from the wall and for a distance of not less than 15 inches measured from the outward edge of the urinals shall be constructed of materials impervious to moisture. Where water under pressure is available, urinals shall be provided with an adequate water flush. Urinal troughs in privies shall drain freely into the pit or vault and the construction of this drain shall be such as to exclude flies and rodents from the pit. (4-7-83)

g. Every water closet installed after the effective date of these standards shall be located in a toilet room. (4-7-83)

h. Each toilet room shall be lighted naturally, or artificially at all hours of the day and night as specified in 191.07. of this Code. (4-7-83)

i. An adequate supply of toilet paper shall be provided in each privy, water closet, or chemical toilet compartment. (4-7-83)

j. Privies and toilet rooms shall be kept in a sanitary condition. They shall be cleaned at least daily. (4-7-83)

05. Sewage disposal facilities. In camps where public sewers are available, all sewer lines and floor drains from buildings shall be connected thereto. (4-7-83)

06. Laundry, hand washing and bathing facilities. (4-7-83)

a. Laundry, hand washing and bathing facilities shall be provided in the following ratio: (4-7-83)

i. Hand wash basin per family shelter or six persons in shared facilities. (4-7-83)

ii. Shower head for every 10 persons. (4-7-83)

iii. Laundry tray or tub for every 30 persons. (4-7-83)

iv. Slop sink in each building used for laundry, hand washing, and bathing. (4-7-83)

b. Floors shall be of smooth finish but not slippery materials; they shall be impervious to moisture. Floor drains shall be provided in all shower baths, shower rooms, or laundry rooms to remove waste water and facilitate cleaning. All junctions of the curbing and the floor shall be the curbing and the floor shall be covered. The walls and partitions of shower rooms shall be smooth and impervious to the height of splash. (4-7-83)

c. An adequate supply of hot and cold running water shall be provided for bathing and laundry purposes. Facilities for heating water shall be provided. (4-7-83)

d. Every service building shall be provided with equipment capable of maintaining a temperature of at least 70 during cold weather. (4-7-83)

e. Facilities for drying clothes shall be provided. (4-7-83)

f. All service buildings shall be kept clean. (4-7-83)

07. Lighting. Where electric service is available, each habitable room in a camp shall be provided with at least one ceiling-type light fixture and at least one separate floor or wall type convenience outlet.laundry and toilet rooms and rooms where people congregate shall contain at least one ceiling or wall type fixture. Light levels in toilet and storage rooms shall be at least 20 foot-candles 30 inches from the floor. Other rooms, including kitchens and living quarters, shall be at least 30 foot-candles 30 inches from the floor. (4-7-83)

08. Refuse disposal. (4-7-83)

a. Fly-tight, rodent-tight, impervious, cleanable or single service containers, approved by the Sate Board of Health shall be provided for the storage of garbage. At least one such container shall be provided for each family shelter and shall be located within 00 feet of each shelter on a wooden, metal, or concrete stand. (4-7-83)

b. Garbage containers shall be kept clean. (4-7-83)

c. Garbage containers shall be emptied when full, but not less than twice a week. (4-7-83)

09. Construction and operation of kitchens, dining hall and feeding facilities. (4-7-83)

a. In all camps where central dining or multiple family feeding operations re permitted or provided, the food handling facilities shall comply with the requirements of the "Food Service Sanitation Ordinance and Code", Part V of the "Food Service Sanitation Manual", U. S. Public Health Service Publication 934 (1965). (4-7-83)

b. A properly constructed kitchen and dining hall adequate in size, separate from the sleeping quarters of any of the workers or their families, shall be provided in connection with all food handling facilities. There shall be no direct opening from living or sleeping quarters into a kitchen or dining hall. (4-7-83)

c. No person with any communicable disease shall be employed or permitted to work in the preparation, cooking, serving, or other handling of food, food-stuffs, or materials used therein, in any kitchen or dining room operated in connection with a camp or regularly used by persons living in a camp. (4-7-83)

10. Insect and rodent control. Effective measures shall be taken to prevent infestation by and harborage of animal or insect vectors or pests. (4-7-83)

11. First Aid. (4-7-83)

a. Adequate first aid facilities approved by a health authority shall be maintained and made available in every labor camp for the emergency treatment of injured persons. (4-7-83)

b. Whenever there shall occur in any camp a case of suspected food poisoning, or an unusual prevalence of any illness in which fever, diarrhea, sore throat, vomiting, or jaundice is a prominent symptom, it shall be the duty of the camp superintendent to report immediately the existence of the outbreak to the local Health Officer or State Board of health by telephone or telegram. (4-7-83)

192. NONWATER CARRIAGE DISPOSAL SYSTEMS.

01. Acceptable Industrial Disposal Systems. (4-7-83)

a. The waste disposal systems described in b., c., d., e., f. or g. of this section may be used only where not prohibited by codes and regulations of local authorities, and where water closets are not feasible due either to the lack of an adequate water supply or to the location or temporary nature of the operation requiring the facility. The number of units required for a place of employment shall be s specified in Section 191.04. of this Code. (4-7-83)

b. Privies constructed in conformity with Section 192.02 may be used for the disposal of human excreta where their use will not contaminate ground or surface water because of privy location, type of soil, or groundwater table. (4-7-83)

c. Chemical toilets constructed in conformity with Section 192.03 of this Chapter may be used in place of privies or where a privy is not permitted due to possible contamination of ground and surface water. (4-7-83)

d. Recirculating toilets constructed in conformity with Section 192.06 may be used in place of privies or chemical toilets. (4-7-83)

e. Combustion toilets constructed in conformity with Section 192.05 may be used in place of privies, chemical toilets or recirculating toilets. (4-7-83)

f. Portable toilets constructed in conformity with Section 192.07 may be used for temporary or mobile installations. Such temporary units may be: (4-7-83)

i. Chemical, recirculating, or combustion toilets designed for installation in or as an integral part of a skid mounted portable privy building, or in a separate toilet room, or (4-7-83)

ii. Portable privies designed for installation over a manhole of a sanitary or a combined waste water sewer system. (4-7-83)

g. A seepage pit constructed in conformity with Section 192.04 may be used for the disposal of waste water from culinary activity, temporary bathing facilities, and clothes washing facilities where there is no available piped water supply. Human excreta shall not be discharged into a seepage pit. All units described in this section shall comply with applicable codes and regulations of local authorities. (4-7-83)

02. Privy Specifications. (4-7-83)

a. A privy pit shall be separated by a minimum distance of 100 feet between the privy and a well, spring, or other source of water supply for drinking, bathing, or culinary purposes. (4-7-83)

i. At no time shall the pit bottom of a privy extend into ground water nor shall it be constructed within 100 feet of the shoreline of any open body of water. Phreatic water, such as may be found in surface soil at depths of 10 feet or less, shall not be interpreted as ground water unless there is evidence of positive directional flow through the pit. (4-7-83)

ii. The privy shall be so located and so constructed that no surface water may enter into the pit either as runoff or as flood water. (4-7-83)

iii. The pit shall be constructed of such material and in such a manner as to prevent rapid deterioration, provide adequate capacity, and facilitate maintenance in a satisfactory manner under ordinary conditions of usage. (4-7-83)

iv. The pit and seat area shall be vented by a flue or vent pipe having not less than 7 square inches cross-sectional area, so as to provide a continuous escape of odors. (4-7-83)

v. The pit shall provide a capacity of 50 cubic feet for each seat installed in the privy building. The vault within 16 inches of the surface grade shall not be counted as part of the 50-cubic-foot capacity. (4-7-83)

vi. Pit cribbing shall fit firmly and be in uniform contact with the earth walls on all sides, and shall rise at least 6 inches above the original ground line and descend to the full depth of the pit. However, the pit cribbing below the soil line may be omitted in rock formations. (4-7-83)

vii. An earth plateau shall be constructed level with the top of the pit cribbing, and extend horizontally for a distance of at least 18 inches before sloping to the original ground level. (4-7-83)

b. Privy building shall be firmly anchored, rigidly constructed, and free from hostile surface features, such as exposed nail points, sharp edges, rough or broken boards, etc., and shall provide privacy and protection from the elements. It shall be ventilated by leaving a 4-inch opening at the top of all the walls just beneath the roof. (4-7-83)

i. The building shall be of fly-tight construction, doors shall be self-closing, and vent and building openings shall be screened with 16-mesh screen of durable material. The vent shall extend 12 inches above the roof. (4-7-83)

ii. The seat shall be so spaced as to provide a minimum clear space of 24 inches between each seat in multiple unit installations, and shall provide 12 inches clear space from the seat opening to the side wall in single and multiple units. (4-7-83)

iii. The seat riser shall have an inside clearance of not less than 21 inches from the front wall and not less than 24 inches from the rear wall of the privy building. (4-7-83)

iv. The seat top shall be not less than 12 inches nor more than 16 inches above the floor. (4-7-83)

v. The seat opening shall be covered with an attached, movable toilet seat and lid, so constructed and installed that when closed it will limit access of insects, and which can be raised to allow sanitary use as a urinal. (4-7-83)

vi. The floor and riser shall be built of impervious material or tongue and groove lumber, and in a manner to deny access of insects. (4-7-83)

vii. Where electricity is available, lighting shall be provided with an intensity of not less than 10 foot-candles 30 inches above the floor. (4-7-83)

viii. A conveniently located receptacle or dispenser containing an adequate supply of toilet paper shall be provided for each seat in each privy building. (4-7-83)

03. Chemical Toilet Specifications. (4-7-83)

a. Rooms, buildings, or shelters housing chemical toilets shall be of sound construction and easy to clean, and shall provide shelter and privacy. The toilet rooms shall be ventilated to the outside and adequately lighted, as specified in Section 192.07 and all openings into the toilet room shall be covered with 16-mesh screen. The minimum requirements given in b. through g. of this Section shall apply. (4-7-83)

b. Caustic receptacles shall be durable and corrosion proof, and provide a minimum capacity of 100 gallons per seat. (4-7-83)

c. The caustic receptacle charge per seat shall be a minimum of 25 pounds of caustic dissolved in 10 gallons of water. (4-7-83)

d. The chemical shall be drained and receptacle recharged every 6 months of continuous use, or at the beginning of each season of operation when in intermittent use, or when 3/4 full, whichever occurs first. (4-7-83)

e. Each seat in the building shall be provided with a conveniently located agitator. (4-7-83)

f. Receptacles shall be vented as prescribed in Section 192.02.a.iv. (4-7-83)

g. The receptacle shall be equipped with a manhole external to the privy building for cleaning and caustic removal purposes. The manhole shall be covered so as to prevent the escape of gases and odors. (4-7-83)

04. Seepage pit construction. (4-7-83)

a. Seepage pit construction shall conform with requirements for privy pit construction in Section 192.03.a.i., ii, iii, iv, v and vi. The seepage pit may be filled with stone or rubble of not less than nominal 1-inch diameter. (4-7-83)

b. Seepage pits shall be of such dimensions as to provide side wall area equal to at least 10 square feet per person served by the facility, or such greater area as may be required by the health agency having jurisdiction. (4-7-83)

c. Temporary piping connections from sinks or shower platforms shall comply with the Uniform Plumbing Code, 1979 edition. (4-7-83)

d. The platform covering the seepage pits shall be built of impervious material and in a manner to exclude insects. (4-7-83)

e. The platform shall be provided with an opening at least 1 foot in each dimension and have a rim at least 1 inch above the floor to prevent precipitation from accumulating on the platform floor. (4-7-83)

f. The platform opening shall be covered with a self-closing lid, so constructed that it can e easily opened by foot or hand, and so installed that when closed it will exclude insects and fit closely over the raised rim of the opening. (4-7-83)

05. Combustion Toilet. (4-7-83)

a. Combustion toilets and combination toilet buildings, rooms, or shelters shall conform to the applicable specifications given for chemical toilets in Section 192.03. (4-7-83)

b. All external surfaces, including bowl and hopper, shall be easy to clean. (4-7-83)

c. The residue must be sterile and inert. (4-7-83)

d. The flue effluent shall be free of bacteria. (4-7-83)

e. The combustion system and all fuel and electrical parts shall be safe and in compliance with applicable gas and electrical codes of local authorities. Where such codes do not exist, the installations shall comply with the National Electrical Code, NFPA 70-1981, ANSI C1-1971. (4-7-83)

06. Recirculating toilet specifications. (4-7-83)

a. Recirculating toilet buildings, rooms, or shelters shall conform to the applicable specifications given for chemical toilets in Section 192.03. (4-7-83)

b. All materials, bowl, piping, and fittings shall be corrosion resistant. (4-7-83)

c. Waste passages shall have smooth surfaces and be free of obstructions, recesses, or chambers that would permit fouling. (4-7-83)

d. Flushing shall be accomplished by a single control so arranged as to be operated without special knowledge or effort. (4-7-83)

e. Recirculating toilets shall conform to ":Self-Contained, Electrically Operated Recirculating, Chemically Controlled Toilet", International Association of Plumbing and Mechanical Officials Trailer Standard TSC 12-1965. (4-7-83)

f. The unit shall be maintained and cleaned; and water, filter, and odor-controlling chemical shall be replaced in accordance with the instructions of the manufacturer. (4-7-83)

07. Portable Toilet Construction. (4-7-83)

a. A portable toilet may comprise the seat and its treatment unit to be installed n a structure, or it may comprise an entire prefabricated, skid mounted, or otherwise portable structure containing a seat or treatment units with seat. (4-7-83)

b. No pit, tank, or other sub-surface structure shall be construed as part of a portable toilet. Portable privies must be installed over a pit conforming to Section 192.02 or a manhole that is part of a sanitary or combined waste water disposal system. (4-7-83)

c. A portable building shall be rigidly constructed, ventilated by a screened opening or a vent having a cross-sectional area of at least 1 square foot per seat, and equipped with a floor, riser, and seat meeting the requirements of Section 192.02, or an equivalent individual stool (4-7-83)

i. The structure shall provide privacy and protection from the elements. (4-7-83)

ii. An airtight seal shall be provided between the structure base and any pit, receptacle, or manhole over which it is placed. (4-7-83)

iii. Ventilation of the pit, receptacle, or manhole shall conform to Section 192.02. (4-7-83)

d. A portable toilet shall be provided with facilities, requisite to its construction, for the removal of chemicals, ash, or residue. All surfaces subject to soiling shall be readily accessible and easily cleaned. (4-7-83)

193. -- 199. (RESERVED).

200. TOXIC AND HAZARDOUS SUBSTANCES.

01. General. Rules and Regulations of the State Board of Health and Welfare shall be complied with by every employer and shall be enforced as provided for by statute law. (4-7-83)

02. Title 29 CFR 1910.1001-1978. Refer to General Industry Safety and Health Standards, 29 CFR 1910 Subpart 1910.1001 through 1910.1500, 1978 as adopted. (4-7-83)

03. Prohibited use of cyanide or cyanide mixtures. (4-7-83)

a. Use of compounds containing dimethylomano-propionitrile, or bis (2 dimethylamino, ethyl, ether), in the sewer grout process, is hereby prohibited. (4-7-83)

b. The term bis (2-dimethylamionom ethyl, ether) shall also include compounds referred to as 2,2' oxybis (N, N dimethylethylamine). (4-7-83)

c. The term dimethylamenopropionitrile shall also include compounds referred to as 3 - (dimethylamino) propionitrile. (4-7-83)

04. Labeling of paint and cleansing liquids containing toxic additives. All persons, partnerships, or corporations who sell or offer to sell in the State of idaho any type of paint, solvent, or cleansing liquids containing toxic additives shall cause a label to be placed on each and eery box, package or container showing thereon the name and type of such ingredients and/or toxic additives and the amount of each. (4-7-83)

05. Air contaminants. An employee's exposure to any material listed in Table 1805-A, 1805-B or 1805-C of this section shall be limited in accordance with the requirements of the following paragraphs of this section. (4-7-83)

TABLE 1805-A available at Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone (208) 334-6000.

a. Materials with names preceded by "C", Ceiling Values. An employee's exposure to any material in Table 1805-A, the name of which is preceded by a "C" shall at no time exceed the ceiling value given for that material in the table. (4-7-83)

b. Other materials - 8-hour times weighted averages. An employee's exposure to any material in Table 1805-A, the name of which is not preceded by "C", in any 8-hour work shift shall not exceed the 8-hour weighted average given for that material in the table. (4-7-83)

TABLE 1805-B available at Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone (208) 334-6000.

c. 8-hour time weighted averages. An employee's exposure to any material listed in Table 1805-B in any 8-hour work day shall not exceed the 8-hour time weighted average limit given for that material in the table. (4-7-83)

d. Acceptable ceiling concentration. An employee's exposure to a material listed in Table 1805-B shall not exceed at any time during an 8-hour shift, the acceptable ceiling concentration limit given for the material in the table, except for a time period, and up to a concentration not exceeding the maximum duration and concentration allowed in the column under "acceptable maximum peak above the acceptable ceiling concentration for an 8-hour shift". (4-7-83)

e. Example. During an 8-hour work shift, an employee may be exposed to a concentration of Benzene above 25 p.p.m. (but never above 50 p.p.m.) only for a maximum period of 10 minutes. Such exposure must be compensated by exposures to concentrations less than 10 p/m so that the cumulative exposure for the entire work shift of eight hours does not exceed a weighted average of 10 p/m. (4-7-83)

TABLE 1805-C available at Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone (208) 334-6000.

f. An employee's exposure to any material listed in Table 1805-C in any 8-hour work shift, shall not exceed the 8-hour time weighted average limit given for that material in the table. (4-7-83)

g. Computation Formula: The cumulative exposure for an 8-hour work shift shall be computed as follows: (E=CaTa + CbTb... CnTn) -- 8. Where: E is the equivalent exposure for the working shift; C is the concentration during any period of time T where the concentration remains constant; and T is the duration in hours of the exposure at the concentration C. The value of E shall not exceed the 8-hour limit for time weighted averages in Table 1805-A, B and C for the material involved. (4-7-83)

h. To illustrate the formula prescribed in this paragraph, note that isoamy1 acetate has an 8-hour weighted average limit of 100 p.p.m. Assume that an employee is subject to the following exposure: Two hours exposure at 150 p.m; Two hours exposure at 75 p.m; Four hours exposure at 50 p/m. Substituting this information in the formula we have: (2x150+2x75+4x50) -- 8 = 81.25 p/m. Since 81.25 p.p.m. is less than 100 p.p.m. the 8-hour time weighted average limit, the exposure is acceptable. (4-7-83)

i. In case of a mixture of air contaminates, an employer shall compute the equivalent exposure as follows: Em = (C1-L1 + C2-L2) + ... (Cn-L n). Where Em is the equivalent exposure for the mixture, C is the concentration of a particular contaminant, L is the exposure limit for that contaminant, from Table 1805-A, C, C. The value of Em shall not exceed units. (4-7-83)

j. To illustrate the formula prescribed in paragraph i of this section, consider the following exposures:

Material	Actual Concentration of 8-hour exposure	8-hour time weighted average exposure limit
Acetone (Table 1805-A)	500 p/m	1,000 p/m
2-Butanone (Table 1805-A)	45 p/m	200 p/m
Toluene (Table 1805-B)	40 p/m	200 p/m

Since Em is less than unity, the exposure combination is within acceptable limits. (4-7-83)

k. To achieve compliance with paragraphs 200.05.a. through 200.05.g.,this section, administrative or engineering controls must first be determined and implemented whenever feasible. When such controls are not feasible to achieve full compliance, protective equipment or any other protective measures shall be used to keep the exposure of employees to air contaminant within the limits prescribed in this section. Any equipment and/or technical measures used for this purpose must be approved for each particular use by a competent industrial hygienist or other technically qualified person. Whenever respirators are used, their use shall comply with Chapter 3 of this Code. (4-7-83)

l. a-Parts or vapor or gas per million parts of contaminated air by volume at 25 C. and 760 mm. Hg pressure. (4-7-83)

m. b-Approximate milligrams of particulate per cubic meter of air. (4-7-83)

n. (No footnote "c" is used to avoid confusion with ceiling value notations.) (4-7-83)

o. An atmospheric concentration of not more than 8.02. (4-7-83)

06. Disposal of hazardous and toxic waste material. Wastes from hazardous and toxic material shall be disposed of in a manner and location approved by the District Health Department. (4-7-83)

201. -- 209. (RESERVED).

210. INSPECTION OF COMPRESSED GAS CYLINDERS.

01. Definitions. (4-7-83)

a. High- and Low-pressure cylinders. High-pressure cylinders means those cylinders with a marked service pressure of 900 p.s.i. or greater; low-pressure cylinders are those with a marked service pressure less than 900 p.s.i. (4-7-83)

b. Minimum allowable wall thickness means the minimum wall thickness required by the specification under which the cylinder was manufactured. (4-7-83)

c. Dents. Dents (in cylinders) means deformities caused by the cylinder coming in contact with a blunt object in such a way that the thickness of metal is not materially impaired. (4-7-83)

d. Cuts, gouges, or digs. Cuts, gouges, or digs (in cylinders) means deformities caused by contact with a sharp object in such a way as to cut into or upset the metal of the cylinder, decreasing the wall thickness at that point. (4-7-83)

e. Corrosion or pitting. Means corrosion or pitting in cylinders involving the loss of wall thickness by corrosive media. NOTE: There are several kinds of pitting or corrosion to be considered. (4-7-83)

f. Isolated pitting. Means isolated pits of small cross-section which do not effectively weaken the cylinder wall but are indicative of possible complete penetration and leakage. NOTE: Since the pitting is isolated, the original wall is essentially intact. (4-7-83)

g. Line corrosion. Means pits which are not isolated but are connected or nearly connected to others in a narrow band or line. NOTE: This condition is more serious than isolated pitting. Line corrosion frequently occurs in the area of intersection of the foot-ring and bottom of a cylinder. This is sometimes referred to as "crevice corrosion". (4-7-83)

h. General corrosion. Means corrosion which coves considerable surface areas of the cylinder. (4-7-83)

NOTE: It reduces the structural strength. It is often difficult to measure or estimate the depth of general corrosion because direct comparison with the original wall cannot always be made. General corrosion is often accompanied by pitting. (4-7-83)

i. "DOT" means the U. S. Department of Transportation. (4-7-83)

02. General requirements. (4-7-83)

a. Application. (4-7-83)

i. Each employer shall determine that compressed gas cylinders under his control are in a safe condition to the extent that this can be determined by visual, and other inspection required by Section 201 through 208 of this Chapter. (4-7-83)

ii. The requirements contained in these standards are not intended to apply to cylinders manufactured under specification DOT (ICC)-3HT (49 CFR Ch. 1). Separate requirements covering service life and standards for visual inspection of these cylinders are contained in Compressed Gas Association Pamphlet C-8, "Standard for Requalification of ICC-3HT Cylinders". (4-7-83)

b. Quality of Inspection. Experience in the inspection of cylinders is an important factor in determining the acceptability of a given cylinder for continued service. NOTE: Users lacking this experience and having doubtful cylinders should return them (4-7-83)

03. Compressed gasses. The in-plant handling, storage, and utilization of all compressed gases in cylinders, portable tanks, rail tank cars, or motor vehicle cargo tanks shall be in accordance with Compressed Gas Association Pamphlet P-1-1965. (4-7-83)

04. Securing of all pressurized cylinders. A suitable cylinder truck, art, chain or other steadying device shall be used to prevent all compressed gas cylinders from being knocked over while in use or in storage, empty or full. (4-7-83)

05. Inspection of low-pressure cylinders exempt from the hydrostatic test including acetylene cylinders. (4-7-83)

a. Application. This section covers cylinders of the type that are exempt from the hydrostatic retest requirements of the DOT by virtue of their exclusive use in certain noncorrosive gas service. They are not subject to internal corrosion and do not require internal shell inspection. (4-7-83)

b. Preparation for Inspection. Rust, scale, caked paint, etc., shall be removed from the exterior surface so that the surface can be adequately observed. Facilities shall be provided for inverting the cylinder to facilitate inspection of the bottom. This is important because experience has shown this area to be the most susceptible to corrosion. (4-7-83)

c. Exterior Inspection. Cylinders shall be checked as outlined below for corrosion, general distortion or any other defect that might indicate a weakness which would render it unfit for service. (4-7-83)

d. To fix corrosion limits for all types, designs, and sizes of cylinders and include them in this section is not practicable. Cylinders shall meet the requirements of 201.05. c. Failure to meet any of these requirements is of itself cause for rejection of a cylinder. (4-7-83)

i. A cylinder shall be rejected when the tare weight is less than 95% of the original tare weight marked on the cylinder. When determining tare weight, be sure that the cylinder is empty. (4-7-83)

ii. A cylinder shall be rejected when the remaining wall in an area having isolated pitting only is less than one-third of the minimum allowable wall thickness as determined under Section 201.05.c.ii through iv. (4-7-83)

iii. A cylinder shall be rejected when line corrosion on the cylinder is 3 inches in length or over and the remaining wall is less than three-fourths of the minimum allowable wall thickness or when line corrosion is less than 3 inches in length and the remaining is less than one-half the minimum allowable wall thickness as determined under Section 201.05.c.ii through iv. (4-7-83)

iv. A cylinder shall be rejected when the remaining wall in an area of general corrosion is less than one-half of the minimum allowable wall thickness as determined under Section 201.05.c.ii through iv. (4-7-83)

e. To use the criteria in Section 201.05.c.i(d), it is necessary to know the original wall thickness of the cylinder or the minimum allowable wall thickness. Table 1905-A lists the minimum allowable wall thickness under

DOT Specifications (49 CFR Ch. 1) for a number of common size low-pressure cylinders. (4-7-83)

TABLE 1905-A available at Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone (208) 334-6000.

f. When the wall thickness of the cylinder at manufacture is not known, and the actual wall thickness cannot be measured, this cylinder shall be rejected when the inspection reveals that the deepest pit in a general corrosion area exceeds three sixty-fourths inch. This is arrived at by considering that in no case shall the pitting exceed one-half the minimum allowable wall thickness which is 0.064 inch. When a pit measures 0.043 inch (approximately three-sixty-fourths inch) in a corrosion area, general corrosion will already have removed 0.021 inch of the original wall and the total pit depth as compared to the initial wall will be 0.064 inch. (4-7-83)

g. When the original wall thickness is measured, this thickness less one and one-half times the maximum measured pit depth shall be 0.064 inch or greater. If it is less, the cylinder shall be rejected. (4-7-83)

h. Dents are of concern where the metal deformity is sharp and confined, or where they are near a weld. Where metal deformity is not sharp, dents of larger magnitude can be tolerated. (4-7-83)

i. Where denting occurs so that any part of the deformityn includes a weld, the maximum allowable dent depth shall be one-fourth inch. (4-7-83)

j. When denting occurs so that no part of the deformity includes a weld, the cylinder shall be rejected if the depth of the dent is greater than one-tenth of the mean diameter of the dent. (4-7-83)

k. Cuts, gouges, or digs reduce the wall thickness of the cylinder an din addition are considered to be stress raises. Depth limits are set in these standards; however, cylinders shall be rejected at one-half of the limit set whenever the length of the defect is 3 inches or more. (4-7-83)

l. When the original wall thickness at manufacture is not known and the actual wall thickness cannot be measured, a cylinder shall be rejected if the cut, gouge, or dig exceeds one-half of the minimum allowable wall thickness as determined under Section 201.05.c.ii through iv. (4-7-83)

m. When the original wall thickness at manufacture is known, or the actual wall thickness is measured, a cylinder shall be rejected if the original wall thickness minus the depth of the defect is less than one-half of the minimum allowable wall (4-7-83)

n. Leaks can originate from a number of sources, such as defects in a welded or brazed seam, defects at the threaded opening, or from sharp dents, digs, gouges, or pits. (4-7-83)

o. To check for leaks, the cylinder shall be charged and carefully examined. All seams and pressure openings shall be coated with a soap or other suitable solution to detect the escape of gas. Any leakage is cause for rejection. (4-7-83)

p. Safety relief devices as defined in 202. 01. a. shall be tested for leaks before a charged cylinder is shipped from the cylinder filling plant. (4-7-83)

q. After fire damage, cylinders shall be carefully inspected for evidence of exposure to fire. (4-7-83)

i. Common evidences of exposure to fire are: charring or burning of the paint or other protective coat; burning or splintering of the metal; distortion of the cylinder; melted out fuse plugs; burning or melting of valve. (4-7-83)

ii. The evaluation of fire damage by DOT Regulations state that, "A cylinder which has ben subjected to the action of fire must not again be placed in service until it has been properly reconditioned," in accordance with 49 CFR 173.34(f). The general intent of this requirements is to remove from service cylinders which have been subject to the action of fire which has changed the metallurgical structure or the strength properties of the steel, or in the case of acetylene cylinders caused breakdown of porous filler. This is normally determined by visual examination

as covered above with particular emphasis to the condition of the protective coating. If the protective coating has been burnt off or if the cylinder body is burnt, warped, or distorted, it is assumed that the cylinder has been overheated and 49 CFR 173.34(f) shall be complied with. If, however, the protective coating is only dirtied from smoke or other debris, and is found by examination to be intact underneath, the cylinder shall not be considered affected within the scope of this requirement. (4-7-83)

r. Cylinders are manufactured with a reasonably symmetrical shape. Cylinders which have definite visible bulges shall be removed from service an devaluated. Cylinders shall be rejected when a variation of 1 percent or more is found in the measured circumferences or in peripheral distances measured from the valve spud to the center seam (of equivalent fixed point). (4-7-83)

s. Cylinder necks shall be examined for serious cracks, folds, and flaws. Neck cracks are normally detected by testing the neck during charging operations with a soap solution. (4-7-83)

t. Cylinder neck threads shall be examined whenever the valve is removed from the cylinder. Cylinders shall be rejected if the require number of effective threads are materially reduced, or if a gas tight seal cannot be obtained by reasonable valving methods. Gages shall be used to measure the number of effective threads. (4-7-83)

u. If the valve is noticeably tilted, the cylinder shall be rejected. (4-7-83)

v. The footring and headring of cylinders may become so distorted through service abuse that they no longer perform their functions: (4-7-83)

i. To cause the cylinder to remain stable and upright. (4-7-83)

ii. To protect the valve. Rings shall be examined for distortion; for looseness, and for failure of welds. Appearances may often warrant rejection of the cylinder. (4-7-83)

06. Low-pressure cylinders subject to hydrostatic testing. (4-7-83)

a. Application. Cylinders covered in this section are low-pressure cylinders other than those covered in Section 201.05. They differ essentially from such cylinders in that they require a periodic hydrostatic retest which includes an internal and external examination. Defect limits for the external examination are prescribed in 1905, with exceptions for aluminum cylinders shown in 201.06. (4-7-83)

b. Preparation for Inspection. Flammable gas cylinders shall be purged before being examined with a light. Lamps used for flammable gas cylinder inspection shall be explosion proof. (4-7-83)

c. Internal Inspection. Cylinders shall be inspected internally at least every time the cylinder is periodically retested. The examination shall be made with a light of sufficient intensity to clearly illuminate the interior walls. (4-7-83)

d. External inspection of Aluminum Cylinders. The inspection requirements of Section 205 shall be met, except as follows: (4-7-83)

i. Aluminum cylinders shall be rejected when impairment to the surface (corrosion or mechanical defect) exceeds a depth where the remaining wall is less than three-fourths of the minimum allowable wall thickness required by the specification under which the cylinder was manufactured. (4-7-83)

ii. Aluminum cylinders subjected to the action of fire shall be removed from service. (4-7-83)

07. High-pressure cylinders. (4-7-83)

a. Application. High-pressure cylinders are those with a marked service pressure of 900 p.s. i. or higher. They are seamless; no welding is permitted. The great bulk of such cylinders are of the 3A or 3AA types under DOT Specifications (49 CFR Ch. 1). (4-7-83)

b. Preparation for inspection. (4-7-83)

i. Cylinders shall be cleaned for inspection so that the inside and outside surfaces and all conditions an e observed. This shall include removal of scale and caked paint from the exterior and the thorough removal of internal scale. Cylinders with interior coating shall be examined for defects in the coating. If the coating is defective, it shall be removed. (4-7-83)

ii. A good inspection light of sufficient intensity to clearly illuminate the interior wall is mandatory for internal inspection. Flammable gas cylinders shall be purged before being examined with a light. Lamps for flammable gas cylinder inspection shall be explosion proof. (4-7-83)

c. Exterior inspection. (4-7-83)

i. To fix corrosion limits for all types, designs, and sizes of cylinders, and include them in this section, is not practicable. Considerable judgment is required in evaluating cylinders fit for service. Experience is a major factor, aside from strength considerations for high pressure cylinders. (4-7-83)

ii. When the original wall thickness of the cylinder is not known and the actual wall thickness cannot be measured, the cylinder shall be rejected if corrosion exceeds one thirty-second inch in depth. This is arrived at by subtracting from the minimum allowable wall at manufacture (0.221 inch), the limiting wall in service (0.195), to give the maximum allowable corrosion limit of 0.026 inch, the equivalent of one thirty-second inch. (4-7-83)

iii. When the wall thickness is known, or the actual wall thickness is measured, the difference between this known wall and the limiting value establishes the maximum corrosion figure. The normal hot forged cylinder of this size will have a measured wall of about 0.250 inch. Comparison of this with the limiting wall thickness shows that defects up to about one-sixteenth inch are allowable provided, of course, that the actual wall is measured or is known. (4-7-83)

iv. Cylinders with general corrosion are evaluated by subjecting them to a hydrostatic test. Thus, a cylinder with an elastic expansion of 227 cc. or greater shall be rejected. If areas of pronounced pitting are included within the general corrosion, the depth of such pitting should also be measured (with the high spots of the actual surface as a reference point) and the criteria established in the first example apply. Thus, the maximum corrosion limit would be one thirty-second inch when the wall was not known. (4-7-83)

v. Any defect of appreciable depth having a sharp bottom is a stress raiser and even though a cylinder may be acceptable from a stress standpoint, it is common practice to remove such defects. After any such repair operation, verification of the cylinder strength and structure shall be made by hydrostatic test of other suitable means. (4-7-83)

vi. Dents can be tolerated when the cylinder wall is not deformed excessively or abruptly. Generally speaking, dents are accepted up to a depth of about one-sixteenth inch when the major diameter of the dent is equal to or greater than 32 times the depth of the dent. Sharper dents than this are considered too abrupt and shall require rejection of the cylinder. On small diameter cylinders, these general rules may have to be adjusted. Considerations of appearance play a major factor in the evaluation of dents. (4-7-83)

vii. Cylinders with arc or torch burns shall be removed from service. Defects of this nature may be recognized by one of the following conditions: Removal of metal by scaring or cratering; a sentering of burning of the base metal; a hardened heat affected zone. A simple method for verifying the presence of small burns is to file the suspected area. The hardened zone will resist filing as compared to the softer base metal. (4-7-83)

viii. Cylinders are normally produced with a symmetrical shape. Cylinders with distinct visual bulges shall be removed from service until the nature of the defect is determined. Some cylinders may have small discontinuities related to the manufacturing process - mushroomed bottoms, offset shoulders, etc. These usually can be identified and are not normally cause for. (4-7-83)

ix. Cylinders shall be carefully inspected for evidences of exposure to fire. (4-7-83)

x. Cylinder necks shall be examined for serious cracks, folds, and flaws. (4-7-83)

08. Internal inspection. (4-7-83)

a. Cylinders shall be inspected internally at least every time the cylinder is periodically retested. This examination shall be made with a light of sufficient intensity to clearly illuminate the interior walls. (4-7-83)

b. A hammer test consists of tapping a cylinder a light blow with a suitably sized hammer. A cylinder, emptied of liquid content, with a clean internal surface, standing free, will have a clear ring. Cylinders with internal corrosion will give a duller ring dependent upon the amount of corrosion and accumulation of foreign material. Such cylinders shall be investigated. The hammer test is very sensitive and is an easy, quick, and convenient test that can be made without removing the valve before each charging. It is an invaluable indicator of internal corrosion. (4-7-83)

211. SAFETY RELIEF DEVICES FOR COMPRESSED GAS CYLINDERS.

01. Definitions. (4-7-83)

a. Safety relief device. A safety relief device" is a device intended to prevent rupture of a cylinder under certain conditions of exposures. (The term as used therein shall include the approach channel, the operating parts, and the discharge channel.) (4-7-83)

b. Approach channel. An "Approach channel" is the passage or passages through which gas must pass from the cylinder to reach the operating parts of the safety relief device. (4-7-83)

c. Discharge channel. A "discharge channel": is the passage or passages beyond the operating parts through which gas must pass to reach the atmosphere exclusive of any piping attached to the outlet of the device. (4-7-83)

d. Safety relief device channel. A "safety relief device channel" is the channel through which gas released by operation of the device must pass from the cylinder to the atmosphere exclusive of any piping attached to the inlet or outlet of the device. (4-7-83)

e. Operating part. The "operating part" of a safety relief device is the part of the safety relief device that normally closes the safety discharge channel but when moved from this position as a result of the action of eat or pressure, or a (4-7-83)

f. Frangible disc. A "frangible disc" is an operating part in the form of a disc usually of metal and which is so held as to close the safety relief device channel under normal conditions. The disc is intended to burst at a predetermined pressure to permit the escape of gas. (4-7-83)

g. Pressure Opening. A "pressure opening" is the orifice against which the frangible disc functions. (4-7-83)

h. Rated bursting pressure. A "rated bursting pressure" of a frangible disc is the maximum pressure for which the disc is designed to burst when in contact with the pressure opening for which it was designed when tested. (4-7-83)

i. Fusible Plug. A "fusible plug" is an operating part in the form of a plug of suitable low melting material, usually a metal alloy, which closes the safety relief device channel under normal conditions and is intended to yield or melt at a predetermined temperature to permit the escape of gas. (4-7-83)

j. Yield temperature. The "yield temperature" of a fusible plug is the temperature at which the fusible metal or alloy will yield when tested. (4-7-83)

k. Reinforced fusible plug. A "reinforced fusible plug" is a fusible plug consisting of a core of suitable material having aa comparatively high yield temperature surrounded by a low melting; point fusible metal of the

required yield temperature. (4-7-83)

l. Combination frangible disc-fusible plug. A "combination frangible disc-fusible plug" is a frangible disc in combination with a low melting point fusible metal, intended to prevent its bursting at its predetermined bursting pressure unless the temperature also is high enough to cause yielding or melting of the fusible metal. (4-7-83)

m. Safety relief valve. A "safety relief valve" is a safety relief device containing an operating part that is held normally in a position closing the safety relief device channel by spring force and is intended to open and to close at predetermined pressures. (4-7-83)

n. Combination safety relief valve and fusible plug. A "combination safety relief valve and fusible plug" is a safety relief device utilizing a safety relief valve in combination with a fusible plug. This combination device may be an integral unit or separate units and is intended to open and close at predetermined pressures or to open at a predetermined temperature. (4-7-83)

o. Set pressure. The "set pressure" of a safety relief valve is the pressure marked on the valve and at which it is set to start-to-discharge. (4-7-83)

p. Start-to-discharge pressure. The "start-to-discharge pressure" of a safety relief valve is the pressure at which the first bubble appears through a water seal of not over 4 inches in the outlet of the safety relief valve. (4-7-83)

q. Flow capacity. The "flow capacity" of a safety relief device is the capacity in cubic feet per minute of feet air discharged at the required flow rating pressure. (4-7-83)

r. Flow rating pressure. The "flow rating pressure" is the pressure at which a safety relief device is rated for capacity. (4-7-83)

s. Nonliquefied compressed gas. A "nonliquefied compressed gas" is a gas, other than a gas in solution which under the charging pressure, is entirely gaseous at a temperature of 70 F. (4-7-83)

t. Liquefied compressed gas. A "liquefied compressed gas" is a gas which, under the charging pressure, is partially liquid at a temperature of 70 F. A flammable compressed gas which is normally nonliquefied at 70 F but which is partially liquid under the charging pressure and temperature, shall follow the requirements for liquefied compressed gases. (4-7-83)

u. Pressurized liquid compressed gas."A "pressurized liquid compressed gas" is a compressed gas other than a compressed gas in solution, which cannot be liquefied at a temperature of 70 F, and which is maintained in the liquid state at a pressure not less than 40 p.s.i.a. by maintaining the gas at a temperature less than 70 F. (4-7-83)

v. Test pressure of the cylinder. The "test pressure of the cylinder" is the minimum pressure at which a cylinder must be tested as prescribed in DOT specifications for compressed gas cylinders (41 CFR Ch. 1). (4-7-83)

w. Free air or free gas."Free air" or "free gas" is air or gas measured at a pressure of 14.7 pounds per square inch absolute and a temperature of 60 F. (4-7-83)

x. DOT regulations. As used in these standards, "DOT regulations refers to the U. S. Department of Transportation Regulations for Transportation of Explosives and Other Freight, Express and Baggage Services and by Motor Vehicle (Highway) and Water, including Specifications for Shipping Containers, Code of Federal Regulations, Title 49, Parts 171 to 178. (4-7-83)

02. General requirements. (4-7-83)

a. Application. Compressed gas cylinder, portable tanks, and cargo tanks shall have pressure relief devices installed and maintained in accordance with Compressed Gas Association Pamphlets S-1.1-1963 and 1965

addenda and S-1.2-1963. (4-7-83)

b. Types of Safety Relief Devices. Types of safety relief devices as covered by this section are designated as follows: (4-7-83)

i. Type CG-1: Frangible disc. (4-7-83)

ii. Type CG-2: Fusible plug or reinforced fusible plug utilizing a fusible allow with yield temperature not over 170 F. nor less than 157 F. (165 F. nominal). (4-7-83)

iii. Type CG-3: Fusible plug or reinforced fusible plug utilizing a fusible alloy with yield temperature not over 220 F. nor less than 208 F. (212 F. nominal) (4-7-83)

iv. Type CG-4: Combination frangible disc-fusible plug, utilizing a fusible alloy with yield temperature not over 170 F., nor less than 157 F. (165 F., nominal) (4-7-83)

v. Type CG-5:Combination frangible disc fusible plug, utilizing a fusible allow with yield temperature not over 220 F. nor less than 208 F. (4-7-83)

vi. Type CG-7: Safety relief valve. (4-7-83)

vii. Type CG-8: Combination safety relief valve and fusible plug. (4-7-83)

c. Specifications and tests. All safety relief devices covered by this section shall meet the design, construction marking and test specification of the "Compressed Gas Association Safety Relief Device Standards Part 1 - Cylinders for Compressed Gases: S1.1-1963". (4-7-83)

d. Specific Requirements for Safety Relief Devices. (4-7-83)

i. Compressed gas cylinders which under the Regulations of the Department of Transportation must be equipped with safety relief devices shall be considered acceptable when equipped with devices of proper construction, location, and discharge capacity under the conditions prescribed in Table 1 of the Compressed Gas Associations Standard S-1.1-1963. (4-7-83)

ii. Only replacement parts or assemblies provided by the manufacturer shall be used unless the advisability of interchange is proved by adequate tests. (4-7-83)

iii. When a frangible disc is used with a compressed gas cylinder, the rated bursting pressure of the disc shall not exceed the minimum required test pressure of the cylinder with which the device is used, except for DOT-3E cylinders (49 CFR Ch. 1) the rated bursting pressure of the device shall not exceed 4,500 pounds per square inch gage (p.s.i.g.). (4-7-83)

iv. When a safety relief valve is used on a compressed gas cylinder, the flow rating pressure shall not exceed the minimum required test pressure of the cylinder on which the safety relief valve is installed and the reseating pressure shall not b less than the pressure in a normally charged cylinder at 130 F. (4-7-83)

v. When fittings and piping are used on either the upstream or downstream side or both of a safety relief device or devices, the passages shall be so designed that the flow capacity of the safety relief device will not be reduced below the capacity required for the container on which the safety relief device assembly is installed, nor to the extent that the operation of the device could be impaired. Fittings, piping and method of attachment shall be designed to withstand normal handling and the pressures developed when the device or devices function. (4-7-83)

vi. No shutoff valve shall be installed between the safety relief devices and the cylinder. (4-7-83)

e. Maintenance Requirements for Safety Relief Devices. (4-7-83)

i. As a precaution to keep cylinder safety relief devices in reliable operating condition, care shall be

taken in the handling or storing of compressed gas cylinders to avoid damage. Care shall also be exercised to avoid plugging by paint or other dirt accumulation of safety relief device channels or other parts which could interfere with the functioning of the device. Only qualified personnel shall be allowed to service safety relief devices. (4-7-83)

ii. Each time a compressed gas cylinder is received at a point for refilling, all safety relief devices shall be examined externally for corrosion, damage, plugging of external safety relief device channels, and mechanical defects such as leakage or extrusion of fusible metal. If there is any doubt regarding the suitability of the safety relief device for service, the cylinder (4-7-83)

212. SAFETY RELIEF DEVICES FOR CARGO AND PORTABLE TANKS STORING COMPRESSED GASES.

01. Definitions. (4-7-83)

a. Cargo Tank. A "cargo tank" means any container designed to be permanently attached to any motor vehicle or other highway vehicle and in which is to be transported any compressed gas. The term "cargo tank" shall not be construed to include any tank used solely for the purpose of supplying fuel for the propulsion of the vehicle or containers fabricated under specifications for cylinders. (4-7-83)

b. Portable Tank. A "portable tank" means any container designed primarily to be temporarily attached to a motor vehicle, other vehicle, railroad car other than a tank ar, or marine vessel, and equipped with skids, mounting, or accessories to facilitate handling of the container by mechanical means, in which is to be transported any compressed gas. The term "portable tank" shall not be construed to include any cargo tank, any tank car tank or any tank of the DOT-106A and DOT-110A-W type. (4-7-83)

c. Safety Relief Device. A "safety relief device" means a device intended to prevent rupture of a container under certain conditions of exposure. (4-7-83)

d. Safety relief valve. A "safety relief valve" means a safety relief device containing an operating part that is held normally in a position closing the safety relief device channel by spring force and is intended to open and to close at predetermined pressures. (4-7-83)

e. Set pressure. The "set pressure" of a safety relief valve is the pressure marked on the valve and at which the valve is set to start-to-discharge. (4-7-83)

f. Start-to-discharge pressure. The "start-to-discharge pressure" of a safety relief valve is the pressure at which the first bubble appears through a water seal of not over 4 inches on the outlet of the valve. NOTE: When the nature of the service requires the use of a metal-to-metal seat safety relief valve, with or without secondary sealing means, the start-to-discharge pressure may be considered the pressure at which an audible discharge occurs. (4-7-83)

g. Resealing pressure. The "resealing pressure" of a safety relief valve is the pressure at which leakage ceases through a water seal of not over 4 inches on the outlet of the valve. (4-7-83)

h. Flow Capacity. The "flow capacity" of a safety relief device is the capacity in cubic feet per minute of free air discharged at the required flow rating pressure. (4-7-83)

i. Flow rating pressure. The "flow rating pressure" means the pressure at which a safety relief device is rated for capacity. (4-7-83)

j. Free air or free gas."Free air" or "free gas" means air or gas measured at a pressure of 14.7 pounds per square inch absolute and a temperature of 60 F. (4-7-83)

k. Frangible disc. A "frangible disc" means a safety relief device in the form of a disc, usually of metal, which is so held as to close the safety relief deice channel under normal condition. The disc is intended to burst at a predetermined pressure to permit the escape of gas. (4-7-83)

l. Fusible Plug. A "fusible plug" means a safety relief device in the form of a plug of suitable low-

melting material, usually a metal alloy, which closes the safety relief device channel under normal conditions and is intended to yield or melt at a predetermined temperature to permit the escape of gas. (4-7-83)

m. DOT Design Pressure. The "DOT design pressure" is identical to the term "maximum allowable working pressure" as used in the "code" and is the maximum gage pressure at the top of the tank in its operating position. To determine the minimum permissible thickness of physical characteristics of the different parts of the vessel, the static head of the lading shall be added to the DOT design pressure to determine the thickness of any specific part of the vessel. If vacuum insulation is used, the liquid container shall be designed for a pressure of 15 P. S. I. more than DOT design pressure, plus static head of the lading. EXCEPTION: For containers constructed in accordance with paragraph U-68 or U-69 of Section VIII of the ASME Boiler and Pressure Vessel Code, 1949 Edition, the maximum allowable working pressure for the purpose of these standards is considered to be 125 percent of the design pressure as provided in 49 CFR 173.315 of DOT Regulations. (4-7-83)

n. Code."Code" is defined as paragraph U-68, U-200 or U-201 of Section VII of the Boiler and Pressure Vessel Code of the American Society of Mechanical Engineers, 1949 Edition, or Section VIII of the Boiler and Pressure Vessel Code of the American Society of Mechanical Engineers, 1950, 1952, 1956, 1959, and 1962 Editions; or the Code for Unfired Pressure Vessels for Petroleum Liquids and Gases of the American Petroleum Institute and the American Society of Mechanical Engineers (API-ASME) 1951 Edition. (4-7-83)

o. DOT Regulations. The "DOT" regulations refers to the Department of Transportation Regulations for Transportation of Explosives and Other Dangerous Articles by Land and Water in Rail Freight, Express and Baggage Services and by Motor Vehicle (high-way) and Water, including Specifications for Shipping Containers, Code of Federal Regulations, Title 49, Parts 171 to 178. (4-7-83)

02. Specifications and Tests. All safety relief devices covered by these standards shall meet the design, construction, marking, and test specifications of the "Compressed Gas Association Safety Relief Device Standards Part 2 - Cargo and Portable Tanks for Compressed Gases: S-1.2-1963". (4-7-83)

03. Specific Requirement for Safety Relief Devices. (4-7-83)

a. Each container shall be provided with one or more safety relief devices which, unless otherwise specified, shall be safety relief valves of the spring-loaded type. (4-7-83)

b. Safety relief valves shall be set to start-to-discharge at a pressure not to exceed 110% of the DOT design pressure of the container nor less than the DOT design pressure of the container except as follows: (4-7-83)

i. If an overdesigned container is used, the set pressure of the safety relief valve may be between the minimum required DOT design pressure for the lading and 110% of the DOT design pressure of the container used. (4-7-83)

ii. For sulfur dioxide containers, a minimum set pressure of 120 and 100 p.s.i.g. is permitted for 150 and 125 p.s.i.g. DOT design pressure containers, respectively. (4-7-83)

iii. For carbon dioxide (refrigerated), nitrous oxide (refrigerated), and pressurized liquid argon, nitrogen and oxygen, there shall be no minimum set pressure. (4-7-83)

iv. For butadiene, inhibited, and liquefied petroleum gas containers, a minimum set pressure of 90% of the minimum design pressure permitted for these ladings may be used. (4-7-83)

v. For containers constructed in accord with paragraph U-68 or U-69 or the Code 1949 Edition, the set pressure marked on the safety relief valve may be 125% of the original DOT design pressure of the container. (4-7-83)

c. Only replacement parts or assemblies provided by the manufacturer of the device shall be used unless the suitability of interchange is proved by adequate tests. (4-7-83)

d. Safety relief valves shall have direct communication with the vapor space of the container. (4-7-83)

e. Any portion of liquid piping or hose which at any time may be closed at each end must be provided with a safety relief device to prevent excessive pressure. (4-7-83)

f. The additional restrictions of this subdivision apply to safety relief devices on containers for carbon dioxide or nitrous oxide which are shipped in refrigerated and insulated containers. The maximum operating pressure in the container may be regulated by the use of one or more pressure controlling devices, which devices shall not be in lieu of the safety relief valve required in paragraph a. of this section. (4-7-83)

g. All safety relief devices shall be so installed and located that the cooling effect of the contents will not prevent the effective operation of the device. (4-7-83)

h. In addition to the safety relief valves required by Section 02., each container for carbon dioxide may be equipped with one or more frangible disc safety relief devices of suitable design set to function at a pressure not exceeding two time the DOT design pressure of the container. (4-7-83)

i. Subject to conditions of 49 CFR 173.315 (a) (1) (DOT Regulations) for methyl chloride and sulfur dioxide optional portable tanks of 225 p.s.i.g. minimum DOT design pressure, one or more fusible plugs approved by the Bureau of Explosives, 63 Vesey Street, Ne York, NY 10007, may be used in lieu of safety relief valves of the spring-loaded type. If the container is over 430 inches long, a safety relief device having the total required flow capacity must be at both ends. (4-7-83)

j. When storage containers for liquefied petroleum gas are permitted to be shipped in accordance with 49 CFR 173.315 (j) (DOT Regulations), they must be equipped with safety relief devices in compliance with the requirements for safety relief devices on above-ground containers as specified in the National Fire Protection Association Pamphlet No. 58-1969 "{Standard for the Storage and Handling of Liquefied Petroleum Gases".(4-7-83)

k. When containers are filled by pumping equipment which has a discharge capacity in excess of the capacity of the container safety relief devices, and which is capable of producing pressures in excess of DOT design pressure of the container, precautions should be taken to prevent the development of pressures in the container in excess of 120% of its DOT design pressure. This may be done by providing additional capacity of the safety relief valves on the container by providing a bypass on the pump discharge, or by any other suitable method. (4-7-83)

l. This additional requirements applies to safety relief devices on containers for liquefied hydrogen and pressurized liquid argon, nitrogen and oxygen. The liquid container shall be protected by one or more safety relief valves and one or more frangible discs. (4-7-83)

m. Safety relief devices shall be arranged to discharge unobstructed to the open air in such a manner as to prevent any impingement of escaping gas upon the container. Safety relief devices shall be arranged to discharge upward, except this is not required for carbon dioxide, nitrous oxide and pressurized liquid argon, nitrogen and oxygen. (4-7-83)

n. No shutoff valves shall be installed between the safety relief devices and the container except, in cases where two or more safety relief devices are installed on the same container, a shutoff valve may be used where the arrangement of the shutoff valve or valves is such as always to insure full requirement capacity flow through at least one safety relief device. (4-7-83)

04. Maintenance Requirements for Safety Relief Devices. (4-7-83)

a. Care shall be exercised to avoid damage to safety relief devices. Care shall also be exercised to avoid plugging by paint or other dirt accumulation of safety relief device channels or other parts which could interfere with the function of the device. (4-7-83)

b. Only qualified personnel shall be allowed to service safety relief devices. Any servicing or repairs which require resetting of safety relief valves shall be done only by or after consultation with the valve manufacturer. (4-7-83)

c. Safety relief devices periodically shall be examined externally for corrosion damage, plugging or external safety relief device channel and mechanical defects such as leakage or extrusion of fusible metal. Valves equipped with secondary resilient seals shall have the seals inspected periodically. If there is any doubt regarding the suitability of the safety relief device for service, the container shall not be filled until it is equipped with a suitable safety relief device. (4-7-83)

213. AIR RECEIVERS.

01. General requirements. (4-7-83)

a. Application. These standards apply to compressed air receivers, and other equipment used in providing and utilizing compressed air for performing operations such as cleaning, drilling, hoisting, and chipping. On the other hand, however, this section does not deal with the special problems created by using compressed air to convey materials nor the problems created when people work in compressed air as in tunnels and caissons. (4-7-83)

b. These standards are not intended to apply to compressed air machinery and equipment used on transportation vehicles such as steam railroad cars, electric railway cars, and automotive equipment. (4-7-83)

c. New and existing equipment. (4-7-83)

i. All new air receivers installed after the effective date of these standards shall be constructed in accordance with the 1968 Edition of the ASME Boiler and Pressure Vessel Code, Section VIII. (4-7-83)

ii. All safety valves used shall be constructed, installed and maintained in accordance with the ASME Boiler and Pressure Vessel Code, Section VIII, 1968 Edition. (4-7-83)

02. Installation and equipment requirements. (4-7-83)

a. Installation. Air receivers shall be so installed that all drains, handholes and manholes therein are easily accessible. Air receivers should be supported with sufficient clearance to permit a complete external inspection and to avoid corrosion of external surfaces. Under no circumstances shall an air receiver be buried underground or located in an inaccessible place. The receiver should be located as close to the compressor or after-cooler as is possible in order to keep the discharge pipe short. (4-7-83)

b. Drains and Traps. A drain pipe and valve shall be installed at the lowest point of every air receiver to provide for the removal of accumulated oil and water. Adequate automatic traps may be installed in addition to drain valves. The drain valve on the air receiver shall be opened and the receiver completely drained frequently and at such intervals as to prevent (4-7-83)

c. Gages and valves. (4-7-83)

i. Every air receiver shall be equipped with an indicating pressure gage (so located as to be readily visible) and with one or more spring-loaded safety valves. The total relieving capacity of such safety valves shall be such as to prevent pressure in the receiver from exceeding the maximum allowable working pressure of the receiver by more than 10 percent. (4-7-83)

ii. No valve of any type shall be placed between the air receiver and its safety valve or valves. (4-7-83)

iii. Safety appliances, such as safety valves, indicating devices and controlling devices, shall be constructed, located and installed so that they cannot be readily rendered inoperative by any means, including the elements. (4-7-83)

iv. All safety valves shall be tested frequently and at regular intervals to determine whether they are in good operating condition. (4-7-83)

214. ACETYLENE.

01. Cylinders. The in-plant transfer, handling, storage and utilization of acetylene in cylinders shall be in accordance with Compressed Gas Association Pamphlet G-1-1966. (4-7-83)

02. Piped. The piped systems for the in-plant transfer and distribution of acetylene shall be designed, installed, maintained and operated in accordance with Compressed Gas Association Pamphlet G-1.3-1959. (4-7-83)

03. Generators and Filling Cylinders. Plants for the generation of acetylene and the charging (filling) of acetylene cylinders shall be designed, constructed and tested in accordance with the standards prescribed in Compressed Gas Association Pamphlet G-1.4-1966. (4-7-83)

215. HYDROGEN.

01. General. Definitions as used in this section. (4-7-83)

a. Gaseous Hydrogen system is one in which the hydrogen is delivered, stored and discharged in the gaseous form to consumer's piping. The system includes stationary or movable containers, pressure regulators, safety relief devices, manifolds, interconnecting piping and controls. The system terminates at the point where hydrogen at service pressure first enters the consumer's distribution piping. (4-7-83)

b. Approved means unless otherwise indicated, listed or approved by the following nationally recognized testing laboratories: Underwriters Laboratories, Inc., and Factory Mutual Engineering Corp. (4-7-83)

c. Listed. See "Approved". (4-7-83)

d. ASME. American Society of Mechanical Engineers. (4-7-83)

e. DOT Specifications. Regulations of the Department of Transportation published in 1949 CFR, Chapter I. (4-7-83)

f. DOT Regulations. See v. above. (4-7-83)

02. Scope. (4-7-83)

a. Gaseous hydrogen systems. (4-7-83)

i. Section 207.01 through 207.05 applies to the installation of gaseous hydrogen systems on consumer premises where the hydrogen supply to the consumer premises originates outside the consumer premises and is delivered by mobile equipment. (4-7-83)

ii. Section 207.01 through 207.05 does not apply to gaseous hydrogen systems having a total hydrogen content of less than 400 cubic feet, nor to hydrogen manufacturing plants or other establishments operated by the hydrogen supplier or his agent for the purpose of storing hydrogen and refilling portable containers, trailers, mobile supply trucks or tank cars. (4-7-83)

b. Liquefied hydrogen systems. (4-7-83)

i. Section 208.01 applies to the installation of liquefied hydrogen systems on consumer premises. (4-7-83)

ii. Section 208.01 does not apply to liquefied hydrogen portable containers of less than 150 liters (39.63 gallons) capacity; nor to liquefied hydrogen manufacturing plants or other establishments operated by the hydrogen supplier or his agent for the sold purpose of storing liquefied hydrogen and refilling portable containers, trailers, mobile supply trucks or tank cars. (4-7-83)

216. GASEOUS HYDROGEN SYSTEMS.

01. Design. (4-7-83)

a. Containers. (4-7-83)

i. Hydrogen containers shall comply with one of the following: Designed, constructed and tested in accordance with appropriate requirements of ASME Boiler and Pressure Vessel Code, Section VIII - Unfired Pressure Vessels - 1968; or Designed, constructed, tested and maintained in accordance with U. S. Department of Transportation Specifications and Regulations. (4-7-83)

ii. Permanently installed containers shall be provided with substantial noncombustible supports on firm, noncombustible foundations. (4-7-83)

iii. Each portable container shall be legibly marked with the name "Hydrogen" in accordance with "Marking Compressed Gas Containers to Identify the Material Contained" ANSI Z48.1-1954. Each manifolded hydrogen supply unit shall be legibly marked with the name "Hydrogen" or a legend such as "This unit contains hydrogen". (4-7-83)

b. Safety relief devices. (4-7-83)

i. Hydrogen containers shall be equipped with safety relief devices as required by the ASME Boiler and Pressure Vessel Code, Section VIII Unfired Pressure Vessels, 1968, or the DOT Specifications and Regulations under which the container is fabricated. (4-7-83)

ii. Safety relief devices shall be arranged to discharge upward and unobstructed to the open air in such a manner as to prevent any impingement of escaping gas upon the container, adjacent structure or personnel. This requirement does not apply to DOT Specification containers having an internal volume of 2 cubic feet or less. (4-7-83)

iii. Safety relief devices or vent piping shall be designed or located so tat moisture cannot collect and freeze in a manner which would interfere with proper operation of the device. (4-7-83)

c. Piping, Tubing, and Fittings. (4-7-83)

i. Piping, tubing and fittings shall be suitable for hydrogen service and for the pressures and temperatures involved. Cast iron pipe and fittings shall not be used. (4-7-83)

ii. Piping and tubing shall conform to Section 2 - "Industrial Gas and Air Piping" - Code for Pressure Piping, ANSI B31. 1-1967 with addenda B31. 1-1969. (4-7-83)

iii. Joints in piping and tubing may be made by welding or brazing or by use of a flange, threaded socket or compression fittings. Gaskets and thread sealants shall be suitable for hydrogen service. (4-7-83)

d. Equipment Assembly. (4-7-83)

i. Valves, gauge, regulators and other accessories shall be suitable for hydrogen service. (4-7-83)

ii. Installation of hydrogen systems shall be supervised by personnel familiar with proper practices with reference to their construction and use. (4-7-83)

iii. Storage containers, piping, valves, regulating equipment and other accessories shall be readily accessible and shall be protected against physical damage and against tampering. (4-7-83)

iv. Cabinets or housings containing hydrogen control or operating equipment shall be adequately ventilated. (4-7-83)

v. Each mobile hydrogen supply unit used as part of a hydrogen system shall be adequately secured to prevent movement. (4-7-83)

vi. Mobile hydrogen supply units shall be electrically bonded to the system before discharging hydrogen. (4-7-83)

e. Marking. The hydrogen storage location shall be permanently placarded as follows: "HYDROGEN-FLAMMABLE GAS-NO SMOKING-NO OPEN FLAMES" or equivalent. (4-7-83)

f. Testing. After installations, all piping, tubing and fittings shall be tested and proved hydrogen gas tight at maximum operating pressure. (4-7-83)

02. Location and requirements. (4-7-83)

a. Location. (4-7-83)

i. The system shall be located so tat it is readily accessible to delivery equipment and to authorized personnel. (4-7-83)

ii. Systems shall be located above ground. (4-7-83)

iii. Systems shall not be located beneath electrical power lines. (4-7-83)

iv. Systems shall not be located close to flammable liquid piping or piping of other flammable gases. (4-7-83)

v. Systems near above-ground flammable liquid storage shall be located on ground higher than the flammable liquid storage except when dikes, diversion curbs, grading, or separating solid walls are used to prevent accumulation of flammable liquids under the system. (4-7-83)

b. Specific requirements. (4-7-83)

i. The location of a system, as determined by the maximum total contained volume of hydrogen, shall be in the order of preference as indicated by Roman Numerals in Table 1923-A. (4-7-83)

TABLE 1923-A available at Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone (208) 334-6000.

ii. The minimum distance in feet from a hydrogen system of indicated capacity located outdoors, in separate buildings or in special rooms to any specified outdoor exposure shall be in accordance with Table 1923-A. (4-7-83)

iii. The distance in Table 1923-B, items 1, 14, 3 to 10 inclusive do not apply where protective structures such as adequate fire walls are located between the system and the exposure. (4-7-83)

iv. Hydrogen systems of less than 3,000 CF when located inside buildings and exposed to other occupancies shall be situated in the building so that the system will be as follows: In an adequately ventilated area as in Section 207.03; Twenty feet from stored flammable materials or oxidized gases; Twenty-five feet from open flames, ordinary electrical equipment or other sources of ignition; twenty-five feet from concentration of people; Fifty feet from intake of ventilation or air-conditioning equipment and air compressors; Fifty feet from other flammable gas storage; Protected against damage or injury due to falling objects or working activity in the area; More than one system of 3,000 CF or less may be installed in the same room, provided the systems are separated by at least 50 feet. Each such system shall meet all of the requirements of this section. (4-7-83)

03. Design Consideration at Specific Locations. (4-7-83)

a. Outdoor locations. (4-7-83)

i. Where protective walls or roofs are provided, they shall be constructed of noncombustible materials. (4-7-83)

ii. Where the enclosing sides adjoin each other, the area shall be properly ventilated. (4-7-83)

iii. Electrical equipment within 15 feet shall be in accordance with Sections 1301 and 1302 in Chapter M of this Code. (4-7-83)

b. Separate buildings. (4-7-83)

i. Separate buildings shall be built of at least noncombustible construction. Windows and doors shall be located so as to be readily accessible in case of emergency. Windows shall be of glass or plastic in metal frames. (4-7-83)

ii. Adequate ventilation to the outdoors shall be provided. Inlet openings shall be located near the floor in exterior walls only. Outlet openings shall be located at the high point of the room in exterior walls or roof. Inlet and outlet openings shall each have minimum total area of one (1) square foot per 1,000 cubic feet of room volume. Discharge from outlet openings shall be directed or conducted to a safe location. (4-7-83)

TABLE 1923-B available at Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone (208) 334-6000.

iii. Explosion venting shall be provided in exterior walls or roof only. The venting area shall be equal to not less than 1 square foot per 30 cubic feet of room volume and may consist of any one or any combination of the following: Walls or light noncombustible material, preferably single thickness, single strength glass; Lightly fastened hatch covers; lightly fastened swinging doors in exterior walls opening outward; Lightly fastened walls or roof designed to relieve at a maximum pressure of 25 pounds per square foot. (4-7-83)

iv. There shall be no sources of ignition from open flames, electrical equipment, or heating equipment. (4-7-83)

v. Electrical equipment shall be in accordance with Chapter M, Sections 150 and 151 of this Code for Class I, Division 2 locations. (4-7-83)

vi. Heating, if provided, shall be by steam, hot water, or other indirect means. (4-7-83)

c. Special rooms. (4-7-83)

i. Floor, walls and ceiling shall have a fire-resistance rating of at least 2 hours. Walls or partitions shall be continuous from floor to ceiling and shall be securely anchored. At least one wall shall be an exterior wall. Openings to other parts of the building shall not be permitted. Windows and doors shall be in exterior walls and shall be located so as to be readily accessible in case of emergency. Windows shall be of glass or plastic in metal frames. (4-7-83)

ii. Ventilation shall be as provided in Section 207.03.b.ii. (4-7-83)

iii. Explosion venting shall be as provided in Section 207.03.b.iii. (4-7-83)

iv. There shall be no sources of ignition from open flames, electrical equipment or heating equipment. (4-7-83)

v. Electrical equipment shall be in accordance with Article 501 of the National Electrical Code, NFPA 70-1971; ANSI C1-1971 (Rev. of 1968), for Class I, Division 2 Locations. (4-7-83)

vi. Heating, if provided, shall be by steam, hot water or indirect means. (4-7-83)

04. Operating Instructions. For installations which require any operation of equipment by the user, legible instructions shall be maintained at operating locations. (4-7-83)

05. Maintenance. The equipment and functioning of each charged gaseous hydrogen system shall be maintained in a safe operating condition in accordance with the requirements of this section. The area with 15 feet of any hydrogen container shall be kept free of dry vegetation and combustible material. (4-7-83)

217. OXYGEN.

01. Scope. This section applies to the installation of bulk oxygen systems on industrial and institutional consumer premises. This section does not apply to oxygen manufacturing plants or other establishments operated by the oxygen supplier or his agent for the purpose of storing oxygen and refilling portable containers, trailers, mobile supply trucks, or tank cars, not to systems having capacities less than those stated in Section 208.02.a. (4-7-83)

02. Bulk oxygen systems. (4-7-83)

a. Definitions. As used in this section: A bulk oxygen system is an assembly of equipment, such as oxygen storage containers, pressure regulators, safety devices, vaporizers, manifolds and interconnecting piping which has storage capacity of more than 13,000 cubic feet of oxygen, Normal Temperature and Pressure (NTP), connected in service or ready for service, or more than 25,000 cubic feet of oxygen (NTP) including unconnected reserves on hand at the site. The bulk oxygen system terminates a the point where oxygen at service pressure first enters the supply line. The oxygen containers may be stationary or movable, and the oxygen may be stored as gas or liquid. (4-7-83)

b. Location. (4-7-83)

i. General. Bulk oxygen storage systems shall be located above ground out of doors, or shall be installed in a building of noncombustible construction, adequately vented an used for that purpose exclusively. The location selected shall be such that containers and associated equipment shall not be exposed by electric power line, flammable or combustible liquid lines, or flammable gas lines. (4-7-83)

ii. Accessibility. The system shall be located so that it is readily accessible to mobile supply equipment at ground level and to authorized personnel. (4-7-83)

iii. Leakage. Where oxygen is stored as liquid, noncombustible surfacing shall be provided in an area in which any leakage of liquid oxygen might fall during operation of the system and filling of a storage container. For purposes of these standards, asphaltic or bituminous paving is considered to be combustible. (4-7-83)

iv. Elevation. When locating bulk oxygen systems near above ground flammable or combustible liquid storage which may be either indoors or outdoors, it is advisable to locate the system on ground higher than the flammable or combustible liquid storage. (4-7-83)

v. Dikes. Where it is necessary to locate a bulk oxygen system on ground lower than adjacent flammable or combustible liquid storage, suitable means shall be taken (such as dikes, diversion curbs, or grading) with respect to the adjacent flammable or combustible liquid storage to prevent accumulation of liquids under the bulk oxygen system. (4-7-83)

c. Distance between systems and exposures. (4-7-83)

i. General. The minimum distance from any bulk oxygen storage container to exposures, measured in the most direct line except as indicated in 208.02.c.iv. and vii. shall be indicated in 208.02.c.ii. to 208.02.c.xvii. (4-7-83)

ii. Combustible structures. Fifty feet from any combustible structure. (4-7-83)

iii. Fire resistive structures. Twenty-five feet from any structures with fire-resistive exterior walls or sprinklers installed in buildings or other construction, but not less than one-half the height of adjacent side wall of the

structure. (4-7-83)

iv. Openings. At least 10 feet from any opening in adjacent walls or fire resistive structures. Spacing from such structures shall be adequate to permit maintenance, but shall not be less than 1 foot. (4-7-83)

v. Flammable liquid storage above ground: (4-7-83)

Distance (feet)	Capacity (gallons)
50	0-1,000
90	1001 or more

vi. Flammable liquid storage below ground: (4-7-83)

Distance measured horizontally from oxygen storage container to flammable liquid tank (feet)	Distance from oxygen storage container to filling and vent connections or openings to flammable liquid tank (feet)	Capacity (gallons)
15	50	0-1,000
30	50	1,000 or more

vii. Combustible liquid storage above ground: (4-7-83)

Distance (feet)	Capacity (gallons)
25	0-1,000
50	1,001 or more

viii. Combustible liquid storage below ground. (4-7-83)

Distance measured horizontally from oxygen storage container to combustible liquid tank (feet)	Distance from oxygen storage container to filling and vent connections or openings to combustible liquid tank (feet)
15	40

ix. Flammable gas storage. (Such as compressed flammable gases, liquefied flammable gases and flammable gases in low pressure gas holder). (4-7-83)

Distance (feet)	Capacity (Cu fl. NTP)
50	Less than 5,000
90	5,000 or more

x. Highly combustible materials. Fifty feet from solid materials which burn rapidly, such as excelsior or paper. (4-7-83)

xi. Slow-burning materials. Twenty-five feet from solid materials which burn slowly, such as coal and heavy timber. (4-7-83)

xii. Ventilation. Seventy-five feet in one direction and 35 feet in approximately 90 direction from confining walls (not including firewalls less than 20 feet high) to provide adequate ventilation in courtyards and similar confining areas. (4-7-83)

xiii. Congested areas. Twenty-five feet from congested areas such as offices, lunchrooms, locker rooms, time clock areas and similar locations where people may congregate. (4-7-83)

xiv. Public areas. Fifty feet from places of public assembly. (4-7-83)

xv. Patients. Fifty feet from areas occupied by patients who are not ambulatory. (4-7-83)

xvi. Sidewalks. Ten feet from any pubic sidewalk. (4-7-83)

xvii. Adjacent property. Five feet from any line of adjoining property. (4-7-83)

xviii. Exceptions. The distance in Section 208.02.c.ii., iii., v. through xi. inclusive and Section 208.02.c.xvi. and xvii. do not apply where protective structures such as firewalls of adequate eight to safeguard the oxygen storage systems are located between the bulk oxygen storage installations and the exposure. In such cases, the bulk oxygen storage may be a minimum distance of 1 foot from the firewall. (4-7-83)

d. Storage containers. (4-7-83)

i. Foundations and supports. Permanently installed containers shall be provided with substantial noncombustible supports on firm noncombustible foundations. (4-7-83)

ii. Construction-liquid. Liquid oxygen storage containers shall be fabricated from materials meeting the impact test requirements of paragraph UG-84 of ASME Boiler and Pressure Vessel Code, Section VIII - Unfired Pressure Vessels - 1968. Containers operating at pressures above 165 pounds per square inch gage (p.s.i.g.) shall be designed, constructed and tested in accordance with appropriate requirements of ASME Boiler and Pressure Vessel Code, Section VII - Unfired Pressure Vessels - 1968. Insulation surrounding the liquid oxygen container shall be noncombustible. (4-7-83)

iii. Construction-gaseous. High-pressure gaseous oxygen containers shall comply with one of the following: Designed, constructed and tested in accordance with appropriate requirements of ASME Boiler and Pressure Vessel Code, Section VIII - Unfired Pressure Vessels - 1968; or Designed, constructed, tested and maintained in accordance with DOT Specifications and Regulations. (4-7-83)

e. Piping, tubing and fittings. (4-7-83)

i. Selection. Piping, tubing and fittings shall be suitable for oxygen service and for the pressures and temperatures involved. (4-7-83)

ii. Specifications. Piping and tubing shall conform to Section 2 - Gas and Air Piping Systems of Code for Pressure Piping, ANSI B31. 1-1967 with addenda B31.10A-1969. (4-7-83)

iii. Fabrication. Piping or tubing for operating temperatures below -20 F. shall be fabricated from materials meeting the impact test requirements of paragraph U-84 of ASME Boiler and Pressure Vessel Code, Section VIII - Unfired Pressure Vessels - 1968, when tested at the minimum operating temperature to which the piping may be subjected in service. (4-7-83)

f. Safety relief devices. (4-7-83)

i. General. Bulk oxygen storage containers, regardless of design pressure shall be equipped with safety relief devices as required by the ASME code or the DOT Specifications and regulations. (4-7-83)

ii. DOT containers. Bulk oxygen storage containers designed and constructed in accordance with DOT specifications shall be equipped with safety relief devices as required thereby. (4-7-83)

iii. ASME containers. Bulk oxygen storage containers designed and constructed in accordance with ASME Boiler and Pressure Vessel Code, Section VIII - Unfired Pressure Vessels - 1968 shall be equipped with safety relief devices meeting the provisions of the Compressed Gas Association Pamphlet "Safety Relief Device Standards for Compressed Gas Storage Containers," S-1, Part 3. (4-7-83)

iv. Insulation. Insulation casings on liquid oxygen containers shall be equipped with suitable safety relief devices. (4-7-83)

v. Reliability. All safety relief devices shall be so designed or located that moisture cannot collect and freeze in a manner which would interfere with proper operation of the device. (4-7-83)

g. Liquid oxygen vaporizers. (4-7-83)

i. Mounts and couplings. The vaporizer shall be anchored and its connecting piping be sufficiently flexible to provide for the effect of expansion and contraction due to temperature changes. (4-7-83)

ii. Relief devices. The vaporizer and its piping shall be adequately protected on the oxygen and heating medium sections with safety relief devices. (4-7-83)

iii. Heating. Heat used in an oxygen vaporizer shall be indirectly supplied only through media such as steam, air, water or water solutions which do not react with oxygen. (4-7-83)

iv. Grounding. If electric heaters are used to provide the primary source of heat, the vaporizing system shall be electrically grounded. (4-7-83)

h. Equipment Assembly and Installation. (4-7-83)

i. Cleaning. Equipment making up a bulk oxygen system shall be cleaned in order to remove oil, grease or other readily oxidizable materials before placing the system in service. (4-7-83)

ii. Joints. Joints in piping and tubing may be made by welding or by use of flanged, threaded, slip or compression fittings. Gaskets or thread sealants shall be suitable for oxygen service. (4-7-83)

iii. Accessories. Valves, gages, regulators and other accessories shall be suitable for oxygen service. (4-7-83)

iv. Installation. Installation of bulk oxygen systems shall be supervised by personnel familiar with proper practices with reference to their construction and use. (4-7-83)

v. Testing. After installation, all field erected piping shall be tested and proved gas tight at maximum operating pressure. Any medium used for testing shall be oil free and nonflammable. (4-7-83)

vi. Security. Storage containers, piping, valves, regulating equipment and other accessories shall be protected against physical damage and against tampering. (4-7-83)

vii. Venting. Any enclosure containing oxygen control or operating equipment shall be adequately vented. (4-7-83)

viii. Placarding. The bulk oxygen storage location shall be permanently placarded to indicate: L "OXYGEN - NO SMOKING - NO OPEN FLAMES" or an equivalent warning. (4-7-83)

ix. Electrical wiring. Bulk oxygen installations are not hazardous locations as defined and covered in Chapter M, Sections 150 and 151 of this Code. (4-7-83)

i. Operating Instructions. For installations which require any operation of equipment by the use, legible instructions shall b maintained at operating locations. (4-7-83)

j. Maintenance. The equipment and functioning of each charged bulk oxygen system shall be maintained in a safe operating condition in accordance with the requirements of this Section. Wood and long dry grass shall be cut back within 15 feet of any bulk oxygen storage container. (4-7-83)

03. Nitrous oxide. The piped systems for the in-plant transfer and distribution of nitrous oxide shall be designed, installed, maintained and operated in accordance with Compressed Gas Association Pamphlet G8.1964. (4-7-83)

218. -- 219. (RESERVED).

220. FLAMMABLE AND COMBUSTIBLE LIQUIDS: DEFINITIONS.
The following definitions are applicable to all sections of this section of this chapter. (4-7-83)

01. Aerosol. Material which is dispensed from its container as a mist, spray, or foam by a propellant under pressure. (4-7-83)

02. Atmospheric tank. A storage tank which has been designed to operate at pressures from atmospheric through 0.5 p.s.i.g. (4-7-83)

03. Automotive service station. That portion of property where flammable or combustible liquids used as motor fuels are stored and dispensed from fixed equipment into the fuel tanks of motor vehicles and shall include any facilities available for the sale and service of tires, batteries, and accessories, and for minor automotive repairs, painting, body, and fender work are excluded. (4-7-83)

04. Basement. A store or a building or structure having one-half or more of its height below ground level and to which access for fire fighting purposes is unduly restricted. (4-7-83)

05. Boiling point. The boiling point of a liquid at a pressure of 14.7 pounds per square inch absolute (p.s.i.a.) (760mm). For purposes of this section, where an accurate boiling point is unavailable for the material in question or for mixtures which do not have a constant boiling point, the 10% point of a distillation performed in accordance with the Standard Method of Test for Distillation of Petroleum Products, ASTM D-86-62, may be used as the boiling point of the liquid that is in question as pertaining to the above section. (4-7-83)

06. Boilover. The expulsion of crude oil (for certain other liquids) from a burning tank. The light fractions of the crude oil burnoff producing a heat wave in the residue which on reaching a water strata may result in the expulsion of a portion of the contents of the tank in the form of a froth. (4-7-83)

07. Bulk plant. That portion of a property where flammable or combustible liquids are received by tank vessel, pipelines, tank car, or tank vehicle, and are stored or blended in bulk for the purpose of distributing such liquids by tank vessel, pipeline, tank car, tank vehicle or container. (4-7-83)

08. Chemical plant. A large integrated plant or that portion of such a plant other than a refinery or distillery where flammable or combustible liquids are produced by chemical reactions or used in chemical reactions. (4-7-83)

09. Closed container. A container as herein defined, so sealed by means of a lid or other device that neither liquid nor vapor will escape from it at most ordinary temperatures. (4-7-83)

10. Crude petroleum. Hydrocarbon mixtures that have a flash point below 150 F. and which have not been processed in a refinery. (4-7-83)

11. Distillery. A plant or that portion of a plant where flammable or combustible liquids produced by fermentation are concentrated, and where the concentrated products may also be mixed, stored, or packaged.(4-7-83)

12. Fire area. An area of a building separated from the remainder of the building by construction having a fire resistance of at least one hour, and having all communicating openings properly secured and protected by an assembly which has a fire resistant rating of at least, but not restricted to, one hour. (4-7-83)

13. Fire resistance or fire resistive construction. That construction which is resistant to the spread of fire should this danger sometime arise. (4-7-83)

14. Flammable aerosol. That aerosol which is required to be labeled as "flammable" under the Federal Hazardous Substances Labeling Act, (15 U. S. C. 1261). For the purposes of Sections 222.01 through 222.07, such aerosols are considered to be Class IA liquids. (4-7-83)

15 Flashpoint. The minimum temperature at which the liquid in question gives off a vapor within a test vessel in sufficient enough concentration to form an ignitable mixture with air near the surface of the liquid, and this shall be determined as follows: (4-7-83)

a. For a liquid which has a viscosity of not less than 45SUS at 100 F. (37.8 C) does not contain suspended solids, and does not have that tendency to form a film on the surface of the liquid, while under pressure and while under test, the procedure specified in the Standard Method of Test for Flashpoint by Tag Closed Tester (ASTM D-56-70) shall be used. (4-7-83)

b. For a liquid which has a viscosity of 45SUS or more at 100 F. (37.8 C) or contains suspended solids, or has a tendency to form a surface film while under test, the Standard Method of Test for Flashpoint by Pensky-Martens Closed Tester (ASTM D-93-71) shall be used, except that the methods specified in Note 1 to Section 1.1 of ASTM 3-93-71 may be used for the respective materials specified in the Note. (4-7-83)

c. For a liquid that is a mixture of compounds that have different volatilities and flashpoints its flashpoint shall be determined by using the procedure specified in xx. (a) or (b) of this section on the liquid in the form it is shipped. If the flashpoint, as determined by this test, is 100 F. (37.8 C.) or higher, an additional flashpoint determination shall be run on a sample of the liquid evaporated to 90% of its original volume, and the lower value of the two tests shall be considered the flashpoint of the material. (4-7-83)

d. Organic peroxides, which undergo auto accelerating thermal decomposition, are excluded from any of the flashpoint determination methods specified in this section. (4-7-83)

16. Hotel. Buildings or groups of buildings under the same management in which there are sleeping accommodations for hire primarily used by transients who are lodged with or without meals including but not limited to inns, clubs, motels and apartment hotels. (4-7-83)

17. Institutional occupancy. The occupancy or use of a building or structure or any portion thereof by persons harbored or detained to receive medical, charitable or other care or treatment, or by persons involuntarily detained. (4-7-83)

18. Liquid. Any material which has a fluidity greater than that of 300 penetration asphalt when tested in accordance with ASTM Test for Penetration for Bituminous Materials, D-5-65. When not otherwise identified, the

term liquid shall include both flammable and combustible liquids. (4-7-83)

19. Combustible liquid. Any liquid having a flashpoint at or above 100 F. (37.8 C.)Combustible liquids shall be divided into two classes as follows: (4-7-83)

a. "Class II liquids" shall include those with flashpoints at or above 100 F. (37.8 C.) and below 140 F. (60 C.) except any mixture having components with flashpoints of 200 F. (93.3 C.) or higher, the volume of which make up 99% or more of the total volume of the mixture. (4-7-83)

b. "Class III liquids" shall include those with flashpoints at or above 140 F. (60 C.)Class III liquids are subdivided into two subclasses: (4-7-83)

i. "Class IIIA liquids" shall include those with flashpoints at or above 140 F. (60 C) and below 200 F. (93.3 C.) except any mixture having components with flashpoints of 200 F. (93.3 C.) or higher, and the total volume of which makes up 99% or more of the total volume of the mixture. (4-7-83)

ii. "Class IIIB liquids" shall include those with flashpoints at or above 200 F. (93.3 C.) This section does not cover Class IIIB liquids. Where the term "Class III liquids" is used in this section, it shall mean only Class IIIA liquids. (4-7-83)

c. When a combustible liquids is heated for use to within 30 F. (16.7 C.) of its flashpoint, it shall be handled in accordance with the requirements for the next lower class of liquids. (4-7-83)

20. "Flammable Liquid" means any liquid having a flashpoint below 100 F. (37.8 C.), except any mixture having components with flashpoints of 100 F. (37.8 C.) or higher, the total of which make up 99% or more of the total volume of the mixture. Flammable liquids shall be known as Class I Liquids. Class I liquids are divided into three classes as follows: (4-7-83)

a. Class IA shall include liquids having flashpoints below 73 F. (22.8 C.) and having a boiling point below 100 F. (37. 8 C.). (4-7-83)

b. Class IB shall include liquids having flashpoints below 73 F. (22.8 C.) and having a boiling point at or above 100 F. (37.8 C.). (4-7-83)

c. Class IC shall include liquids having flashpoints at or above 73 F. (22.8 C.) and below 100 F. (37.8 C.). (4-7-83)

21. Unstable (reactive) liquid shall mean a liquid which in the pure state or as commercially produced or transported will vigorously polymerize, decompose, condense or will become self-reactive under conditions of shock, pressure, or temperature. (4-7-83)

22. Low-pressure tank shall mean a storage tank which has been designed to operate at pressure above 0.5 p.s.i.g. but not more than 15 p.s.i.g. (4-7-83)

23. Marine service station shall mean that portion of a property where flammable or combustible liquids used as fuel are stored and dispensed from fixed equipment on shore, piers, wharves, or floating craft, and shall include all facilities used in connection therewith. (4-7-83)

24. Mercantile occupancy shall mean the occupancy or use of a building or structure or any portion thereof for the displaying, selling, or buying of goods, wares or merchandise. (4-7-83)

25. Office occupancy shall mean the occupancy or use of a building or structure or any portion thereof for the transaction of business, or the rendering or receiving of professional services. (4-7-83)

26. Portable tank shall mean a closed container having a liquid capacity over 60 U. S. Gallons and not intended for fixed installation. (4-7-83)

27. Pressure vessel shall mean a storage tank or vessel. (4-7-83)

28. Protection for exposure shall mean adequate fire protection for structures on property adjacent to tanks, where there are employees of the establishment. (4-7-83)

29. Refinery shall mean a plant in which flammable or combustible liquids are produced on a commercial scale from crude petroleum, natural gasoline, or other hydrocarbon sources. (4-7-83)

30. Safety Can shall mean an approved container, of not more than gallons capacity, having a spring-closing lid and spout cover and so designed that it will safely relieve internal pressure when subjected to fire exposure. (4-7-83)

31. Ventilation as specified in these standards is for the prevention of fire and explosion. It is considered adequate if it is sufficient to prevent assimilation of significant quantities of vapor-air mixtures in concentration over one-fourth of the lower flammable limit. (4-7-83)

32. Vapor Pressure shall mean the pressure, measured in pounds per square inch (absolute) exerted by a volatile liquid as determined by the "Standard Method of Test for Vapor Pressure of Petroleum Products (Reid Method), "American Society for Testing and Materials ASTM D-323-68. (4-7-83)

33. Storage: Flammable or combustible liquids shall be stored in a tank or in a container that complies with Section 222.02 of this chapter. (4-7-83)

34. Barrel shall mean a volume of 42 U. S. Gallons. (4-7-83)

35. Container shall mean any can, barrel or drum. (4-7-83)

36. Approved unless otherwise indicated, approved or listed by at least one of the following nationally recognized testing laboratories:Underwriters Laboratories, Inc., Factory Mutual Engineering Corp. (4-7-83)

37. "SUS" means Saybolt Universal Seconds as determined by the Standard Method of Test for Saybolt Viscosity (ASTM D-88-56), and may be determined by use of the SUS Conversion tables specified in ASTM Method D-2161-66 following determination of viscosity in accordance with the procedures specified in the Standard Method of Test for Viscosity of Transparent and Opaque Liquids (ADTM D 445-65). (4-7-83)

38. "Viscous" means a viscosity of 45 SUS or more. NOTE: The volatility of liquids is increased when artificially heated to temperatures equal to or higher than the flashpoints. When so heated, Class II and III liquids shall be subject to the applicable requirements for Class I or II liquids. These standards may also be applied to high flashpoint liquids when so heated even though these same liquids when not heated are outside of its scope. (4-7-83)

39. Scope. This section applies to the handling, storage and use of flammable and combustible liquids with a flashpoint below 200 F. This section does not apply to: (4-7-83)

a. Bulk transportation of flammable and combustible liquids; (4-7-83)

b. Storage, handling, and use of fuel oil tanks and containers connected with oil burning equipment; (4-7-83)

c. Storage of flammable and combustible liquids on farms; (4-7-83)

d. Liquids without flashpoints that may be flammable under some conditions, such as certain halogenated hydrocarbons and mixtures containing halogenated hydrocarbons; (4-7-83)

e. Mists, sprays, or foams, except flammable aerosols covered in Sections 222.01 through 222.07 of this chapter; (4-7-83)

f. Installations made in accordance with requirements of the following standards: (4-7-83)

i. National Fire Protection Association Standard for Dry Cleaning Plants, NFPA No.32-1970; (4-7-83)

ii. National Fire Protection Association Standard for the Manufacture of Organic Coatings, NFPA No. 35-1970; (4-7-83)

iii. National Fire Protection Association Standard for Solvent Extraction Plants NFPA No. 36-1967; (4-7-83)

iv. National Fire Protection Association Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines, NFPA No. 37-1970. (4-7-83)

221. STORAGE.

01. Design and construction of tanks. (4-7-83)

a. Materials. (4-7-83)

i. Tanks shall be built of steel except as provided in ii. through vi. of this section. (4-7-83)

ii. Tanks may be built of materials other than steel for installation underground or if required by the properties of the liquid stored. Tanks located above ground or inside buildings shall be of noncombustible construction. (4-7-83)

iii. Tanks built of materials other than steel shall be designed to specifications embodying principles recognized as good engineering design for the material used. (4-7-83)

iv. Unlined concrete tanks may be used for storing flammable or combustible liquids having a gravity of 40 API or heavier. Concrete tanks with special lining may be used for other services provided the design is in accordance with sound engineering practice. (4-7-83)

v. Tanks may have combustible or noncombustible linings. (4-7-83)

vi. Special engineering consideration shall be required if the specific gravity of the liquid to be stored exceeds that of water or if the tanks are designed to contain flammable or combustible liquids at a liquid temperature below 0 F. (4-7-83)

b. Fabrication. (4-7-83)

i. Tanks may be of any shape or type consistent with sound engineering design. (4-7-83)

ii. Metal tanks shall be welded, riveted, and caulked, brazed, or bolted, or constructed by use of a combination of these methods. Filler metal used in brazing shall be nonferrous metal or an alloy having a melting point above 1000 F. and below that of the metal jointed. (4-7-83)

c. Atmospheric Tanks. (4-7-83)

i. Atmospheric tanks shall be built in accordance with acceptable good standards of design. Atmospheric tanks may be built in accordance with: Underwriters' Laboratories, Inc., Subjects No. 142, Standard for Steel Above-ground Tanks for Flammable and Combustible Liquids, 1968; No. 58, Standards for Steel Underground Tanks for Flammable and Combustible Liquids, 5th Edition, Dec. 1961; or No. 80, Standard for Steel Inside Tanks for Oil-burner fuel, September 1963. (b) American Petroleum Institute Standards No.12A, Specification for Oil Storage Tanks with Riveted Shells, 7th Edition, September 1951, or No. 650 Welded Steel Tanks for Oil Storage, 3rd Edition, 1966. (c)American Petroleum Institute Standards No. 12B, Specification for Bolted Production Tanks, 11th Edition, May 1958, and Supplement 1, March 1962; No. 12D Specification for Large Welded Production Tanks, 7th Edition, August 1957; or No. 12F, Specification for Small Welded Production Tanks, 5th Edition, March 1961. Tanks built in

accordance with these standards shall be used only as production tanks for storage of crude petroleum in oil producing areas. (4-7-83)

ii. Low-pressure tanks and pressure vessels may be used as atmospheric tanks. (4-7-83)

iii. Tanks designed for underground service not exceeding 2,500 gallons capacity may be used above-ground. (4-7-83)

iv. Atmospheric tanks shall not be used for the storage of a flammable or combustible liquid at a temperature at or above its boiling point. (4-7-83)

d. Low Pressure Tanks. (4-7-83)

i. The normal operating pressure of the tank shall not exceed the design pressure of the tank. (4-7-83)

ii. Low-pressure tanks shall be built in accordance with acceptable standards of design. Low-pressure tanks may be built in accordance with: (a) American Petroleum Institute Standard No. 620, Recommended Rules for the Design and Construction of Large, Welded, Low-pressure Storage Tanks, 3rd Edition, 1966. (b)The principles of the chapter for Unfired Pressure Vessels, (4-7-83)

iii. Atmospheric tanks built according to the Underwriter's Laboratories, Inc., requirements in Section 221.01.c.i. of this section may be used for operating pressures not exceeding 1 p.s.i.g. and shall be limited to 2.5 p.s.i.g. under emergency venting conditions. Pressure Vessels may be used as low-pressure tanks. (4-7-83)

e. Pressure Vessels. (4-7-83)

i. The normal operating pressure of the vessel shall not exceed the design pressure of the vessel. (4-7-83)

ii. Pressure Vessels shall be built in accordance with the Code for Unfired Pressure Vessels, Section VIII of the ASME Boiler and Pressure Vessel Code, 1968. (4-7-83)

f. Provisions for internal corrosion. When tanks are not designed in accordance with the American Petroleum Institute, American Society of Mechanical Engineers, or the Underwriter's Laboratories, Inc., Standards, or if corrosion is anticipated beyond that provided for in the design formulas used, additional metal thickness or suitable protective coatings or linings shall be provided to compensate for the corrosion loss expected during the design life of the tank. (4-7-83)

02. Installation of outside above-ground tanks. (4-7-83)

a. Location with respect to property lines and public ways. (4-7-83)

i. Every above-ground tank for the storage of flammable or combustible liquids, except those liquids with boilover characteristics and unstable liquids, operating at pressures not in excess of 2.5 p.s.i.g and equipped with emergency venting which will not permit pressures to exceed 2.5 p.s.i.g. shall be located in accordance with Table 220.02-A. (4-7-83)

ii. Every above-ground tank for the storage of flammable or combustible liquids, except those liquids with boil over characteristics and unstable flammable or combustible liquids operating at pressures exceeding 2.5 p.s.i.g. or equipped with emergency venting which will permit pressures to exceed 2.5 p.s.i.g. shall be located in accordance with Table 220.02-B. (4-7-83)

iii. Every above-ground tank for the storage of flammable or combustible liquids with boilover characteristics shall be located in accordance with Table 220.02-C. (4-7-83)

iv. Every above-ground tank for the storage of unstable liquids shall be located in accordance with Table 220.02-D. (4-7-83)

v. Reference minimum distance for use in Tables 220.02-A through -D inclusive. (4-7-83)

TABLE 221.02-A available at Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone (208) 334-6000.

TABLE 221.02-B available at Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone (208) 334-6000.

TABLE 221.02-C available at Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone (208) 334-6000.

TABLE 221.02-D available at Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone (208) 334-6000.

TABLE 221.02-E available at Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone (208) 334-6000.

TABLE 221.02-F available at Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone (208) 334-6000.

vi. Where end failure or horizontal pressure tanks and vessels may expose property, the tank shall be placed with the longitudinal axis parallel to the nearest important exposure. (4-7-83)

b. Spacing (Shell-to-Shell) between above-ground tanks. (4-7-83)

i. The distance between any two flammable or combustible liquid storage tanks shall not be less than three feet. (4-7-83)

ii. Except as provided in iii of this section, the distance between any two adjacent tanks shall not be less than one-sixth the sum of their diameters. When the diameter of one tank is less than one-half the diameter of the adjacent tank, the distance between the two tanks shall not be less than one-half the diameter of the smaller tank. (4-7-83)

iii. Where crude petroleum in conjunction with production facilities are located in areas that are not congested and have capacities not exceeding 126,000 gallons (3,000 barrels), the distance between such tanks shall not be less than 3 feet. (4-7-83)

iv. Where unstable flammable or combustible liquids are stored, the distance between such tanks shall not be less than one-half the sum of their diameters. (4-7-83)

v. When tanks are compacted in three or more rows or in an irregular pattern, greater spacing or other means shall be provided so that inside tanks are accessible for fire-fighting purposes. (4-7-83)

vi. The minimum separation between a liquefied petroleum gas container and a flammable or combustible liquid storage tank shall be 20 feet, except in the case of flammable or combustible liquid tanks operating at pressures exceeding 2.5 p.s.i.g. or equipped with emergency venting which will permit pressures to exceed 2.5 p.s.i.g. in which case the provisions of i. and ii. of this section shall apply. Suitable means shall be taken to prevent the accumulation of flammable or combustible liquids under adjacent liquefied petroleum gas containers such as by diversion curbs or grading. When flammable or combustible liquid storage tanks are within a diked area, the liquefied petroleum gas containers shall be outside the diked area and at least 10 feet away from the centerline of the wall of the diked area. The foregoing provisions shall not apply when liquefied petroleum gas containers of 125 gallons or less capacity are installed adjacent to fuel oil supply tanks of 550 gallons or less capacity. (4-7-83)

c. Location of outside above-ground tanks with respect to important buildings on same property. Every outside above-ground tank shall be separated from important buildings on the same property by distances not less than those specified in a.i., ii. and iv. of this section, whichever is applicable. The appropriate distance column to

be used in Tables 221.02-A, -B, -C, and -D, shall be the column reading "Minimum Distance in Feet From Nearest Side of Any Public Way or From Nearest Important Building". (4-7-83)

d. Normal Venting for Above-ground Tanks. (4-7-83)

i. Atmospheric storage tanks shall be adequately vented to prevent the development of vacuum or pressure sufficient to distort the roof of a cone roof tank or exceed the design pressure in the case of other atmospheric tanks, as a result of filling or emptying, and atmospheric temperature changes. (4-7-83)

ii. Normal vents shall be sized either in accordance with: (a) The American Petroleum Institute Standard 2000 (1968) Venting Atmospheric and Low-Pressure Storage Tanks; or (b)Other accepted standard; or (c) Shall be at least as large as the filling or withdrawal connection, whichever is larger but in no case less than 1 1/4 inch normal inside diameter. (4-7-83)

iii. Low-pressure tanks and pressure vessels shall be adequately vented to prevent development of pressure or vacuum, as a result of filling or emptying and atmospheric temperature changes, from exceeding the design pressure of the tank or vessel. Protection shall also be provided to prevent over-pressure from any pump discharging into the tank or vessel when the pump discharge pressure can exceed the design pressure of the tank or vessel. (4-7-83)

iv. If any tank or pressure vessel has more than one fill or withdrawal connection and simultaneous filling or withdrawal can be made, the vent size shall be based on the maximum anticipated simultaneous flow. (4-7-83)

v. Unless the vent is designed to limit the internal pressure 2.5 p.s.i. or less, the outlet of vents and vent drains shall be arranged to discharge in such a manner as to prevent localized overheating of any part of the tank in the event vapors from such vents are ignited. (4-7-83)

vi. Tanks and pressure vessels storing Class IA liquids shall be equipped with venting devices which shall be normally closed except when venting to pressures or vacuum conditions. Tanks and pressure vessels storing Class IB and IC liquids shall be equipped with venting devices which shall be normally closed except when venting under pressure or vacuum conditions, or with approved flame arresters. Exception: Tanks of 3,000 bbls. capacity or less containing crude petroleum in crude-producing areas; and, outside above-ground atmospheric tanks under 1,000 gallons capacity containing other than Class IA Flammable liquids may have open vents. (see f.ii. of this section.) (4-7-83)

vii. Flame arresters or venting devices required in e.vi. of this section may be omitted for Class IB and IC liquids where conditions are such that their use may, in case of obstruction, result in tank damage. (4-7-83)

e. Emergency Relief Venting for Fire Exposure for above-ground Tanks. (4-7-83)

i. Every above-ground storage tank shall have some form of construction or device that will relieve excessive internal pressure caused by exposure fires. (4-7-83)

ii. In a vertical tank the construction referred to in e.i. above may take the form of a floating roof, lifter roof, a weak roof-to-shell seam, or other approved pressure relieving construction. The weak roof-to-shell seam shall be constructed to fail preferential to any other seam. (4-7-83)

iii. Where entire dependence for emergency relief is placed upon pressure relieving devices, the total venting capacity of both normal and emergency vents shall be enough to prevent rupture of the shell or bottom of the tank if vertical, or of the shell or heads if horizontal. If unstable liquids are stored, the effects of heat or gas resulting from polymerization, decomposition, condensation, or self-reactivity shall be taken into account. The total capacity of both normal and emergency venting devices shall be not less than that derived from Table 2004-G except as provided in e.v. and vi. of this section. Such device may be a self-closing manhole cover, or one using long bolts that permit the cover to lift under internal pressure, or an additional or large relief valve or valves. The wetted area of the tank shall be calculated on the basis of 55% of the total exposed area of a sphere or spheroid, 75% of the total exposed area of a horizontal Tank and the first 30 feet above grade of the exposed shell area of a vertical tank. (4-7-83)

TABLE 221.02-G, WETTED AREA VERSUS CUBIC FEET FREE AIR PER HOUR, (a.7 psi and 60 F.), available Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone (208) 334-6000.

iv. For Tanks and storage vessels designed for pressure over 1 p.s.i.g. the total rate of venting shall be determined in accordance with Table 221.02-F, except that when the exposed wetted area of the surface is greater than 2,800 square feet, the total rate of venting shall be calculated by the following formula: CFH equals 1,107A (superscript 0.82). Where CFH equals venting requirement, in cubic feet of free air per hour. A equals exposed wetted surface in square feet. NOTE: The foregoing formula is based on Q = 21,000A (superscript 0.82). (4-7-83)

v. The total emergency relief venting capacity for any specific stable liquid may be determined by the following formula: Cubic feet of free air per hour equals V. V equals 1337 LM. Where: V equals cubic feet of free air per hour from Table 2004-F, L equals latent heat of vaporization of specific liquid in BTU per pound, M equals molecular weight of specific liquids. (4-7-83)

vi. The required air flow rate of e.iii. or v. of this section may be multiplied by the appropriate factor listed in the following schedule when protection is provided as indicated. Only one factor may be used for any one tank.0.5 for drainage in accordance with g.ii. of this section for tanks over 200 sq. feet of wetted area; 0.3 for approved water spray; 0.3 for approved insulation; 0.15 for approved water spray with approved insulation. (4-7-83)

vii. The outlet of all vents and vent drais on tanks equipped with emergency venting to permit pressures exceeding 2.5 p.s.i.g. shall be arranged to discharge in such a way as to prevent localized overheating of any part of the tank, in the event vapors from such vents are ignited. (4-7-83)

viii. Each commercial tank venting device shall have stamped on it the opening pressure, the pressure at which the valve reaches the full open position, and the flow capacity at the latter pressure, expressed in cubic feet per hour of air at 60 F and at a pressure of 14.7 p.s.i.a. (4-7-83)

ix. The flow capacity of tank venting devices 12 inches and smaller in nominal pipe size shall be determined by actual test of each type and size of vent. These flow tests may be conducted by the manufacturer if certified by a qualified impartial observer, or may be conducted by an outside agency. The flow capacity of tank venting devices larger than 12 inches nominal pipe size, including manhole covers with long bolts or equivalent, may be calculated provided that the opening pressure is actually measured, the rating pressure and corresponding free orifice area are stated, the work "calculated" appears on the nameplate and the computation is based on a flow coefficient of 0.5 applied to the rated orifice area. (4-7-83)

f. Vent piping for above-ground tanks. (4-7-83)

i. Vent piping shall be constructed in accordance with section 221.08 of this chapter. (4-7-83)

ii. Where vent pipe outlets for tanks storing Class I liquids are adjacent to buildings or public ways, they shall be located so that the vapors are released at a safe point outside of buildings and not less than 12 feet above the adjacent ground level. In order to aid their dispersion, vapors shall be discharged upward or horizontally away from closely adjacent walls. Vent outlets shall be located so that flammable vapors will not be trapped by eaves or other obstructions and shall be at least five feet from building openings. (4-7-83)

iii. When tank vent piping is manifold, pipe sizes shall be such as to discharge within the pressure limitations of the system, the vapors they may be required to handle when manifolded tanks are subject to the same fire exposure. (4-7-83)

g. Drainage, dikes and walls for above-ground tanks. (4-7-83)

i. Drainage and diked areas. The area surrounding a tank or a group of tanks shall be provided with drainage as in g.ii. of this section or shall be diked as provided in g.vii. to prevent accidental discharge of liquid from endangering adjoining property or reaching waterways. (4-7-83)

ii. Drainage. Where protection of adjoining property or waterways is by means of a natural or

manmade drainage system, such a system shall comply with the following: (a)A slope of not less than 1% away from the tank toward the drainage system shall be provided. (b)The drainage system shall terminate in vacant land or other areas or in an impounding basin having a capacity not smaller than that of the largest tank served. This termination area and the route of the drainage system shall be so located that if the flammable or combustible liquids in the drainage system are ignited, the fire will not seriously expose tanks or adjoining property. (c)The drainage system, including automatic drainage pumps shall not discharge to adjoining property, natural water courses, public sewers, or public drains unless the discharge of flammable or combustible liquids would not constitute a hazard, or the system is so designed that it will not permit flammable or combustible liquids to be released. (4-7-83)

iii. Diked Areas. Where protection of adjoining property or waterways is accomplished by retaining the liquid around the tank by means of a dike, the volume of the diked area shall comply with the following requirements: (a) Except as provided in g.iii.(c) of this section, the volumetric capacity of the diked area shall not be less than the greatest amount of liquid that can be released from the largest tank within the diked area, assuming a full tank. The capacity of the diked area enclosing more than one tank shall be calculated by deducting the volume of the tanks other than the largest tank below the height of the dike. (b) For a tank or group of tanks with fixed roofs containing crude petroleum with boilover characteristics, the volumetric capacity of the diked area shall be not less than the capacity of the largest tank served by the enclosure, assuming a full tank. The capacity of the diked enclosure shall be calculated by deducting the volume below the height of the dike of all tanks within the enclosure. (c) Walls of the diked area shall be of earth, steel, concrete or solid masonry designed to be liquid tight and to withstand a full hydrostatic head. Earthen walls 3 ft. or more in height shall have a flat section at the top not less than 2 feet wide. The slope of an earthen wall shall be consistent with the angle of repose of the material of which the wall is constructed. (d)The walls of the diked area shall be restricted to an average height of 6 feet above interior grade. (e) Where provision is made for draining water from diked area, drainage shall be provided at a uniform slope of not less than 1 percent away from tanks toward a sump, drain box, or other safe means of disposal located at the greatest practical distance from the tank. Such drains shall normally be controlled in a manner so as to prevent flammable or combustible liquids from entering natural water courses, public sewers, or public drains, if their presence would constitute a hazard. Control of drainage shall be accessible under fire conditions. (f) No loose combustible material, empty or full drum or barrel, shall be permitted within the diked area. (g)Each diked area containing two or more tanks shall be subdivided preferably by drainage channels or at least by intermediate curbs in order to prevent spills from endangering adjacent tanks within the diked area as follows: (1) When storing normally stable liquids in vertical cone roof tanks constructed with weak roof-to-shell seams or approved floating roof tanks or when storing crude petroleum in producing areas of any type of tank, one subdivision for each tank in excess of 10,000 bbls. and one subdivision for each group of tanks (no tank exceeding 10,000 bbls. capacity) having an aggregate capacity not exceeding 15,000 bbls. (2) When storing normally stable flammable or combustible liquids in tanks not covered in (1) of this section, one subdivision for each tank in excess of 100,000 gallons (2,500 bbls.) and one subdivision for each group of tanks (no tank exceeding 100,000 gallons capacity) having an aggregate capacity not exceeding 15,000 gallons (3,570 bbls.). (3)When storing unstable liquids in any type of tank, one subdivision for each tank except that tanks installed in accordance with the drainage requirements of NFPA 15-1969, Standard for Water Spray Fixed Systems for Fire Protection shall require no additional subdivision. (4) The drainage channels or intermediate curbs shall be located between tanks so as to take full advantage of the available space with due regard for the individual tank capacities. Intermediate curbs, where used, shall be not less than 18 inches in height. (4-7-83)

h. Tank openings other than vents for above-ground tanks. (4-7-83)

i. Connections for all tank openings shall be vapor tight and liquid tight. Vents are covered in d. through f. of this section. (4-7-83)

ii. Each connection to an above-ground tank through which liquid can normally flow shall be provided with an internal or an external valve located as close as practical to the shell of the tank. Such valves, when external, and their connections to the tank shall be of steel except when the chemical characteristics of the liquid stored are incompatible with steel. When materials other than steel are necessary, they shall be suitable for the pressures, structural stresses, and temperatures involved, including fire exposures. (4-7-83)

iii. Each connection below the liquid level through which liquid does not normal flow shall be provided with a liquid tight closure. This may be a valve, plug, or blind or a combination of these. (4-7-83)

iv. Openings for gaging shall be provided with a vapor tight cap or cover. (4-7-83)

v. For Class IB and Class IC liquids other than crude oil, gasoline and asphalt, the fill pipe shall be so designed and installed as to minimize the possibility of generating static electricity. A fill pipe entering the top of a tank shall terminate within 6 inches of the bottom of the tank and shall be installed to avoid excessive vibration. (4-7-83)

vi. Filling and emptying connections which are made and broken shall be located outside of buildings at a location free from any source of ignition and not less than 5 feet away from any building opening. Such connection shall be closed and liquid tight when not in use. The connection shall be properly identified. (4-7-83)

03. Installation of underground tanks. (4-7-83)

a. Location. Excavation for underground storage tanks shall be made with due care to avoid undermining of foundations of existing structures. Underground tanks or tanks under buildings shall be so located with respect to existing building foundations and supports that the loads carried by the latter cannot be transmitted to the tank. The distance from any part of a tank storing Class I liquids to the nearest wall of any basement or pit shall be not less than 1 foot, and to any property line that may be built upon, not less than 3 feet. The distance from any part of a tank storing Class II or Class III liquids to the nearest wall of any basement, pit or property line shall not be less than 1 foot. (4-7-83)

b. Depth and Cover. Underground tanks shall be set on firm foundations and surrounded with at least 6 inches of noncorrosive, inert materials such as clean sand, earth, or gravel well stamped in place. The tank shall be placed in the hold with care since dropping or rolling the tank into the hole can break a weld, puncture or damage the tank, or scrape off the protective coating of coated tanks. Tanks shall be covered with a minimum of 2 feet of earth or shall be covered with not less than 1 foot of earth on top of which shall be placed a slab of reinforced concrete not less than 4 inches thick. When underground tanks are or are likely to be, subject to traffic, they shall be protected against damage from vehicles passing over them by at least 3 feet of earth cover, or 18 inches of well-tamped earth, plus 6 inches of reinforced concrete or 8 inches of asphaltic concrete. When asphaltic or reinforced concrete paving is used as part of the protection, it shall extend at least 1 foot horizontally beyond the outline of the tank in all directions. (4-7-83)

c. Corrosion protection. Corrosion protection for the tank and its piping shall be provided by one or more of the following methods: (4-7-83)

i. Use of protective coatings or wrappings; (4-7-83)

ii. Cathodic protection; or (4-7-83)

iii. Corrosion resistant material of construction. (4-7-83)

d. Vents. (4-7-83)

i. Location and arrangement of vents for Class I liquids. Vent pipes from tanks storing Class I liquids shall be so located that the discharge point is outside of buildings, higher than the fill pipe opening, and not less than 12 feet above the adjacent ground level. Vent pipes shall discharge only upward in order to disperse vapors. Vent pipes 2 inches or less in nominal inside diameter shall not be obstructed by devices that will cause excessive back pressure. Vent pipe outlets shall be so located that flammable vapors will not enter building openings, or be trapped under eaves or other obstructions. If the vent pipe is less than 10 feet in length, or greater than 2 inches in nominal inside diameter, the outlet shall be provided with a vacuum and pressure relief device or shall be an approved flame arrester located in the vent line at the outlet or within the approved distance from the outlet. (4-7-83)

ii. Size of Vents. Each tank shall be vented through piping adequate in size to prevent blow-back of vapor liquid at the fill opening while the tank is being filled. Vent pipes shall be not less than 1/4 inch nominal inside diameter. (4-7-83)

iii. Location and Arrangement of vents for Class II or Class III liquids. Vent pipes from tanks storing Class II or Class III flammable liquids shall terminate outside of the building and higher than the fill pipe opening.

Vent outlets shall be above normal snow level. They may be fitted with return bends course screens or other devices to minimize ingress or foreign material. (4-7-83)

TABLE 221.03-A, VENT LINE DIAMETERS

Maximum Flow GPM	50'	Pipe Length# 100'	200'
	Inches	Inches	Inches
100	1 1/4	1 1/4	1 1/4
200	1 1/4	1 1/4	1 1/4
300	1 1/4	1 1/4	1 1/2
400	1 1/4	1 1/2	2
500	1 1/2	1 1/2	2
600	1 1/2	2	2
700	2	2	2
800	2	2	3
900	2	2	3
1000	2	2	3

*Vent lines of 50 ft., 100 ft., and 200 ft. of pipe plus 7 wells. (4-7-83)

iv. Vent piping shall be constructed in accordance with Section 221.08 of this chapter. Vent pipes shall be so laid as to drain toward the tank without sags or traps in which liquid can collect. They shall be located so that they will not be subjected to physical damage. The tank end of the vent pipe shall enter the tank through the top. (4-7-83)

v. When tank vent piping is manifolded, pipe sizes shall be such as to discharge, within the pressure limitations of the system, the vapors they may be required to handle when manifolded tanks are filled simultaneously. (4-7-83)

e. Tank openings other than vents. (4-7-83)

i. Connections for all tank openings shall be vapor or liquid tight. (4-7-83)

ii. Openings for manual gaging, if independent of the fill pipe shall be provided with a liquid-tight cap or cover. If inside a building, each such opening shall be protected against liquid overflow and possible vapor release by means of a springs loaded check valve or other approved device. (4-7-83)

iii. Fill and discharge lines shall enter tanks only through the top. Fill lines shall be sloped toward the tank. (4-7-83)

iv. For Class IB and IC liquids other than crude oils, gasolines, and asphalt, the fill pipe shall be so designed and installed as to minimize the possibility of generating static electricity by terminating within 6 inches of the bottom of the tank. (4-7-83)

v. Filling and emptying connections which are made and broken shall be located outside of buildings at a location free from any source of ignition and not less than 5 feet away from any building openings. Such connection shall be closed and liquid-tight when not in use. The connection shall be properly identified. (4-7-83)

04. Installation of tanks inside of buildings. (4-7-83)

a. Location. Tanks shall not be permitted inside of buildings except as provided in Sections 223.01 through 223.09 and Sections 225.01 through 227.01 of this chapter. (4-7-83)

b. Vents. Vents for tanks inside of buildings shall be as provided in 221.02.d., e., f.ii. and 221.05.d. of this Chapter, except that emergency venting by the use of weak roof seams on tanks shall not be permitted. Vents shall discharge vapors outside of buildings. (4-7-83)

c. Vent Piping. Vent piping shall be constructed in accordance with 221.08 of this chapter. (4-7-83)

d. Tank openings other than vents. (4-7-83)

i. Connections for all tank openings shall be vapor or liquid tight. Vents are covered in b. of this Section. (4-7-83)

ii. Each connection to a tank inside of buildings through which liquid can normally flow shall be provided with an internal or an external valve located as close as practical to the shell of the tank. Such valves, when external, and their connections to the tank shall be of steel except when the chemical characteristics of the liquid stored are incompatible with steel. When materials other than steel are necessary they shall be suitable for the pressures, structural stresses, and temperatures involved, including fire exposures. (4-7-83)

iii. Flammable or combustible liquid tanks located inside of buildings except in one-story buildings designed and protected for flammable or combustible liquids storage shall be provided with an automatic closing heating actuated valve on each withdrawal connection below the liquid level, except for connections used for emergency disposal, to prevent continued flow in the event of fire in the vicinity of the tank. This function may be incorporated in the valve required in d.i i. of this section, and if a separate valve, shall be located adjacent to the valve required in d.ii.of this section. (4-7-83)

iv. Openings for manual gaging, if independent of the fill pipe (see d.vi. of this section), shall be provided with a vapor tight cap or cover. Each such opening shall be protected against liquid overflow and possible vapor release by means of a spring loaded check valve or other approved device. (4-7-83)

v. For Class IB and IC liquids other than crude oil, gasoline and asphalt, the fill pipe shall be so designed and installed as to minimize the possibility of generating static electricity by terminating within 6 inches of the bottom of the tank. (4-7-83)

vi. The fill pipe inside of the tank shall be installed to avoid excessive vibration of the pipe. (4-7-83)

vii. The inlet of the fill pipe shall be located outside of buildings at a location free from any source of ignition and not less than 5 feet away from any building opening. The inlet of the fill pipe shall be closed and liquid tight when not in use. The fill connection shall be properly identified. (4-7-83)

viii. Tanks inside buildings shall be equipped with a device, or other means shall be provided, to prevent overflow into the building. (4-7-83)

05. Supports, foundations, and anchorage for all tank locations. (4-7-83)

a. General. Tank supports shall be installed on firm foundations. Tank supports shall be of concrete, masonry, or protected steel. Single wood timber supports (not cribbing) laid horizontally may be used for outside above-ground tanks if not more than 12 inches high at their lowest point. (4-7-83)

b. Fire resistance. Steel supports or exposed piling shall be protected by materials having a fire resistance rating of not less than 2 hours, except that steel saddles need not be protected if less than 12 inches high at their lowest point. Water spray protection or its equivalent may be used in lieu of fire resistive materials to protect supports. (4-7-83)

c. Spheres. The design of the supporting structure for tanks such as spheres shall receive special engineering consideration. (4-7-83)

d. Load distribution. Every tank shall be so supported as to prevent the excessive concentration of loads on the supporting portion of the shell. (4-7-83)

e. Foundations. Tanks shall rest on the ground or on foundations made of concrete, masonry, piling, or steel. Tank foundations shall be designed to minimize the possibility of uneven settling of the tank and to minimize corrosion in any part of the tank resting on the foundation. (4-7-83)

f. Flood areas. Where a tank is located in an area that may be subjected to flooding, the applicable precautions outlined as follows: (4-7-83)

i. No above-ground vertical storage tank containing a flammable or combustible liquid shall be located so that the allowable liquid level within the tank is below the established maximum flood stage, unless the tank is provided with a guiding structure such as described in xiii., xiv., and xv. of this section. (4-7-83)

ii. Independent water supply facilities shall be provided at locations where there is no ample and dependable public water supply available for loading partially empty tanks with water. (4-7-83)

iii. In addition to the preceding requirements, each tank so located that more than 70% but less than 100% of its allowable liquid storage capacity will be submerged at the established maximum flood stage, shall be safeguarded by one of the following methods: (a)Tank shall be raised or its height shall be increased, until its top extends above the maximum flood stage a distance equivalent to 30% or more of its allowable liquid storage capacity. Provided, however, that the submerged part of the tank shall not exceed two and one-half times the diameter. Or, as an alternative to the foregoing, adequate noncombustible structural guides, designed to permit the tank to float vertically without loss of product, shall be provided. (4-7-83)

iv. Each horizontal tank so located that more than 70% of its storage capacity will be submerged at the established flood stage, shall be anchored, attached to a foundation of concrete or of steel and concrete, of sufficient weight to provide adequate load for the tank when filled with flammable or combustible liquid and submerged by flood waters to the established flood stage, or adequately secured by other means. (4-7-83)

v. Spherical and spheroidal tanks shall be protected by applicable methods as specified for either vertical or horizontal tanks. (4-7-83)

vi. At locations where there is no ample and dependable water supply, or where filling of underground tanks with liquid is impracticable because of the character of their contents, their use, or for other reasons, each tank shall be safeguarded against movement when empty and submerged by high ground water or flood waters by anchoring, weighing with concrete or other approved solid loading material, or securing by other means. Each such tank shall be so constructed and installed that it will safely resist external pressures due to high ground water or flood waters. (4-7-83)

vii. At locations where there is an ample and dependable water supply available, underground tanks containing flammable or combustible liquids, so installed that more than 70% of their storage capacity will be submerged at the maximum flood stage, shall be so anchored weighted or secured by other means, as to prevent movement of such tanks when filled with flammable or combustible liquids, and submerged by flood waters to the established flood stage. (4-7-83)

viii. Pipe connections below the allowable liquid level in a tank shall be provided with valves or cocks located as closely as practicable to the tank shell. Such valves and their connections to tanks shall be of steel or other material suitable for use with the liquid being stored. Cast iron shall not be used. (4-7-83)

ix. At locations where an independent water supply is required, it shall be entirely independent of public power and water supply. Independent source of water shall be available when flood waters reach a level not less than 10 feet below the bottom of the lowest tank on a property. (4-7-83)

x. The self-contained power and pumping unit shall be so located or so designed that pumping into tanks may be carried on continuously throughout the rise in flood waters from a level 10 feet below the lowest tank to the level of the potential flood stage. (4-7-83)

xi. Capacity of the pumping unit shall be such that the rate of rise of water in all tanks shall be equivalent to the established potential average rate of rise of flood waters at any stage. (4-7-83)

xii. Each independent pumping unit shall be tested periodically to insure that it is in satisfactory operating condition. (4-7-83)

xiii. Structural guides for holding floating tanks above their foundations shall be so designed that there will be no resistance to the free rise of a tank and shall be constructed of noncombustible material. (4-7-83)

xiv. The strength of the structure shall be adequate to resist lateral movement of a tank subject to a horizontal force in any direction equivalent to not less than 25 pounds per square foot acting on the projected vertical cross-sectional area of the tank. (4-7-83)

xv. Where tanks are situated on exposed points or bends in a shoreline where swift currents in floodwater will be present, the structures shall be designed to withstand a unit force of not less than 50 pounds per square foot. (4-7-83)

xvi. The filling of a tank to be protected by water loading shall be started as soon as flood waters reach a dangerous flood stage. The rate of filling shall be at least equal to the rate of rise of the flood waters (or the established average potential rate of rise). (4-7-83)

xvii. Sufficient fuel to operate the water pumps shall be available at all times to insure adequate power to fill all tankage with water. (4-7-83)

xviii. All valves on connecting pipelines shall be closed and locked in closed position when water loading has been completed. (4-7-83)

xix. Where structural guides are provided for the protection of floating tanks, all rigid connections between tanks and pipelines shall be disconnected and blanked off or banded before the flood waters reach the bottom of the tank, unless control valves and their connections to the tank are of a type designed to prevent breakage between the valve and the tank shell. (4-7-83)

xx. All valves attached to tanks other than those used in connection with water loading operations shall be closed and locked. (4-7-83)

xxi. If a tank is equipped with a swing line, the swing pipe shall be raised to and secured at its highest position. (4-7-83)

xxii. Inspection. The Director or his designated representative shall make periodic inspections of all plants where the storage of flammable or combustible liquids is such as to require compliance with the foregoing requirements, in order to assure the following: (a) That all flammable or combustible liquid storage tanks are in compliance with these requirements and so maintained. (b)That detailed printed instructions of what to do in flood emergencies are properly posted. (c) That station operators and other employees depended upon to carry out such instructions are thoroughly informed as to the location and operation of such valves and other equipment necessary to effect these requirements. (4-7-83)

g. Earthquake Areas. In areas subject to earthquakes, the tank supports and connections shall be designed to resist damage as a result of such shocks. (4-7-83)

06. Sources of ignition. In locations where flammable vapors may be present, precautions shall be taken to prevent ignition by eliminating or controlling sources of ignition. Sources of ignition may include open flames, light, smoking, cutting and welding, hot surfaces, frictional heat, sparks, (static, electrical and mechanical),

spontaneous ignition, chemical and physical chemical reactions and radiant heat. (4-7-83)

07. Test. (4-7-83)

a. General. All tanks, whether shop built or field erected shall be strength tested before they are placed in service in accordance with the applicable sections of the code under which they were built. The American Society of Mechanical Engineers (ASME) code stamp. American Petroleum Institute (API) monogram, or the label of the Underwriters' Laboratories, Inc., on a tank shall be evidence of compliance with this strength test. Tanks not marked in accordance with the above codes shall be strength tested before they are placed in service in accordance with good engineering principles and reference shall be made to the sections on testing on the code listed in 221.01.c.i., d.ii. and e.ii. of this chapter. (4-7-83)

b. Strength. When the vertical length of the fill and vent pipes is such that when filled with liquid the static head imposed upon the bottom of the tank exceeds 10 lbs. per square inch, the tank and related piping shall be tested hydrostatically to a pressure equal to the static head thus imposed. (4-7-83)

c. Tightness. In addition to the strength test called for in a. and b. above, all tanks and connections shall be tested for tightness. Except for underground tanks, this tightness test shall be made at operating pressure with air, inert gas, or water prior to placing the tank in service. In the case of field-erected tanks, the strength test may be considered to be the test for tank tightness. Underground tanks and piping, before being covered, enclosed, or placed in use, shall be tested for tightness hydrostatically, or with air pressure at not less than 3 pounds per square inch and not more than 5 pounds per square inch. (4-7-83)

d. Repairs. All leaks or deformations shall be corrected in an acceptable manner before the tank is placed in service. Mechanical caulking is not permitted for correcting leaks in welded tanks except pinhole leaks in the roof. (4-7-83)

e. Derated operations. Tanks to be operated at pressures below their design pressure may be tested by the applicable provisions of a. or b. of this section. (4-7-83)

08. Piping, valves, and fittings. (4-7-83)

a. General. (4-7-83)

i. Design. The design (including selection of materials) fabrication, assembly, test and inspection of piping systems containing flammable or combustible liquids shall be suitable for the expected working pressures and structural stresses. Conformity with the applicable provisions of Pressure Piping, ANSI B31-1967 series and the provisions of this section shall be considered prima facie evidence of compliance with the foregoing provisions. (4-7-83)

ii. Exception. This section does not apply to the following: (a) Tubing or casing on any oil or gas wells and any piping connected directly thereto. (b) Motor vehicle, aircraft, boat, or portable or stationary engines. (c) Piping within the scope of any applicable boiler and pressure vessel code. (4-7-83)

iii. Definitions. As used in this section, piping systems consist of pipe, tubing flanges, bolting, gaskets, valves, fittings, the pressure containing parts of other components such as expansion joints and strainers, and devices which serve such purposes as mixing, separating, snubbing, distribution, metering, or controlling flow. (4-7-83)

b. Materials for Piping, Valves and Fittings. (4-7-83)

i. Required Materials. Materials for piping, valves or fittings shall be steel, nodular iron or malleable iron, except as provided in subsections ii., iii., and iv. of this section. (4-7-83)

ii. Exceptions. Materials other than steel, nodular iron, or malleable iron may be used underground or if required by the properties of the flammable or combustible liquid handled. Material other than steel, nodular iron or malleable iron shall be designed to specifications embodying principles recognized as good engineering practices for the material used. (4-7-83)

iii. Linings. Piping, valves, and fittings may have combustible or noncombustible linings. (4-7-83)

iv. Low-melting materials. When low-melting point materials such as aluminum and brass or materials that soften on fire exposure such as plastics or nonductile materials such as cast iron, are necessary special consideration shall be given to their behavior on fire exposure. If such materials are used in above-ground piping systems or inside buildings, they shall be suitably protected against fire exposure or so located that any spill resulting from the failure of these materials could not unduly expose person, important buildings or structures or can be readily controlled by remote valves. (4-7-83)

c. Pipe joints. Joints shall be made liquid tight. Welded or screwed joints or approved connectors shall be used. Threaded joints and connections shall be made up tight with a suitable lubricant or piping compound. Pipe joints dependent upon the friction characteristics of combustible materials for mechanical continuity of piping shall not be used inside buildings. They may be used outside of buildings above or below ground. If used above ground, the piping shall either be secured to prevent disengagement at the fitting or the piping system shall be so designed that any spill resulting from such disengagement could not unduly expose person, important buildings, or structures, and could be readily controlled by remote valves. (4-7-83)

d. Supports. Piping systems shall be substantially supported and protected against physical damage and excessive stresses arising from settlement, vibrations, expansion, or contraction. (4-7-83)

e. Protection Against Corrosion. All piping for flammable or combustible liquids both above ground and under ground where subject to external corrosion, shall be painted or otherwise protected. (4-7-83)

f. Valves. Piping systems shall contain a sufficient number of valves to operate the system properly and to protect the plant. Piping systems in connection with pumps shall contain a sufficient number of valves to control properly the flow of liquid in normal operation and in the event of physical damage. Each connection to pipelines, by which equipment such as tank cars, or tank vehicles discharge liquids by means of pumps into storage tanks, shall be provided with a check valve for automatic protection against back flow if the piping arrangement is such that back flow from the system is possible. (4-7-83)

g. Testing. All piping before being covered, enclosed, or placed in use shall be hydrostatically tested to 150% of the maximum anticipated pressure of the system, or pneumatically tested to 110% of the maximum anticipated pressure of the system, but not less than 5 pounds per square inch gage at the highest point of the system. This test shall be maintained for a sufficient time to complete visual inspection of all joints and connections but for at least 10 minutes. (4-7-83)

222. CONTAINER AND PORTABLE TANK STORAGE.

01. Scope. (4-7-83)

a. General. This section shall apply only to the storage of flammable or combustible liquids in drum or other containers (including flammable aerosols) not exceeding 60 gallon individual capacity and those portable tanks not exceeding 660 gallons individual capacity. (4-7-83)

b. Exceptions. This section shall not apply to the following: (4-7-83)

i. Storage of containers in bulk plants, service stations, refineries, chemical plants, and distilleries; (4-7-83)

ii. Class I or Class II liquids in the fuel tanks of a motor vehicle, aircraft, boat or portable or stationary engine; (4-7-83)

iii. Flammable or combustible paints, oils, varnishes, and similar mixtures used for painting or maintenance when not kept for a period in excess of 30 days; (4-7-83)

iv. Beverages when packaged in individual containers not exceeding 1 gallon in size. (4-7-83)

02. Design, construction and capacity of containers. (4-7-83)

a. General. Only approved containers and portable tanks shall be used. Metal containers and portable tanks meeting the requirements of and containing products authorized by Chapter I, Title 49 of the Code of Federal Regulations - October 1, 1972, (regulations issued by the Hazardous Material Regulations Board, Department of Transportation), shall be deemed to be acceptable. (4-7-83)

b. Emergency Venting. Each portable tank shall be provided with one or more devices installed in the top with sufficient emergency venting capacity to limit internal pressure under fire exposure conditions to 10 p.s.i.g. or 30% of the bursting pressure of the tank, whichever is greater. The total venting capacity shall be not less than that specified in 2004.e.iii. or v. At least one pressure-actuated vent having a minimum capacity of 6,000 cubic feet of free air (14.7 p.s.i.a. and 60 F.) shall be used. It shall be set to open at not less than 5 p.s.i.g. If fusible vents are used, they shall be actuated by elements that operate at a temperature not exceeding 300 F. Container exemptions: Medicines, beverages, foodstuffs, cosmetics, and other common consumer items, when packaged according to commonly accepted practices, shall be exempt from the requirements of 222.04.a. and b. of this chapter. (4-7-83)

c. Size. Flammable and combustible liquid containers shall be in accordance with Table 222.02, except that glass or plastic containers of no more than 1 gallon capacity may be used for a Class IA or IB flammable liquid if: (4-7-83)

i. Such liquid either would be rendered unfit for its intended use by contact with metal or would excessively corrode a metal container so as to create a leakage hazard; and (4-7-83)

ii. The user's process either would require more than 1 pint of Class IA liquid or more than 1 quart of a Class IB liquid of a single assay lot to be used at one time, or would require the maintenance of an analytical standard liquid of a quality which is not met by the specified standards of liquids available, and the quantity of the analytical standard liquid required to be used in any one control process exceeds one-sixteenth the capacity of the container allowed under Table 222.02 for the class or liquid; or (4-7-83)

iii. The containers are intended for direct export outside the United States. (4-7-83)

TABLE 222.02, MAXIMUM ALLOWABLE SIZE OF CONTAINER AND PORTABLE TANKS
available at Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone (208) 334-6000.

03. Design, construction, and capacity of storage cabinets. (4-7-83)

a. Maximum capacity. Not more than 60 gallons of Class I or Class II liquids nor more than 120 gallons of Class III liquids may be stored in a storage cabinet. (4-7-83)

b. Fire resistance. Storage cabinets shall be designed and constructed to limit the internal temperature to not more than 325 F. when subjected to a 10-minute fire test using the standard time-temperature curve as set forth in Standard Methods of Fire Tests of Building Construction and Materials, NFPA 251-1969. All joints and seams shall remain tight and the door shall remain securely closed during the fire test. Cabinets shall be labeled "Flammable -- Keep Fire Away", to meet specifications set forth in 171.01 through 171.09 of this chapter. (4-7-83)

i. Metal cabinets constructed in the following manner shall be deemed to be in compliance. The bottom, top, door and sides of cabinet shall be at least no. 18 gage sheet iron and double walled with 1 1/2 -inch air space. Joints shall be riveted, welded or made tight by some equally effective means. The door shall be provided with a three-point lock, and the door sill shall be raised at least 2 inches above the bottom of the cabinet. (4-7-83)

ii. Wooden cabinets constructed in the following manner shall be deemed in compliance. The bottom, sides, and top shall be constructed of an approved grade of plywood at least 1 inch in thickness, which shall not break down or delaminate under fire conditions. All joints shall be rabbetted and shall be fastened in two directions with flathead wood screws. When more than one door is used, there shall be a rabbetted overlap of not less than 1 inch. Hinges shall be mounted in such a manner as not to lose their holding capacity due to loosening or burning out of the screws when subjected to the fire test. (4-7-83)

04. Design and construction of inside storage rooms. (4-7-83)

a. Construction. Inside storage rooms shall be constructed to meet the required fire-resistive rating for their use. Such construction shall comply with the test specifications set forth in Standard Methods of Fire Tests of Building Construction and Materials, NFPA 251-1969. Where an automatic sprinkler system is provided, the system shall be designed and installed in an acceptable manner. Openings to other rooms or buildings shall be provided with noncombustible liquid-tight raised sills or ramps at least 4 inches below the surrounding floor. Openings shall be provided with approved self-closing fire doors. The room shall be liquid tight where the walls join the floor. A permissible alternate to the sill or ramp is an open grated trench inside of the room which drains to a safe location. Where other portions of the building or other properties are exposed, windows shall be protected as set forth in the Standard for Fire Doors and Windows NFPA no. 80-1968, for Class E or F openings. Wood at least 1 inch nominal thickness may be used for shelving, racks, dunnage, scuff-boards, floor overlay, and similar installations. (4-7-83)

b. Rating and capacity. Storage in inside storage rooms shall comply with Table 222.04. (4-7-83)

TABLE 222.04, STORAGE IN INSIDE ROOMS available at Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone (208) 334-6000.

c. Wiring. Electrical wiring and equipment located in inside storage rooms used for Class I liquids shall be approved under Section 150 of this Code for Class I Division 2 Hazardous Location; for Class II and Class III liquids, shall be approved for general use. (4-7-83)

d. Ventilation. Every inside storage room shall be provided with either a gravity or a mechanical exhaust ventilation system. Such system shall be designed to provide for a complete change of air within the room at least 6 times per hour. If a mechanical exhaust system is used, it shall be controlled by a switch located outside of the doors. The ventilation equipment and any lighting fixtures shall be operated by the same switch. A pilot light shall be installed adjacent to the switch if Class I flammable liquids are dispensed within the room. Where gravity ventilation is provided the fresh air intake, as well as the exhaust outlet from the rooms, shall be on the exterior of the building in which the room is located. (4-7-83)

e. Storage in inside storage rooms. In every inside storage room there shall be maintained one clear aisle at least 3 feet wide. Containers over 30 gallons capacity shall not be stacked one upon the other. Dispensing shall be by approved pump or self-closing faucet only. (4-7-83)

05. Storage inside building. (4-7-83)

a. Egress. Flammable or combustible liquids, including stock for sale, shall not be stored so as to limit use of exits, stairways, or areas normally used for the safe egress of people. (4-7-83)

b. Containers. The storage of flammable or combustible liquids in containers or portable tanks shall comply with 222.04.c. through e. of this chapter. (4-7-83)

c. Office occupancies. Storage shall be prohibited except that which is required for maintenance and operation of building and operation of equipment. Such storage shall be kept enclosed metal containers stored in a storage cabinet or in safety cans or in an inside storage room not having a door that opens into that portion of the building used by the public. (4-7-83)

d. Mercantile occupancies and other retail stores. (4-7-83)

i. In rooms or areas accessible to the public, storage shall be limited to quantities needed for display and normal merchandising purposes but shall not exceed 2 gallons per square foot of gross floor area. The gross floor area used for computing the maximum quantity permitted shall be considered as that portion of the store actually being used for merchandising flammable and combustible liquids. (4-7-83)

ii. Where the aggregate quantity of additional stock exceeds 60 gallons of Class IA, of 120 gallons of class IB, or 180 gallons of Class IC, or 240 gallons of Class II or 500 gallons of Class III liquids, or any combination

of Class I and Class II liquids exceeding 240 gallons, it shall be stored in a room or portion of the building that complies with the construction provisions for an inside storage room as prescribed in Section 222.04 of this chapter. For water miscible liquids, these quantities may be doubled. (4-7-83)

iii. Containers in a display area shall not be stacked more than 3 feet or two containers high, whichever is greater, unless the stacking is done on fixed shelving or is otherwise satisfactorily secured. (4-7-83)

iv. Shelving shall be of stable construction, or sufficient depth and arrangement such that containers displayed thereon shall not be easily displaced. (4-7-83)

v. Leaking containers shall be removed to a storage room or taken to a safe location outside the building and the contents transferred to an undamaged container. (4-7-83)

e. General purpose public warehouses. Storage shall be in accordance with Table 222.05-A or 222.05-B and in buildings or in portions of such buildings cut off by standard fire-walls. Material creating no fire exposure hazard to the flammable or combustible liquids may be stored in the same area. (4-7-83)

f. Flammable and combustible liquid warehouses or storage buildings. (4-7-83)

i. If the storage building is located 50 feet or less from a building or line of adjoining property that may be built upon, the exposing wall shall be a blank wall having a fire-resistance rating of at least 2 hours. (4-7-83)

ii. The total quantity of liquids within a building shall not be restricted, but the arrangement of storage shall comply to Tables 222.05A and 222.05-B. (4-7-83)

TABLE 222.05-A, INDOOR CONTAINER STORAGE available at Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone (208) 33. -6000)

TABLE 222.05-B, INDOOR PORTABLE TANK STORAGE available at Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone (208) 334-6000.

iii. Containers in piles shall be separated by pallets or dunnage where necessary to provide stability and to prevent excessive stress on container walls. (4-7-83)

iv. Portable tanks stored over one tier high shall be designed to nest securely, without dunnage and adequate materials handling equipment shall be available to handle tanks safely at the upper tier level. (4-7-83)

v. No pile shall be closer than 3 feet to the nearest beam, chord, girder, or other obstruction, and shall be 3 feet below sprinkler deflectors or discharge orifices of water spray, or other over head fire protection systems. (4-7-83)

vi. Aisles of at least 3 feet wide shall be provided where necessary for reasons of access to doors, windows or standpipe connections. (4-7-83)

06. Storage outside buildings. (4-7-83)

a. General. Storage outside buildings shall be in accordance with Table 222.06-A and 222.06-B and b. and d. of this section. (4-7-83)

b. Maximum Storage. A maximum of 1,100 gallons of flammable or combustible liquids may be located adjacent to buildings located on the same premises and under the same management, provided the provisions of i. and ii. below are followed: (4-7-83)

i. The building shall be a one-story building devoted principally to the handling and storing of flammable or combustible liquids or the building shall have 2-hour fire-resistive exterior walls having no opening within 10 feet of such storage. (4-7-83)

ii. Where quantity stored exceeds 1,100 gallons, or provisions of i. cannot be met, a minimum distance of 10 feet between buildings and nearest container of flammable or combustible liquid shall be maintained. (4-7-83)

TABLE 222.06-A, OUTDOOR CONTAINER STORAGE, available at Idaho Industrial Commission, 317Main,Boise, Idaho 83720, Telephone (208) 334-6000.

TABLE 222.06-B, OUTDOOR PORTABLE TANK STORAGE available at Idaho Industrial Commission, 317Main, Boise, Idaho 83720, Telephone (208) 334-6000.

c. Spill Containment. The storage area shall be graded in a manner to divert possible spills away from buildings or other exposures or shall be surrounded by a curb at least 6 inches high. When curbs are used, provisions shall be made for draining of accumulations of ground or rain water or spills of flammable or combustible liquids. Drains shall terminate at a safe location and shall be accessible to operation under fire conditions. (4-7-83)

d. Security. The storage area shall be protected against tampering or trespassers where necessary and shall be kept free of weeds, debris and other combustible material not necessary to the storage. (4-7-83)

07. Fire control. (4-7-83)

a. Extinguishers. Suitable fire control devices, such as small hose or portable fire extinguishers shall be available at locations where flammable or combustible liquids are stored. (4-7-83)

i. At least one portable fire extinguisher having a rating of not less than 12-B units shall be located outside of, but not more than 10 feet from, the door opening into any room used for storage. (4-7-83)

ii. At least one portable fire extinguisher having a rating of not less than 12-B units must be located not less than 10 feet, nor more than 25 feet, from any Class I or Class II liquid storage area located outside of a storage room but inside a building. (4-7-83)

b. Sprinklers. When sprinklers are provided, they shall be installed in accordance with 410 through 414 of this chapter. (4-7-83)

c. Open flames and smoking. Open flames and smoking shall not be permitted in flammable or combustible liquid storage areas. (4-7-83)

d. Water reactive materials. Materials which will react with water shall not be stored in the same room with flammable or combustible liquids. (4-7-83)

223. INDUSTRIAL PLANTS.

01. Scope. (4-7-83)

a. Application. This paragraph shall apply to those industrial plants where: (4-7-83)

i. The use of flammable or combustible liquids is incidental to the principle business, or (4-7-83)

ii. Where flammable or combustible liquids are handled or used only in unit physical operations such as mixing, drying, evaporating, filtering, distillation, and similar operations which do not involve chemical reaction. This section shall not involve chemical plants, refineries or distilleries. (4-7-83)

b. Exceptions. Where portions of such plants involve chemical reactions such as oxidation, reduction, halogenation, hydrogenation, alkylation, polymerization, and other chemical processes, those portions of the plant shall be in accordance with Sections 226.01 through 227.01 of this chapter. (4-7-83)

02. Incidental storage or use of flammable and combustible liquids. (4-7-83)

a. Application. This shall be applicable to those portions of an industrial plant where the use and handling of flammable or combustible liquids is only incidental to the principal business, such as automobile assembly, construction of electronic equipment, furniture manufacturing, or other similar activities. (4-7-83)

b. Containers. Flammable or combustible liquids shall be stored in tanks or closed containers. (4-7-83)

i. Except as provided in ii. and iii. of this section, all storage shall comply with Sections 222.03 or 222.04 of this chapter. (4-7-83)

ii. The quantity of liquid that may be located outside of an inside storage room or storage cabinet in a building or in anyone fire area of a building shall not exceed: 25 gallons of Class IA liquids in containers; 120 gallons of Class IB, IC, II or III liquids in containers; 660 gallons of Class IB, IC, II, or III liquids in a single portable tank. (4-7-83)

iii. Where large quantities of flammable or combustible liquids are necessary, storage may be in tanks which shall comply with the applicable requirements of Sections 221.03 through 221.07 of this chapter. (4-7-83)

c. Separation and protection. Areas in which flammable or combustible liquids are transferred from one tank or container to another container shall be separated from other operations in the building by adequate distance or by construction having adequate fire resistance. Drainage or other means shall be provided to control spills. Adequate natural or mechanical ventilation shall be provided. (4-7-83)

d. Handling liquids at point of final use. (4-7-83)

i. Flammable liquids shall be kept in covered containers when not actually in use. (4-7-83)

ii. Where flammable or combustible liquids are used or handled, except in closed containers, means shall be provided to dispose promptly and safely of leakage or spills. (4-7-83)

iii. Class I liquids may be used only where there are no open flames or other sources of ignition within the possible path of vapor travel. (4-7-83)

iv. Flammable or combustible liquids shall be drawn from or transferred into vessels, containers or portable tanks within a building only through a closed piping system, from safety cans, by means of a device drawing through the top, or from a container or portable tanks by gravity through an approved self-closing valve. Transferring by means of air pressure on the container or portable tanks shall be prohibited. (4-7-83)

03. Unit physical operations. (4-7-83)

a. Application. This section shall be applicable in those portions of industrial plants where flammable or combustible liquids are handled or used in unit physical operations such as mixing, drying, evaporation, filtering, distillation, and similar operations which do not involve chemical change. Examples are plants compounding cosmetics, pharmaceuticals, solvents, cleaning fluids, insecticides and similar types of activities. (4-7-83)

b. Location. Industrial Plants shall be located so that each building or unit of equipment is accessible from at least one side for fire fighting and fire control purposes. Buildings shall be located with respect to lines of adjoining property which may be built upon as set forth in Sections 226.02.a. and b. of this chapter except that the blank wall referred to in Section 226.02.b. shall have a fire resistance rating of at least 2 hours. (4-7-83)

c. Chemical Process. Areas where unstable liquids are handled or small scale unit chemical processes are carried on shall be separated from the remainder of the plant by a fire wall of 2-hour minimum fire resistance rating. (4-7-83)

d. Drainage. (4-7-83)

i. Emergency drainage systems shall be provided to direct flammable or combustible liquid leakage

and fire protection wear to a safe location. This may require curbs, scuppers, or special drainage systems to control the spread of fire; see Section 221.02.g.ii. of this chapter. (4-7-83)

ii. Emergency drainage systems, if connected to public sewers or discharged into public waterways, shall be equipped with traps or separators. (4-7-83)

iii. The industrial plant shall be designed and operated to prevent the normal discharge of flammable or combustible liquids into public waters, public sewers or adjoining property. (4-7-83)

e. Ventilation. (4-7-83)

i. Areas as defined in Section 223.01.a. of this chapter using Class I liquids shall be ventilated at a rate of not less than 1 cubic foot per minute per square foot of solid floor area. This shall be accomplished by natural or mechanical ventilation with discharge or exhaust to a safe location outside of the building. Provisions shall be made for introduction of makeup air in such a manner as not to short circuit the ventilation. Ventilation shall be arranged to include all floor areas or pits where flammable vapors may collect. (4-7-83)

ii. Equipment used in a building and the ventilation of the building shall be designed so as to limit flammable vapor-air mixtures under normal operation conditions to the interior of equipment, and to not more than 5 feet from equipment which exposes Class I liquids to the air. Examples of such equipment are dispensing stations, open centrifuges, plate and frame filters, open vacuum filters, and surfaces of open equipment. (4-7-83)

f. Storage and Handling. The storage, transfer, and handling of liquid shall comply with Section 226.04 of this chapter. (4-7-83)

04. Tank vehicle and tank care loading and unloading. Tank vehicle and tank care loading or unloading facilities shall be separated from above-ground tanks, warehouses, other plant buildings or nearest line of adjoining property which may be built upon by a distance of 25 feet for Class I liquids and 15 feet for Class II and Class III liquids measured from the nearest position of any fill stem. Buildings for pumps or shelters for personnel may be a part of the facility. Operations of the facility shall comply with the appropriate portions of Section 224.03 of this chapter. (4-7-83)

05. Fire control. (4-7-83)

a. Portable and special equipment. Portable fire extinguishment and control equipment shall be provided in such quantities and types as are needed for the special hazards of operation and storage. (4-7-83)

b. Water supply. Water shall be available in volume and at an adequate pressure to supply water hose streams, foam-producing equipment, automatic sprinklers, or water spray systems as the need is indicated by the special hazards of operation, dispensing and storage. (4-7-83)

c. Special Extinguishers. Special extinguishing equipment such as that utilizing foam, inert gas, or dry chemical shall be provided as the need is indicated by the special hazards of operation dispensing and storage. (4-7-83)

d. Special Hazards. Where the need is indicated by special hazards of operation, flammable or combustible liquid processing equipment, major piping, and supporting steel shall be protected by approved water spray, deluge systems, approved fire resistant coating, insulation, or any combination of these. (4-7-83)

e. Maintenance. All plant fire protection facilities shall be adequately maintained and periodically inspected and tested to make sure they are always in satisfactory operating condition, and will serve their purpose in time of emergency. (4-7-83)

06. Sources of ignition. (4-7-83)

a. General. Adequate precautions shall be taken to prevent the ignition of flammable vapors. Sources of ignition include but are not limited to open flames, lightning, smoking, cutting and welding, hot surfaces, frictional

heat, static, electrical and mechanical sparks spontaneous ignition, including heat-producing chemical reactions, and radiant heat. (4-7-83)

b. Grounding. Class I liquids shall not be dispensed into containers unless the nozzle and container are electrically under connected. Where the metallic floor plate on which the container stands while filling is electrically connected to the fill stem or where the fill stem is bonded to the container during filling operations by means of a bond wire, the provisions of these standards shall be deemed to have been complied with. (4-7-83)

07. Electrical. (4-7-83)

a. All electrical wiring and equipment shall be installed according to the requirements of Section 151 of this chapter. (4-7-83)

b. Locations where flammable vapor-air mixtures may exist under normal operations shall be classified Class I Division I according to the requirements of Section 151 of this chapter. For those pieces of equipment installed in accordance with Section 223.03.e.ii., the Division I area shall extend 5 feet in all directions from all points of vapor liberation. All areas within pits shall be classified Division I if any part of the pit is within a Division I or 2 classified area, unless the pit is provided with mechanical ventilation. (4-7-83)

c. Locations where flammable vapor-air mixtures may exist under abnormal conditions and for a distance beyond Division I locations shall be classified Division 2 according to the requirements of Section 151 of this chapter. These locations include an area within 20 feet horizontally, 3 feet vertically beyond a Division 1 area, and up to 3 feet above floor or grade level within 25 feet, if indoors, or 10 feet if outdoors, from any pump, bleeder, withdrawal fitting, meter, or similar device handling Class I liquids. Pits provided with adequate mechanical ventilation within a Division 1 or 2 area shall be classified Division 2. If class II or Class III liquids only are handled, then ordinary electrical equipment is satisfactory though care shall be used in locating electrical apparatus to prevent hot metal from falling into open equipment. (4-7-83)

d. Where the provisions of a., b., and c. of this section require the installation of electrical equipment suitable for Class I, Division 1 or Division 2 locations, ordinary electrical equipment including switch gear may be used if installed in a room or enclosure which is maintained under positive pressure with respect to the hazardous area. Ventilation makeup air shall be uncontaminated by flammable vapors. (4-7-83)

08. Repairs to equipment. Hot work, such as welding or cutting operations, use of spark producing power tools, and chipping operations shall be permitted only under supervision of an individual in responsible charge. The individual in responsible charge shall make an inspection of the area to be sure that it is safe for the work to be done and that safe procedures will be followed for the work specified. (4-7-83)

09. Housekeeping. (4-7-83)

a. General. Maintenance and operating practices shall be in accordance with established procedures which will tend to control leakage and prevent the accidental escape of flammable or combustible liquids. Spills shall be cleaned up promptly. (4-7-83)

b. Access. Adequate aisles shall be maintained for unobstructed movement of personnel and so that fire protection equipment can be brought to bear on any part of flammable or combustible liquid storage, use, or any unit physical operation. (4-7-83)

c. Waste and residue. Combustible waste material and residues in a building or unit operating area shall be kept to a minimum stored in covered metal receptacles and disposed of daily. (4-7-83)

d. Clear Zone. Ground area around buildings and unit operation areas shall be kept free of weeds, trash, or other unnecessary combustible materials. (4-7-83)

224. BULK PLANTS.

01. Storage. (4-7-83)

a. Class I liquids. Class I shall be stored in closed containers or in storage tanks above ground outside of buildings, or underground in accordance with Sections 221.01 through 221.07 of this chapter. (4-7-83)

b. Class II and III liquids. Class II and Class III liquids shall be stored in containers, or in tanks within buildings or above ground outside of buildings, or underground in accordance with Sections 200d through 221.07 of this chapter. (4-7-83)

c. Piping containers. Containers of flammable or combustible liquid when piled one upon the other shall be separated by dunnage sufficient to provide stability and to prevent excessive stress on container walls. The height of the pile shall be consistent with the stability and strength of the containers. (4-7-83)

02. Buildings. (4-7-83)

a. Exits. Rooms in which flammable or combustible liquids are stored or handled by pumps shall have exit facilities arranged to prevent occupants from being trapped in the event of fire. (4-7-83)

b. Heating. Rooms in which Class I liquids are stored or handled shall be heated only be means not constituting a source of ignition, such as steam or hot water. Rooms containing heating appliances involving sources of ignition shall be located and arranged to prevent entry of flammable vapors. (4-7-83)

c. Ventilation. (4-7-83)

i. Ventilation shall be provided for all rooms, buildings, or enclosure in which Class I liquids are pumped or dispensed. Design of ventilation systems shall take into account the relatively high specific gravity of the vapors. Ventilation may be provided by adequate openings in outside walls at floor level unobstructed except by louvers or course screens. When natural ventilation is inadequate, mechanical ventilation shall be provided. (4-7-83)

ii. Class I liquids shall not be stored or handled within a building having a basement or pit into which flammable vapors may travel, unless such area is provided with ventilation designed to prevent the accumulation of flammable vapors therein. (4-7-83)

iii. Containers of Class I liquids shall not be drawn from or filled within buildings unless provision is made to prevent the accumulation of flammable vapors in hazardous concentrations. Where mechanical ventilation is required, it shall be kept in operation while flammable liquids are being handled. (4-7-83)

03. Loading and unloading facilities. (4-7-83)

a. Separation. Tank vehicle and tank care loading or unloading facilities shall be separated from above-ground tanks, warehouses, other plant buildings or nearest line of adjoining property that may be built upon by a distance of 25 feet for Class I liquids and 15 feet for Class II and Class III liquids measured from the nearest position of any fill spout. Buildings for pumps or shelters for personnel may be a part of the facility. (4-7-83)

b. Class Restriction. Equipment such as piping, pumps, and meters used for the transfer of Class I liquids between storage tanks and the fill stem of the loading rack shall not be used for the transfer of Class II or Class III liquids. (4-7-83)

c. Valves. Valves used for the final control for filling tank vehicles shall be of the self-closing type and manually held open except where automatic means are provided for shutting off the flow when the vehicle is full or after filling of a preset amount. (4-7-83)

d. Static protection. (4-7-83)

i. Bonding facilities for protection against static sparks during the loading of tank vehicles through open domes shall be provided: where Class I liquids are loaded; or where Class II or Class III liquids are loaded into vehicles which may contain vapors from previous cargos of Class I liquids. (4-7-83)

ii. Protection as required in d.i. of this section shall consist of a metallic bond wire permanently electrically connected to the fill stem or to some part of the rack structure in electrical contact with the fill stem. The free end of such wire shall be provided with a clamp or equivalent device for convenient attachment to some metallic part in electrical contact with the cargo tank of the tank vehicle. (4-7-83)

iii. Such bonding connection shall be made fast to the vehicle or tank before dome covers are raised and shall remain in place until filling is completed and all dome covers have been closed and secured. (4-7-83)

iv. Bonding as specified in d.i., ii. and iii. of this Section is not required: where vehicles are loaded exclusively with products not having a static accumulating tendency, such as asphalt, most crude oils, residual oils, and water soluble liquid; where no Class I liquids are handled at the loading facility and the tank vehicles loaded are used exclusively for Class II and Class III liquids; and where vehicles are loaded or unloaded through closed bottom or top connections. (4-7-83)

v. Filling through open domes into the tanks of tank vehicles or tank cars that contain vapor-air mixtures within the flammable range or where the liquid being filled can form such a mixture, shall be by means of a down spout which extends near the bottom of the tank. This precaution is not required when loading liquids which are not accumulators of static charges. (4-7-83)

e. Stray currents. Tank car loading facilities where Class I liquids are loaded through open domes shall be protected against stray current by bonding the pipe to at least one rail and to the rack structure if of metal. Multiple lines entering the rack area shall be electrically bonded together. In addition, in areas where excessive stray currents are known to exist, all pipe entering the rack area shall be provided with insulation sections to electrically isolate the rack piping from the pipelines. No bonding between the tank car and the rack or piping is required during either loading or unloading of Class II or III liquids. (4-7-83)

f. Container filling facilities. Class I liquids shall not be dispensed into containers unless the nozzle and container are electrically interconnected. Where the metallic floor plate on which the container stands while filling is electrically interconnected. When the metallic floor plate on which the container stands while filling is electrically connected to the fill stem or where the fill stem is bonded to the container during filling operations by means of a bond wire, the provisions of these standards shall be deemed to have been complied with. (4-7-83)

04. Wharves. (4-7-83)

a. Definition, application. The term wharf shall mean any wharf, pier, bulkhead, or other structure over or contiguous to navigable water used in conjunction with a bulk plant, the primary function of which is the transfer of flammable or combustible liquid cargo in bulk between the bulk plant and any tank vessel, ship, barge, lighter boat, or other mobile floating craft; and this paragraph shall apply to all such installations except Marine Service Stations as covered in Section 225.04 of this chapter. (4-7-83)

b. Package Cargo. Package cargo of flammable and combustible liquids, including full and empty drums, bulk fuel, and stores may be handled over a wharf and at such times and places as may be agreed upon by the wharf superintendent and the senior deck officer on duty. (4-7-83)

c. Location. Wharves at which flammable or combustible liquid cargos are to be transferred in bulk quantities to or from tank vessels shall be at least 100 feet from any bridge over a navigable waterway, or from an entrance to or superstructure of any vehicular or railroad tunnel under a waterway. The termination of the wharf loading or unloading fixed piping shall be at least 200 feet from a bridge or from an entrance to or superstructure of a tunnel. (4-7-83)

d. Design and construction. Substructure and deck shall be substantially designed for the use intended. Deck may employ any material which will afford the desired combination of flexibility, resistance to shock, durability, strength, and fire resistance. Heavy timber construction is acceptable. (4-7-83)

e. Tanks. Tanks used exclusively for ballast water or Class II or Class III liquids may be installed on suitably designed wharves. (4-7-83)

f. Pumps. Loading pumps capable of building up pressures in excess of the safe working pressure of cargo hose or loading arms shall be provided with bypasses, relief valves, or other arrangement to protect the loading facilities against excessive pressure. Relief devices shall be tested at not more than yearly intervals to determine that they function satisfactorily at the pressure at which they are set. (4-7-83)

g. Hoses and couplings. All pressure hoses and couplings shall be inspected at intervals appropriate to the service. The hose and couplings shall be tested with the hose extended and using the "in service maximum operating pressure". Any hose showing material deteriorations, signs of leakage, or weakness in its carcass or at the couplings shall be withdrawn from service and repaired or discarded. (4-7-83)

h. Piping and fittings. Piping, valves and fittings shall be in accordance with 221. 08 of this chapter with the following exceptions and additions: (4-7-83)

i. Flexibility of piping shall be assured by appropriate layout and arrangement of piping supports so that motion of the wharf structure resulting from wave action, currents, tides, or the mooring of vessels will not subject the pipe to repeated strain beyond the elastic limit. (4-7-83)

ii. Pipe joint depending upon the friction characteristics of combustible materials or grooving of pipe ends for mechanical continuity of piping shall not be used. (4-7-83)

iii. Swivel joints may be used in piping to which hoses are connected, and for articulated swivel-joint transfer systems, provided that the design is such that the mechanical strength of joint will not be impaired if the packing material should fail, as by exposure to fire. (4-7-83)

iv. Piping systems shall contain a sufficient number of valves to operate the system properly and to control the flow of liquid in normal operation and in the event of physical damage. (4-7-83)

v. In addition to the requirements of h.iv. above, each line conveying flammable liquids leading to a wharf shall be provided with a readily accessible block valve located on shore near the approach to the wharf and outside of any diked area. Where more than one line is involved, the valves shall be grouped in one location. (4-7-83)

vi. Means of easy access shall be provided for cargo line valves located below the wharf deck. (4-7-83)

vii. Pipelines on flammable or combustible liquid wharves shall be adequately bonded and grounded. If excessive stray currents are encountered, insulating points shall be installed. Bonding and grounding connections on all pipelines shall be located on wharfside of hose-rise insulating flanges, if used and shall be accessible for inspection. (4-7-83)

viii. Hose or articulated swivel-joint pipe connections used for cargo transfer shall be capable of accommodating the combined effects of change in draft and maximum tidal range, and mooring lines shall be kept adjusted to prevent the surge of the vessel from placing stress on the cargo transfer system. (4-7-83)

ix. Hose shall be supported so as to avoid kinking and damage from chafing. (4-7-83)

i. Fire protection. Suitable portable fire extinguishers with a rating of not less than 12-BC shall be located within 75 feet of those portions of the facility where fires are likely to occur, such as hose connections, pumps, and separator tanks. (4-7-83)

i. Where piped water is available, ready-connected fire hose in size appropriate for the water supply shall be provided so that manifolds where connections are made and broken can be reached by at least one hose stream. (4-7-83)

ii. Material shall not be placed on wharves in such a manner as to obstruct access to fire-fighting equipment, or important pipeline control valves. (4-7-83)

iii. Where the wharf is accessible to vehicle traffic, an unobstructed roadway to the shore end of the

wharf shall be maintained for access of fire-fighting apparatus. (4-7-83)

j. Operations control. Loading or discharging shall not commence until the wharf superintendent and officer in charge of the tank vessel is properly moored and all connections are properly made. Mechanical work shall not be performed on the wharf during cargo transfer, except under special authorization by a delegated person or his authorized representative based on a review of the area involved, methods to be employed, and precaution necessary. (4-7-83)

05. Electrical equipment. (4-7-83)

a. Applications. This section shall apply to areas where Class I liquids are stored or handled. For areas where Class II or Class III liquids only are stored or handled, the electrical equipment may be installed in accordance with the provisions of Section 150 of this chapter, for ordinary locations. (4-7-83)

b. Conformance. All electrical equipment and wiring shall be of a type specified by and shall be installed in accordance with Section 150 of this chapter. (4-7-83)

c. Classification. So far as it applies Table 224. 05 shall be used to delineate and classify hazardous areas for the purpose of installation of electrical equipment under normal circumstances. In Table 224. 05 a classified area shall not extend beyond an unpierced wall, roof, or other solid partition. The area classifications listed shall be based on the premise that the installation meets the applicable requirements of this section in all respects. (4-7-83)

06. Sources of ignition. Class I liquids shall not be handled, drawn, or dispensed where flammable vapors may reach a source of ignition. Smoking shall be prohibited except in designated localities."No Smoking" signs shall be conspicuously posted where hazard from flammable liquid vapors is normally present. (4-7-83)

07. Drainage and waste disposal. Provision shall be made to prevent flammable or combustible liquids which may be spilled at loading or unloading points from entering public sewers and drainage systems, or natural waterways. Connection to such sewers, drains, or waterways by which flammable or combustible liquids might enter shall be provided with separator boxes or other approved means whereby such entry is precluded. Crankcase drainings and flammable or combustible liquids shall not be dumped into sewers, but shall be stored in tanks or tight drums outside of any building until removed from the premises. (4-7-83)

08. Fire control. Suitable fire control devices, such as small hose or portable fire extinguishers, shall be available to locations where fires are likely to occur. Additional fire control equipment may be required where a tank of more than 50,000 gallons individual capacity contains Class I liquids and where an unusual exposure hazard exists from surrounding property. Such additional fire control equipment shall be sufficient to extinguish a fire in the largest tank. The design and amount of such equipment shall be in accordance with approved engineering standards. (4-7-83)

225. SERVICE STATIONS.

01. Storage and handling: general provisions. (4-7-83)

a. Liquids shall be stored in approved closed containers not exceeding 670 gallons capacity, in tanks located underground, in tanks in special enclosures as provided for in Section 225.04.b.i. through iv. of this chapter. (4-7-83)

b. Above-ground tanks, located in an adjoining bulk plant, may be connected by piping to service station underground tanks if, in addition to valves at above-ground tanks, a valve is also installed within control of service station personnel. (4-7-83)

c. Apparatus dispensing class I liquids into the fuel tanks of motor vehicles of the public shall not be located at a bulk plant unless separated by a fence or similar barrier from the area in which bulk operations are conducted. (4-7-83)

d. The provisions of i. of this section shall not prohibit the dispensing of flammable liquids in the

open from a tank vehicle to a motor vehicle. Such dispensing shall be permitted provided: (4-7-83)

i. The tank vehicle complies with the requirements covered in the Standard on Tank Vehicles for Flammable Liquids, NFPA 385-1966. (4-7-83)

ii. The dispensing is done on premises not open to the public. (4-7-83)

iii. The dispensing hose does not exceed 50 feet in length. (4-7-83)

iv. The dispensing nozzle is a listed automatic-closing type without a latch-open device. (4-7-83)

e. Class I liquids shall not be stored or handled within a building having a basement or pit into which flammable vapors may travel, unless such area is provided with ventilation designed to prevent the accumulation of flammable vapors therein. (4-7-83)

f. Accurate inventory records shall be maintained and reconciled on all Class I liquid storage tanks for possible indication of leakage from tanks or piping. (4-7-83)

g. Special enclosures. (4-7-83)

i. When installation of tanks in accordance with 222.03 of this chapter, is impractical because of property or building limitations, tanks for flammable or combustible liquids may be installed in buildings if properly enclosed. (4-7-83)

ii. The enclosure shall be substantially liquid and vapor tight without backfill. Sides, tip, and bottom of the enclosure shall be of reinforced concrete at least 6 inches thick, with openings for inspection through the top only. Tank connections shall be so piped or closed that neither vapors nor liquid can escape into the enclosed space. Means shall be provided whereby portable equipment may be employed to discharge to the outside (4-7-83)

iii. At automotive service stations provided in connection with tenant or customer parking facilities at or below grade level in large buildings of commercial, mercantile, or residential occupancy, tanks containing Class I liquids, installed of necessity in accordance with b.ii. above, shall not exceed 6,000 gallons individual or 18,000 gallons aggregate capacity. (4-7-83)

h. Inside building. (4-7-83)

i. Except where stored in tanks as provided in b. of this section, no Class I liquids shall be stored within any service station building except in closed containers of aggregate capacity not exceeding 60 gallons capacity equipped with an approved pump is permitted. (4-7-83)

ii. Class I liquids may be transferred from one container to another in lubrication or service rooms of a service station building provided the electrical installation complies with Table 225.05 and provided that any heating equipment complies with Section 225.06 of this chapter. (4-7-83)

iii. Class II and Class III liquids may be stored and dispensed inside service station buildings from tanks of not more than 120 gallons capacity each. (4-7-83)

i. Labeling. No sale or purchase of any Class I, II or III liquids shall be made in containers unless such containers are clearly marked with the name of the product contained. (4-7-83)

j. Dispensing into portable containers. No delivery of any Class I liquid shall be made into portable containers unless the container is constructed of metal has a tight closure with screwed or spring cover, and is fitted with a spout or so designed that the contents can be poured without spilling. (4-7-83)

02. Private stations. Service stations not accessible to or open to the public do not require an attendant or supervisor. Such stations may be used by commercial, industrial, governmental or manufacturing establishments. (4-7-83)

03. Dispensing systems. (4-7-83)

a. Location. Dispensing devices at automotive service stations shall be so located that all parts of the vehicle being serviced will be on the premises of the service station. (4-7-83)

b. Inside Location. Approved dispensing units may be located inside of buildings. The dispensing area shall be separated from other areas in an approved manner. The dispensing unit and its piping shall be mounted either on a concrete island or protected against collision damage by suitable means and shall be located in a position where it cannot be struck by a vehicle descending a ramp or other slope out of control. The dispensing area shall be provided with an approved mechanical or gravity ventilation system. When dispensing units are located below grade, only approved mechanical ventilation shall be used and the entire dispensing area shall be protected by an approved automatic sprinkler system. Ventilating systems shall be electrically interlocked with gasoline dispensing units so that the dispensing units cannot be operated unless the ventilating fan motors are energized. (4-7-83)

c. Emergency power cutoff. A clearly identified and easily accessible switch(es) or a circuit breaker(s) shall be provided at a location remote from dispensing devices, including remote pumping systems, to shut off the power to all dispensing devices in the event of an emergency. (4-7-83)

d. Dispensing Units. (4-7-83)

i. Class I liquids shall be transferred from tanks by means of fixed pumps so designed and equipped as to allow control of the flow and prevent leakage or accidental discharge. (4-7-83)

ii. Only listed devices may be used for dispensing class I liquids. No such device may be used if it shows evidence of having been dismantled. (4-7-83)

iii. Every dispensing device for Class I liquids installed after December 31, 1978, shall contain evidence of listing so placed that any attempt to dismantle the device will result in damage to such evidence, visible without disassembly or dismounting of the nozzle. (4-7-83)

iv. Class I liquids shall not be dispensed by pressure from drums, barrels, and similar containers. Approved pumps taking suction through the top of the container or approved self-closing faucets shall be used. (4-7-83)

v. The dispensing units, except those attached to containers, shall be mounted either on a concrete island or protected against collision damage by suitable means. (4-7-83)

e. Remote pumping systems. (4-7-83)

i. This section shall apply to systems for dispensing Class I liquids where such liquids are transferred from storage to individual or multiple dispensing units by pumps located elsewhere than at the dispensing units. (4-7-83)

ii. Pumps shall be designed or equipped so that no part of the system will be subjected to pressures above its allowable working pressure. Pumps installed above grade, outside of buildings, shall be located not less than 10 feet from lines of adjoining property which is or may be built upon, and not less than 5 feet from any building opening. When an outside pump location is impractical, pumps may be installed inside of buildings as provided for dispensers in b. of this section, or in pits as provided in e.iii. of this section. Pumps shall be substantially anchored and protected against physical damage by vehicles. (4-7-83)

iii. Pits for subsurface pumps or piping manifolds of submersible pumps shall withstand the external forces to which they may be subjected without damage to the pump, tanks, or piping. The pit shall be no larger than necessary for inspection and maintenance and shall be provided with a fitted cover. (4-7-83)

iv. A control shall be provided that will permit the pump to operate only when a dispensing nozzle is removed from its bracket on the dispensing unit and the switch on this dispensing unit is manually actuated. This

control shall also stop the pump when all nozzles have been returned to their brackets. (4-7-83)

v. An approved impact valve, incorporating a fusible link, designed to close automatically in the event of severe impact or fire exposure shall be properly installed in the dispensing supply line at the base of each individual dispensing device. (4-7-83)

vi. Testing. After the completion of the installation, including any paving, that section of the pressure piping system between the pump discharge and the connection for the dispensing facility shall be tested for at least 30 minutes at the maximum operating pressure of the system. Such tests shall be repeated at 5-year intervals thereafter. (4-7-83)

f. Delivery Nozzles. (4-7-83)

i. Hose-nozzle valves of either the manual or automatic closing type for dispensing Class I liquids into a fuel tank or into a container shall be manually held open during the dispensing operation except as provided in ii. below. (4-7-83)

ii. On a service station dispenser accessible to the public, a listed automatic type nozzle with hold-open latch is permitted only when all dispensing of Class I liquids is to be done by the service station attendant. (4-7-83)

iii. If the dispensing of Class I liquids at a service station available and open to the public is to be done by a person other than the service station attendant, the nozzle shall be listed automatic-closing type without a hold-open latch. (4-7-83)

g. Special type dispensers. (4-7-83)

i. Emergency controls shall be installed at an acceptable location, but controls shall not be more than 100 feet from dispensers. (4-7-83)

ii. Instructions for the operation of dispensers shall be conspicuously posted. (4-7-83)

04. Marine service stations. (4-7-83)

a. Dispensing. (4-7-83)

i. The dispensing area shall be located away from other structures so as to provide room for safe ingress and egress of craft to be fueled. Dispensing units shall in all cases be at least 20 feet from any activity involving fixed sources of ignition. (4-7-83)

ii. Dispensing shall be by approved dispensing units with or without integral pumps and may be located on open piers, wharves, or floating docks or on shore or on piers of the solid fill type. (4-7-83)

iii. Dispensing nozzles shall be automatic-closing without a hold-open latch. (4-7-83)

b. Tanks and Pumps. (4-7-83)

i. Tanks and pumps not integral with the dispensing unit, shall be on shore or on a pier of the solid fill type, except as provided in ii. and iii. of this section. Pumps shall be substantially anchored and protected against physical damage by vehicles. (4-7-83)

ii. Where shore location would require excessively long supply lines to dispensers, tanks may be installed on a pier provided that applicable portions of Sections 221.01 through 221.07 of this chapter relative to spacing, diking, and piping, are complied with and the quantity so stored does not exceed 1,100 gallons aggregate capacity. (4-7-83)

iii. Shore tanks supplying marine service stations may be located above-ground where rock ledge or

high water table make underground tanks impractical. (4-7-83)

iv. Where tanks are at an elevation which would produce gravity head on the dispensing unit, the tank outlet shall be equipped with a pressure control valve positioned adjacent to and outside the tank block valve specified in Section 221.02.h.ii. of this chapter, so adjusted that liquid cannot flow by gravity from the tank in case of piping or hose failure. (4-7-83)

c. Piping. (4-7-83)

i. Piping between wharf tanks and dispensing units shall be as described in Section 221.08, except that, where dispensing is from a floating structure, suitable lengths of oil-resistive flexible hose may be employed between the shore piping and the piping on the floating structure as made necessary by change in water level or shoreline. (4-7-83)

ii. A readily accessible valve to shut off the supply from shore shall be provided in each pipeline at or near the approach to the pier and at the shore end of each pipeline adjacent to the point where flexible hose is attached. (4-7-83)

iii. Piping shall be located so as to be protected from physical damage. (4-7-83)

iv. Piping handling Class I liquids shall be grounded to control stray currents. (4-7-83)

05. Electrical equipment. (4-7-83)

a. Application. This section shall apply to areas where Class I or Class III liquids are stored or handled, the electrical equipment may be installed in accordance with the provisions of Section 150 of this chapter, for ordinary locations. (4-7-83)

b. All electrical equipment and wiring shall be of a type specified by and shall be installed in accordance with Section 150 of this chapter. (4-7-83)

c. So far as it applies, Table 225.05 shall be used to delineate and classify hazardous areas for the purpose of installation of electrical equipment under normal circumstances. A classified area shall not extend beyond an unpierced wall, roof, or other solid partition. (4-7-83)

d. The area classifications listed shall be based on the assumption that the installation meets the applicable requirements of this section in all respects. (4-7-83)

TABLE 225.05, ELECTRICAL EQUIPMENT HAZARDOUS AREAS, SERVICE STATIONS,
available at Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone (208) 334-6000.

06. Heating equipment. (4-7-83)

a. Conformance. Heating equipment shall be installed as provided in b. through e. of this section. (4-7-83)

b. Application. Heating equipment may be installed in the conventional manner in an area except as provided in c., d. or e., of this section. (4-7-83)

c. Special Room. Heating equipment may be installed in a special room separated from an area classified by Table 225.05 by walls having a fire resistance rating of at least 1 hour and without any openings in the walls within 8 feet of the floor into an area classified in Table 225.05. This room shall not be used for combustible storage and all air for combustible purposes shall come from outside the building. (4-7-83)

d. Work Areas. Heating equipment using gas or oil fuel may be installed in the lubrication, sales or service room where there is no dispensing or transferring of Class I liquids provided the bottom of the combustion chamber is at least 18 inches above the floor and the heating equipment is protected from physical damage by

vehicles. Heating equipment using gas or oil fuel listed for use in garages may be installed in the lubrication or service room where Class I liquids are dispensed provided the equipment is installed at least 8 feet above the floor. (4-7-83)

e. Electric Heat. Electrical heating equipment shall conform to Section 225.05 of this chapter. (4-7-83)

07. Drainage and waste disposal. Provision shall be made in the area where Class I liquids are dispensed to prevent spilled liquids from flowing into the interior of service station buildings. Such provision may be by grading driveways, raising door sills, or other equally effective means. Crankcase drainings and flammable or combustible liquids shall not be dumped into sewers but shall be stored in tanks or drums outside of any buildings until removed from the premises. (4-7-83)

08. Sources of ignition. In addition to the previous restrictions of this section, the following shall apply: there shall be no smoking or open fumes in the areas used for fueling servicing fuel systems for internal combustion engines receiving or dispensing of flammable or combustible liquids. Conspicuous and legible signs prohibiting smoking shall be posted within sight of the customer being served. The motors of all equipment being field shall be shut off during the fueling operation. (4-7-83)

09. Fire control. Each service station shall be provided with at least one fire extinguisher having a minimum approved classification of 6 B, C located so that an extinguisher will be within 75 feet of each pump, dispenser, underground fill pipe opening and lubrication or service room. (4-7-83)

226. PROCESSING PLANTS.

01. Scope. This section shall apply to those plants or buildings which contain chemical operations such as oxidation, reduction, halogenation, hydrogenation, alkylation, polymerization, and other chemical processes but shall not apply to chemical plants, refineries, or distilleries. (4-7-83)

02. Location. (4-7-83)

a. Classification. The location of each processing vessel shall be based upon its flammable or combustible liquid capacity. Processing vessels shall be located, with respect to distances to lines or adjoining property which may be built upon, in accordance with Table 226.02 except when the processing plant is designed in accordance with b. of this section. (4-7-83)

TABLE 226.02 available at Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone (208) 334-6000.

b. Exception. The distance required in a. of this section may be waived when the vessels are housed within a building and the exterior wall facing the line of adjoining property which may be built upon is a blank wall having a fire-resistance rating of not less than 4 hours. When Class IA or unstable liquids are handled, the blank wall shall have explosion resistance in accordance with good engineering practices. (see Section 226.03.d. of this chapter). (4-7-83)

03. Processing building. (4-7-83)

a. Construction. (4-7-83)

i. Processing buildings shall be of fire-resistance or noncombustible construction, except heavy timber construction with load-bearing walls may be permitted for plants utilizing only stable Class II or Class III liquids. Except as provided in Section 226.02.b. of this chapter, or in the case of explosion resistant walls used in conjunction with explosion relieving facilities, see d. of this section, load-bearing walls are prohibited. Buildings shall be without basements or covered pits. (4-7-83)

ii. Areas shall have adequate exit facilities arranged to prevent occupants from being trapped in the event of fire. Exits shall not be exposed by the drainage facilities described in d. of this section. (4-7-83)

b. Drainage. (4-7-83)

i. Emergency drainage systems shall be provided to direct flammable or combustible liquid leakage and fire protection water to a safe location. This may require curbs, scuppers, or special drainage systems to control the spread of fire. (See Section 221.02.g.ii. of this chapter.) (4-7-83)

ii. Emergency drainage systems, if connected to public sewers or discharged into public waterways shall be equipped with traps or separators. (4-7-83)

iii. The processing plant shall be designed and operated to prevent the normal discharge of flammable or combustible liquids to public waterways, public sewers, or adjoining property. (4-7-83)

c. Ventilation. (4-7-83)

i. Enclosed processing buildings shall be ventilated at a rate of not less than 1 cubic foot per minute per square foot of solid floor area. This shall be accomplished by natural or mechanical ventilation with discharge or exhaust to a safe location outside of the building. Provision shall be made for introduction of makeup air in such a manner as not to short circuit the ventilation. Ventilation shall be arranged to include all floor areas or pits where flammable vapors may collect. (4-7-83)

ii. Equipment used in a building and the ventilation of the building shall be designed so as to limit flammable vapor-air mixtures under normal operating conditions to the interior of equipment, and to not more than 5 feet from equipment which exposes Class I liquids to the air. Examples of such equipment are dispensing stations, open centrifuges, plate and frame filters, open vacuum filters, and surfaces of open equipment. (4-7-83)

d. Explosion relief. Areas where Class IA or unstable liquids are processed shall have explosion venting through one or more of the following methods: (4-7-83)

i. Open air construction. (4-7-83)

ii. Lightweight walls and roof, (4-7-83)

iii. Lightweight wall panels and roof hatches, (4-7-83)

iv. Windows of explosion venting type. (4-7-83)

04. Liquid handling. (4-7-83)

a. Storage. (4-7-83)

i. The storage of flammable or combustible liquids in tanks shall be in accordance with the applicable provisions of Sections 221.01 through 221.07 of this chapter. (4-7-83)

ii. If the storage of flammable or combustible liquids in outside above-ground or underground tanks is not practical because of temperature or production considerations, tanks may be permitted inside of buildings or structures in accordance with the applicable provisions of Sections 221.01 through 221.07 of this chapter. (4-7-83)

iii. Storage tanks inside of buildings shall be permitted only in areas at or above grade which have adequate drainage and are separated from the processing area by construction having a fire resistance rating of at least 2 hours. (4-7-83)

iv. The storage of flammable or combustible liquids in containers shall be in accordance with the applicable provisions of Sections 221.01 through 221.07 of this chapter. (4-7-83)

b. Piping valves, and fittings. (4-7-83)

i. Piping, valves and fittings shall be in accordance with Sections 222.01 through 222.07 of this chapter. (4-7-83)

ii. Approved flexible connector may be used where vibration exists or where frequent movement is necessary. Approved hose may be used at transfer stations. (4-7-83)

iii. Piping containing flammable or combustible liquids shall be identified. (4-7-83)

c. Transfer. (4-7-83)

i. The transfer of large quantities of flammable or combustible liquids shall be through piping by means of pumps or water displacement. Except as required in process equipment, gravity flow shall not be used. The use of compressed air as a transferring medium is prohibited. (4-7-83)

ii. Positive displacement pumps shall be provided with pressure relief discharging back to the tank or to pump suction. (4-7-83)

d. Equipment. (4-7-83)

i. Equipment shall be designed and arranged to prevent the unintentional escape of liquids and vapors and to minimize the quantity escaping in the event of accidental release. (4-7-83)

ii. Where the vapor space of equipment is usually within the flammable range, the probability of explosion damage to the equipment can be limited by inerting, by providing an explosion suppression system, or by designing the equipment to contain the peak explosion pressure which may be modified by explosion relief. Where the special hazards of operation, sources of ignition, or exposures indicate a need, consideration shall be given to providing protection by one or more of the above means. (4-7-83)

05. Tank vehicles and tank car loading and unloading. Tank vehicles and tank car loading or unloading facilities shall be separated from above ground tanks, warehousers, other plant buildings, or nearest line of adjoining property which may be built upon by a distance of 25 feet for Class I liquids and 15 feet for Class II and Class III liquids measured from the nearest position of any fill-stem. Buildings for pumps or shelters for personnel may be a part of the facility. Operations of the facility shall comply with the appropriate portions of Section 225.03 of this chapter. (4-7-83)

06. Fire control. (4-7-83)

a. Portable extinguishers. Approved portable fire extinguishers of appropriate size, type and number shall be provided. (4-7-83)

b. Other controls. Where the special hazards of operation or exposure indicate a need, the following fire control provision shall be provided: (4-7-83)

i. A reliable water supply shall be available in pressure and quantity adequate to meet the probable fire demands. (4-7-83)

ii. Hydrants shall be provided in accordance with accepted good practice. (4-7-83)

iii. Hose connected to a source of water shall be installed so that all vessels, pumps and other equipment containing flammable or combustible liquids can be reached with at least one hose stream. Nozzles that are capable of discharging a water spray shall be provided. (4-7-83)

iv. Processing plants shall be protected by an approved automatic sprinkler system or equivalent extinguishing system. If special extinguishing systems including but not limited to those employing foam, carbon dioxide, or dry chemical are provided, approved equipment shall be used and installed in an approved manner. (4-7-83)

c. Alarm systems. An approved means for prompt notification of fire to those within the plant and any public fire department available shall be provided. It may be advisable to connect the plant system with the public system where public fire alarm systems are available. (4-7-83)

d. Maintenance. All plant fire protection facilities shall be adequately maintained and periodically inspected and tested to make sure they are always in satisfactory operating condition and that they will serve their purpose in time of emergency. (4-7-83)

07. Sources of ignition. (4-7-83)

a. General. (4-7-83)

i. Precautions shall be taken to prevent the ignition of flammable vapors. Sources of ignition include but are not limited to open flames, lightning, smoking, cutting and welding, hot surfaces, frictional heat, static, electrical, any mechanical sparks, spontaneous ignition, including heat-producing chemical reactions, and radiant heat. (4-7-83)

ii. Class I liquids shall not be dispensed into containers unless the nozzle and container are electrically interconnected. Where the metallic floor plate on which the container stands while filling is electrically connected to the fill stem or where the fill stem is bonded to the container during filling operations by means of a bond wire, the provisions of this section shall be deemed to have been complied with. (4-7-83)

b. Maintenance and repair. (4-7-83)

i. When necessary to do maintenance work in a flammable or combustible liquid processing area, the work shall be authorized by a responsible representative of the employer. (4-7-83)

ii. Hot work such as welding or cutting operations, use of spark-producing power tools, the chipping operations shall be permitted only under supervision of an individual in responsible charge who shall make an inspection of the area to be sure that it is safe for the work specified. (4-7-83)

c. Electrical. (4-7-83)

i. All electrical wiring and equipment within storage or processing areas shall be installed in accordance with nationally recognized good practice. (4-7-83)

ii. Locations where flammable vapor-air mixtures may exist under normal operation shall be classified Class I, Division I according to the requirements of Section 150 of this chapter. For those pieces of equipment installed in accordance with Section 226.03.c.ii. of this chapter, the Division I area shall extend 5 feet in all directions from all points of vapor liberation. All areas within pits shall be classified Division I if any part of the pit is within a Division I or 2 classified area, unless the pit is provided with mechanical ventilation. (4-7-83)

iii. Locations where flammable vapor-air mixtures may exist under abnormal conditions shall be classified Division 2 according to the requirements of Section 150 of this chapter. These locations include an area within 20 feet horizontally, 3 feet vertically beyond a Division 1 area, and up to 3 feet above floor or grade level within 25 feet, if indoors, or 10 feet if outdoors, from any pump, bleeder, withdrawal fittings, meter or similar device handling Class I liquids. Pits provided with adequate mechanical ventilation within a Division 1 or 2 area shall be classified Division 2. If Class II or Class III liquids only are handled, then ordinary electrical equipment is satisfactory though care shall be used in locating electrical apparatus to prevent hot metal from falling into open equipment. (4-7-83)

iv. Where the provisions of c.i.,ii. and iii. of this section require the installation of explosion-proof equipment, ordinary electrical equipment, including switch gear, may be used if installed in a room or enclosure which is maintained under positive pressure with respect to the hazardous area. Ventilation makeup air shall be uncontaminated by flammable vapors. (4-7-83)

08. Housekeeping. (4-7-83)

a. General. Maintenance and operating practices shall be in accordance with established procedures which will tend to control leakage and prevent the accidental escape of flammable or combustible liquids. Spills shall be cleaned up promptly. (4-7-83)

b. Access. Adequate aisle shall be maintained for unobstructed movement of personnel and so that fire protection equipment can be brought to bear on any part of the processing equipment. (4-7-83)

c. Waste and residues. Combustible waste material and residues in a building or operating area shall be kept at a minimum, stored in closed metal waste cans, and disposed of daily. (4-7-83)

d. Clear zone. Ground area around buildings and operating areas shall be kept free of tall grass, weeds, trash, or other combustible materials. (4-7-83)

227. REFINERIES, CHEMICAL PLANTS, AND DISTILLERIES.

01. Storage Tanks. Flammable or combustible liquids shall be stored in tanks, in containers, or in portable tanks. Tanks shall be installed in accordance with Sections 221.01 through 221.07 of this chapter. Tanks for the storage of flammable or combustible liquids in tank farms and in locations other than process areas shall be located in accordance with Sections 221.04.a. and b. of this chapter. (4-7-83)

02. Wharves. Wharves handling flammable or combustible liquids shall be in accordance with Section 224.04 of this chapter. (4-7-83)

03. Fire and unfired pressure vessels. (4-7-83)

a. Fired vessels. Fire pressure vessels shall be constructed in accordance with the Code for Fire Pressure Vessels, Section I of the ASME Boiler and Pressure Vessel Code -- 1968. (4-7-83)

b. Unfired vessels shall be constructed in accordance with the Code for Unfired Pressure Vessels, Section VIII of the ASME Boiler and Pressure Vessel Code -- 1968. (4-7-83)

04. Location of Process Units. Process units shall be located so that they are accessible from at least one side for the purpose of fire control. Where topographical conditions are such that flammable or combustible liquids may flow from a processing area so as to constitute a fire hazard to property of others, provisions shall be made to divert or impound the flow by curbs, rains or other suitable means. (4-7-83)

05. Fire control. (4-7-83)

a. Portable equipment. Portable fire extinguishing and control equipment shall be provided in such quantities and types as are needed for the special hazards of operation and storage. (4-7-83)

b. Water supply. Water shall be available in volume and at adequate pressure to supply water hose streams, foam producing equipment, automatic sprinklers or water spray systems as the need is indicated by the special hazards of operations and storage. (4-7-83)

c. Special equipment. Special extinguishing equipment such as foam, inert gas or dry chemical shall be provided as the need is indicated by the special hazards of operation and storage. (4-7-83)

228. -- 239. (RESERVED).

240. SPRAY FINISHING USING FLAMMABLE AND COMBUSTIBLE MATERIALS.

01. Definitions. (4-7-83)

a. Aerated Solid Powders. Aerated powders shall mean any powdered material used as a coating material which shall be fluidized within a container by passing air uniformly from below. It is common practice to

fluidize such material to form a fluidized powder bed and then dip the part to be coated into the bed in a manner similar to that used in liquid dipping. Such beds are also used as sources for powder spray operations. (4-7-83)

b. Spraying Area. Any area in which dangerous quantities of flammable vapors or mists or combustible residues, dusts, or (4-7-83)

c. Spray Booth. A power ventilated structure provided to enclose or accommodate a spraying operation to confine and limit the escape of spray, vapor, and residue, and to safely conduct or direct them to an exhaust system. (4-7-83)

d. Waterwash spray booth. A spray booth equipped with a water washing system designed to minimize dusts or residues entering exhaust ducts and to permit the recovery of overspray finishing material. (4-7-83)

e. Dry Spray Booth. A spray booth not equipped with a water washing system as described in d. of this section. A dry spray booth may be equipped with: (4-7-83)

i. Distribution or baffle plates to promote an even flow of air through the booth or cause the deposit of overspray before it enters the exhaust duct; or (4-7-83)

ii. Overspray dry filters to minimize dusts; or (4-7-83)

iii. Overspray dry filters to minimize dusts or residues entering exhaust ducts; or (4-7-83)

iv. Overspray dry filter rolls designed to minimize dusts or residues entering exhaust ducts; or (4-7-83)

v. Where dry powders are being sprayed, with powder collection systems so arranged in the exhaust to capture oversprayed material. (4-7-83)

f. Fluidized Bed. A container holding material which is aerated from below so as to form an air-supported expanded cloud of such material through which the preheated object to be coated is immersed and transported. (4-7-83)

g. Electrostatic Fluidized Bed. A container holding powder coating material which is aerated from below so as to form an air supported expanded cloud of such material which is electrically charged with a charge opposite to the charge of the object to be coated; such object is transported through the container immediately above the charged and aerated materials in order to be coated. (4-7-83)

h. Approved. Shall mean approved and listed by the following nationally recognized testing laboratories: Underwriters' Laboratories, Inc., Factory Mutual Engineering Corporation. (4-7-83)

i. Listed. See "approved" in Section h. above. (4-7-83)

02. Spray booths. (4-7-83)

a. Construction. Spray booths shall be substantially constructed of steel, securely and rigidly supported, or of concrete or masonry except that aluminum or other substantial noncombustible material may be used for intermittent or low volume spraying. Spray booths shall be designed to sweep air currents toward the exhaust outlet. (4-7-83)

b. Interiors. The interior surfaces of spray booths shall be smooth and continuous without edges and otherwise designed to prevent pocketing of residues and facilitate cleaning and washing without injury. (4-7-83)

c. Floors. The floor surface of a spray booth and operator's working area, if combustible, shall be covered with noncombustible material of such character as to facilitate the safe cleaning and removal of residues. (4-7-83)

d. Distribution of Baffle Plates. Distribution of baffle plates, if installed to promote an even flow of air through the booth or cause the deposit of overspray before it enters the exhaust duct, shall be of noncombustible material and readily removal be or accessible on both sides for cleaning. Such plates shall not be located in exhaust ducts. (4-7-83)

e. Dry Type Overspray Collectors (Exhaust Air Filters). In conventional dry type spray booths, overspray dry filters or filter rolls, if installed shall conform to the following: (4-7-83)

i. The spraying operations except electrostatic spraying operations shall be so designed, installed, and maintained that the open face of the booth (or booth cross section during spraying operations) shall be not less than 100 linear feet per minute. Electrostatic spraying operations may be conducted with an air velocity over the open face of the booth of not less than 60 linear feet per minute, or more, depending on the volume of the finishing material being applied and its flammability and explosion characteristics. Visible gauges or audible alarm or pressure activated devices shall be installed to indicate or insure that the required air velocity is maintained. Dry spray booths equipped with a filter roll which is automatically advanced should be arranged to cause shutdown of spraying operations if the filter roll fails to advance automatically. Maintenance procedures should be established to assure replacing filter pads before excessive restriction to air-flow occurs. Filter pads should be inspected after each period of use and clogged filter pads discarded and replaced. Filter rolls shall be inspected to insure proper replacement of filter media. (4-7-83)

ii. All discarded filter pads and filter rolls shall be immediately removed to a safe, well-detected location or placed in a water-filled metal container and disposed of at the close of the day's operation unless maintained completely in water. (4-7-83)

iii. The location of filters in a spray booth shall be so as to not reduce the effective booth enclosure of the articles being sprayed. (4-7-83)

iv. Space within the spray booth on the downstream and upstream sides of filters shall be protected with approved automatic sprinklers. (4-7-83)

v. Filters or filter rolls shall not be used when applying a spray material known to be highly susceptible to spontaneous heating and ignition. (4-7-83)

vi. Clean filters or filter rolls shall be noncombustible or of a type having a combustibility not in excess of Class 2 filters as listed by Underwriters' Laboratories, Inc. Filters and filter rolls shall not be alternately used for different types of coating materials, where the combination of materials may be conducive to spontaneous ignition. (see also Section 240. 06.f.). (4-7-83)

f. Frontal area. Each spray booth having a frontal area larger than 9 square feet shall have a metal deflector or curtain not less than 2? inches deep installed at the upper outer edge of the booth over the opening. (4-7-83)

g. Conveyors. Where conveyors are arranged to carry work into or out of spray booths, the openings therefor shall be as small as practical. (4-7-83)

h. Separation of Operations. Each spray booth shall be separated from other operations by not less than 3 feet, or by a greater distance or by such partition or wall as to reduce the danger from juxtaposition of hazardous operations. (See also Section 240.03.a). (4-7-83)

i. Cleaning. Spray booths shall be so installed that all portions are readily accessible for cleaning. A clear space of not less than 3 feet on all sides shall be kept free from storage of combustible construction. (4-7-83)

j. Illumination. When Spraying areas are illuminated through glass panels or other transparent materials, only fixed lighting units shall be used as a source of illumination. Panels shall effectively isolate the spraying area from the area in which the lighting unit is located, and shall be of a noncombustible material of such a nature or so protected that breakage will be unlikely. Panels shall be so arranged that normal accumulations of residue

on the exposed surface of the panel will not be raised to a dangerous temperature by radiation or conduction from the source of illumination. (4-7-83)

03. Electrical and other sources of ignition. (4-7-83)

a. Conformance. All electrical equipment, open flames and other sources of ignition shall conform to the requirements of this section, except as follows: (4-7-83)

i. Electrostatic apparatus shall conform to the requirements of Sections 240.07 and 240.08 of this chapter. (4-7-83)

ii. Drying, curing and fusion apparatus shall conform to the requirements of Section 240.09 of this chapter. (4-7-83)

iii. Automobile undercoating spray operations in garages shall conform to the requirements of Section 240.10 of this chapter. (4-7-83)

iv. Powder coating equipment shall conform to the requirements of Section 240.11 of this chapter. (4-7-83)

b. Minimum Separation. There shall be no open flame or spark producing equipment in any spraying area nor within 20 feet thereof, unless separated by a partition. (4-7-83)

c. Hot surfaces. Space-heating appliances, steam pipes, or hot surfaces shall not be located in a spraying area where deposits of combustible residues may readily accumulate. (4-7-83)

d. Wiring Conformance. Electrical wiring and equipment shall conform to the provisions of this section and shall otherwise be in accordance with Section 150 of this chapter. (4-7-83)

e. Combustible Residues, Area. Unless specifically approved for locations containing both deposits of readily ignitable residue and explosive vapors, there shall be no electrical equipment in any spraying area, whereon deposits of combustible residues may readily accumulate, except wiring in rigid conduit or in boxes or fittings containing no taps, splices or terminal connections. (4-7-83)

f. Wiring Type Approved. Electrical wiring and equipment not subject to deposits of combustible residues but located in a spraying area as herein defined shall be of explosion-proof type approved for Class I, Group D locations and shall otherwise conform to the provisions of Section 150 of this chapter, for Class I, Division I Locations. Electrical wiring, motors, and other equipment outside of but within twenty (20) feet of any spraying area, and not separated therefrom by partitions shall not produce sparks under normal operating conditions and shall otherwise conform to the provisions of Section 150 of this chapter, for Class I, Division 2 Hazardous Locations. (4-7-83)

g. Lamps, Electric lamps outside of but within twenty (20) feet of any spraying area, and not separated therefrom by a partition, shall be totally enclosed to prevent the falling of hot particles and shall be protected from mechanical injury by suitable guards or by location. (4-7-83)

h. Portable Lamps. Portable electric lamps shall not be used in any spraying area during spraying operations. Portable electric lamps, if used during cleaning or repairing operations, shall be of the type approved for hazardous class I locations. (4-7-83)

i. Grounding. (4-7-83)

i. All metal parts of spray booths, exhaust ducts, and piping systems conveying flammable or combustible liquids or aerated solids shall be properly electrically grounded in an effective and permanent manner. (4-7-83)

ii. "Airless" high-fluid pressure spray guns and any conductive object being sprayed should be

properly electrically grounded. (4-7-83)

04. Flammable and combustible liquids - storage and handling. (4-7-83)

a. Conformance. The storage of flammable or combustible liquids in connection with spraying operations shall conform to the requirements of Section 220.01, where applicable. (4-7-83)

b. Quantity.the quantity of flammable or combustible liquids kept in the vicinity of spraying operations shall be the minimum required for operations and should ordinarily not exceed a supply for 1 day or one shift. Bulk storage of portable containers of flammable or combustible liquids shall be in a separate, constructed building detached from other important buildings or cut off in a standard manner. (4-7-83)

c. Container. Original closed containers, approved portable tanks, approved safety cans or a properly arranged system of piping shall be used for bringing flammable or combustible liquids into spray finishing room. Open or glass containers shall not be used. (4-7-83)

d. Transferring Liquids. Except as provided in e. of this section, the withdrawal of flammable and combustible liquids from containers having a capacity of greater than 60 gallons shall be by approved pumps. The withdrawal of flammable or combustible liquids from containers and the filling of containers, including portable mixing tanks, shall be done only in a suitable mixing room or in a spraying area when the ventilating system is in operation. Adequate precautions shall be taken to protect against liquid spillage and sources of ignition. (4-7-83)

e. Spraying Containers. Containers supplying spray nozzles shall be of closed type or provided with metal covers kept closed. Containers not resting on floors shall be on metal supports or suspended by wire cables. Containers supplying spray nozzles by gravity flow shall not exceed 10 gallons capacity. Original shipping containers shall not be subject to air pressure for supplying spray nozzles. Containers under air pressure supplying spray nozzles shall be of limited capacity, not exceeding that necessary for 1 day's operation; shall be designed and approved for such use; shall be provided with a visible pressure gage; and shall be provided with a relief valve set to operate in conformance with the requirements of the code for Unfired Pressure Vessels, Section VIII of the ASME Boiler and Pressure Vessel Code -- 1968. Containers under air pressure supplying spray nozzles air-storage tanks and coolers shall conform to the standards of the Code for Unfired Pressure Vessels, Section VIII of the ASME Boiler and Pressure Vessel Code, 1968 for construction, tests and maintenance. (4-7-83)

f. Pipes and Hoses. (4-7-83)

i. All containers or piping to which is attached a hose or flexible connection shall be provided with a shutoff valve at the connection. Such valves shall be kept shut when spraying operations are not being conducted. (4-7-83)

ii. When a pump is used to deliver products, automatic means shall be provided to prevent pressure in excess of the design working pressure of accessories, piping and hose. (4-7-83)

iii. All pressure hose and couplings shall be inspected at regular intervals appropriate to their service. The hose and couplings shall be tested with the hose extended, and using the "in service maximum operating pressures". Any hose showing material deteriorations, signs of leakage, or weakness in its carcass or at the couplings, shall be withdrawn from service and repaired or discarded. (4-7-83)

iv. Piping systems conveying flammable or combustible liquids shall be of steel or other material having comparable properties of resistance to heat and physical damage. Piping systems shall be properly bonded and grounded. (4-7-83)

g. Spray Liquid Heaters. Electrically powered spray liquid heaters shall be approved and listed for the specific location in which used (see Section 240.03). Heaters shall not be located in spray booths nor other locations subject to the accumulation of deposits or combustible residue. Agitators, if used, should preferably be driven by compressed air, water, or low-pressure steam. If an electric motor is used, see Section 240.03 of this chapter. (4-7-83)

h. Pump Relief. If flammable or combustible liquids are supplied to spray nozzles by positive

displacement pumps, the pump discharge line shall be provided with an approved relief valve discharging to a pump suction or a safe detached location, or a device provided to stop the prime-mover if the discharge pressure exceeds the safe operating pressure of the system. (4-7-83)

i. Grounding. Whenever flammable or combustible liquids are transferred from one container to another, both containers shall be effectively bonded and grounded to prevent discharge sparks of static electricity. (4-7-83)

05. Protection. (4-7-83)

a. Conformance. In sprinklered buildings, the automatic sprinkler system in rooms containing spray finishing operations shall conform to the Standard for the Installation of Sprinkler Systems. NFPA 13-1969, Provisions for Extra Hazard Occupancy, and in unsprinklered buildings where sprinklers are installed only to protect spraying areas, the installations shall conform to such standards insofar as they may be applicable. Sprinkler installations shall also conform to the provisions of this section. Sprinkler heads shall be located to effect water distribution throughout the entire booth. (4-7-83)

b. Valve Access. Automatic sprinklers protecting each spray booth (together with its connecting exhaust) shall be under an accessibility located separate outside stem and yoke (OS&Y) subcontrol valve. (4-7-83)

c. Cleaning of Heads. Sprinklers protecting spraying areas shall be kept as free from deposits as practical by cleaning daily if necessary (See also Section 240.06). (4-7-83)

d. Portable Extinguishers. An adequate supply of suitable portable fire extinguishers shall be installed near all spraying areas. (4-7-83)

06. Operations and maintenance. (4-7-83)

a. Spraying. Spraying shall not be conducted outside of predetermined spraying areas. (4-7-83)

b. Cleaning. All spraying areas shall be kept as free from the accumulation of deposits of combustible residues as practical, with cleaning conducted daily if necessary. Scrapers, spuds, or other such tools used for cleaning purposes shall be of nonsparking material. (4-7-83)

c. Residue Disposal. Residue scrapings and debris contaminated with residue shall be immediately removed from the premises and properly disposed of. Approved metal waste cans shall be provided wherever rags or waste are impregnated with finishing material and all such rags or waste deposited therein immediately after use. The contents of waste cans shall be properly disposed of at least once daily or at the end of each shift. (4-7-83)

d. Clothing Storage. Spray finishing employees clothing shall not be left on the premises overnight unless kept in metal lockers. (4-7-83)

e. Cleaning Solvents. The use of solvents for cleaning operations shall be restricted to those having flash points not less than 100 F; however, for cleaning spray nozzles and auxiliary equipment, solvents having flash points not less than those normally used in spray operations may be used. Such cleaning shall be conducted inside spray booths and ventilating equipment operated during cleaning. (4-7-83)

f. Hazardous Materials Combinations. Spray booths shall not be alternately used for different types of coating materials, where the combination of the materials may be conductive to spontaneous ignition, unless all deposits of the first used material are removed from the booth and exhaust ducts prior to spraying with the second used material. (4-7-83)

g. "No Smoking" signs."No Smoking" signs in large letters on contrasting color background shall be conspicuously posted at all spraying areas and paint storage rooms. (See Section 171.01 of this chapter.) (4-7-83)

07. Fixed electrostatic apparatus. (4-7-83)

a. Conformance. Where installation and use of electrostatic spraying equipment is used, such installation and use shall conform to all other requirements contained in Sections 240.01 through 240.13 of this chapter. (4-7-83)

b. Type Approval. Electrostatic apparatus and devices used in connection with coating operations shall be of approved types. (4-7-83)

c. Location. Transformers, power packs, control apparatus, and all other electrical portions of the equipment with the exception of high-voltage grids, electrodes, and electrostatic atomizing heads and their connections, shall be located outside of the spraying area, or shall otherwise conform to the requirements of Section 240.03 of this chapter. (4-7-83)

d. Support. Electrodes and electrostatic atomizing heads shall be adequately supported in permanent locations and shall be effectively insulated from the ground. Electrodes and electrostatic atomizing heads which are permanently attached to their bases, supports, or reciprocator, shall be deemed to comply with this section. Insulators shall be nonporous and noncombustible. (4-7-83)

e. Insulators. Grounding. High-voltage leads to electrodes shall be properly insulated and protected from mechanical injury or exposure to destructive chemicals. Electrostatic atomizing heads shall be effective and permanently supported on suitable insulators and shall be effectively guarded against accidental contact or grounding. An automatic means shall be provided for grounding the electrode system when it is electrically de-energized for any reason. All insulators shall be kept clean and dry. (4-7-83)

f. Safe Distance. A safe distance shall be maintained between goods being painted and electrodes or electrostatic atomizing heads or conductors of at least twice the sparking distance. A suitable sign indicating this safe distance shall be conspicuously posted near the assembly. (4-7-83)

g. Conveyors Required. Goods being painted using this process are to be supported on conveyors. The conveyors shall be so arranged as to maintain safe distances between the goods and the electrodes or electrostatic atomizing head at all times. Any irregularly shaped or other goods subject to possible swinging or movement shall be rigidly supported to prevent such swinging or movement which would reduce the clearance to less than that specified in of this section. (4-7-83)

h. Prohibition. This process is not acceptable where goods being coated are manipulated by hand. When finishing equipment which is manipulated by hand, see Section 240.08 of this chapter. (4-7-83)

i. Fail-safe Controls. Electrostatic apparatus shall be equipped with automatic controls which will operate without time delay to disconnect the power supply to the high voltage transformer and to signal the operator under any of the following conditions: (4-7-83)

i. Stoppage of ventilating fans or failure of ventilating equipment from any cause. (4-7-83)

ii. Stoppage of the conveyor carrying goods through the high voltage field. (4-7-83)

iii. Occurrence of a ground or of an imminent ground at any point on the high voltage system. (4-7-83)

iv. Reduction of clearance below that specified in of this section. (4-7-83)

j. Guarding. Adequate booths, fencing, railings, or guards shall be so placed about the equipment that they, either by their location or character or both, assure that a safe isolation of the process is maintained from plant storage or personnel. Such railings, fencing, and guards shall be conducting material, adequately grounded. (4-7-83)

k. Ventilation. Where electrostatic atomization is used, the spraying area shall be so ventilated as to insure safe conditions from a fire and health standpoint. (4-7-83)

l. Fire Protection. All areas used for spraying, including the interior of the booth, shall be protected by automatic sprinklers where this protection is available. Where this protection is not available, other approved

automatic extinguishing equipment shall be provided. (4-7-83)

08. Electrostatic hand spraying equipment. (4-7-83)

a. Application. This section shall apply to any equipment using electrostatically charged elements for the atomization and/or precipitation of materials for coatings on articles, or for other similar purposes in which the atomizing device is hand held and manipulated during the spraying operation. (4-7-83)

b. Conformance. Electrostatic hand spraying equipment shall conform with the other provisions of 240.01 through 240.13 of this chapter. (4-7-83)

c. Equipment Approval and Specifications. Electrostatic hand spray apparatus and devices used in connection with coating operations shall be of approved types. The equipment should be so designed that the maximum surface temperature of the equipment in the spraying area shall not exceed 150 F. under any condition. The high voltage circuits shall be designed so as to not produce a spark of sufficient intensity to ignite any vapor-air mixtures nor result in appreciable shock hazard upon coming in contact with a grounded object under all normal operating conditions. The electrostatically charged exposed elements of the handgun shall be capable of being energized only by a switch which also controls the coating material supply. (4-7-83)

d. Electrical Support Equipment. Transformers, powerpacks, control apparatus, and all other electrical portions of the equipment, with the exception of the handgun itself and its connections to the powder supply shall be located outside of the spraying area or shall otherwise conform to the requirements of Section 240.03 of this chapter. (4-7-83)

e. Spray Gun Ground. The handle of the spraying gun shall be electrically connected to ground by a metallic connection and to be so constructed that the operator in normal operating position is in intimate electrical contact with the grounded handle. (4-7-83)

f. Grounding, general. All electrically conductive objects in the spraying area shall be adequately grounded. This requirement shall apply to paint containers, wash cans, and any other objects or devices in the area. The equipment shall carry a prominent permanently installed warning regarding the necessity for this grounding feature. (4-7-83)

g. Maintenance of Grounds. Objects being painted or coated shall be maintained in metallic contact with the conveyor or other grounded support. Hooks shall be regularly cleaned to insure this contact and areas of contact shall be sharp points or knife edges where possible. Points of support of the object shall be concealed from random spray where feasible and where the objects being sprayed are supported from a conveyor, the point of attachment to the conveyor shall be so located as to not collect spray material during normal operation. (4-7-83)

h. Interlocks. The electrical equipment shall be so interlocked with the ventilation of the spraying area that the equipment cannot be operated unless the ventilation fans are in operation. (4-7-83)

i. Ventilation. The spraying operation shall take place within a spray area which is adequately ventilated to remove solvent vapors released from the operation. (4-7-83)

09. Drying, curing or fusion apparatus. (4-7-83)

a. Conformance. Drying, curing, or fusion apparatus in connection with spray application of flammable and combustible finishes shall conform to the Standard for Ovens and Furnaces, NFPA 86A-1969, where applicable and shall also conform with the following requirements of this section. (4-7-83)

b. Alternate Use Prohibited. Spray booths, rooms, or other enclosures used for spraying operations shall not alternately be used for the purpose of drying by any arrangement which will cause a material increase in the surface temperature of the spray booth, room, or enclosure. (4-7-83)

c. Adjacent System Interlocked. Except as specifically provided in d. of this section, drying, curing or fusion units utilizing a heating system having open flames or which may produce sparks shall not be installed in a

spraying area, but may be installed adjacent thereto when equipped with an interlocked ventilation system arranged to: (4-7-83)

i. Thoroughly ventilate the drying space before the heating system can be started. (4-7-83)

iii. Automatically shut down the heating system in the event of failure of the ventilating system. (4-7-83)

d. Alternate Use Permitted. Automobile refinishing spray booths or enclosures, otherwise installed and maintained in full conformity with this section may alternatively be used for drying with portable electrical infrared drying apparatus when conforming with the following: (4-7-83)

i. Interior (especially floors) of spray enclosures shall be kept free of overspray deposits. (4-7-83)

ii. During spray operations, the drying apparatus and electrical connections and wiring thereto shall not be located within spray enclosure nor in any other location where spray residues may be deposited thereon. (4-7-83)

iii. The spraying apparatus, the drying apparatus and the ventilating system of the spray enclosure shall be equipped with suitable interlocks so arranged that: the spraying apparatus cannot be operated while the drying apparatus is inside the spray enclosure; the spray enclosure will be purged of spray vapors for a period of not less than 3 minutes before the drying apparatus can be energized; the ventilating system will maintain a safe atmosphere within the enclosure during the drying process and the drying process apparatus will automatically shut off in the event of failure of the ventilating system. (4-7-83)

iv. All electrical wiring and equipment of the drying apparatus shall conform with the applicable sections of Section 150 of this chapter. (4-7-83)

v. The drying apparatus shall contain a prominently located, permanently attached warning sign indicating that ventilation should be maintained during the drying period and that spraying should not be conducted in the vicinity that spray will deposit on apparatus. (4-7-83)

10. Automobile undercoating in garages. Automobile undercoating spray operations in garages, conducting in areas having adequate natural or mechanical ventilation, are exempt from the requirements pertaining to spray finishing operations, when using undercoating materials not more hazardous than kerosene (as listed by Underwriters' Laboratories in respect to fire hazard rating 30-40) or undercoating materials using only solvents listed as having a flash point in excess of 100 F. Undercoating spray operations not conforming to these provisions are subject to all requirements of Section 240.01 through 240.13 of this chapter, pertaining to spray finishing operations. (4-7-83)

11. Powder coating. (4-7-83)

a. Electrical and other sources of ignition. Electrical equipment and other sources of ignition shall conform to the requirements of Section 240.03.a.i. through iv., h. and ii. and Section 150 of this chapter. (4-7-83)

b. Ventilation. (4-7-83)

i. In addition to the provisions of Section 241.01 through 242.01 where applicable, exhaust ventilation shall be sufficient to maintain the atmosphere below the lowest explosive limits for the materials being applied. All nondeposited air-suspended powders shall be safely removed via exhaust ducts to the powder recovery cyclone or receptacle. Each installation shall be designed and operated to meet the foregoing performance specifications. (4-7-83)

ii. Powders shall not be released to the outside atmosphere. (4-7-83)

c. Drying, curing, or fusion equipment. The provisions of the Standard for ovens and furnaces, NFPA No. 86A-1969 shall apply where applicable. (4-7-83)

d. Operation and Maintenance. (4-7-83)

i. All areas shall be kept free of the accumulation of powder coating dusts, particularly such horizontal surfaces as ledges, beams, pipes, hoods, booths, and floors. (4-7-83)

ii. Surfaces shall be cleaned in such manner as to avoid scattering dust to other places or creating dust clouds. (4-7-83)

iii. "No Smoking" signs in large letters on contrasting color background shall be conspicuously posted at all powder coating areas and powder storage rooms. (4-7-83)

e. Fixed Electrostatic Spraying Equipment. The provisions of Section 240.07 and other subsections of this section shall apply to fixed electrostatic equipment, except that electrical equipment not covered therein shall conform to a. of this section. (4-7-83)

f. Electrostatic Hand Spraying Equipment. The provisions of Section 240.08 and other subsections of this section shall apply to electrostatic handguns when used in powder coating, except that electrical equipment not covered therein shall conform to a. of this section. (4-7-83)

g. Electrostatic Fluidized Beds. (4-7-83)

i. Electrostatic fluidized beds and associated equipment shall be of approved types. The maximum surface temperature of this equipment in the coating area shall not exceed 150 F. The high voltage circuits shall be so designed as to not produce a spark of sufficient intensity to ignite any powder-air mixtures nor result in appreciable shock hazard upon coming in contact with a grounded object under normal conditions. (4-7-83)

ii. Transformers, power-packs, control apparatus, and all other electrical portions of the equipment, with the exception of the charging electrodes and their connections to the power supply shall be located outside of the powder coating area or shall otherwise conform to the requirements of a. of this section. (4-7-83)

iii. All electrically conductive objects within the charging influence of the electrodes shall be adequately grounded. The powder coating equipment shall carry a prominent, permanently installed warning regarding the necessity for grounding these objects. (4-7-83)

iv. Objects being coated shall be maintained in contact with the conveyor or other support in order to insure proper grounding. Hangers shall be regularly cleaned to insure effective contact and areas of contact shall be sharp points or knife edges where possible. (4-7-83)

v. The electrical equipment shall be so interlocked with the ventilation system that the equipment cannot be operated unless the ventilation fans are in operation. (4-7-83)

12. Organic peroxides and dual component coatings. (4-7-83)

a. Conformance. All spraying operations involving the use of organic peroxides and other dual component coatings shall be conducted in approved sprinklered spray booths meeting the requirements of this section. (4-7-83)

b. Smoking. Smoking shall be prohibited and "No Smoking" signs shall be prominently displayed and only nonsparking tools shall be used in any area where organic peroxides are stored, mixed or applied. (4-7-83)

13. Scope. This section applies to flammable and combustible finishing materials when applied as a spray by compressed air, "airless" or "hydraulic atomization", steam, electrostatic methods, or by any other means in continuous or intermittent processes. The section also covers the application of combustible powders by powder spray guns, electrostatic powder spray guns, fluidized beds, or electrostatic fluidized beds. The section does not apply to outdoor spray application of buildings, tanks or other similar structures, nor to small portable spraying apparatus not used repeatedly in the same location. (4-7-83)

241. VENTILATION.

01. Conformance. Ventilating and exhaust systems shall be in accordance with the Standard for Blower and Exhaust Systems for Vapor Removal, NFPA No. 91-1961, where applicable and shall also conform to the provisions of this section. (4-7-83)

02. General. All spraying areas shall be provided with mechanical ventilation adequate to remove flammable vapors, mists or powders to a safe location and to confine the control combustible residues so that life is not endangered. Mechanical ventilation shall be kept in operation at all times while spraying operations are being conducted and for a sufficient time thereafter to allow vapors from drying coated articles and drying finishing material residue to be exhausted. (4-7-83)

03. Independent exhaust. Each spray booth shall have an independent exhaust duct system discharging to the exterior of the building, except that multiple cabinet spray booths in which identical spray finishing material is used with a combined frontal area of not more than 18 square feet may have a common exhaust. If more than one fan serves one booth, all fans shall be so interconnected that one fan cannot operate without all fans being operated. (4-7-83)

04. Fan-rotating element. The fan rotating element shall be non-ferrous or nonsparking or the casing shall consist of or be lined with such material. There shall be ample clearance between the fan-rotating element and the fan casing to avoid a fire by friction, necessary allowance being made for ordinary expansion and loading to prevent contact between moving parts and the duct or fan housing. Fan blades shall be mounted on a shaft sufficiently heavy to maintain perfect alignment even when the blades of the fan are heavily loaded, the shaft preferably to have bearings outside the duct and booth. All bearings shall be the self-lubricating type, or lubricated from the outside duct. (4-7-83)

05. Electric motors. Electric motors driving exhaust fans shall not be placed inside booths or ducts. See also Section 240.03 of this chapter. (4-7-83)

06. Belts. Belts shall not enter the duct or booth unless the belt and pulley within the duct or booth are thoroughly enclosed. (4-7-83)

07. Exhaust ducts. (4-7-83)

a. Exhaust ducts shall be constructed of steel and shall be substantially supported. Exhaust ducts without dampers are preferred; however, if dampers are installed, they shall be maintained so that they will be in a full open position at all times the ventilating system is in operation. (4-7-83)

b. Exhaust ducts shall be protected against mechanical damage and have a clearance from unprotected combustible construction or other combustible material of not less than 18 inches. (4-7-83)

c. If combustible construction is provided with the following protection applied to all surfaces within 18 inches, clearances may be reduced to the distances indicated: (4-7-83)

i. 28-gage sheet metal on 1/4-inch asbestos mill board - 12 in. (4-7-83)

ii. 28-gage sheet metal on 1/8-inch asbestos mill board space out 1 in. on noncombustible spacers, 9 in. (4-7-83)

iii. 22-gage sheet metal on 1-inch rockrool batts reinforced with wire mesh or the equivalent ----------
-------3 in. (4-7-83)

iv. Where ducts are protected with an approved automatic sprinkler system, properly maintained, the clearance required in subdivision 1. of this paragraph may be reduced to 6 inches. (4-7-83)

08. Discharge clearance. Unless spray booth exhaust duct terminal is from a water-wash spray booth,

the terminal discharge point shall be not less than 6 feet from any combustible exterior wall or roof nor discharge in the direction of any combustible construction or unprotected opening in any noncombustible exterior wall within 25 feet. (4-7-83)

09. Air exhaust. Air exhaust from spray operations shall not be directed so that it will contaminate makeup air being introduced into the spraying area or other ventilating intakes, nor directed so as to create a nuisance. Air exhausted from spray operations shall not be recirculated. (4-7-83)

10. Access doors. When necessary to facilitate cleaning, exhaust ducts shall be provided with an ample number of access doors. (4-7-83)

11. Room intakes. Air intake openings to rooms containing spray finishing operations shall be adequate for the efficient operation of exhaust fans and shall be so located as to minimize the creation of dead air pockets. (4-7-83)

12. Drying spaces. Freshly sprayed articles shall be dried only in spaces provided with adequate ventilation to prevent the formation of explosive vapors. In the event adequate and reliable ventilation is not provided such drying spaces shall be considered a spraying area. (see also Section 240.09 of this chapter.) (4-7-83)

13. Definitions applicable to this paragraph. (4-7-83)

a. Spray-finishing operation. Spray finishing operations are employment of methods wherein organic or inorganic materials are utilized in dispersed form for deposit on surfaces to be coated, treated, or cleaned. Such methods of deposit may involve either automatic, manual or electrostatic deposition but do not include metal spraying or metallizing, dipping, flow coating, roller coating, tumbling, centrifuging, or spray washing and degreasing as conducted in self-contained washing and degreasing machines or systems. (4-7-83)

b. Spray booth. Spray booths are defined and described in Section 240.01 of this chapter. (see Sections 103, 104, and 105 of the Standard for Spray Finishing Using Flammable and Combustible Materials, NFPA No. 33-1969.) (4-7-83)

c. Spray Room. A spray room is a room in which spray-finishing operations not conducted in a spray booth are performed separately from other areas. (4-7-83)

d. Minimum Maintained Velocity. Minimum maintained velocity is the velocity of air movement which must be maintained in order to meet minimum specified requirements for health and safety. (4-7-83)

14. Location and application. Spray booths or spray rooms are to be used to enclose or confine all operations. Spray-finishing operations shall be located as provided in Sections 201 through 206 of the Standard for Spray Finishing Using Flammable and Combustible Materials, NFPA No. 33-1969. (4-7-83)

15. Design and construction of spray booths. (4-7-83)

a. Spray booths shall be designed and constructed in accordance with Section 240.01 of this chapter, (see Sections 301 -304 and 306 - 310 of the Standard for Spray Finishing Using Flammable and Combustible Materials, NFPA No. 33-1969), for general construction specifications. For a more detailed discussion of fundamentals relating to this subject, see ANSI Z9.2-1960. (4-7-83)

i. Lights, motors, electrical equipment, and other sources of ignition shall conform to the requirements of Section 240.01. (See Section 310 and Chapter 4 of the Standard for Spray Finishing Using Flammable and Combustible Materials, NFPA No. 33-1969.) (4-7-83)

ii. In no case shall combustible material be used in the construction of a spray booth and supply or exhaust duct connected to it. (4-7-83)

b. Unobstructed walkways shall not be less than 6? feet high and shall be maintained clear of obstruction from any work location in the booth to a booth exit or open booth front. In booths where the open front is

the only exit, such exits shall be not less than 3 feet wide. In booths having multiple exits, such exits shall not be less than 2 feet wide, provided that the maximum distance from the work location to the exit is 25 feet or less. Where booth exits are provided with doors, such doors shall open outward from the booth. (4-7-83)

c. Baffles, distribution plates and dry-type overspray collectors shall conform to the requirements of Section 240.01 of this chapter. (See section 304 and 305 of the Standard for Spray Finishing Using Flammable and Combustible Materials, NFPA No. 33-1969). (4-7-83)

i. Overspray filters shall be installed and maintained in accordance with the requirements of Section 240.01. (See Section 305 of Standard for Spray Finishing Using Flammable and Combustible Materials, NFPA No. 33-1969), and shall only be in a location easily accessible for inspection, cleaning, or replacement. (4-7-83)

ii. Where effective means, independent of the overspray filters, are installed which will result in design air distribution across the booth cross section, it is permissible to operate the booth without the filters in place. (4-7-83)

iii. For wet or water-wash spray booths, the water-chamber enclosure within which intimate contact of contaminated air and cleaning water or other cleaning medium is maintained, if made of steel, shall be 18 gage or heavier and adequately protected against corrosion. (4-7-83)

iv. Chambers may include scrubber spray nozzles, headers, troughs, or other devices. Chambers shall be provided with adequate means for creating and maintaining scrubbing action for removal of particular matter from the exhaust air stream. (4-7-83)

d. Collecting tanks shall be of welded steel construction or other suitable non-combustible material. If pits are used as collecting tanks, they shall be concrete, masonry, or other material having similar properties. (4-7-83)

i. Tanks shall be provided with tiers, skimmer plates, or screens to prevent sludge and floating point from entering the pump suction box. Means for automatically maintaining the proper water level shall also be provided. Fresh water inlets shall not be submerged. They shall terminate at least one pipe diameter above the safety overflow level of the tank. (4-7-83)

ii. Tanks shall be so constructed as to discourage accumulation of hazardous deposits. (4-7-83)

e. Pump manifolds, risers, and headers shall be adequately sized to insure sufficient water flow to provide efficient operation of the water chamber. (4-7-83)

16. Design and construction of spray rooms. (4-7-83)

a. Spray rooms, including floors, shall be constructed of masonry, concrete, or other noncombustible material. (4-7-83)

b. Spray rooms shall have noncombustible fire doors and shutters. (4-7-83)

c. Spray rooms shall be adequately ventilated so that the atmosphere in the breathing zone of the operator shall be maintained in accordance with the requirements of Section 211.18.b. of this chapter. (4-7-83)

d. Spray rooms used for production spray-finishing operations shall conform to the requirements for spray booths. (4-7-83)

17. Ventilation. (4-7-83)

a. Ventilation shall be provided in accordance with provisions of Section 240.01 of this chapter (See Chapter 5 of the Standard for Spray Finishing Using Flammable or Combustible Materials, NFPA No. 33-1969), and in accordance with the following: Where a fan plenum is used to equalize or control the distribution of exhaust air movement through the booth, it shall be of sufficient strength or rigidity to withstand the differential air pressure or

other superficially imposed loads for which the equipment is designed and also to facilitate cleaning. Construction specifications shall be at least equivalent to those of c. of this section. (4-7-83)

b. Inlet or supply ductwork used to transport makeup air to spray booths or surrounding areas shall be constructed of noncombustible materials. (4-7-83)

i. If negative pressure exists within inlet ductwork, all seams and joints shall be sealed if there is a possibility of infiltration of harmful quantities of noxious gases, fumes or mists from areas through which ductwork passes. (4-7-83)

ii. Inlet ductwork shall be sized in accordance with volume flow requirements and provide design air requirements at the spray booth. (4-7-83)

iii. Inlet ductwork shall be adequately supported throughout its length to sustain at least its own weight plus any negative pressure which is exerted upon it under normal operating conditions. (4-7-83)

c. Exhaust ductwork shall be adequately supported throughout its length to sustain its weight plus any normal accumulation in interior during normal operating conditions and any negative pressure exerted upon it. (4-7-83)

d. Exhaust ductwork shall be sized in accordance with good design practice which shall include consideration of fan capacity, length of duct, number of turns and elbows, variation in size, volume, and character of materials being exhausted. See American National Standard Z9.2-1960 for further details and explanation concerning elements of design. (4-7-83)

e. Longitudinal joints in sheet steel ductwork shall be either lock-seamed riveted, or welded. For other than steel construction, equivalent securing of joints shall be provided. (4-7-83)

f. Circumferential joints in ductwork shall be substantially fastened together and lapped in the direction of air-flow. At least every fourth joint shall be provided with connecting flanges, bolted together, or of equivalent fastening security. (4-7-83)

g. Inspection or clean-out doors shall be provided for every 9 to 12 feet of running length for ducts up to 12 inches in diameter, but the distance between cleanout doors may be greater for larger pipes. (See 8.3.21 of American National Standard Z9.1-1951). A clean-out door or doors shall be provided for servicing the fan, and where necessary, a drain shall be provided. (4-7-83)

h. Where ductwork passes through a combustible roof or wall, the roof or wall shall be protected at the point of penetration by open space or fire-resistive material between the duct and the roof or wall. When ducts pass through firewalls, they shall be provided with automatic fire dampers on both sides of the wall, except that three-eighth-inch steel plates may be used in lieu of automatic fire dampers for ducts not exceeding 18 inches in diameter. (4-7-83)

i. Ductwork used for ventilating and process covered in this standard shall not be connected to ducts ventilating any other process or any chimney or flue used for conveying any products of combustion. (4-7-83)

18. Velocity and air flow requirements. (4-7-83)

a. Except where a spray booth has an adequate air replacement system, the velocity of air into all openings of a spray booth shall be not less than that specified in Table 2131-A for the operating conditions specified. An adequate air replacement system is one which introduces replacement air upstream or above the object being sprayed and is so designed that the velocity of air in the booth cross section is not less than that specified in Table 241.18-A when measured upstream or above the object being sprayed. (4-7-83)

TABLE 241.18-A, MINIMUM MAINTAINED VELOCITIES INTO SPRAY BOOTHS, available at Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone (208) 334-6000.

NOTES: 1. Attention is invited to the fact that the effectiveness of the spray booth is dependent upon the relationship of the depth of the booth to its height and width. 2. Crossdrafts can be eliminated through proper design and such design should be sought. Crossdrafts in excess of 100fpm (feet per minute) should not be permitted.3. Excessive air pressures result in loss of both efficiency and material waste in addition to creating a backlash that may carry overspray and fumes into adjacent work areas.4. Booths should be designed with velocities shown in the column headed "Design". However, booths operating with velocities shown in the column headed "Range" are in compliance with this standard. (4-7-83)

b. In addition to the requirements of a. of this section, the total air volume exhausted through a spray booth shall be such as to dilute solvent vapor to at least 25 percent of the lower explosive limit of the solvent being sprayed. An example of the method of calculating this volume is given below. (4-7-83)

i. Example: To determine the lower explosive limits of the most common solvents used in spray finishing, see table 2131-B. Column 1 gives the number of cubic feet of vapor per gallon of solvent and column 2 gives the lower explosive limit (LEL) in percentage by column of air. Note that the quantity of solvent will be diminished by the quantity of solids and nonflammables contained in the finish. (4-7-83)

ii. To determine the volume of air in cubic feet necessary to dilute the vapor from 1 gallon of solvent to 25 percent of the lower explosive limit, apply the following formula: Dilution volume required per gallon of solvent = 4 (100-LEL) (Cubic feet of vapor per gallon) 1/2 LEL (4-7-83)

iii. Using toluene as the solvent, LEL of toluene from Table 241.18-B, Column 2, is 1.4 percent; cubic feet of vapor per gallon from Table 241.18-B Column 1, is 30.4 cubic feet per gallon; dilution volume required = 4 (100-1.4) 30.4 1.4 = 8,564 cubic feet. (4-7-83)

iv. To convert cubic feet per minute of required ventilation, multiply the dilution volume required per gallon of solvent by the number of gallons of solvent evaporated per minute. (4-7-83)

c. When an operator must position himself in a booth downstream of the object being sprayed, an air-supplied respirator or other type of respirator approved by the Bureau of Mines, U. S. Department of the Interior or specified in ANSI Z88.2-1969 for the material being sprayed should be used by the operator. Where downdraft booths are provided with doors, such doors shall be closed when spray painting. (4-7-83)

19. Make-up air. (4-7-83)

a. Clean fresh air, free from contamination from adjacent industrial exhaust systems, chimneys, stacks, or vents, shall be supplied to a spray booth or room in quantities equal to the volume of air exhausted through the spray booth. (4-7-83)

b. Where a spray booth or room receives make-up air through self-closing doors, dampers, or louvers, they shall be fully open at all times when the booth or room is in use for spraying. The velocity of air through such doors, dampers, or louvers shall not exceed 200 feet per minute. If the fan characteristics are such that the required air flow through the booth will be provided, higher velocities through the doors, dampers, or louvers may be used. (4-7-83)

TABLE 241.18-B, LOWER EXPLOSIVE LIMIT OF SOME COMMONLY USED SOLVENTS

Solvent	Cubic feet per gallon ov vapor of liquid at 70 Deg F.#	Lower explosive limit in percent by volume of air at 70 Deg. F.
	Column 1	Column 2
Acetone	44.0	2.6
Amyl Acetate (iso)	21.6	1.0

Solvent	Cubic feet per gallon ov vapor of liquid at 70 Deg F.#	Lower explosive limit in percent by volume of air at 70 Deg. F.
Amyl Alcohol (n)	20.6	1.2
Amyl Alcohol (iso)	29.6	1.2
Benzene	30.8	1.4
Butyl Acetate (n)	24.8	1.7
Butyl Alcohol (n)	35.2	1.4
Butyl Cellosolve	24.8	1.1
Cellosolve	33.6	1.8
Cellosolve Acetate	23.2	1.7
Cyclohexanone	31.2	1.1
1.1 Dichloroethylene	42.4	5.9
1.2 Dichloroethylene	42.4	9.7
Ethyl Acetate	32.8	2.5
Ethyl Alcohol	55.2	4.3
Ethyl Lactate	28.0	1.5
Methyl Acetate	40.0	3.1
Methyl Alcohol	80.8	7.3
Methyl Cellosolve	40.8	2.5
Methyl Ethy Ketone	36.0	1.8
Methyl n-Propyl Ketone Naphtha (VM&P)	30.4	1.5
(76Deg. Naphtha) Naphtha (100 Deg. Flash) Safety	22.4	0.9
Solvent-Stoddard Solvent	23.2	1.0
Propyl Acetate (n)	27.2	2.8
Propyl Acetate (iso)	28.0	1.1
Propyl Alcohol (n)	44.8	2.1
Propyl Alcohol (iso)	44.0	2.0
Toluene	30.4	1.4
Turpentine	20.8	0.8
Xylene (o) At 212 F.	26.4	1.0

c. Where the air supply to a spray booth or room is filtered, the fan static pressure shall be calculated on the assumption that the filters are dirty to the extent that they require cleaning or replacement. The rating of filters

shall be governed by test date supplied by the manufacturer of the filter. A pressure gage shall be installed to show the pressure drop across the filters. This gage shall be marked to show the pressure drop at which the filters require cleaning or replacement. Filters shall be replaced or cleaned whenever the pressure drop across them becomes excessive or whenever the air flow through the face of the booth falls below that specified in Table 241.18-B. (4-7-83)

d. Means for heating make-up air to any spray booth or room, before or at the time spraying is normally performed, shall be provided in all places where the outdoor temperature may be expected to remain below 55 F. for appreciable periods of time during the operation of the booth except where adequate and safe means of radiant heating for all operating personnel affected is provided. The replacement air during the heating seasons shall be maintained at not less than 65 F. at the point of entry into the spray booth or spray room. When otherwise unheated make-up air would be at a temperature of more than 10 F. below room temperature, its temperature shall be regulated as provided in Section 3.6.3 of ANSI Z9.2-1960. (4-7-83)

e. As an alternative to an air replacement system complying with the preceding section, general heating of the building in which the spray room or booth is located may be employed provided that all occupied parts of the building are maintained at not less than 65 F. when the exhaust system is in operation or the general heating system supplemented by other sources of heat may be employed to meet this requirement. (4-7-83)

f. No means of heating make-up air shall be located in a spray booth. (4-7-83)

g. Where make-up air is heated by coal, or oil, the products of combustion shall not be allowed to mix with the makeup air, and the products of combustion shall be conducted outside the building through a flue terminating at a point remote from all points where make-up air enters the building. (4-7-83)

h. Where make-up air is heated by gas, and the products of combustion are not mixed with the make-up air but are conducted through an independent flue to a point outside the building remote from all points where make-up air enters the building, it is not necessary to comply with paragraph vi. of this section. (4-7-83)

i. Where make-up air to any manually operated spray booth or room is heated by gas and the products of combustion are allowed to mix with the supply air, the following precautions must be taken. (4-7-83)

i. The gas must have a distinctive and strong enough odor to warn workmen in a spray booth or room of its presence if in an unburned state in the make-up air. (4-7-83)

ii. The maximum rate of gas supply to the make-up air heater burners must not exceed that which would yield in excess of 200 p.p.m. (parts per million) of carbon monoxide of 2,000 p.p.m. of total combustible gases in the mixture if the unburned gas upon the occurrence of flame failure were mixed with all of the make-up air supplied. (4-7-83)

iii. A fan must be provided to deliver the mixture of heated air and products of combustion from the plenum chamber housing the gas burners to the spray booth or room. (4-7-83)

20. Scope. Spray booths or spray rooms are to be used to enclose or confine all spray finishing operations covered by this paragraph. This paragraph does not apply to the spraying of the exteriors of buildings, fixed tanks, or similar structures, nor to small portable spraying apparatus not used repeatedly in the same location. (4-7-83)

242. DIP TANKS CONTAINING FLAMMABLE OR COMBUSTIBLE LIQUIDS, DEFINITIONS.

01. Dip Tank. Shall mean a tank, vat, or container of flammable or combustible liquid in which articles or materials are immersed for the purpose of coating, finishing, treating or similar processes. (4-7-83)

02. Vapor area. Shall mean any area containing dangerous quantities of flammable vapors in the vicinity of dip tanks, their drainboards or associated drying, conveying, or other equipment during operation or shutdown periods. (4-7-83)

03. Approved. Unless otherwise indicated, approval or listing by at least one of the following nationally recognized testing laboratories:Underwriters' Laboratories, Inc.; Factory Mutual Engineering Corporation. (4-7-83)

04. Listed. See "approved" in c. of this section. (4-7-83)

05. Construction of dip tanks. (4-7-83)

a. General. Dip tanks, including drainboards if provided, shall be constructed of substantial noncombustible material, and their supports shall be of heavy metal reinforced concrete, or masonry. Where dip tanks extend through a floor to the story below or where the weakening of the tank supports by fire may result in the material having not less than 1-hour fire resistance. (4-7-83)

b. Overflow Pipes. (4-7-83)

i. Dip tanks of over 150 gallons in capacity or 10 square feet in liquid surface area shall be equipped with a properly trapped overflow pipe leading to a safe location outside buildings. Smaller dip tanks should also be so equipped, where practical. The discharge of the overflow pipe should be so located and arranged that if the entire combustible contents of the dip tanks is overflowed through overflow pipe by the application of water during fire fighting, property will not be endangered. The size of the overflow pipe should be sufficient to conduct the maximum rate of flow of water expected to be applied to the liquid surface of the dip tank from automatic sprinklers or from other sources in the event of fire. (4-7-83)

ii. Overflow pipes shall be of sufficient capacity to overflow the maximum delivery of dip tank liquid fill pipes but shall not be less than 3 inches in diameter and shall be increased in size depending upon the area of the liquid surface and the length and pitch of pipe. (4-7-83)

iii. Piping connections on drains and overflow lines shall be designed so as to permit ready access for inspection and cleaning of the interior. (4-7-83)

iv. The bottom of the overflow connection shall be not less than 6 inches below the top of the tank. See also C.i, I. and f. of this section. (4-7-83)

c. Bottom Drains. (4-7-83)

i. Dip tanks over 500 gallons in liquid capacity shall be equipped with bottom drains automatically and manually arranged to quickly drain the tank in the event of fire, unless the viscosity of the liquid at normal atmospheric temperature makes this impractical. Manual operation shall be from a safely accessible location. Where gravity flow is not practicable, automatic pumps shall be required. (4-7-83)

ii. Such drain shall be trapped and discharged to a closed properly vented salvage tank or to a safe location outside which will not endanger property. (4-7-83)

iii. According to tank capacity the diameter of bottom drainpipe shall be not less than the following:

Gallons	Inches
500 to 750	3
750 to 1,000	4
1,000 to 2,500	5
2,500 to 4,000	6
over 4,000	8

d. Salvage Tanks. The capacity of the salvage tank shall be greater than the capacity of the dip tank or

tanks to which they are connected. (4-7-83)

e. Automatic Extinguishing Facilities. Except as noted in Section 242.07.a. (applying to hardening and tempering tanks), all dip tanks exceeding 150 gallons liquid capacity or having a liquid surface area exceeding 4 square feet shall be protected with at least one of the automatic extinguishing facilities conforming to Section 242.06.b., c., d., e. or f. (4-7-83)

f. Conveyor Systems. Dip tanks utilizing a conveyor system shall be so arranged that in the event of fire, the conveyor system shall automatically cease motion and required bottom drains shall open. Conveyor systems shall automatically cease motion unless required ventilation is in full operation. See also Section 243.01. (4-7-83)

g. Heating Dip Tank Liquids. When dip tank liquids are artificially heated, either by the dipping of heated articles, or by other application of heat to the liquid, provision shall be made to prevent a temperature rise greater than 50 F. below the flashpoint of the liquid. See also Section 242.07.a. (4-7-83)

06. Liquids used in dip tanks storage and handling. The storage of flammable and combustible liquids in connection with dipping operation shall conform to the requirements of Section 220.01 where applicable. Where portable containers are used for the replenishment of flammable and combustible liquids, provision shall be made so that both the container and tank shall be positively grounded and electrically bonded to prevent static electric sparks. (4-7-83)

07. Electrical and other sources of ignition. (4-7-83)

a. Vapor Areas. (4-7-83)

i. There shall be no open flames, spark producing devices, or heated surfaces having a temperature sufficient to ignite vapors in any vapor area. Except as specifically permitted in Section 242.07.c., relating to electrostatic apparatus, electrical wiring and equipment in any vapor area (as defined in Section 242.01.b.) shall be explosion proof type according to the requirements of Section 150 of this chapter for Class I, Group D locations and shall otherwise conform to Section 150 of this chapter. (4-7-83)

ii. Unless specifically approved for locations containing both deposits of readily ignitable residues and explosive vapors, there shall be no electrical equipment in the vicinity of dip tanks or associated drainboards or drying operations which are subject to splashing or dripping of dip tank liquids, except wiring in rigid conduit or in threaded boxes or fittings containing no taps, splices, or terminal connections, and except as specifically permitted in Section 242.07.c. (4-7-83)

b. Adjacent Areas. In any floor space outside a vapor area but within 20 feet therefrom, and not separated by tight partitions, there shall be no open flames or spark producing devices except as specifically permitted in NFPA Standard No. 86A-1969. Ovens and Furnaces, paragraph 200-7, and electrical wiring and equipment shall conform to the provisions of Sections 150 of this chapter. (4-7-83)

08. Operations and maintenance. (4-7-83)

a. General. Areas in the vicinity of dip tanks shall be kept as clear of combustible stock as practical and shall be kept entirely free of combustible debris. (4-7-83)

b. Waste Cans. When waste or rags are used in connection with dipping operations, approved metal waste cans shall be provided and all impregnated rags or waste deposited therein immediately after use. The contents of waste cans shall be properly disposed of at least once daily at the end of each shift. (4-7-83)

c. Inspection. Periodic inspection or tests of all dip tank facilities shall be made, including covers, overflow pipe inlets and discharge, bottom drains and valves, electrical wiring and equipment and grounding connections, ventilating facilities, and all extinguishing equipment. Any defects found shall be promptly corrected. (4-7-83)

d. Warning Signs. "No Smoking" signs in large letters on contrasting color background shall be

conspicuously posted in the vicinity of dip tanks. (4-7-83)

09. Extinguishment. (4-7-83)

a. Extinguishers. Areas in the vicinity of dip tanks shall be provided with manual fire extinguishers suitable for flammable and combustible liquid fires, conforming to Standard for Portable Fire Extinguishers NFPA No. 10-1970. (4-7-83)

b. Automatic Water Spray Extinguishing Systems. Such systems shall conform to NFPA Standard for Water Spray Systems for Fire Protection NFPA No. 15-1969 and shall be arranged to protect tanks, drainboards, and stock over drainboards. (4-7-83)

c. Automatic Foam Extinguishing Systems. Automatic foam extinguishing systems shall conform to NFPA Standard for Foam Extinguishing Systems, NFPA No. 11-1970 and; foam producing material selected shall be suitable for intended use, taking into account characteristics of the dip tank liquid. (4-7-83)

d. Overflow pipe shall be arranged to prevent the floating away of foam and clogging overflow pipe. This may be accomplished by either of the following: (4-7-83)

i. Overflow pipe may be extended through tank wall and terminated in an ell pointing downward. The bottom of the overflow pipe at the point it pierces tank wall should not be over 2 inches above the opening or face of the ell. (4-7-83)

ii. Overflow pipe inlet may be provided with a removable screen of ?-inch mesh having an area of at least twice the cross-sectional area of overflow pipe. Screens which may be clogged by dip tank ingredients shall be inspected and cleaned periodically. (4-7-83)

e. Automatic Carbon Dioxide Systems. Automatic carbon dioxide systems shall conform to NFPA Standards for Carbon Dioxide Extinguishing Systems NFPA No. 12-1968, and shall be arranged to protect both dip tanks and drainboards and unless stock over drainboards is otherwise protected with automatic extinguishing facilities, shall also be arranged to protect such stock. (4-7-83)

f. Dry Chemical Extinguishing Systems. Dry chemical extinguishing systems shall conform to NFPA Standard for Dry Chemical Extinguishing Systems NFPA No. 17-1969 and shall be arranged to protect both dip tanks and drainboards, and unless stock over drainboards is otherwise protected with automatic extinguishing facilities, shall also be arranged to protect such stock. (4-7-83)

g. Dip Tank Covers. (4-7-83)

i. covers arranged to close automatically in the event of fire shall be actuated by approved automatic devices and shall also be arranged for manual operation. (4-7-83)

ii. Covers shall be of substantial noncombustible material or of tin-clad type with enclosing metal applied with locked joints. (4-7-83)

iii. Chains or wire rope shall be sued for cover support or operating mechanism where the burning of a cord would interfere with the action of a device. (4-7-83)

10. Special dip tank applications. (4-7-83)

a. Hardening and Tempering Tanks. (4-7-83)

i. Tanks shall be located as far as practicable from furnaces and shall not be located on or near combustible floors. (4-7-83)

ii. Tanks shall be provided with a noncombustible hood and vent or other equally effective means of venting to the outside of the building to serve as a vent in case of fire. All such vent ducts shall be treated as flues and

be kept well away from combustible roofs or materials. (4-7-83)

iii. Tanks shall be so designed that the maximum workload is incapable of raising the temperature of the cooling medium to within 50 below its flash point, or such tanks shall be equipped with circulating cooling systems which will accomplish the same result. (4-7-83)

iv. Tanks shall be equipped with a high temperature limit switch arranged to sound an alarm when the temperature of the quenching medium reaches within 50 F. below the flashpoint. If practical from an operating standpoint, such limit switches shall also shut down conveying equipment supplying work to the tank. (4-7-83)

v. The provisions of Section 2135.e. shall apply to tanks having a liquid surface area of 25 square feet or more or a capacity of 500 gallons or more. (4-7-83)

vi. Air under pressure shall not be used to fill or to agitate oil tanks. (4-7-83)

vii. Drain facilities from the bottom of the tank may be combined with the oil circulating system or arranged independently to drain the oil to a safe location. The drain valve shall be operated automatically with approved heat actuated devices or manually, and if the latter, the valve shall be operated from a safe distance. (4-7-83)

b. Flow Coat; General. (4-7-83)

i. Except as modified in this subsection, all of the preceding standards for dip tanks apply. (4-7-83)

ii. All piping shall be strongly erected and rigidly supported. (4-7-83)

iii. Paint shall be supplied by direct low-pressure pumping arranged to automatically shut down by means of approved heat actuated devices, in the case of fire, or paint may be supplied by a gravity tank not exceeding 10 gallons in capacity. (4-7-83)

iv. The area of the sump and any areas on which paint flows should be considered the area of dip tank. (4-7-83)

c. Electrostatic Apparatus; General. (4-7-83)

i. Installation and use of electrostatic detearing equipment shall conform to Sections 242.01 through 242.06 of this chapter. (4-7-83)

ii. Electrostatic apparatus and devices used in connection with paint detearing operations shall be of approved types. (4-7-83)

iii. Transformers, power-packs, control apparatus, and all other electrical portions of the equipment, with the exception of high voltage grids and their connections, shall be located outside the vapor area or shall conform to the requirements of Section 242.04. (4-7-83)

iv. Electrodes shall be of substantial construction, shall be rigidly supported in permanent locations and shall be effectively insulated from ground. Insulators shall be nonporous and noncombustible. (4-7-83)

v. High voltage leads to electrodes shall be effectively and permanently supported on suitable insulators, and shall be effectively guarded against accidental contact or grounding. An automatic means shall be provided for grounding and discharging any accumulated residual charge on the electrode assembly or the secondary circuit of the high voltage transformer when the transformer primary is disconnected from the source of supply. (4-7-83)

vi. A space shall be maintained between goods being deteared and electrodes or conductors of at least twice the sparking distance shall be conspicuously posted near the assembly. (4-7-83)

vii. Goods being deteared using this electrostatic process are to be supported on conveyors. The conveyors shall be so arranged as to maintain safe distance between the goods and the electrodes at all times. All goods shall be so supported as to prevent any swinging or movement which would reduce the clearance to less than specified in c.vi. of this section. (4-7-83)

viii. This electrostatic process is not approved where goods being deteared are manipulated by hand. (4-7-83)

ix. Electrostatic apparatus shall be equipped with automatic controls which will operate without time delay to disconnect the power supply to the high voltage transformer and to signal the operator under any of the following conditions: Stoppage of ventilating fans or failure of ventilating equipment from any cause; Stoppage of the conveyor carrying goods past the high voltage grid; Occurrence of a ground of imminent ground at any point on the high voltage system; Reduction of clearance below that specified in c.vi. of this section. (4-7-83)

x. Adequate fencing, railings, or guards shall be so placed about the equipment that they, either by their location or character or both assure that a safe isolation of the process is maintained from plant storage or personnel. Such railings, fencing and guards shall be of conducting material, adequately grounded, and should be at least 5 feet from processing equipment. (4-7-83)

xi. Electrode insulators shall be kept clean and dry. (4-7-83)

xii. The detearing area shall be ventilated by exhausting adequate air from the area as specified in Section 243.01. (4-7-83)

xiii. All areas for detearing shall be protected by automatic sprinklers where this protection is available. Where this protection is not available, other approved automatic extinguishing equipment shall be provided. (4-7-83)

xiv. Drip plates and screens subject to paint deposits shall be removable and shall be taken to a safe place of cleaning. (4-7-83)

d. Roll Coating. (4-7-83)

i. The processes of roll coating, spreading and impregnating, in which fabrics, paper or other materials are passed directly through a tank containing flammable or combustible liquids, or over the surface of a roller that revolves partially submerged in a Class I, or Class II liquids, as these terms are defined in Section 220.01 of this chapter, shall conform to the applicable requirements of Sections 242.01 through 242.06. (7-1-93)

ii. Adequate arrangements shall be made to prevent sparks from static electricity bonding and grounding all metallic rotating and other parts of machinery and equipment and by the installation of static collectors or maintaining a conductive atmosphere such as a high relative humidity. (4-7-83)

11. Chlorine cylinders used in chlorinator systems. (4-7-83)

a. Ventilation, storage of tanks and use of tanks shall meet specifications of the Chlorine Manual, The Chlorine Institute, Inc., Third Edition, 1959. (4-7-83)

243. VENTILATION.

01. Vapor area ventilation. Vapor areas as defined in Section 242.01.b. shall be limited to the smallest practical space by maintaining a properly designed system of mechanical ventilation arranged to move air from all directions towards the vapor area origin and thence to a safe outside location. Ventilating systems shall conform to the Standards of Blower and Exhaust Systems (NFPA Pamphlet No. 91-1969). Required ventilating systems shall be so arranged that the failure of any ventilating fan shall automatically stop any dipping conveyor system. See also Section 242.02. (4-7-83)

02. Ventilation combined with drying. When a required ventilating system serves associated drying operations utilizing a heating system which may be a source of ignition, means shall be provided for preventilation

before the heating system can be started; the failure of any ventilating fan shall automatically shut down the heating system; and the installation shall otherwise conform to the Standard for Ovens and Furnaces (NFPA No. 86A-1969). (4-7-83)

03. General. (4-7-83)

a. This paragraph applies to all operations involving the immersion of materials in liquids, or in the vapors of such liquids, for the purpose of cleaning or altering the surface or adding to or imparting a finish thereto or changing the character of the materials and their subsequent removal from the liquid or vapor, draining, and drying. These operations include washing, electroplating, anodizing, pickling, quenching, dying, dipping, tanning, dressing, bleaching, degreasing, alkaline cleaning, stripping, rinsing, digesting, and other similar operations. (4-7-83)

b. Except where specific construction specifications are prescribed in this section, hoods, ducts, elbows, fans, blowers, and all other exhaust system parts, components, and supports thereof shall be so constructed as to meet conditions of service and to facilitate maintenance and shall conform in construction to the specifications contained in American National Standard Fundamentals Governing the Design and Operation of Local Exhaust Systems, Z9.2-1960. (4-7-83)

04. Classification of open surface tank operations. (4-7-83)

a. Open-surface tank operations shall be classified into 16 classes, numbered A-1 to D-4, inclusive. (4-7-83)

b. Determination of Class. Class is determined by two factors, hazard potential designated by a letter from A to D, inclusive, and rate of gas, vapor, or mist evolution designated by a number from 1 to 4, inclusive (for example, B.3). (4-7-83)

c. Hazard potential is an index, on a scale from A to D, inclusive, of the severity of the hazard associated with the substance contained in the tank because of the toxic, flammable, or explosive nature of the vapor, gas, or mist produced therefrom. The toxic hazard is determined from the concentration, measured in parts by volume of a gas or vapor, per million parts by volume of contaminated air (p.p.m.) or in milligrams of mist per cubic meter of air (mg./m.3), below which ill effects are unlikely to occur to the exposed worker. (4-7-83)

d. The relative fire or explosion hazard is measured in degrees Fahrenheit in terms of the closed-cup flash point of the substance in the tank. Detailed information on the prevention of fire hazards in dip tanks may be found in Dip Tanks Containing Flammable or Combustible Liquids, NFPA No. 34-1966, National Fire Protection Association. Where the tank contains a mixture of liquids, other than organic solvents, whose effects are additive, the hygienic standard of the most toxic component (for example, the one having the lowest p.p.m. or mg./m.3) shall be used, except where such substance constitutes an insignificantly small fraction of the mixture. For mixtures of organic solvents their combined effect, rather than that of either individually, shall determine the hazard potential. In the absence of information to the contrary, the effects shall be considered as additive. If the sum of the ratios of the airborne concentration of each contaminant to the toxic concentration of that contaminant exceeds unity, the toxic concentration shall be considered to have been exceeded. (See Note A to Subdivision e. of this paragraph.) (4-7-83)

e. Hazard potential shall be determined from Table 2145-A with the value indicating greater hazard being used. When the hazardous material may be either a vapor with a threshold limit value (TLV) in p.p.m. or a mist with a TLV in mg./m.3, the TLV indicating the greater hazard shall be used (for example, A takes precedence over B or C; B over C; C over D).

NOTE: A: (c1 / TLV1) + (C2 / TLV2+(C3 / TLV3) +; (Cn / TLVn)1 where C equals concentration measured at the operation in p.p.m. (4-7-83)

TABLE 243.04-A, DETERMINATION OF HAZARD POTENTIAL, available at Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone (208) 334-6000.

f. Rate of gas, vapor, or mist evolution is a numerical index, on a scale of from 1 to 4, inclusive, both of the relative capacity of the tank to produce gas, vapor, or mist and of the relative energy with which it is projected

or carried upwards from the tank. Rate is evaluated in terms of: (4-7-83)

i. The temperature of the liquid in the tank in degrees Fahrenheit; (4-7-83)

ii. The number of degrees Fahrenheit that this temperature. (4-7-83)

iii. The relative evaporation of the liquid in still air at room temperature in an arbitrary scale -- fast, medium, slow, or nil; and (4-7-83)

iv. The extent that the tank gases or produces mist in an arbitrary scale -- high, medium, low, and nil. (See Table 243.04-B, Note 2.)Gassing depends upon electrochemical or mechanical processes, the effects of which have to be individually evaluated for each installation (see Table 243.04-B, Note 3). (4-7-83)

g. Rate of evolution shall be determined from Table 243. 04-B. When evaporation and gassing yield different rates, the lowest numerical value shall be used. (4-7-83)

TABLE 243.04-B, DETERMINATION OF RATE OF GAS, VAPOR, OR MIST EVOLUTION1,
available at Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone (208) 334-6000.

i. In certain classes of equipment specifically vapor degreasers, an internal condenser or vapor level thermostat is used to prevent the vapor from leaving the tank during normal operation. In such cases, rate of vapor evolution from the tank into the workroom is not dependent upon the factors listed in the table, but rather upon abnormalities of operating procedure, such as carryout of vapors from excessively fast parts, contamination of solvent by water and other materials, or improper heat balance. When operating procedure is excellent effective rate of evolution may be taken as 4. When operating procedure is average, the effective rate of evolution may be taken as 3. When the operation is poor, a rate of 2 or 1 is indicated, depending upon observed conditions. (4-7-83)

ii. Relative evaporation rate is determined according to the methods described by A. K. Doolittle in Industrial and Engineering Chemistry, Vol. 27, P. 1169, (3) where time for 100-percent evaporation is as follows: Fast: 0-3 hours; Medium: 3-12 hours; Slow: 12-50 hours; Nil: more than 50 hours. (4-7-83)

iii. Gassing means the formation by chemical or electrochemical action of minute bubbles of gas under the surface of the liquid in the tank is generally limited to aqueous solutions. (4-7-83)

05. Ventilation. Where ventilation is used to control potential exposures to workers as defined in Section 243.04 of this chapter, it shall be adequate to reduce the concentration of the air contaminant to the degree that a hazard to the worker does not exist. Methods of ventilation are discussed in American National Standard Fundamentals Governing the Design and Operation of Local Exhaust Systems, Z9.2-1960. (4-7-83)

06. Control requirements. (4-7-83)

a. Control velocities shall conform to Table 243. 06-A in all cases where the flow or air past the breathing or working zone of the operator and into the goods is undisturbed by local environmental conditions, such as open windows, wall fans, unit heaters, or moving machinery. (4-7-83)

b. All tanks exhausted by means of hoods which: (4-7-83)

i. project over the entire tank; (4-7-83)

ii. Are fixed in position in such a location that the head of the workman, in all his normal operating positions while working at the tank, is in front of all hood openings; and (4-7-83)

iii. Are completely enclosed on at least two sides, shall be considered to be exhausted through an enclosing hood. (4-7-83)

iv. The quantity of air in cubic feet per minute necessary to be exhausted through an enclosing hood shall be not less than the product of the control velocity times the net area of all openings in the enclosure through

which air can flow into the hood. (4-7-83)

c. All tanks exhausted by means of hoods which do not project over the entire tank, and in which the direction of air movement into the hood or hoods is substantially horizontal, shall be considered to be laterally exhausted. The quantity of air in cubic feet per minute necessary to be laterally exhausted per square foot of tank area in order to maintain the required control velocity shall be determined from Table 243. 06-B for all variations in ratio of tank width (W) to tank length (L). The total quantity of air in cubic feet per minute required to be exhausted per tank shall be not less than the product of the area of tank surface times the cubic feet per minute per square foot of tank area, determined from Table 243. 06-B. (4-7-83)

i. For lateral exhaust hoods over 42 inches wide, or where it is desirable to reduce the amount of air removed from the workroom, air supply slots or orifices shall be provided along the side or the center of the tank opposite from the exhaust slots. The design of such systems shall meet the following criteria: (a) The supply air volume plus the entrained air shall not exceed 50 percent of the exhaust volume. (b) The velocity of the supply airstream as it reaches the effective control area of the exhaust slot shall be less than the effective velocity over the exhaust slot area. (c)The vertical height of the receiving exhaust hood, including any baffle, shall not be less than one-quarter the width of the tank. (d)The supply airstream shall not be allowed to impinge on obstructions between it and the exhaust slot in such a manner as to significantly interfere with the performance of the exhaust hood. (4-7-83)

TABLE 243.06-A, CONTROL VELOCITIES IN FEET PER MINUTE (F. P. M.) FOR UNDISTURBED LOCATIONS, available at Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone (208) 334-6000.

ii. See Table 243. 06-B for computation of ventilation rate. (4-7-83)

iii. Do not use canopy hood for Hazard Potential A Processes. (4-7-83)

iv. Where complete control of hot water is desired, design as next highest class. (4-7-83)

TABLE 2147-B, MINIMUM VENTILATION RATE IN CUBIC FEET OF AIR PER MINUTE, PER SQUARE FOOT OF TANK AREA FOR LATERAL EXHAUST, available at Idaho Industrial Commission, 317 Main, Boise, Idaho 83720, Telephone (208) 334-6000.

v. It is not practicable to ventilate across the long dimension of a tank whose ratio W/L exceeds 2.0. It is undesirable to do so when W/L exceeds 1.0. For circular tanks with lateral exhaust along up to ? the circumference, use W/L = 1.0; for over one-half the circumference use W/L = 0.5. (4-7-83)

vi. Baffle is a vertical plate the same length as the tank, and with the top of the plate as high as the tank is wide. If the exhaust hood is on the side of a tank against a building wall or close to it, it is perfectly baffled. (4-7-83)

vii. Use W/2 as tank width in computing when manifold is along centerline, or when hoods are used on two parallel sides of a tank. Tank width (W) means the effective width over which the hood must pull air to operate (for example, where the hood face is set back from the edge of the tank, this set back must be added in measuring tank width). The surface area of tanks can frequently be reduced and better control obtained (particularly on conveyorized systems) by using covers extending from the upper edges of the slots toward the center of the tank. (4-7-83)

viii. Since most failure of pushpull systems result from excessive supply air volumes and pressures, methods of measuring and adjusting the supply air shall be provided. When satisfactory control has been achieved, the adjustable features of the hood shall be fixed so that they will not be altered. (4-7-83)

d. All tanks exhausted by means of hoods which project over the entire tank and which do not conform to the definition of enclosing hoods, shall be considered to be overhead canopy hoods. The quantity of air in cubic feet per minute necessary to be exhausted through a canopy hood shall be not less than the product of the control velocity times the net area of all openings between the bottom edges of the hood and the top edges of the tank. (4-7-83)

e. The rate of vapor evolution (including steam or products of combustion) from the process shall be estimated. If the rate of vapor evolution is equal to or greater than 10 percent of the calculated exhaust volume required, the exhaust volume shall be increased in equal amount. (4-7-83)

07. Spray cleaning and degreasing. Wherever spraying or other mechanical means are used to disperse a liquid above an open-surface tank, control must be provided for the airborne spray. Such operations shall be enclosed as completely as possible. The inward air velocity into the enclosure shall be sufficient to prevent the discharge of spray into the workroom. Mechanical baffles may be used to help prevent the discharge of spray. Spray painting operations are covered by Sections 240.01 through 241.20 of this chapter. (4-7-83)

08. Control means other than ventilation. Tank covers, foams, beads, chips or other materials floating on the tank surface so as to confine gases, mists, or vapors to the area under the cover or to the foam, bead, or chip layer; or surface tension depressive agents added to the liquid in the tank to minimize mist formation, or any combination thereof, may all be used as gas, mist, or vapor control means for open-surface tank operations, provided that they effectively reduce the concentrations of hazardous materials in the vicinity of the worker below the limits set in accordance with section 243.06.c.i.(b) of this chapter. (4-7-83)

09. System design. (4-7-83)

a. The equipment for exhausting air shall have sufficient capacity to produce the flow of air required in each of the hoods and openings of the system. (4-7-83)

b. The capacity required in a. of this section shall be obtained when the airflow producing equipment is operating against the following pressure losses, the sum of which is the static pressure: (4-7-83)

i. Entrance losses into the hood. (4-7-83)

ii. Resistance to air flow in branch pipe including bends and transformations. (4-7-83)

iii. Entrance loss into the main pipe. (4-7-83)

iv. Resistance to airflow in main pipe including bends and transformations. (4-7-83)

v. Resistance of mechanical equipment; that is, filters, washers, condensers, absorbers, etc., plus their entrance and exit losses. (4-7-83)

vi. Resistance in outlet duct and discharge stack. (4-7-83)

c. Two or more operations shall not be connected to the same exhaust system where either one or the combination of the substances removed may constitute a fire, explosion, or chemical reaction hazard in the duct system. Traps or other devices shall be provided to insure that condensate in ducts does not drain back into any tank. (4-7-83)

d. The exhaust system, consisting of hoods, ducts, air mover, and discharge outlet, shall be designed in accordance with American National Standard Fundamentals Governing the Design and Operation of Local Exhaust Systems, Z9.2-1960, or the manual, Industrial Ventilation, published by the American Conference of Governmental Industrial Hygienists, 1970. Airflow and pressure loss data provided by the manufacturer of any air cleaning device shall be included in the design calculations. (4-7-83)

10. Operation. (4-7-83)

a. The required air flow shall be maintained at all times during which gas, mist or vapor is emitted from the tank, and at all times the tank, the draining, or the drying area is in operation or use. When the system is first installed, the airflow from each hood shall be measured by means of a pivot traverse in the exhaust duct and corrective action taken if the flow is less than that required. When the proper flow is obtained, the hood static pressure shall be measured and recorded. At intervals of not more than 3 months operation, or after a prolonged shutdown period, the hoods and duct system shall be inspected for evidence of corrosion or damage. In any case where the

airflow is found to be less than required, it shall be increased to the required value. (Information on airflow and static pressure measurement and calculations may be found in American National Standard Fundamental Governing the Design and Operation of Local Exhaust systems Z9.2-1960, or in the manual, Industrial Ventilation, published by the American Conference of Governmental Industrial Hygienists.) (4-7-83)

b. The exhaust system shall discharge to the outer air in such a manner that the possibility of its effluent entering any building is at a minimum. Recirculation shall only be through a device for contaminant removal which will prevent the creation of a health hazard in the room or area to which the air is recirculated. (4-7-83)

c. A volume of outside air in the range of 90% to 110% of the exhaust volume shall be provided to each room having exhaust hoods. The outside air supply shall enter the workroom in such a manner as not to be detrimental to any exhaust hood. The air-flow of the make-up air system shall be measured on installation. Periodically, thereafter, the airflow should be remeasured, and corrective action shall be taken when the airflow is below that required. The makeup air shall be uncontaminated. (4-7-83)

11. Personal protection. (4-7-83)

a. All employees working in and around open-surface tank operations must be instructed as to the hazards of their respective jobs, and in the personal protection and first aid procedures applicable to these hazards. (4-7-83)

b. All persons required to work in such a manner that their feet may become wet shall be provided with rubber of other impervious boots or shoes, rubbers, or wooden-soled shoes sufficient to keep feet dry. (4-7-83)

c. All persons required to handle work wet with a liquid other than water shall be provided with gloves impervious to such a liquid and of a length sufficient to prevent entrance of liquid into the tops of the gloves. The interior of gloves shall be kept free from corrosive or irritating contaminants. (4-7-83)

d. All persons required to work in such a manner that their clothing may become wet shall be provided with such aprons, coats, jackets, sleeves, or other garments made of rubber of other materials impervious to liquids other than water, as are required to keep their clothing dry. Aprons shall extend well below the top of boots to prevent liquid splashing into the boots. Provisions of dry, clean, cotton clothing along with rubber shoes or short boots and an apron impervious to liquids other than water shall be considered a satisfactory substitute where small parts are cleaned, plated, or acid dipped in open tanks and rapid work is required. (4-7-83)

e. Whenever there is a danger of splashing, for example, when additions are made manually to the tanks, or when acids and chemicals are removed from the tanks, the employees so engaged shall be required to wear either tight-fitting chemical goggles or an effective face shield. See Section 051.01 of this chapter. (4-7-83)

f. When, during emergencies as described in Section 243.13.e. of this chapter, workers must be in areas where concentrations of air contaminants are greater than the limit set by Section 243.04.c. of this chapter, or oxygen concentrations are less than 19.5%, they shall be required to wear respirators adequate to reduce their exposure to a level below these limits, or to provide adequate oxygen. Such respirators shall also be provided in marked, quickly accessible storage compartments built for the purpose, when there exists the possibility of accidental release of hazardous concentrations of air contaminants. Respirators shall be approved by the U. S. Bureau of Mines, U. S. Department of the Interior and shall be selected by a competent industrial hygienist or other technically qualified source. Respirators shall be used in accordance with Section 052.01 of this chapter, and persons who may require them shall be trained in their use. (4-7-83)

g. Near each tank containing a liquid which may burn, irritate, or otherwise be harmful to the skin if splashed upon the worker's body, there shall be a supply of clean cold water. The water pipe (carrying a pressure not exceeding 25 pounds) shall be provided with a quick opening valve and at least 48 inches of hose not smaller than three-fourths inch, so that no time may be lost in washing off liquids from the skin or clothing. Alternately, deluge showers and eye flushes shall be provided in cases where harmful chemicals may be splashed on parts of the body. (4-7-83)

h. Operators with sores, burns, or other skin lesions requiring medical treatment shall not be allowed

to work at their regular operations until so authorized by a physician. Any small skin abrasions, cuts, rash, or open sores which are found or reported shall be treated by a properly designated person so that chances of exposures to the chemicals are removed. Workers exposed to chromic acids shall have a periodic examination made of the nostrils and other parts of the body, to detect incipient ulceration. (4-7-83)

i. Sufficient washing facilities, including soap, individual towels, and hot water, shall be provided for all persons required to use or handle any liquids which may burn, irritate, or otherwise be harmful to the skin, on the basis of at least one basin (or its equivalent) with a hot water faucet for every 10 employees. See Section 080.01 of this chapter. (4-7-83)

j. Locker space or equivalent clothing storage facilities shall be provided to prevent contamination of street clothing. (4-7-83)

k. First aid facilities specific to the hazards of the operations conducted shall be readily available. (4-7-83)

12. Special precautions for cyanide. Dikes or other arrangements shall be provided to prevent the possibility of intermixing of cyanide and acid in the event of tank rupture. (4-7-83)

13. Inspection, maintenance and installation. (4-7-83)

a. Floors and platforms around tanks shall be prevented from becoming slippery both by original type of construction and by frequent flushing. They shall be firm, sound, and of the design and construction to minimize the possibility of tripping. (4-7-83)

b. Before cleaning the interior of any tank, the contents shall be drained off, and the cleanout doors shall be opened where provided. All pockets in tanks or pits, where it is possible for hazardous vapors to collect, shall be ventilated and cleared of such vapors. (4-7-83)

c. Tanks which have been drained to permit employees to enter for the purposes of cleaning, inspection, or maintenance may contain atmospheres which are hazardous to life or health, through the presence of flammable or toxic air contaminants, or through the absence of sufficient oxygen. Before employees shall be permitted to enter any such tank, appropriate tests of the atmosphere shall be made to determine if the limits set by Section 243.04.c. of this chapter are exceeded, or if the oxygen concentration is less than 19. 5%. (4-7-83)

d. If the tests made in accordance with c. of this section indicate that the atmosphere in the tank is unsafe, before any employee is permitted to enter the tank, the tank shall be ventilated until the hazardous atmosphere is removed, and ventilation shall be continued so as to prevent the occurrence of a hazardous atmosphere as long as an employee is in the tank. (4-7-83)

e. If, in emergencies, such as rescue work, it is necessary to enter a tank which may contain a hazardous atmosphere, suitable respirators, such as self-contained breathing apparatus; hose mask with blower, if there is a possibility of oxygen deficiency; or a gas mask, selected and operated in accordance with Section 243.11.f. of this chapter shall be used. If a contaminant in the tank can cause dermatitis, or be absorbed through the skin, the employee entering the tank shall also wear protective clothing. At least one trained standby employee, with suitable respirator, shall be present in the nearest uncontaminated area. The standby employee must be able to communicate with the employee in the tank and be able to haul him out of the tank with a lifeline if necessary. (4-7-83)

f. Maintenance work requiring welding or open flame, where toxic metal fumes such as cadmium, chromium, or lead may be involved, shall be done only with sufficient local exhaust ventilation to prevent the creation of a health hazard, or be done with respirators selected and used in accordance with Section 243.11.f. of this chapter. Welding, or the use of open flames near any solvent cleaning equipment shall be permitted only after such equipment has first been thoroughly cleared of solvents and vapors. (4-7-83)

14. Vapor degreasing tanks. (4-7-83)

a. In any vapor degreasing tank equipped with a condenser or vapor level thermostat, the condenser or

thermostat shall keep the level of vapors below the top edge of the tank by a distance of at least equal to one-half the tank width, or at least 36 inches, whichever is shorter. (4-7-83)

b. Where gas is used as a fuel for heating vapor degreasing tanks, the combustion chamber shall be of tight construction, except for such openings as the exhaust flue, and those that are necessary for supplying air for combustion. Flues shall be of corrosion-resistant construction and shall extend to the outer air. If mechanical exhaust is used on this flue, a draft diverter shall be used. Special precautions must be taken to prevent solvent fumes from entering the combustion air of this or any other heater when chlorinated or fluorinated hydrocarbon solvents (for example, trichloroethylene, Freon) are used. (4-7-83)

c. Heating elements shall be so designed and maintained that their surface temperature will not cause the solvent of mixture to decompose, break down, or be converted into an excessive quantity of vapor. (4-7-83)

d. Tanks or machines of more than 4 square feet of vapor area, used for solvent cleaning or vapor degreasing, shall be equipped with suitable cleanout or sludge doors located near the bottom of each tank or still. These doors shall be so designed and gasketed that there will be no leakage of solvent when they are closed. (4-7-83)

15. Scope. (4-7-83)

a. These paragraphs (243.01 through 243.15) applies to all operations involving the immersion of materials in liquids, or in the vapors of such liquids for the purpose of cleaning or altering their surfaces, or adding or imparting a finish thereto, or changing the character of the materials, and their subsequent removal from the liquids or vapors, draining and drying. Such operations include washing, electroplating, anodizing, pickling, quenching, dyeing, dipping tanning, dressing, bleaching, degreasing, alkaline cleaning, stripping, risning, degesting, and other similar operations, but do not include molten materials handling operations, or surface coating operations. (4-7-83)

b. "Molten Materials Handling Operations" means all operations, other than welding, burning, and soldering operations involving the use, melting, smelting, or pouring of metals, alloys, salts, or other similar substances in the molten state. Such operations also include heat treating baths, descaling baths, die casting stereotyping, galvanizing, tanning, and similar operations. (4-7-83)

c. "Surface Coating Operations" means all operations involving the application of protective, decorative, adhesive, or strengthening coating or impregnation to one or more surfaces, or into the intertices of any object or material, by means of spraying, spreading, flowing, brushing, roll coating, pouring, cementing, or similar means; and any subsequent draining or drying operations, excluding open-tank operations. (4-7-83)

244. -- 249. (RESERVED).

250. MACHINERY AND MACHINE GUARDING.

01. Machinery and machine guarding - General requirements for all machines. Scope and application. All sections of this chapter V apply to machinery and machine guarding. (4-7-83)

02. Machine guarding. (4-7-83)

a. Types of guarding. One or more methods of machine guarding shall be provided to protect the operator and other employees in the machine area from hazards such as those created by point of operation, ingoing nip points, rotating parts, flying chips and sparks. Example of guarding methods are: Barrier guards, two-hand tripping devices, electronic safety devices, etc. (4-7-83)

b. General requirements for machine guards. Guards shall be affixed to the machine where possible and secured elsewhere if for any reason attachment to the machine is not possible. The guard shall be such that it does not offer an accident hazard in itself. (4-7-83)

c. Point of operation guarding. (4-7-83)

i. Point of operation is the area on a machine where work is actually performed upon the material

being processed. (4-7-83)

ii. The point of operation of machines whose operation exposes an employee to injury shall be guarded. The guarding device shall be in conformity with any appropriate standards thereof, or, in the absence of applicable specific standards, shall be so designed and constructed as to prevent the operator from having any part of his body in the danger zone during the operating cycle. (4-7-83)

iii. Special handtools for placing and removing material shall be such as to permit easy handling of material without the operator placing a hand in the danger zone. Such tools shall not be in lieu of other reguarding required by this Chapter, but can only be used to supplement protection provided. (4-7-83)

iv. The following are some of the machines which usually require point of operation guarding: guillotine cutters, shears, alligator shears, power presses, milling machines, power saws, jointers, portable power tools, forming tools and calendars. (4-7-83)

d. Barrels, containers, and drums. Revolving drums, barrels, and containers shall be guarded by an enclosure which is interlocked with the drive mechanism, so that the barrel, drum, or container cannot revolve unless the guard enclosure is in place. (4-7-83)

e. Exposure of blades. When the periphery of the blades of a fan is less than seven (7) feet above the floor or working level, the blades shall be guarded. The guard shall have openings no larger than one-half (?) inch. Safeguards shall be so constructed that rods, pipes, or like material being handled by workmen will not enter same, and come in contact with moving machinery. (4-7-83)

f. Cams and other machine parts which move in such a manner as to create shearing or crushing hazards shall, if exposed to contact, be guarded with a standard safeguard. (4-7-83)

03. Anchoring fixed machinery. Machines designed for a fixed location shall be securely anchored to prevent walking or moving. (4-7-83)

04. Means to prevent slipping. Operators of dangerous machinery, such as shapers, jointers, and circular saws, shall be safeguarded against slipping on smooth, oily or otherwise slippery floor, where he stands while at the point of operation of such dangerous machinery, by covering such portion of the floor with a rubber mat, cork, non-slip composition flooring, or some other effective means of preventing slipping. (4-7-83)

05. Tag or Lockout. The workman making the repairs or adjustments shall tag and/or lock out the main disconnecting device, warning that the machine shall not be started. The said tag and/or lock shall not be removed by any other person than the one who attached it, unless authorized by a department head, i.e., superintendent or foreman, after proper investigation and notification to the person applying the tag and/or lock. These tags and/or locks shall carry the name of the person applying, and the time and date of application. (4-7-83)

06. Machines shall be stopped when making repairs. All power-driven machinery shall be stopped and brought to a complete standstill before any repairs or adjustments are made, or pieces of material or refuse removed, except where motion is necessary to make adjustment. (4-7-83)

07. Counterweights. All counterweights exposed to contact shall be guarded with standard safeguards . (4-7-83)

251. FIXED AND PORTABLE POWER TOOL REQUIREMENTS.

01. Definitions. (4-7-83)

a. "Point of operation" means that point at which cutting, shaping, boring, or forming is accomplished upon the stock. (4-7-83)

b. "Push stock" means a narrow strip of wood or other soft material with a notch cut into one end and which is used to push short pieces of material through saws. (4-7-83)

c. "Block" means a short block of wood, provided with a handle similar to that of a plane and a shoulder at the rear end, which is used for pushing short stock over revolving cutters. (4-7-83)

02. Machine construction general. (4-7-83)

a. Each machine shall be so constructed as to be free from sensible vibration when the largest size tool is mounted and run idle at full speed. (4-7-83)

b. Arbors and mandrels shall be constructed so as to have firm and secure bearing and be free from play. (4-7-83)

c. The use of wooden bandsaw wheels other than those of commercial manufacture is prohibited. (4-7-83)

d. Any automatic cutoff saw that strokes continuously without the operator being able to control each stroke shall not be used. (4-7-83)

e. Saw frames or tables shall be constructed with lugs cast on the frame or with an equivalent means to limit the size of the saw blade that can be mounted, so as to avoid overspeed caused by mounting a saw larger than intended. (4-7-83)

f. Circular saw fences shall be so constructed that they can be firmly secured to the table or table assembly without changing their alignment with the saw. For saws with tilting tables or tilting arbors the fence shall be so constructed that it will remain in a line parallel with the saw, regardless of the angle of the saw with the table. (4-7-83)

g. Circular saw gages shall be so constructed as to slide in grooves or tracks that are accurately machined, to insure exact alignment with the saw for all positions of the guide. (4-7-83)

h. Hinged saw tables shall be so constructed that the table can be firmly secured in any position and in true alignment of the saw. (4-7-83)

i. All belts, pulleys, gears, shafts, and moving parts shall be guarded in accordance with the specific requirements of Section 250.01 through 257.17 of this chapter. (4-7-83)

j. It is recommended that each power-driven woodworking machine be provided with a disconnect switch that can be locked in the off position. (4-7-83)

k. The frames and all exposed, noncurrent-carrying metal parts of portable electric woodworking machinery operated at more than 90 volts to ground shall be grounded and other portable motors driving electric tools which are held in the hand while being operated shall be grounded if they operate at more than 90 volts to ground. The ground shall be provided through use of a separate ground wire and polarized plug and receptacle. (4-7-83)

l. For all circular saws where conditions are such that there is a possibility of contact with the portion of the saw either beneath or behind the table, that portion of the saw shall be covered with an exhaust hood, or, if no exhaust system is required, with a guard that shall be so arranged as to prevent accidental contact with the saw. (4-7-83)

m. Revolving double arbor saws shall be fully guarded in accordance with all the requirements for circular crosscut saws or with all the requirements for circular ripsaws, according to the kind of saws mounted on the arbors. (4-7-83)

n. No saw, cutter head, or tool collar shall be placed or mounted on a machine arbor unless the tool has been accurately machined to size and shape to fit the arbor. (4-7-83)

o. Combs (featherboards) or suitable jigs shall be provided at the workplace for use when a standard

guard cannot be used, as in dadoing, grooving, jointing, moulding and rabbeting. (4-7-83)

03. Machine Controls and Equipment. (4-7-83)

a. A mechanical or electrical power control shall be provided on each machine to make it possible for the operator to cut off the power from each machine without leaving his position at the point of operation. (4-7-83)

b. On machines driven by belts and shafting, a locking-type belt shifter or an equivalent positive device shall be used. (4-7-83)

c. On applications where injury to the operator might result if motors were to restart after power failures, provision shall be made to prevent machines from automatically restarting upon restoration of power. (4-7-83)

d. Power controls and operating controls should be located within easy reach of the operator while he is at his regular work location, making it unnecessary for him to reach over the cutter to make adjustments. This does not apply to constant pressure controls used only for setup purposes. (4-7-83)

e. On each machine operated by electric motors, positive means shall be provided for rendering such controls or devices inoperative while repairs or adjustments are being made to the machines they control. (4-7-83)

f. Each operating treadle shall be protected against unexpected or accidental tripping. (4-7-83)

g. Feeder attachments shall have the feed rolls or other moving parts so covered or guarded as to protect the operator from hazardous points. (4-7-83)

04. Hand-Fed Ripsaws. (4-7-83)

a. Each circular hand-fed ripsaw shall be guarded by a hood which shall completely enclose that portion of the saw above the table and that portion of the saw above the material being cut. The hood and mounting shall be arranged so that the hood will automatically adjust itself to the thickness of and remain in contact with the material being cut but it shall not offer any considerable resistance to insertion of material to saw or to passage of the material being sawed. The hood shall be made of adequate strength to resist blows and shall be so designed as to protect the operator from flying splinters and broken saw teeth. It shall be made of material that is soft enough so that it will be unlikely to cause tooth breakage. The material should not shatter when broken, should be nonexplosive, and should be no more flammable than wood. The hood shall be so mounted as to insure that its operation will be positive, reliable and in true alignment with the saw; and the mounting shall be adequate in strength to resist any reasonable side thrust or other force tending to throw it out of line. (4-7-83)

b. Each hand-fed circular ripsaw shall be furnished with a spreader to prevent material from squeezing the saw or being thrown back on the operator. The spreader shall be made of hard tempered steel, or its equivalent, and shall be thinner than the saw kerf. It shall be of sufficient width to provide adequate stiffness or rigidity to resist any reasonable side thrust or blow tending to bend or throw it out of position. The spreader shall be attached so that it will remain in true alignment with the saw even when either the saw or table is tilted, and should be placed so that there is not more than 1/2-inch space between the spreader and the back of the saw when the largest saw is mounted in the machine. The provision of a spreader in connection with grooving, dadoing, or rabbeting is not required. On the completion of such operations, the spreader shall be immediately replaced. (4-7-83)

c. Each hand-fed circular ripsaw shall be provided with non-kickback fingers on dogs so located as to oppose the thrust or tendency of the saw to pick up the material or to throw it back toward the operator. They shall be designed to provide adequate holding power for all the thicknesses of materials being cut. (4-7-83)

05. Hand-Fed Crosscut Table Saws. (4-7-83)

a. Each circular crosscut table saw shall be guarded by a hood which shall meet all the requirements of Section 2211.A. for hoods for circular ripsaws. (4-7-83)

b. Each circular crosscut saw should also be provided with a spreader which should meet all the requirements. (4-7-83)

06. Circular Resaws. (4-7-83)

a. Each circular resaw shall be guarded by a hood or shield of metal above the saw. This hood or shield shall be so designed as to guard against danger from flying splinters or broken saw teeth. (4-7-83)

b. Each circular resaw (other than self-feed saws with a roller or sheel at back of the saw) shall be provided with a spreader fastened securely behind the saw. The spreader shall be slightly thinner than the saw kerf and slightly thicker than the saw disk. (4-7-83)

07. Self-Feed Circular Saws. (4-7-83)

a. Feed rolls and saws shall be protected by a hood or guard to prevent the hands of the operator from coming in contact with the in-running rolls at any point. The guard shall be constructed of heavy material, preferably metal, and the bottom of the guard shall come down to within 3/8-inch of the plane formed by the bottom or working surface of the feed rolls. This distance (3/8-inch) may be increased to 3/4-inch, provided the lead edge of the hood is extended to be not less than 5 1/2 inches in front of the rip point between the front roll and the work. (4-7-83)

b. Each self-feed circular ripsaw shall be provided with sectional non-kickback fingers for the full width of the feed rolls. They shall be located in front of the saw and so arranged as to be in continual contact with the wood being fed. (4-7-83)

08. Swing Cutoff Saws. The requirements of this section are also applicable to sliding cutoff saws mounted above the table. (4-7-83)

a. Each swing cutoff saw shall be provided with a hood that will completely enclose the upper half of the saw, the arbor end, and the point of operation at all positions of the saw. The hood shall be constructed in such a manner and of such material that it will protect the operator from flying splinters and broken saw teeth. Its hood shall be so designed that it will automatically cover the lower portion of the blade, so that when the saw is returned to the back of the table the hood will rise on top of the fence, and when the saw is moved forward the hood will drop on top of and remain in contact with the table or material being cut. (4-7-83)

b. Each swing cutoff saw shall be provided with an effective device to return the saw automatically to the back of the table when released at any point of its travel. Such a device shall not depend for its proper functioning upon any rope, cord, or If there is a counterweight, the bolts supporting the bar and counterweight shall be provided with cotter pins; and the counter-weight shall be prevented from dropping by either a bolt passing through both the bar and counterweight, or a bolt put through the extreme end of the bar, or, where the counterweight does not encircle (4-7-83)

c. Limit chains or other equally effective devices shall be provided to prevent the saw from swinging beyond the front or back edges of the table, or beyond a forward position where the gullets of the lowest saw teeth will rise above the table top. (4-7-83)

d. Inverted swing cutoff saws shall be provided with a hood that will cover the part of the saw that protrudes above the top of the table or above the material being cut. It shall automatically adjust itself to the thickness of and remain in contact with the material being cut. (4-7-83)

09. Radial Saws. (4-7-83)

a. The upper hood shall completely enclose the upper portion of the blade down to a point that will include the end of the saw arbor. The upper hood shall be constructed in such a manner and of such material that it will protect the operator from flying splinters, broken saw teeth, ect., and will deflect sawdust away from the operator. The sides of the lower exposed portion of the blade shall be guarded to the full diameter of the blade by a device that will automatically adjust itself to the thickness of the stock and remain in contact with stock being cut to give maximum protection possible for the operation being performed. (4-7-83)

b. Each radial saw used for ripping shall be provided with non-kickback fingers or dogs located on both sides of the saw so as to oppose the thrust or tendency of the saw to pick up the material or to throw it back toward the operator. They shall be designed to provide adequate holding power for all the thickness of material being cut. (4-7-83)

c. An adjustable stop shall be provided to prevent the forward travel of the blade beyond the position necessary to complete the cut in repetitive operations. (4-7-83)

d. Installation shall be in such a manner that the front end of the unit will be slightly higher than the rear, so as to cause the cutting head to return gently to the starting position when released by the operator. (4-7-83)

e. Ripping and ploughing shall be against the direction in which the saw turns. The direction of the saw rotation shall be conspicuously marked on the hood. In addition, a permanent label not less than 1 1/2 inches by 3/4-inch shall be affixed to the rear of the guard at approximately the level of the arbor, reading as follows: "Danger: Do Not Rip or Plough From This End". Such a label should be colored standard danger red. (4-7-83)

10. Bandsaws and Band Resaws. (4-7-83)

a. All portions of the saw blade shall be enclosed or guarded except for the working portion of the blade between the bottom of the guide rolls and the table. Bandsaw wheels shall be fully encased. The outside periphery of the enclosure shall be solid. The front and back of the band wheels shall be either enclosed by solid material or by wire mesh or perforated metal. Such mesh or perforated metal shall be not less than 0.037 inch (U. S. Gage No. 20), and the openings shall be not greater than 3/8-inch. Solid material used for this purpose shall be of an equivalent strength and firmness. The guard for the portion of the blade between the sliding guide and the upper-saw-wheel guard shall protect the saw blade at the front and outer side. This portion of the guard shall be self-adjusting to raise and lower with the guide. The upper-wheel guard shall be made to conform to the travel of the saw on the wheel, and the top member of the guard should have at least a 2-inch clearance outside the saw and be lined with smooth material, preferably metal. Effective brakes should be provided to stop the wheel in case of blade breakage. (4-7-83)

b. Each bandsaw machine shall be provided with a tension control device to indicate a proper tension for the standard saws used on the machine, in order to assist in the elimination of saw breakage due to improper tension. (4-7-83)

c. Feed rolls of band resaws shall be protected with a suitable guard to prevent the hands of the operator from coming in contact with the in-running rolls at any point. The guard shall be constructed of heavy material, preferably metal, and the edge of the guard shall come to within 3/8-inch of the plane formed by the inside face of the feed roll in contact with the stock being cut. (4-7-83)

11. Jointers. (4-7-83)

a. Each hand-fed planer and jointer with horizontal head shall be equipped with a cylindrical cutting head, the knife projection of which shall not exceed 1/8-inch beyond the cylindrical body of the head. (4-7-83)

b. The opening in the table shall be kept as small as possible. The clearance between the edge of the rear table and the cutter head shall be not more than 1/8-inch. The table throat opening shall be not more than 2 1/2 inches when tables are set or aligned with each other for zero cut. (4-7-83)

c. Each hand-fed jointer with a horizontal cutting head shall have an automatic guard which will cover all the section of the head on the working side of the fence or gage. The guard shall effectively keep the operator's hand from coming in contact with the revolving knives. The guard shall automatically adjust itself to cover the unused portion of the head and shall remain in contact with the material at all times. (4-7-83)

d. Each hand-fed jointer with horizontal cutting head shall have a guard which will cover the section of the head back of the gage or fence. (4-7-83)

e. Each wood jointer with vertical head shall have either an exhaust hood or other guard so arranged

as to enclose completely the revolving head, except for a slot of such width as may be necessary and convenient for the application of the material to be jointed. (4-7-83)

12. Tenoning Machines. (4-7-83)

a. Feed chains and sprockets of all double end tenoning machines shall be completely enclosed, except for that portion of chain used for conveying the stock. (4-7-83)

b. At the rear ends of frames over which feed conveyors run, sprockets and chains shall be guarded at the sides by plates projecting beyond the periphery of sprockets and the ends of lugs. (4-7-83)

c. Each tenoning machine shall have all cutting heads, and saws it used, covered by metal guards. These guards shall cover at least the unused part of the periphery of the cutting head. If such a guard is constructed of sheet metal, the material used shall be not less than 1/16-inch in thickness, and if cast iron is used, it shall be not less than 3/16-inch in thickness. (4-7-83)

d. Where an exhaust system is used, the guard shall form part or all of the exhaust hood and shall be constructed of metal of a thickness not less than that specified in C. of this section. (4-7-83)

13. Boring and Mortising Machines. (4-7-83)

a. Safety-bit chucks with no projecting set screws shall be used. (4-7-83)

b. Boring bits should be provided with a guard that will enclose all portions of the bit and chuck above the material being worked. (4-7-83)

c. The top of the cutting chain and driving mechanism shall be enclosed. (4-7-83)

d. If there is a counterweight, one of the following or equivalent means shall be used to prevent its dropping. (4-7-83)

i. It shall be bolted to the bar by means of a bolt passing through both bar and counterweight. (4-7-83)

iii. Where the counterweight does not encircle the bar, a safety chain shall be attached to it. (4-7-83)

iv. Other types of counterweights shall be suspended by chain or wire rope and shall travel in a pipe or other suitable enclosure wherever they might fall and cause injury. (4-7-83)

e. Universal joints on spindles of boring machines shall be completely enclosed in such a way as to prevent accidental contact by the operator. (4-7-83)

f. Each operating treadle shall be covered by an inverted U-shaped metal guard, fastened to the floor, and of adequate size to prevent accidental tripping. (4-7-83)

14. Wood Shapers and Similar Equipment. (4-7-83)

a. The cutting heads of each wood shaper, hand-fed panel raiser, or other similar machine not automatically fed, shall be enclosed with a cage or adjustable guard so designed as to keep the operator's hand away from the cutting edge. The diameter of circular shaper guards shall be not less than the greatest diameter of the cutter. In no case shall a warning device of leather or other material attached to the spindle be acceptable. (4-7-83)

b. Cylindrical heads should be used whenever the nature of the work will permit. Single cutter knives in shaper heads shall not be used unless properly balanced. (4-7-83)

c. All double-spindle shapers shall be provided with a spindle starting and stopping device for each spindle. (4-7-83)

15. Planing, Molding, Sticking, and Matching Machines. (4-7-83)

a. Each planing, molding, sticking, and matching machine shall have all cutting heads, and saws if used, covered by a metal guard. If such guard is constructed of sheet metal, the material used shall be not less than 1/16-inch in thickness, and if cast iron is used, it shall be not less than 3/16-inch in thickness. (4-7-83)

b. Where an exhaust system is used, the guards shall form part or all of the exhaust hood and shall be constructed of metal of a thickness not less than that specified in a. of this section. (4-7-83)

c. Feed rolls shall be guarded by a hood or suitable guard to prevent the hands of the operator from coming in contact with the in-running rolls at any point. The guard shall be fastened to the frame carrying the rolls so as to remain in adjustment for any thickness of stock. (4-7-83)

d. Surfacers or planers used in thicknessing multiple pieces of material simultaneously shall be provided with sectional infeed rolls having sufficient yield in the construction of the sections to provide feeding contact pressure on the stock, over the permissible range of variation in stock thickness specified or for such yielding sectional rolls, suitable section kickback finger devices shall be provided at the infeed end. (4-7-83)

16. Profile and Swing-Head Lathes and Wood Heel Turning Machine. (4-7-83)

a. Each profile and swinghead lathe shall have all cutting heads covered by a metal guard. If such a guard is constructed of sheet metal the material used shall be not less than 1/16-inch in thickness; and if cast iron is used, it shall be not less than 3/16-inch in thickness. (4-7-83)

b. Cutting heads on wood-turning lathes, whether rotating or not, shall be covered as completely as possible by hoods or shields, which should be hinged to the machines so that they can be thrown back for making adjustments. (4-7-83)

c. Shoe last and spoke lathes, doweling machines, wood heal turning machines, and other automatic wood-turning lathes of the rotating knife type shall be equipped with hoods enclosing the cutter blades completely except at the contact points while the stock is being cut. (4-7-83)

d. Lathes used for turning long pieces of wood stock held only between the two centers shall be equipped with long curved guards extending over the tops of the lathes in order to prevent the work pieces from being thrown out of the machines if they should become loose. (4-7-83)

e. Where an exhaust system is used, the guard shall form part or all of the exhaust hood and shall be constructed of metal of a thickness not less than that specified in a. of this section. (4-7-83)

17. Sanding Machines. (4-7-83)

a. Feed rolls of self-feed sanding machines shall be protected with a semi-cylindrical guard to prevent the hands of the operator from coming in contact with the in-running rolls at any point. The guard shall be constructed of heavy material, preferably metal, and firmly secured to the frame carrying rolls so as the remain in adjustment for any thickness of stock. The bottom of the guard should come down to within 3/8-inch of a plane formed by the bottom or contact face of the feed roll where it touches the stock. (4-7-83)

b. Each drum sanding machine shall have an exhaust hood, or other guard if no exhaust system is required, so arranged as to enclose the revolving drum, except for that portion of the drum above the table, if a table is used which may be necessary and convenient for the application of the material to be finished. (4-7-83)

c. Each disk sanding machine shall have the exhaust hood, or other guard if no exhaust system is required, so arranged as to enclose the revolving disk, except for that portion of the disk above the table, if a table is used, which may be necessary for the application of the material to be finished. (4-7-83)

d. Belt sanding machines shall be provided with guards at each nip point where the sanding belt runs

on to a pulley. These guards shall effectively prevent the hands or fingers of the operator from coming in contact with the nip points. The unused run of the sanding belt shall be guarded against accidental contact. (4-7-83)

18. Veneer Cutters and Wringers. (4-7-83)

a. Veneer slicer knives shall be guarded to prevent accidental contact with knife edge, at both front and rear. (4-7-83)

b. Veneer clippers shall have automatic feed or shall be provided with a guard which will make it impossible to place a finger or fingers under the knife while feeding or removing the stock. (4-7-83)

c. Sprockets on chain or slatbelt conveyors shall be enclosed. (4-7-83)

d. Where practicable, hand and foot-power guillotine veneer cutters shall be provided with rods or plates or other satisfactory means, so arranged on the feeding side that the hands cannot reach the cutting edge of the knife while feeding or holding the stock in place. (4-7-83)

e. Power-driven guillotine veneer cutters, except continuous feed trimmers, shall be equipped with: (4-7-83)

i. Starting devices which require the simultaneous action of both hands to start the cutting motion and of at least one hand on a control during the complete stroke of the knife; or (4-7-83)

ii. An automatic guard which will remove the hands of the operator from the danger zone at every descent of the blade, used in conjunction with one-hand starting devices which require two distinct movements of the device to start the cutting motion, and so designed as to return positively to the nonstarting position after each complete cycle of the knife. (4-7-83)

f. Where two or more workers are employed at the same time on the same power-driven guillotine veneer cutter equipped with two-hand control, the device shall be so arranged that each worker shall be required to use both hands simultaneously on the controls to start the cutting motion, and at least one hand on a control to complete the cut. (4-7-83)

g. Power-driven guillotine veneer cutters, other than continuous trimmers, shall be provided, in addition to the brake or other stopping mechanism, with an emergency device which will prevent the machine from operating in the event of failure of the brake when the starting mechanism is in the non-starting position. (4-7-83)

19. Miscellaneous Woodworking Machines. (4-7-83)

a. The feed rolls of roll type glue spreaders shall be guarded by a semi-cylindrical guard. The bottom of the guard shall come to within 3/8-inch of the feed roll where it touches the stock. (4-7-83)

b. Drag saws shall be so located as to give at least a 4-foot clearance for passage when the saw is at the extreme end of the stroke; or if such clearance is not obtainable, the saw and its driving mechanism shall be provided with a standard enclosure. (4-7-83)

c. For combination or universal woodworking machines each point of operation of any tool shall be guarded as required for such a tool in a separate machine. (4-7-83)

d. The mention of specific machines in Section 2209 thru 2225 of this Chapter, is not intended to exclude other woodworking machines from the requirement that suitable guards and exhaust hoods be provided to reduce, to a minimum, the hazard due to the point of operation of such machines. (4-7-83)

20. Inspection and Maintenance of Woodworking Machinery. (4-7-83)

a. Dull, badly set, improperly filed, or improperly tensioned saws shall be immediately removed from service before they begin to cause the material to stock, jam, or kickback when it is fed to the saw at normal speed.

Saws to which gum had adhered on the sides shall be immediately cleaned. (4-7-83)

b. All knives and cutting heads of woodworking machines shall be kept sharp, properly adjusted, and firmly secured. Where two or more knives are used in one head, they shall be properly balanced. (4-7-83)

c. Bearings shall be kept free from lost motion and shall be well lubricated. (4-7-83)

d. Arbors of all circular saws shall be free from play. (4-7-83)

e. Sharpening or tensioning of saw blades or cutters shall be done only by persons of demonstrated skill in this kind of work. (4-7-83)

f. Emphasis is placed upon the importance of maintaining cleanliness around woodworking machinery, particularly as regards the effective functioning of guards and the prevention of fire hazards in switch enclosures, bearings, and motors. (4-7-83)

g. All cracked saws shall be removed from service. (4-7-83)

h. The practice of inserting wedges between the saw disk and the collar to form what is commonly known as a "wobble saw" shall not be permitted. (4-7-83)

i. Push sticks or push blocks shall be provided at the work place in the several sizes and types suitable for the work to be done. (4-7-83)

j. Twists or kinks in bandsaws and band resaws shall be promptly removed with a hammer. (4-7-83)

k. To avoid vibration, brazed joints in bandsaws and band resaws shall be the same thickness as the saw blades (4-7-83)

l. The knife blade of jointers shall be so installed and adjusted that it does not protrude more than 1/8-inch beyond the cylindrical body of the head. Push sticks or push blocks shall be provided at the work place in the several sized and types suitable for the work to be done. (4-7-83)

m. Whenever veneer slicers or rotary veneer-cutting-machines have been shutdown for the purpose of inserting logs or to make adjustments, operators shall make sure that machine is clear and other workmen are not in a hazardous position before starting the machine. (4-7-83)

n. Operators shall not ride the carriage of a veneer slicer. (4-7-83)

252. COOPERAGE MACHINERY.

01. Definitions. (4-7-83)

a. "Point of operation" means that point at which cutting, shaping, boring, or forming is accomplished upon the stock. (4-7-83)

b. "Push stick" means a narrow strip of wood or other soft material with a notch cut into one end and which is used to push short pieces of material through saws. (4-7-83)

c. "Block" means a short block of wood, provided with a handle similar to that of a plane and a shoulder at the rear end, which is used for pushing short stock over revolving cutters. (4-7-83)

02. Heading Bolt Sawing Machine. (4-7-83)

a. Each heading saw shall be guarded by a hood curved to the contour of the saw. The hood shall cover the saw at least to the depth of the teeth, except for that portion actually used in making the cut. The exhaust hood shall be so arranged and maintained as to guard effectively the bottom portion of the saw. The hood shall be

made of adequate strength to resist strains incidental to reasonable operation. (4-7-83)

b. The balance wheel shall be covered to enclose the rim and outside portion of the wheel. Expanded metal curved to fit the contour of the wheel is recommended. (4-7-83)

c. The swing carriage shall be provided with an effective device that will return the carriage automatically to the position in front of the saw. Such a device shall not depend entirely upon any rope, cord, or spring for its proper functioning. If a counterweight is used, a safety chain shall be attached to it to prevent dropping should the bar break or the weight become disengaged. All bolts supporting the bar, weight, and chain shall be provided with cotter pins or equally effective devices. A bolt shall be put through the extreme end of the counterweight bar to prevent dropping of the weight. (4-7-83)

d. A limit stop shall be provided to prevent the carriage from swinging too far back and thereby exposing the unguarded portion of the saw to contact. (4-7-83)

03. Bolt, Equalizer, Stave, and Heading Saws (Tilting Table Style). (4-7-83)

a. All heading and stave bolt equalizer saws shall be guarded by hoods, curved to the contour of all the saws. The hood shall cover the saw at least to the depth of the teeth, except for that portion actually used in making the cut. The exhaust hood shall be so arranged and maintained as to guard effectively the bottom portion of the saws. (4-7-83)

b. Hoods shall be attached to each end of the tilting table and shall extend forward to cover the portion of the saws which cannot be enclosed by a stationary guard. (4-7-83)

c. A limit stop shall be provided to prevent the table from coming too far back and thereby exposing the unguarded portion of the saws to contact. (4-7-83)

04. Barrel Stave Saws (Cylinderical Saws). (4-7-83)

a. Each machine of this type shall have the saw and the revolving part (head) to which the saw blade is bolted enclosed with a hinged guard to prevent accidental contact, except for that part of the saw immediately adjacent to the carriage, which is the point of operation of the saw. (4-7-83)

b. The exhaust hood shall be so arranged and maintained as to guard effectively the bottom portion of the saw. The hood shall be made of adequate strength to resist strains incidental to reasonable operation. (4-7-83)

05. Hand-Fed Ripsaws. (4-7-83)

a. Each circular hand-fed ripsaw shall be guarded with a hood. The hood shall be stationary and cover the saw to a distance of approximately 3/4-inch above the stave being ripped. This will prevent the material being cut from being raised by upward centrifugal force of the saw in cases of pinching or binding before the stave reaches the splitter. The hood shall provide inside clearance to allow an accidental blow to strike it to the table and not engage the teeth with the guard. The hood shall be constructed of heavy material, preferably metal. That portion of the saw remaining below the table shall be completely enclosed in an exhaust hood. (4-7-83)

b. Spreader requirements for this equipment are contained in Section 2610 of this Chapter. (4-7-83)

06. Self-Feed Stave and Heading Equalizer Saws. (4-7-83)

a. Self-feed equalizer saws shall be guarded with a hood guard which will cover the top and sides of the saws. The hood should adjust itself automatically to the thickness of, and remain in contact with, the material being cut. (4-7-83)

b. The portion of the saw blade extending beneath the mandrel shall be enclosed in an exhaust hood and be easily accessible for changing saws. (4-7-83)

07. Stave and Heading Planers (Single and Double Heads). (4-7-83)

a. The exhaust hood, or other guards, if no exhaust system is required, shall be so arranged and maintained as to guard effectively all cutting heads and knives or single and double planers. (4-7-83)

b. Feed rolls, except for such portion as may be necessary to admit stock, shall be completely enclosed. (4-7-83)

c. Pressure bars or holddown arrangements shall be properly adjusted to assure correct pressure and clearance at all times. (4-7-83)

08. Stave Jointing Machines (Wheel). (4-7-83)

a. Stave jointer wheels shall be covered on both sides with a removable metal hood connected to the exhaust system, except for that portion where the stock is applied to the knives. (4-7-83)

b. A limit stop should be installed on the frame to prevent any part of the carriage from coming in contact with any moving part of the wheel. (4-7-83)

c. The equipment described in A. and B. of this Section include double independent stave jointer wheels, double jointer stave wheels, single jointer stave wheels, and all kinds of keg stave jointer wheels. (4-7-83)

09. Heading Jointer and Doweler Machine (Wheel). (4-7-83)

a. Each heading jointer shall be equipped with a removable guard covering the upper half of the wheel, except for that portion where the stock is applied to the knives. (4-7-83)

b. The lower portion of the wheel shall be guarded with sheet metal or expanded metal to prevent accidental contact with the knives. (4-7-83)

10. Heading Rounder. The cutter head shall be enclosed in a hood attached to the exhaust system, arranged and maintained in such a manner as to guard effectively the entire cutting mechanism, except for that portion of the cutting head where the stock is applied. (4-7-83)

11. Power Windlass Machine. Windlass machines having counterweights shall operate with the weights in a stationary casing. On all machines having a friction gear, the gear shall be properly guarded. (4-7-83)

12. Crozing Machine (Stationary Heads). Feed chains and sprockets shall be completely enclosed. This includes all types of barrel, keg, bucket, tub, and individual stave crozers, chamfering, crozing, and doweling machinery. (4-7-83)

13. Heading-Up Machine. The outside portion and teeth of both drive gears for the racks shall be completely guarded. This includes all types of heading-up machines. (4-7-83)

14. Head Charring Machine. All tripping mechanisms shall be completely guarded. (4-7-83)

15. Bilge Cruss Hoop Ring Removing Machine. (4-7-83)

a. Both eccentric cams and gear works on horizontal machines shall be guarded. (4-7-83)

b. Combined flywheel and gear shall be completely enclosed by a guard. This includes the horizontal and upright-type machines. (4-7-83)

16. Hoop Elevators and Conveyors. Lower sprockets and chains shall be guarded by complete enclosure to a height of at least 7 feet. (4-7-83)

17. Barrel Sanding Machine. Belt sanding machines shall be provided with guards at each hip point

where the sanding belt runs onto a pulley. This guard may be a part of the exhaust system. The unused run of the sanding belt shall be closed. (4-7-83)

18. Hoop Drivers and Trussers. (4-7-83)

a. All friction pulleys shall be enclosed by a guard. A hinged gate should be provided for that portion of the guard covering adjustments to the friction blocks. (4-7-83)

b. The foregoing recommendation covers drivers for keg hoops, tin barrel hoops, and both screw and rack and pinion-type hoop drivers. (4-7-83)

19. Head Sanding Machine. The exhaust hood of automatic horizontal disk head sanders shall be so arranged as to enclose each disc, except for that portion necessary for the application of the barrel being finished. (4-7-83)

20. Hand Jointer. All hand-fed jointers shall be guarded in accordance with the provisions of Section 2218 of this Chapter. (4-7-83)

21. Hoop Punching and Coiling Machine. Miter gear, spur gears, drive pulley, and pulley for coiling attachment shall be guarded. This includes the horizontal hoop punching and coiling machine as well as the upright hoop punching machine. (4-7-83)

22. Hoop Riveting Machine. The balance and drive wheels shall be effectively guarded. This includes automatic, single, and double hoop riveters. (4-7-83)

23. Hoop Flaring and Expanding. Gearing shall be completely enclosed. (4-7-83)

24. Inspection and Maintenance of Cooperage Machinery. For inspection and maintenance of cooperage machinery see Section 2227 of this Chapter. (4-7-83)

253. ABRASIVE WHEEL MACHINERY.

01. Definitions. (4-7-83)

a. "Type 1 straight wheels" means wheels having diameter, thickness, and hole size dimensions, and they should be used only on the periphery. Type 1 wheels shall be mounted between flanges. See Figure 2252-A. Limitation: Hole dimension (H) should not be greater than two-thirds of wheel diameter dimension (D) for precision, cylindrical, centerless, or surface grinding applications. Maximum hole size for all other applications should not exceed one-half wheel diameter. (4-7-83)

FIGURE 2252-A, Type I, Straight Wheel, available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, Telephone (208) 334-6000.

b. "Type 2 cylinder wheels" means wheels having diameter, wheel thickness, and rim thickness dimensions. Grinding is performed on the rim face only, dimension (W). Cylinder wheels may be plain, plate mounted, inserted nut, or of the projecting stud type. See Figure 2252-B. Limitation: Rim height, (T) dimension, is generally equal to or greater than rim thickness, (W) dimension. (4-7-83)

FIGURE 2252-B, Type 2 Cylinder Wheel, available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, Telephone (208) 334-6000.

c. "Type 6 straight cup wheels" means wheels having diameter, thickness, hole size, rim thickness, and back thickness dimensions. Grinding is always performed on rim face, (W) dimension. See Figure 2252-C. Limitation: Minimum back thickness, (E) dimension, should not be less than 1/4 (T) dimension. In addition, when unthreaded hole wheels are specified, the inside flat, (K) dimension, must be large enough to accommodate a suitable flange. (4-7-83)

FIGURE 2252-C, Type 6 Straight-Cup Wheel, available from the Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

d. "Type II flaring cup wheels" means wheels having double diameter dimensions (D) and (J) and in addition, have thickness, hole size, rim and back thickness dimensions. Grinding is always performed on rim face, (W) dimension Type II wheels are subject to all limitation of use and mounting listed for type 6 straight sided cup wheels definition. See Figure 2252-D. Limitation: Minimum back thickness, (E) dimension, should not be less than threaded hole wheels are specified the inside flat, (K) dimension, shall be large enough to accommodate a suitable flange. (4-7-83)

FIGURE 2252-D, Type II Flaring-Cup Wheel, available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

e. "Modified Types 6 and 11 wheels (terrazzo)" means some type 6 and 11 cup wheels used in the terrazzo trade having tapered (K) dimensions to match a special tapered flange furnished by the machine builder. See Figure 2252-E. Limitation: These wheels shall be mounted only with a special tapered flange. (4-7-83)

FIGURE 2252-E, Typical examples of modified types 6 and 11 wheels (terrazzo) showing tapered (K) dimensions, available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

f. "Types 27 and 28 depressed center wheels" mean wheels having diameter, thickness, and hole size dimensions. Both types are reinforced, organic bonded wheels having offset hubs which permit side and peripheral grinding operations without interference with the mounting. Type 27 wheels are manufactured with flat grinding rims permitting notching and cutting operations. Type 28 wheels have saucer shaped grinding rims. (4-7-83)

i. Limitations: Special supporting, back adapter and inside flange nuts are required for the proper mounting of these types of wheels subject to limitations of Section 2255-A. and B. of this Chapter. (4-7-83)

ii. Mounts which are affixed to the wheel by the manufacturer may not require an inside nut and shall not be reused. (4-7-83)

g. "Type 27A depressed center, cutting off wheels" means wheels having diameter, thickness, and hole size dimensions. They are reinforced, organic bonded, offset hub type wheels, usually 16 inches diameter and larger, specially designed for use on cutting-off machines where mounting nut or outer flange interference cannot be tolerated. Limitations: See Section 2255 of this Chapter. (4-7-83)

h. "Surface feet per minute" (s.f.p.m.) means the distance in feet any one abrasive grain on the peripheral surface of a grinding wheel travels in 1 minute. (4-7-83)

Formulae, diagrams and examples available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

i. "Flanges" means collars, discs, or plates between which wheels are mounted and are referred to as adaptor, sleeve, or back up type. See Section 2254 of this Chapter for full description. (4-7-83)

j. "Snagging" means grinding which removes relatively large amounts of material without regard to close tolerances or surface finish requirements. (4-7-83)

k. "Off-hand grinding" means the grinding of any material or part which is held in the operator's hand. (4-7-83)

l. "Safety guard" means an enclosure designed to restrain the pieces of the grinding wheel and furnish all possible protection in the event that the wheel is broken in operation. See Section 2254 of this Chapter. (4-7-83)

m. "Cutting off Wheels" means wheels having diameter, thickness and hole size dimensions and are subject to all limitations of mounting and use listed for Type 1 wheels, the definition in 2252. A. and 2256. They may

be steel centered, diamond abrasive or organic bonded abrasive of the plain or reinforced type. (4-7-83)

i. Limitation: Cutting off wheels are recommended only for use on specially designed and fully guarded machines and are subject to the following maximum thickness and hole size limitations: (4-7-83)

Wheel Diameter:	Maximum Thickness (Inch)
0 to 6 inches	3/16
6 to 12 inches	1/4
12 to 23 inches	3/8
23 and over inches	1/2

ii. Maximum hole size for cutting-off wheels should not be larger than 1/4 wheel diameter. (4-7-83)

n. "Abrasive wheel" means a cutting tool consisting of abrasive grains held together by organic or inorganic bonds. Diamond and reinforced wheels are included. (4-7-83)

o. "Organic wheels" means wheels which are bonded by means of an organic material such as resin, rubber, shellac, or other similar bonding agent. (4-7-83)

p. "Inorganic wheels" means wheels which are bonded by means of inorganic material such as clay, glass, porcelain, sodium silicate, magnesium oxycholoride, or metal. Wheels bonded with clay, glass, porcelain, or related ceramic materials are characterized as "vitrified bonded wheels". (4-7-83)

02. General Requirements. (4-7-83)

a. Machine Guarding, abrasive wheels shall be used only on machines provided with safety guards as defined in Section 2254 except: (4-7-83)

i. Wheels used for internal work while within the work being ground; (4-7-83)

ii. Mounted wheels used in portable operations 2 inches and smaller in diameter; and (4-7-83)

iii. Types 16, 17, 18, 18R, and 19 cones, plugs, and threaded hole pit balls where the work offers protection. (4-7-83)

b. Guard Design. The safety guard shall cover the spindle end, nut, and flange projections. The safety guard shall be mounted so as to maintain proper alignment with the wheel, and the strength of the fastenings shall exceed the strength of the guard, except: (4-7-83)

i. Safety guards on all operations where the work provides a suitable measure of protection to the operator, may be so constructed that the spindle end, nut, and outer flange are exposed; and where the nature of the work is such as to entirely cover the side of the wheel, the side covers of the guard may be omitted; and (4-7-83)

ii. The spindle end, nut, and outer flange may be exposed on machines designed as portable saws. (4-7-83)

c. Flanges. Grinding machines shall be equipped with flanges in accordance with Section 2255 of this Chapter. (4-7-83)

d. Work rests. On off-hand grinding machines, work rests shall be used to support the work. They shall be of rigid construction and designed to be adjustable to compensate for wheel wear. Work rests shall be kept adjusted closely to the wheel with a maximum opening of 1/8-inch to prevent the work from being jammed between

the wheel and the rest, which may cause wheel breakage. The work rest shall be securely clamped after each adjustment. The adjustment shall not be made with the wheel in motion. (4-7-83)

e. Excluded Machinery. Natural sandstone wheels and metal, wooden, cloth, or paper discs, having a layer of abrasive on the surface are not covered by Section 2253 of this Chapter. (4-7-83)

03. Guarding of Abrasive Wheel Machinery. (4-7-83)

a. Cup Wheels. Cup wheels (Types 6 and 11) shall be protected by: (4-7-83)

i. Safety guards as specified in A. through J. of this Section; and (4-7-83)

ii. Band type guards as specified in K. of this Section; and (4-7-83)

iii. Special "Revolving Cup Guards" which mount behind the wheel and turn with it. They shall be made of steel or other material with adequate strength and shall enclose the wheel sides upward form the back for one-third of the wheel thickness. The mounting features shall conform with all requirements of this section. It is necessary to maintain clearance between the wheel side and the guard. This clearance shall not exceed 1/16 inch. (4-7-83)

b. Guard exposure angles. The maximum exposure angles specified in C. through H. of this Section shall not be exceeded. Visors or other accessory equipment shall not be included as a part of the guard when measuring the guard opening, unless such equipment has strength equal to that of the guard. (4-7-83)

c. Bench and Floor Stands. The angular exposure of the grinding wheel periphery and sides for safety guards used on machines known as bench and floor stands should not exceed 90 degrees or 1/4 of the periphery. This exposure shall begin at a point not more than 65 degrees above the horizontal plane of the wheel spindle. (See figures 2254-A and 2254-B of this Section).

FIGURE 2254-A and FIGURE 2254-B available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

Wherever the nature of the work requires contact with the wheel below the horizontal plane of the spindle, the exposure shall not exceed 125 degrees. (See Figures 2254-C and 2254-D) (4-7-83)

FIGURE 2254-C and FIGURE 2254-D, available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

d. Cylindrical Grinders. The maximum angular exposure of the grinding wheel periphery and sides for safety guards used on cylindrical grinding machines shall not exceed 180 degrees. This exposure shall begin at a point not more than 65 degrees above the horizontal plane of the wheel spindle. (See Figures 2254-E and 2254-F, and i. of this Section). (4-7-83)

FIGURE 2254-E and FIGURE 2254-F, available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

e. Surface Grinders and Cutting-Off Machines. The maximum angular exposure of the grinding wheels periphery and sides for safety guards used on cutting-off machines and on surface grinding machines which employ the wheel periphery shall not exceed 150 degrees. This exposure shall begin at a point not less than 15 degrees below the horizontal plane of the wheel spindle. (See figures 2254-G and 2254-H). (4-7-83)

FIGURE 2254-G and FIGURE 2254-H available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

f. Swing Frame Grinders. The maximum angular exposure of the grinding wheel periphery and sides for safety guards used on machines shall not exceed 180 degrees, and the top half of the wheel shall be enclosed at all times. (See figures 2254-J and 2254-K). (4-7-83)

FIGURE 2254-J and FIGURE 2254-K available from Industrial Commission, 317 Main Street, Boise Idaho 83720, telephone (208) 334-6000.

g. Automatic Snagging Machines. The maximum angular exposure of the grinding wheel periphery and sides known as automatic snagging machines shall not exceed 180 degrees and the top half of the wheel shall be enclosed at all times. (See Figures 2254-J and 2254-K) (4-7-83)

h. Top Grinding. Where the work is applied to the wheel above the horizontal center line, the exposure of the grinding wheel periphery shall be as small as possible and shall not exceed 60 degrees. (See Figures 2254-L and 2254-M). (4-7-83)

FIGURE 2254-L and FIGURE 2254-M available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

i. Exposure adjustment. Safety guards of the types described in C. and D. of this Section, where the operator stands in front of the opening shall be constructed so that the peripheral protecting member can be adjusted to the constantly decreasing diameter of the wheel. The maximum angular exposure above the horizontal plane of the wheel spindle as specified in C. and D. of this Section shall never be exceeded, and the distance between the wheel periphery and the adjustable tongue or the end of the peripheral member at the top shall never exceed 1/4-inch. (See Figures 2254-N through 2254-T.) (4-7-83)

j. Material Requirements and Minimum Dimensions. (4-7-83)

i. See Figures 2256-M, 2256-N, and Table 2256-J for minimum basic thickness of peripheral and side members for various types of safety guards and classes of service. (4-7-83)

ii. If operating speed does not exceed 8,000 surface feet per minute cast iron safety guards, guards as described in item J. iii. of this Section. (4-7-83)

iii. Cast steel, or structural steel, safety guards as specified in Figures 2256-M, 2256-N and Table 2256-J shall be used where operating speeds of wheels are faster than 8,000 surface feet per minute up to a maximum of 16,000 surface feet per minute. (4-7-83)

iv. For cutting-off wheels 16 inches diameter and smaller and where speed does not exceed 16,000 surface feet per minute, cast iron or malleable iron safety guards as specified in Figures 2256-M, 2256-N, and in Table 2256-J shall be used. (4-7-83)

FIGURE 2254-N and FIGURE 2254-P available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

FIGURE 2254-Q and FIGURE 2254-R available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

FIGURE 2254-S and FIGURE 2254-T available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

v. For cutting-off wheels larger than 16 inches diameter and where speed does not exceed 14,200 surface feet per minute, safety guards as specified in Figures 2256-C, 2256-D, and in Table 2256-A shall be used. (4-7-83)

vi. For thread grinding wheels not exceeding 1 inch in thickness cast iron or malleable iron safety guards as specified in Figures 2256-M, 2256-N and in Table 2256-M shall be used. (4-7-83)

k. Band Type Guards - General Specifications. Band type guards shall conform to the following specifications: (4-7-83)

i. The bands shall be of steel plate or other material of equal or greater strength. They shall be continuous, the ends being either riveted, bolted, or welded together in such a manner as to leave the inside free from projections. (4-7-83)

ii. The inside diameter of the band shall not be more than 1 inch larger than the outside diameter of the wheel, and shall be mounted as nearly concentric with the wheel as practicable. (4-7-83)

iii. The band shall be of sufficient width and its position kept so adjusted that at no time will the wheel protrude beyond the edge of the band a distance greater than that indicated in Figure 2256-F and in Table 2256-B or the wall thickness (W), whichever is smaller. (4-7-83)

l. Guard Design Specifications. Abrasive wheel machinery guards shall meet the design specifications. of the American National Standard Safety Code for the use, care, and protection of abrasive wheels, ANSI B7.1 - 1970. These requirements shall not apply to natural sandstone wheels or metal, wooden, cloth, or paper discs, having a layer of abrasive on the surface. (4-7-83)

04. Flanges. (7-1-93)

a. General requirements. All abrasive wheels shall be mounted between flanges which shall not be less than one-third of diameter of the wheel. (4-7-83)

i. Exceptions: (a) Mounted wheels, (b) Portable wheels with threaded inserts or projecting studs, (c) Abrasive discs (inserted nut, inserted washer and projecting stud type), (d) plate mounted wheels, (e) cylinders, cup or segmental wheels that are mounted in chucks, (f) types 27 and 28 wheels, (g) certain internal wheels, (h) modified types 6 and 11 wheels (terrazzo), (i) cutting-off wheels types 1 and 27A (see ii. and iii. of this Section). (4-7-83)

ii. Type 1 cutting-off wheels are to be mounted between properly relieved flanges which have matching bearing surfaces. Such flanges shall be at least one-fourth the wheel diameter. (4-7-83)

iii. Type 27A cutting-off wheels are designed to be mounted by means of flat, not relieved, flanges having matching bearing surfaces and which may be less than one-third but shall not be less than one-fourth the wheel diameter. (See Figure 2255-A for one such type of mounting). (4-7-83)

iv. There are three general types of flanges: (a) Straight relieved flanges (see Figure 2256-H), (b) straight unrelieved flanges (see Figure 2256-F), (c) adaptor flanges (see Figures 2256-J and 2256-K). (4-7-83)

v. Regardless of flange type used, the wheel shall always be guarded. Blotters shall be used in accordance with F. of this Section. (4-7-83)

FIGURE 2655-A, type 27A wheel mounted between flat non-relieved flanges of equal bearing surfaces, available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

b. Design and Material. (4-7-83)

i. Flanges shall be of such design as to satisfactorily transmit the driving torque from the spindle to the grinding wheel. (4-7-83)

ii. Flanges may be made of steel cast iron, or other material of equal or greater strength and rigidity. (4-7-83)

iii. Flanges shall be designed with respect to rigidity so that when tightened, the radial width of bearing surface of contact on the wheel is maintained. (See Table 2256-F and Figure 2256-H.) (4-7-83)

c. Finish and balance. Flanges shall be dimensionally accurate and in good balance. There shall be no rough surfaces or sharp edges. (4-7-83)

d. Uniformity of Diameter. (4-7-83)

i. Both flanges, of any type, between which a wheel is mounted, shall be of the same diameter and have equal bearing surface. Exceptions are set forth in D., ii., and iii. (4-7-83)

ii. Type 27 and 28 wheels because of their shape and usage, require specially designed adaptors. The back flange shall extend beyond the central hub or raised portion and contact the wheel to counteract the side pressure on the wheel in use. The adapter nut which is less than the minimum one-third diameter of the wheel fits in the depressed side of wheel to prevent interference in side grinding and serves to drive the wheel by its clamping force against the depressed portion of the back flange. The variance in flange diameters, the adaptor nut being less than one-third wheel diameter, and the use of side pressure in wheel operation limit the use to reinforced organic bonded wheels. Mounts which are affixed to the wheel by the manufacturer shall not be reused. Type 27 and Type 28 wheels shall be used only with a safety guard located between wheel and operator during use. (See Figure 2255-B). (4-7-83)

iii. Modified Types 6 and 11 wheels (terrazzo) with tapered K. dimension. (4-7-83)

FIGURE 2655-B, PROPERLY MOUNTED TYPE 27 WHEEL and IMPROPERLY MOUNTED TYPE 27 WHEEL, available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

iv. Types 27 and 28 wheels, because of their shape, require specially designed adaptors. (4-7-83)

e. Recess and Undercut. (4-7-83)

i. Straight relieved flanges made according to Table 2256-F and Figure 2256-H shall be recessed at least one-sixteenth inch on the side next to the wheel for a distance as specified in Table 2256-F. (4-7-83)

ii. Straight flanges of the adaptor or sleeve type (Table 2256-C, Figures 2256-J and 2256-K) shall be undercut so that there will be no bearing on the sides of the wheel within one-eighth inch of the arbor hole. (4-7-83)

f. Blotters. (7-1-93)

i. Blotters (compressible washers) shall always be used between flanges and abrasive wheel surfaces to insure uniform distribution of flange pressure. (4-7-83)

ii. Exceptions: (a) Mounted wheels, (b) abrasive discs (inserted nut, inserted washer, and projecting stud type), (c) plate mounted wheels, (d) cylinders, cups or segmental wheels that are mounted in chucks, (e) type 27 and 28 wheels, (f) certain Type 1 and Type 27A cutting-off wheels, (g) certain internal wheels, (h) type 4 tapered wheels, (i) diamond wheels, except certain vitrified diamond wheels, (j) modified types 6 and 11 wheel (terrazzo) - blotters applied flat side of wheel only. (4-7-83)

g. Driving Flange. The driving flange shall be securely fastened to the spindle and the bearing surface shall run true. When more than one wheel is mounted between a single set of flanges, wheels may be cemented together or separated by specially designed spacers. Spacers shall be equal in faces. (See 2256 F.) (4-7-83)

h. Dimensions. (4-7-83)

i. Table 2256-D, 2256-F, and Figures 2256-F, 2256-H show minimum dimensions for straight relieved and unrelieved flanges for use with wheels with small holes that fit directly on the machine spindle. Dimensions of such flanges shall never be less than indicated and should be greater where practicable. (4-7-83)

ii. Tables 2256-E, 2256-G and Figures 2256-G, 2256-J, and 2256-K show minimum dimensions for straight adaptor flanges for use with wheels having holes larger than the spindle. Dimensions of such adaptor flanges shall never be less than indicated and should be greater where practicable. (4-7-83)

iii. Table 2256-G and Figure 2256-L show minimum dimensions for straight flanges that are an integral part of wheel sleeves which are frequently used on precision grinding machines. Dimensions of such flanges shall never be less than indicated and should be greater where practicable. (4-7-83)

i. Repairs and Maintenance. All flanges shall be maintained in good condition. When the bearing surfaces become worn, warped, sprung, or damaged, they should be trued or refaced. When refacing or truing care shall be exercised to make sure that proper relief and rigidity is maintained as specified in B. and E. of this Section and they shall be replaced when they do not conform to these requirements and Tables 2256-D, E, F, L and Figures 2256-F, G, H. Failure to observe these rules might cause excessive flange pressure around the hole of the wheel. This is especially true of wheel-sleeve or adaptor flanges. (4-7-83)

05. Mounting. (4-7-83)

a. Inspection. Immediately before mounting, all wheels shall be closely inspected and sounded by the user (ring test) to make sure they have not been damaged in transit, storage, or otherwise. The spindle speed of the machine shall be checked before mounting of the wheel to be certain that it does not exceed the maximum operating speed marked on the wheel. Wheels should be tapped gently with a light nonmetallic implement, such as the handle of a screwdriver for light wheels, or a wooden mallet for heavier wheels. If they sound cracked (dead), they shall not be used. This is known as the "Ring Test". (4-7-83)

i. Wheels must be dry and free from sawdust when applying the ring test, otherwise the sound will be deadened. It should also be noted that organic bonded wheels do not emit the same clear metallic ring as do citrified and silicate wheels. (4-7-83)

ii. "Tap" wheels about 45 degrees each side of the vertical centerline and about 1 or 2 inches from the periphery as indicated by the spots in Figure 2256-A and 2256-B. Then rotate the wheel 45 degrees and repeat the test. A sound and undamaged wheel will give a clear metallic tone. If cracked there will be a dead sound and not a clear "ring" (4-7-83)

b. Arbor Size. Grinding wheels shall fit freely on the spindle and remain free under all grinding conditions. A controlled clearance between the wheel hole and the machine spindle (or wheel sleeves or adaptors) is essential to avoid excessive pressure from mounting and spindle expansion. To accomplish this, the machine spindle shall be made to nominal (standard) size plus zero minus .002 inch, and the wheel hole shall be made suitably oversize to assure safety clearance under the conditions of operating heat and pressure. (4-7-83)

c. Surface Condition. All contact surfaces of wheels, blotters, and flanges shall be flat and free of foreign matter. (4-7-83)

d. Bushing. When a bushing is used in the wheel hole it shall not exceed the width of the wheel and shall not contact the flanges. (4-7-83)

FIGURE 2256-A, Light Wheels suspended from hole by small pin or flanger, available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

FIGURE 2256-B, Heavy Wheels support on clean hard floor, available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

e. Blotters. When blotters or flange facings of compressible material are required, they shall cover entire contact area of wheel flanges. Highly compressible material such as blotting paper as normally used should not exceed .025 inch in thickness. If material of lower compressibility is used, greater thickness may be necessary. Blotters need not be used with the following types of wheels: (4-7-83)

i. Mounted Wheels. (4-7-83)

ii. Abrasive discs (inserted nut, inserted washer, and projecting stud type). (4-7-83)

iii. Plate mounted wheels. (4-7-83)

iv. Cylinders, cups, or segmental wheels that are mounted in chucks. (4-7-83)

v. Types 27 and 28 wheels. (4-7-83)

vi. Certain type 1 and type 27A cutting-off wheels. (4-7-83)

vii. Certain internal wheels. (4-7-83)

viii. Type 4 tapered wheels. (4-7-83)

ix. Diamond wheels, except certain vitrified diamond wheels. (4-7-83)

f. Multiple wheel mounting. When more than one wheel is mounted between a single set of flanges, wheels may be cemented together or separated by specially designed spacers. Spacers shall be equal in diameter to the mounting flanges and have equal bearing surfaces. When mounting wheels which have not been cemented together, or ones which do not utilize separating spacers, care must be exercised to use wheels specially manufactured for that purpose. (4-7-83)

g. Replacing Safety Guard. After mounting a wheel, care should be taken to see that the safety guard is properly positioned before starting the wheel. (4-7-83)

FIGURE 2256-C available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

FIGURE 2256-D available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

TABLE 2256-A available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

TABLE 2256-B available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

TABLE 2256-C available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

FIGURE 2256-E available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

FIGURE 2256-F available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

TABLE 2256-D available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

TABLE 2256-E available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

FIGURE 2256-G available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

FIGURE 2256-H available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

TABLE 2256-F available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

FIGURE 2256-J available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

FIGURE 2256-K available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

TABLE 2256-G available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

FIGURE 2256-L available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

TABLE 2256-H available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

FIGURE 2256-M, available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

FIGURE 2256-N, available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

TABLE 2256-J, Part 1, available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

TABLE 2256-J, Part 2, available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

TABLE 2256-J, Part 3, available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

TABLE 2256-J, Part 4, available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

254. MILLS AND CALENDERS IN THE RUBBER AND PLASTICS INDUSTRIES.

01. Definitions. (4-7-83)

a. "Bite" means the nip point between any two in running rolls. (4-7-83)

b. "Calendar" means a machine equipped with two or more metal rolls revolving in opposite directions and used for continuously sheeting or plying up rubber and plastics compounds and for frictioning or coating materials with rubber and plastics compounds. (4-7-83)

c. "Mill" means a machine consisting of two adjacent metal rolls, set horizontally, which revolve in opposite directions (i.e. toward each other as viewed from above) used for the mechanical working of rubber and plastics compounds. (4-7-83)

02. General Requirements. (4-7-83)

a. New Installations. All new installations after August 27, 1971 shall be in conformity with Sections 2257 through 2264 of this Chapter. (4-7-83)

b. Existing Installations. All existing plant installations or equipment contracted for prior to the effective date of these standards, shall comply with Sections 2257 through 2264 of this Chapter. (4-7-83)

c. Auxiliary Equipment. Mechanical and electrical equipment and auxiliaries shall be installed in accordance with this Section, with the Electrical Safety Requirements for Employee Workplaces (1979 NFPA 70E), and the National Electrical Code (NEC). (4-7-83)

d. Mill Roll Heights. All new mill installations shall be installed so that the top of the operating roll is not less than 50 inches above the level on which the operator stands, irrespective of the size of the mill. This distance shall apply to the actual working level, whether it be at the general floor level, in a pit, or on a platform. (4-7-83)

03. Mill safety controls. (4-7-83)

a. Safety trip control. A safety trip control shall be provided in front and in back of each mill. It shall be accessible and shall operate readily on contact. The safety trip control shall be one of the following types or combination thereof: (4-7-83)

i. Pressure-sensitive body bars. Installed at front and back of each mill having a 46-inch roll height or over. These bars shall operate readily by pressure of the mill operator's body. Pressure-sensitive body bars should be installed on new equipment. (4-7-83)

ii. Safety triprod. Installed in the front and in the back of each mill and located with 2 inches of a vertical plane tangent to the front and rear rolls. The tp rods shall be not more than 72 inches above the level on which the operator stands. The triprods shall be accessible and shall operate readily whether the rods are pushed or pulled. (4-7-83)

iii. Safety trip wire cable or wire center cord. Installed in the front and in the back of each mill and located within 2 inches of a vertical plane tangent to the front and rear rolls. The cables shall not be more than 72 inches above the level on which the operator stands. The tripwire cable or wire center cord shall operate readily whether cable or cord is pushed or pulled. (4-7-83)

b. Fixed guards. A fixed bar across the front and one across the back of the mill approximately 40 inches vertically above the working level and 20 inches horizontally from the crown face of the roll should be used where they are applicable. (4-7-83)

c. Auxiliary equipment. All auxiliary equipment such as mill divider, support bars, spray pipes, feed conveyors, strip knives, ect., shall be located in such a manner as to avoid interference with access to and operation of safety devices. (4-7-83)

04. Calender safety controls. (4-7-83)

a. Safety trip, face. A safety triprod, cable, or wire center cord shall be provided across each pair of in-running rolls extending the length of the face of the rolls. It shall be readily accessible and operate whether pushed or pulled. The safety tripping devices shall be located within reach of the operator and the bite. (4-7-83)

b. Safety trip, side. On both sides of the calender and near each end of the face of the roll, there shall be a cable or wire center cord connected to the safety trip. These lines should be not more than 12 inches from the faces of the respective rolls and not less than 2 inches from the calender frame. They should be anchored to the frame not more than 6 inches from the floor or operator's platform. They shall operate readily when pushed or pulled. (4-7-83)

05. Protection by location. (4-7-83)

a. Mills. Where a mill is so installed that persons cannot normally reach through, over, under or around to come in contact with the roll bite or be caught between a roll and an adjacent object, then, provided such elements are made a fixed part of a mill, safety control devices listed Section 2259 of this Chapter shall not apply. (4-7-83)

b. Calenders. Where a calender is so installed that persons cannot normally reach through, over, under, or around to come in contact with the roll bite or be caught between a roll and an adjacent object, then, provided such elements are made a fixed part of a calender, safety control devices listed in Section 2259 of this Chapter shall not apply. (4-7-83)

06. Trip and emergency switches. All trip and emergency switches shall not be of the automatically

resetting type, but shall require manual resetting. (4-7-83)

07. Stopping limits. (4-7-83)

a. Determination of Distance of Travel. All measurements on mills and calenders shall be taken with the rolls running empty at maximum operating speed. Stopping distances shall be ex pressed in inches of surface travel of the roll from the instant the emergency stopping device is actuated. (4-7-83)

b. Stopping Limits for Mills. All mills irrespective of the size of the rolls or their arrangement (individually or group-driven) shall be stopped within a distance, as measured in inches of surface travel, not greater than 1 1/2% of the peripheral no-load surface speeds of the respective rolls as determined in feet per minute. (4-7-83)

c. Stopping Limits for Calenders. (4-7-83)

i. All calenders, irrespective of size of the roll for their configuration, shall be stopped within a distance, as measured in inches of surface travel, not greater than 1 3/4% of the peripheral noload surface speeds of the respective calender rolls as determined in feet per minute. (4-7-83)

ii. Where speeds above 250 feet per minute as measured on the surface of the drive roll are used, stopping distances of more than 1 3/4% are permissible. Such stopping distances shall be subject to engineering determination. (4-7-83)

08. Alarm. Where an exposure is created by the operation, and the operators are not within sight or hearing of other employees, a suitable alarm device should be provided so that assistance will be available in case of accidents. (4-7-83)

255. MECHANICAL POWER PRESSES.

01. Definitions. (4-7-83)

a. "Antirepeat" means the part of the clutch/brake control system designed to limit the press to a single stroke if the tripping means is held operated. Antirepeat requires release of all tripping mechanisms before another stroke can be initiated. "Antirepeat" is also called single stroke reset or reset circuit. (4-7-83)

b. "Brake" means the mechanism used on a mechanical power press to stop and/or hold the crankshaft, either directly or through a gear train, when the clutch is disengaged. (4-7-83)

c. "Bolster Plate" means the plate attached to the top of the bed of the press having drilled holes or t-slots for attaching the lower die or die shoe. (4-7-83)

d. "Clutch" means the coupling mechanism used on a mechanical power press to couple the flywheel to the crankshaft, either directly or through a gear train. (4-7-83)

e. "Full revolution clutch" means a type of clutch that, when tripped, cannot be disengaged until the crankshaft has completed a full revolution and the press slide a full stroke. (4-7-83)

f. "Part revolution clutch" means a type of clutch that can be disengaged at any point before the crankshaft has completed a full revolution and the press slide a full stroke. (4-7-83)

g. "Direct drive" means the type of driving arrangement wherein no clutch is used; coupling and decoupling of the driving torque is accomplished by energization and deenergization of a motor. Even though not employing a clutch, direct drives match the operational characteristics of "part revolution clutches" because the driving power may be disengaged during the stroke of the press. (4-7-83)

h. "Concurrent" means acting in conjunction, and is used to describe a situation wherein two or more controls exist in an operated condition at the same time. (4-7-83)

i. "Continuous" means uninterrupted multiple strokes of the slide without intervening stops (or other clutch control action) at the end of individual strokes. (4-7-83)

j. "Counterbalance" means the mechanism that is used to balance or support the weight of the connecting rods, slide, and slide attachments. (4-7-83)

k. "Device" means a press control or attachment that: (4-7-83)

i. Restrains the operator from inadvertenely reaching into the point of operation, or (4-7-83)

ii. Prevents normal press operation if the operator's hands are inadvertently within the point of operation, or (4-7-83)

iii. Automatically withdraws the operator's hands if the operator's hands are inadvertently within the point of operation as the dies close. (4-7-83)

l. "Presence sensing device" means a device designed, constructed and arranged to create a sensing field or area and deactivate the clutch control of the press when an operator's hand and/or other parts of his body is within such field or area. (4-7-83)

m. "Gate or movable barrier device" means a movable barrier arranged to enclose the point of operation before the press stroke can be started. (4-7-83)

n. "Holdout or restraint device" means a mechanism, including attachments for operator's hands, that when anchored and adjusted prevent the operators hands from entering the point of operation. (4-7-83)

o. "Pull-out device" means a mechanism attached to the operator's hands and connected to the upper die or slide of the press, that is designed, when properly adjusted, to withdraw the operators hands as the dies close, if the operator's hands are inadvertently within the point of operation. (4-7-83)

p. "Sweep device" means a single or double arm (rod) attached to the upper die or slide of the press and designed to move the operator's hands to a safe position as the dies close, if the operator's hands are inadvertently within the point of operation. (4-7-83)

q. "Two hand control device" means a two-hand trip that further requires concurrent pressure from both hands of the operator during a substantial part of the die-closing portion of the stroke of the press. (4-7-83)

r. "Die" means the tooling used in a press for cutting or forming material. An upper and a lower die make a complete set. (4-7-83)

s. "Die builder" means any person who builds die for power presses. (4-7-83)

t. "Die set" means a tool holder held in alignment by guide posts and bushings and consisting of a lower shoe, an upper shoe or punch holder, and guide posts and bushing. (4-7-83)

u. "Die setter" means an individual who places or removes dies in or from mechanical power presses, and who, as a part of his duties, makes the necessary adjustments to cause the tooling to function properly and safely. (4-7-83)

v. "Die Setting" means the process of placing or removing dies in or from a mechanical power press, and the process of adjusting the dies, other tooling and safeguarding means to cause them to function properly and safely. (4-7-83)

w. "Die shoe" means a plate or block upon which a die holder is mounted. A die shoe functions primarily as a base for the complete die assembly, and, when used, is bolted or clamped to the bolster plate or the face of slide. (4-7-83)

x. "Ejector" means a mechanism for removing work or material from between the dies. (4-7-83)

y. "Face of slide" means the bottom surface of the slide to which the punch or upper die is generally attached. (4-7-83)

z. "Feeding" means the process of placing or removing material within or from the point of operation. (4-7-83)

aa. "Automatic feeding" means feeding wherein the material or part being processed is placed within or removed from the point of operation by a method or means not requiring action by an operator on each stroke of the press. (4-7-83)

bb. "Semiautomatic feeding" means feeding wherein the material or part being processed is placed within or removed from the point of operation by an auxiliary means controlled by operator on each stroke of the press. (4-7-83)

cc. "Manual feeding" means feeding wherein the material or part being processed is handled by the operator on each stroke of the press. (4-7-83)

dd. "Foot control" means the foot operated control mechanism designed to be used with a clutch or clutch/brake control system. (4-7-83)

ee. "Foot pedal" means the foot operated lever designed to operate the mechanical linkage that trips a full revolution clutch. (4-7-83)

ff. "Guard" means a barrier that prevents entry of the operator's hands or fingers into the point of operation. (4-7-83)

gg. "Die enclosure guard" means an enclosure attached to the die shoe or stipper, or both, in a fixed position. (4-7-83)

hh. "Fixed barrier guard" means a die space barrier attached to the press frame. (4-7-83)

ii. "Interlocked press barrier guard" means a barrier attached to the press frame and interlocked so that the press stroke cannot be started normally unless the guard itself, or its hinged or movable sections, enclose the point of operation. (4-7-83)

jj. "Adjustable barrier guard" means a barrier requiring adjustment for each job or die setup. (4-7-83)

kk. "Guide post" means the pin attached to the upper or lower die shoe, operating within the bushing on the opposing die shoe, to maintain the alignment of the upper and lower dies. (4-7-83)

ll. "Hand feeding tool" means any hand held tool designed for placing or removing material or parts to be processed within or from the point of operation. (4-7-83)

mm. "Inch" means an intermittent motion imparted to the slide (on machines using part revolution clutches) by momentary operation of the "inch" operating means. Operation of the "Inch" operating means engages the driving clutch so that a small portion of one stroke or indefinite stroking can occur, depending upon the length of time the "Inch" operating means is held operated."Inch" is a function used by the die setter for setup of dies and tooling, but is not intended for use during production operations by the operator. (4-7-83)

nn. "Job" means an intermittent motion imparted to the slide by momentary operation of the drive motor, after the clutch is engaged with the flywheel at rest. (4-7-83)

oo. "Knockout" means a mechanism for releasing material from either die. (4-7-83)

pp. "Liftout" means the mechanism also known as knockout. (4-7-83)

qq. "Operator's station" means the complete complement of controls used by or available to an operator on a given operation for stroking the press. (4-7-83)

rr. "Pinch point" means any point other than the point of operation at which it is possible for a part of the body to be caught between the moving parts of a press or auxiliary equipment, or between moving and stationary parts of a press or auxiliary equipment or between the material and moving part or parts of the press or auxiliary equipment. (4-7-83)

ss. "Point of Operation" means the area of the press where material is actually positioned and work is being performed during any process such as shearing, punching, forming, or assembling. (4-7-83)

tt. "Press" means a mechanically powered machine that shears, punches, forms, or assembles metal or other material by means of cutting, shaping, or combination dies attached to slides. A press consists of a stationary bed or anvil, and a slide (or slides) having a controlled reciprocating motion toward and away from the bed surface, the slide being guided by a definite path by the frame of the press. (4-7-83)

uu. "Repeat" means an unintended or unexpected successive stroke of the press resulting from a malfunction. (4-7-83)

vv. "Safety block" means a prop that, when inserted between the upper and lower dies or between the bolster plate and the face of the slide prevents the slide from falling off its own deadweight. (4-7-83)

ww. "Single stroke" means one complete stroke of the slide, usually initiated from a full open (or up) position, followed by closing, (or down), and then a return to the full open position. (4-7-83)

xx. "Slide" means the main reciprocating press member. A slide is also called a ram, plunger, or platen. (4-7-83)

yy. "Stop control" means an operator control designed to immediately deactivate the clutch control and activate the brake to stop slide motion. (4-7-83)

zz. "Stripper" means a mechanism or die part for removing the parts or material from the punch. (4-7-83)

aaa. "Stroking selector" means the part of the clutch/brake that determines the type of stroking when the operating means is actuated. The stroking selector generally includes positions for "OFF" ("clutch control", "inch", "single stroke", and "continuous" (when continuous is furnished). (4-7-83)

bbb. "Trip or (tripping)" means activation of the clutch to "run" the press. (4-7-83)

ccc. "Turnover bar" means a bar used in die setting to manually turn the crankshaft of the press. (4-7-83)

ddd. "Two-hand trip" means a clutch actuating means, requiring the concurrent use of both hands of the operator to trip the press. (4-7-83)

eee. "Unitized tooling" means a type of die in which the upper and lower members are incorporated into a self-contained unit so arranged as to hold the die members in alignment. (4-7-83)

fff. "Control system" means sensors, manual input and mode selection elements, interlocking and decision-making circuitry, and output elements to the press operating mechanism. (4-7-83)

ggg. "Brake monitor" means a sensor designed, constructed, and arranged to monitor the effectiveness of the press braking system. (4-7-83)

02. General Requirements. (4-7-83)

a. New Installations. The requirements of this section shall apply to all mechanical power presses installed on or after August 31, 1971 except that the requirements of Sections 2267 M., N. and 2268 E. of this Chapter shall be complied with by November 1, 1975. (4-7-83)

b. Former Installations. The requirements of this section shall apply to all mechanical power presses installed prior to August 31, 1971 except that the requirements of Sections 2267 and 2268 of this Chapter shall be complied with by November 1, 1975. (4-7-83)

c. All Installations. The requirements of this section pertaining to the care and use of mechanical power presses shall apply to all mechanical power press operations as of February 15, 1972. (4-7-83)

d. Reconstruction and Modification. It shall be the responsibility of any person reconstructing, or modifying a mechanical power press to do so in accordance with Section 2267. (4-7-83)

e. Excluded Machines. Press brakes, hydraulic and pneumatic power presses, bulldozers, hot bending and hot metal presses, forging presses and hammers, riveting machines and similar types of fastener applicators are excluded from the requirements of this section. (4-7-83)

03. Mechanical Power Press Guarding and Construction, General. (4-7-83)

a. Hazards to Personnel Associated with Broken or Falling Machine Components. Machine components shall be designed, secured, or covered to minimize hazards caused by breakage, or loosening and falling or release of mechanical energy (i.e. broken springs). (4-7-83)

b. Brakes. Friction brakes provided for stopping or holding a slide movement shall be inherently self-engaging by requiring power or force from an external source to cause disengagement; brake capacity shall be sufficient to stop the motion of the slide quickly and capable of holding the slide and its attachments at any point in its travel. (4-7-83)

c. Machines Using Full Revolution Positive Clutches. (4-7-83)

i. Machines using full revolution clutches shall incorporate a single-stroke mechanism. (4-7-83)

ii. If the single-stroke mechanism is dependent upon spring action, the spring(s) shall be of the compression type, operating on a rod or guided within a hold or tube, and designed to prevent interleaving of the spring coils in event of breakage. (4-7-83)

d. Foot Pedals (treadle). (4-7-83)

i. The pedal mechanism shall be protected to prevent unintended operation from falling or moving objects or by accidental stepping onto the pedal. (4-7-83)

ii. A pad with a non-slip contact area shall be firmly attached to the pedal. (4-7-83)

iii. The pedal return spring(s) shall be of the compression type, operating on a rod or guided within a hole or tube, or designed to prevent interleaving of spring coils in the event of breakage. (4-7-83)

iv. If pedal counterweights are provided, the path of the travel of the weight shall be enclosed. (4-7-83)

e. Hand Operated Levers. (4-7-83)

i. Hand-lever-operated power presses shall be equipped with a spring latch on the operating lever to prevent premature or accidental tripping. (4-7-83)

ii. The operating levers on hand-tripped presses having more than one operating station shall be

interlocked to prevent the tripping of the press except by the "concurrent" use of all levers. (4-7-83)

f. Two-hand trip. (4-7-83)

i. A two-hand trip shall have the individual operator's hand controls protected against unintentional operation and have the individual operator's hand controls arranged by design and construction and/or separation to require the use of both hands to trip the press and use a control arrangement requiring concurrent operation of the individual operator's hand controls. (4-7-83)

ii. Two-hand trip systems on full revolutions clutch machines shall incorporate an anti-repeat feature. (4-7-83)

iii. If two-hand trip systems are used on multiple operator presses, each operator shall have a separate set of controls. (4-7-83)

g. Machines Using Part Revolution Clutches. (4-7-83)

i. The clutch shall release and the brake shall be applied when the external clutch engaging means is removed, deactivated, or deenergized. (4-7-83)

ii. A red color stop control shall be provided with the clutch/brake control system. Momentary operation of the stop control shall immediately deactivate the clutch and apply the brake. The stop control shall override any other control, and reactuation of the clutch shall require use of the operating (tripping) means which has been selected. (4-7-83)

iii. A means of selecting "OFF", "INCH", "SINGLE STROKE", and "CONTINUOUS" (when the continuous function is furnished) shall be supplied with the clutch/brake control to select type of operation of the press. Fixing of selection shall be by means capable of supervision by the employer. (4-7-83)

iv. The "INCH" operating means shall be designed to prevent exposure of the worker's hands within the point of operation by: (a) requiring the concurrent use of both hands to actuate the clutch, or (b) being a single control protected against accidental actuation and so located that the worker cannot reach into the point of operation while operating the single control. (4-7-83)

v. Two-hand controls for single stroke shall conform to the following requirements: (a) each hand control shall be protected against unintended operation and arranged by design, construction, and/or separation so that the concurrent use of both hands is required to trip the press (b) the control system shall be designed to permit an adjustment which will require concurrent pressure from both hands during the die closing portion of the stroke (c) the control system shall incorporate an anti-repeat feature (d) the control system shall be designed to require release of all operator's hand controls before an interrupted stroke can be resumed. This requirement pertains only to those single stroke two-hand controls manufactured and installed on or after August 31, 1971. (4-7-83)

vi. Controls for more than one operating station shall be designed to be activated and deactivated in complete sets of two operator's hand controls per operating station by means capable of being supervised by the employer. The clutch/brake control system shall be designed and constructed to prevent actuation of the clutch if all operating stations are bypassed. (4-7-83)

vii. Those clutch/brake control systems which contain both single and continuous functions shall be designed so that completion of continuous circuits may be supervised by the employer. The initiation of continuous run shall require a prior action or decision by the operator in addition to the selection of "Continuous" on the stroking selector, before actuation of the operating means will result in continuous stroking. (4-7-83)

viii. If foot control is provided, the selection method between hand and foot stroking selector and shall be designed so that the selection may be supervised by the employer. (4-7-83)

ix. Foot operated tripping controls, if used, shall be protected so as to prevent operation from falling or moving objects, or from unintended operation by accidental stepping onto the foot control. (4-7-83)

x. The control of air-clutch machines shall be designed to prevent a significant increase in the normal stopping time due to failure within the operating valve mechanism, and to inhibit further operation if such failure does occur. These requirements shall apply only to those clutch/brake air-valve controls manufactured and installed on or after August 31, 1971 but shall not apply to machines intended only for continuous automatic feeding applications. (4-7-83)

xi. The clutch/brake control shall incorporate an automatic means to prevent initiation or continued activation of the Single Stroke or Continuous functions unless the press drive motor is energized and in the forward direction. (4-7-83)

xii. The clutch/brake control shall automatically deactivate in the event of failure of the power or pressure supply for the clutch engaging means. Reactivation of clutch shall require restoration of normal supply and the use of the tripping mechanism(s). (4-7-83)

xiii. The clutch/brake control shall automatically deactivate in the event of failure of the counterbalance(s) air supply. Reactivation of the clutch shall require restoration of normal air supply and use of the tripping mechanism(s). (4-7-83)

xiv. Selection of bar operation shall be by means capable of being supervised by the employer. A separate pushbutton shall be employed to activate the clutch, and the clutch shall be activated only if the driver motor is deenergized. (4-7-83)

h. Electrical. (7-1-93)

i. A main power disconnect switch capable of being locked only in the "OFF" position shall be provided with every power press control system. (4-7-83)

ii. The motor start button shall be protected against accidental operation. (4-7-83)

iii. All mechanical power press controls shall incorporate a type of drive motor starter that will disconnect the drive motor from the power source in event of control voltage or power source failure, and require operation of the motor start button to restart the motor when voltage conditions are restored to normal. (4-7-83)

iv. All AC control circuits and solenoid valve coils shall be powered by not more than a nominal 120-volt AC supply obtained from a transformer with an isolated secondary. Higher voltages that may be necessary for operation of machine or control mechanism shall be isolated form any control mechanism handled by the operator, but motor starters with integral Start-Stop buttons may utilize line voltage controls. All DC control circuits shall be powered by not more than nominal 240-volt DC supply isolated from any higher voltages. (4-7-83)

v. All clutch/brake control electrical circuits shall be protected against the possibility of an accidental ground in the control circuit causing false operation of the press. (4-7-83)

vi. Electrical clutch/brake control circuits shall incorporate features to minimize the possibility of an unintended stroke in event of the failure of a control component to function properly, including relays, limit switches, and static output circuits. (4-7-83)

i. Slide Counterbalance System. (4-7-83)

i. Spring counterbalance systems when used shall incorporate means to retain system parts in event of breakage. (4-7-83)

ii. Spring counterbalances when used shall have the capability to hold the slide and its attachments at midstroke, without brake applied. (4-7-83)

iii. Air counterbalance cylinders shall incorporate means to retain the piston and rod in case of breakage or loosening. (4-7-83)

iv. Air counterbalance cylinders shall have adequate capability to hold the slide and its attachments at any point in stroke, without brake applied. (4-7-83)

v. Air counterbalance cylinders shall incorporate means to prevent failure of capability (sudden loss of pressure) in event of air supply failure. (4-7-83)

j. Air Controlling Equipment. Air controlling equipment shall be protected against foreign material and water entering the pneumatic system of the press. A means of air lubrication shall be provided when needed. (4-7-83)

k. Hydraulic Equipment. The maximum anticipated working pressures in any hydraulic system on a mechanical power press shall not exceed the safe working pressure rating of any component used in that system. (4-7-83)

l. Pressure Vessels. All pressure vessels used in conjunction with power presses shall conform to the American Society of Mechanical Engineers Code for Pressure Vessels, 1968 edition. (4-7-83)

m. Control Reliability. When required by Section 2267 E. of this Chapter, the control system shall be constructed so that a failure within the system does not prevent the normal stopping action from being applied to the press when required, but does prevent initiation of a successive stroke until the failure is corrected. The failure shall be detectable by a simple test, or indicated by the control system. This requirement does not apply to those elements of the control system which have no effect on the protection against point of operation injuries. (4-7-83)

n. Brake System Monitoring. When required by Section 2268 E. of this section, the brake monitor shall meet the following requirements: (4-7-83)

i. Be so constructed as to automatically prevent the activation of a successive stroke if the stopping time or braking distance deteriorates to a point where the safety distance being utilized does not meet the requirements set forth in Section 2268 C.iii.(e), or Section 2268 C.viii.(c), of this Chapter. The brake monitor used with the type B gate or movable barrier device shall be installed in a manner to detect slide top-stop overrun beyond the normal limit reasonably established by the employer. (4-7-83)

ii. Be installed on a press such that it indicates when the performance of the braking system has deteriorated to the extent described in i. of this Section: and (4-7-83)

iii. Be constructed and installed in a manner to monitor brake system performance on each stroke. (4-7-83)

04. Safeguarding the Point of Operation. (4-7-83)

a. General Requirements. (4-7-83)

i. It shall be the responsibility of the employer to provide and insure the usage of "point of operation guards" or properly applied and adjusted point of operation devices on every operation performed on a mechanical power press. See Table 2268-A. (4-7-83)

ii. The requirement of i. above, shall not apply when the point of operation opening is one-fourth inch or less. See Table 2268-A. (4-7-83)

b. Point of Operation Guards. (4-7-83)

i. Every point of operation guard shall meet the following design, construction, application and adjustment requirements: (4-7-83)

(a) It shall prevent entry of hands or fingers into the point of operation by reaching through, over, under, or around the guard; (4-7-83)

(b) It shall conform to the maximum permissible openings of Table 2268-A; (4-7-83)

(c) It shall, in itself, create no pinch point between the guard and moving machine parts; (4-7-83)

(d) It shall utilize fasteners not readily removable by operator, so as to minimize the possibility of misuse or removal of essential parts; (4-7-83)

(e) It shall facilitate its inspection; and (4-7-83)

(f) It shall offer maximum visibility of the point of operation consistent with other requirements. (4-7-83)

TABLE 255.04-A available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

ii. A die enclosure guard shall be attached to the die shoe or stripper in a fixed position. (4-7-83)

iii. A fixed barrier guard shall be attached securely to the frame of the press or to the bolster plate. (4-7-83)

iv. An interlocked press barrier guard shall be attached to the press from or bolster and shall be interlocked with the press clutch control so that the clutch cannot be activated unless the guard itself, or the hinges or movable sections of the guard are in position to conform to the requirements of Table 2268-A. (4-7-83)

v. The hinged or movable sections of an interlocked press barrier guard shall not be used for manual feeding. The guard shall prevent opening of the interlocked section and reaching into the point of operation prior to die closure or prior to the cessation of slide motion. See Section 2268. C.ii., of this Chapter regarding manual feeding through interlocked press barrier devices. (4-7-83)

vi. The adjustable barrier guard shall be securely attached to the press bed, bolster plate, or die shoe, and shall be adjusted and operated in conformity with Table 2268-A and the requirements of this Section. Adjustments shall be made only by authorized personnel whose qualifications include a knowledge of the provisions of Table 2268-A and this section. (4-7-83)

vii. A point of operation enclosure which does not meet the requirements of this Section and Table 2268-A shall be used only in conjunction with point of operation devices. (4-7-83)

c. Point of Operation Devices. (4-7-83)

i. Point of operation devices shall protect the operator by: (4-7-83)

(a) Preventing and/or stopping normal stroking of the press if the operator's hands are inadvertently placed in the point of operation; or (4-7-83)

(b) Preventing the operator from inadvertently reaching into the point of operation or withdrawing his hands if they are inadvertently located in the point of operation as the dies close; or (4-7-83)

(c) Preventing the operator from inadvertently reaching into the point of operation at all times; or (4-7-83)

(d) Requiring application of both of the operator's hands to machine operating controls and locating such controls at such a safety distance from the point of operation that the slide completes the downward travel or stops before the operator can reach into the point of operation with his hands; or (4-7-83)

(e) Enclosing the point of operation before a press stroke can be initiated and maintaining this closed condition until the motion of the slide had ceased; or (4-7-83)

(f) Enclosing the point of operation before a press stroke can be initiated, so as to prevent an operator from reaching into the point of operation prior to die closure or prior to cessation of slide motion during the downward stroke. (4-7-83)

ii. The gate or movable barrier device shall protect the operator as follows: (a) A Type A gate or movable barrier device shall protect the operator in the manner specified in C. i. (e) of this Section, (b) a Type B gate or movable barrier device shall protect the operator in the manner specified in C. i. (e) of this Section. (4-7-83)

iii. A presence sensing point of operation device shall protect the operator as provided in C.i.(a) of this Section, and shall be interlocked into the control circuit to prevent or stop slide motion if the operator's hand or other part of his body is within the sensing field of the device during the downstroke of the press slide. (4-7-83)

(a) The device may not be used on machine using full revolution clutches; (4-7-83)

(b) The device may not be used as a tripping means to initiate slide motion; (4-7-83)

(c) The device shall be constructed so that a failure within the system does not prevent the normal stopping action from being applied to the press when required, but does prevent the initiation of a successive stroke until the failure is corrected. The failure shall be indicated by the system; (4-7-83)

(d) Muting (bypassing of the protective function) of such device, during the upstroke of the press slide, is permitted for the purpose of parts ejection, circuit checking, and feeding; (4-7-83)

(e) The safety distance (Ds) from the sensing field to the point of operation shall be greater than the distance determined by the following formula: Ds equals 63 inches per second multiplied by Ts where: Ds equals minimum safety distance in inches; 63 inches per second equals hand speed constant; Ts equals stopping time of the press measured at approximately 90 degree position of crankshaft rotation (seconds); (4-7-83)

(f) Guards shall be used to protect all areas of entry to the point of operation not protected by the presence of a sensing device. (4-7-83)

iv. The pull-out device shall protect the operator as specified in C.i.(b) of this Section and shall include attachments for each of the operator's hands. (4-7-83)

(a) Attachments shall be connected to and operated only by the press slide or upper die; (4-7-83)

(b) Attachment shall be adjusted to prevent the operator from reaching into the point of operation or to withdraw the operator's hands from the point of operation before the dies close; (4-7-83)

(c) A separate pull-out device shall be provided for each operator if more than one operator is used on a press; (4-7-83)

(d) Each pull-out device that is used shall be visually inspected and checked for proper adjustment at the start of each operator shift, following a new die set-up, and when operators are changed. Necessary maintenance or repair or both shall be performed and completed before the press is operated. Records of inspections and maintenance shall be kept in accordance with Section 2270 of this Chapter. (4-7-83)

v. The sweep device shall protect the operator as specified in c.i.(b) of this Section, by removing his hands safely to a safe position if they are inadvertently located in the point of operation, as the dies close or prior to tripping the clutch. Devices operating in this manner shall have a barrier, attached to the sweep arm in such a manner as to prevent the operator from reaching into the point of operation, past the trailing edge of the sweep are on the downward stroke of the press. This device may not be used for point of operation safeguarding after December 31, 1976. (4-7-83)

(a) The sweep device must be activated by the slide or by motion of a foot pedal tripped; (4-7-83)

(b) The sweep device must be designed, installed and operated so as to prevent the operator from reaching into the point of operation before the dies close; (4-7-83)

(c) The sweep device must be installed so that it will not itself create an impact or shear hazard between the sweep arm and the press tie rods, dies, or any other part of the press or barrier; (4-7-83)

(d) Partial enclosure conforming with this Section C.v. as to the area of entry which they protect, must be provided on both sides of the point of operation to prevent the operator from reaching around or behind the sweep device and into the point of operation after the dies start to close. Partial enclosures shall not themselves create a pinch point or shear hazard. (4-7-83)

vi. A holdout or a restraint device shall protect the operator as specified in C.i.(c) of this Section and shall include attachments for each of the operator's hands. Such attachments shall be securely anchored and adjusted in such a way that the operator is restrained from reaching into the point of operation. A separate set of restraints shall be provided for each operator if more than one operator is required on a press. (4-7-83)

vii. The two hand control device shall protect the operator as specified in C.i.(e) of this Section. (4-7-83)

(a) When used in press operations requiring more than one operator, separate two hand controls shall be provided for each operator, and shall be designed to require concurrent application of all operators' controls to activate the slide. The removal of a hand from any control button shall cause the slide to stop; (4-7-83)

(b) Each two hand control shall meet the construction requirements of C. v. of this Section; (4-7-83)

(c) The safety distance (Ds) between each two hand control device and the point of operation shall be greater than the distance determined by the following formula: Ds equals 63 inches per second multiplied by Ts, where: Ds equals minimum safety distance in inches; 63 inches per second equals hand speed constant; Ts equals stopping time of the press measured at approximately 90 degree position of crankshaft rotation in seconds; (4-7-83)

(d) Two hand control safety shall be fixed in position so that only a supervisor or safety engineer is capable of relocating the controls. (4-7-83)

viii. The two hand trip device shall protect the operator as specified in C.i.(e) of this Section. (4-7-83)

(a) When used in press operations requiring more than one operator, separate two hand trips shall be provided for each operator, and shall be designed to require concurrent application of all operators' controls to activate the slide; (4-7-83)

(b) Each two hand trip shall meet the construction requirements of Section 2267 F. of this Chapter; (4-7-83)

(c) The safety distance (Dm) between the two hand trip and the point of operation shall be greater than the distance determined by the following formula: Dm minus 63 inches per second multiplied by Tm; Dm equals minimum safety distance in inches; 63 inches per second equals hand speed constant; Tm equals the maximum time the press takes for the die closure after it has been tripped (seconds). For full revolution clutch presses with only one engaging point, Tm is equal to the time necessary for 1 1/2 revolutions of the crankshaft. For full revolution clutch presses with more than one engaging point, Tm shall be calculated as follows: (4-7-83)

DIAGRAM available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

(d) Two hand trips shall be fixed in position so that only a supervisor or safety engineer is capable of relocating the controls. (4-7-83)

d. Hand Feeding Tools. Hand feeding tools are intended for placing and removing materials in and from the press. Hand feeding tools are not a point of operation guard or protection device and shall not be used in lieu

of the "Guards" or devices required in this Section. (4-7-83)

e. Additional Requirements for Safeguarding. Where the operator feeds or removes parts by placing one or both hands in the point of operation, and a two hand control, presence sending device of Type B gate or movable barrier (on a part revolution clutch) is used for safeguarding. (4-7-83)

i. The employer shall use a control system and a broke monitor which comply with Section 2267 M. and N. of this Chapter. This requirement shall be complied with by November 1, 1975. (4-7-83)

ii. The exception in Section 2267 G.v.(d) of this Chapter for two hand controls manufactured and installed before August 31, 1971 is not applicable under this Section 2268 E. (4-7-83)

iii. The control of air clutch machines shall be designed to prevent a significant increase in the normal stopping time due to a failure within the operating valve mechanism, and to inhibit further operation if such failure does occur, where a part revolution clutch is employed. The exception is Section 2267 G. xi. of this Chapter for controls manufactured and installed before August 31, 1971 is not applicable under this Section. (4-7-83)

05. Design, Construction, Setting and Feeding of Dies. (4-7-83)

a. General Requirements. Effective February 1, 1975 the employer shall: (4-7-83)

i. Use dies and operating methods designed to control or eliminate hazards to operating personnel, and (4-7-83)

ii. Furnish and enforce the use of hand tools for freeing and removing stuck work or scrap pieces from the die, so that no employee need reach into the point of operation for such purposes. (4-7-83)

b. Scrap Handling. The employer shall provide means for handling scrap from roll feed or random length stock operations. Scrap cutters used in conjunction with scrap handling systems shall be safeguarded in accordance with Section 2267 and 2284 of this Chapter. (4-7-83)

c. Guide Post Hazard. The hazard created by a guide post (when it is located in the immediate vicinity of the operator) when separated from its bushing by more than 1/4 inch shall be considered as a point of operation hazard and be protected in accordance with Section 2288 of this Chapter. (4-7-83)

d. Unitized Tooling. If unitized tooling is used, the opening between the top of the punch holder and the face of the slide, or striking pad, shall be safeguarded in accordance with the requirements of Section 2267 of this Chapter. (4-7-83)

e. Tonnage, Stroke and Weight Designation. All dies shall be: (4-7-83)

i. Stamped with the tonnage and stroke requirements, or have these characteristics recorded if these records are readily available to the die setter; (4-7-83)

ii. Stamped to indicate upper die weight when necessary for air counterbalance pressure adjustment; and (4-7-83)

iii. Stamped to indicate complete die weight when handling equipment may become overloaded. (4-7-83)

f. Die Fastening. Provision shall be made in both the upper and lower shoes for securely mounting the die to the bolster and slide. Where clamp caps or setscrews are used in conjunction with punch stems, additional means of securing the upper shoe to the slide shall be used. (4-7-83)

g. Die Handling. Handling equipment attach points shall be provided on all dies requiring mechanical handling. (4-7-83)

h. Diesetting. (4-7-83)

i. The employer shall establish a diesetting procedure that will insure compliance with Section 2267 of this Chapter. (4-7-83)

ii. The employer shall provide spring loaded turnover bars, for presses designed to accept such turnover bars. (4-7-83)

iii. The employer shall provide die stops or other means to prevent losing control of the die while setting or removing dies in presses which are inclined. (4-7-83)

iv. The employer shall provide and enforce the use of safety blocks for use whenever dies are being adjusted or repaired in the press. (4-7-83)

v. The employer shall provide brushes, swabs, lubricating rolls, and automatic or manual pressure guns so that operators and diesetters shall not be required to reach into the point of operation or other hazard areas to lubricate material, punches, or dies. (4-7-83)

06. Inspection, Maintenance, and Modification of Presses. (4-7-83)

a. Inspection and Maintenance Records. (4-7-83)

i. It shall be the responsibility of the employer to establish and follow a program of periodic and regular inspections of his power pressed to insure that all their parts, auxiliary equipment and safeguards are in a safe operating condition and adjustment. The employer shall maintain records of these inspections and the maintenance work performed. (4-7-83)

ii. Each press shall be inspected and tested no less than weekly to determine the condition of the clutch/brake mechanism, anti-repeat feature and single stroke mechanism. Necessary maintenance or repair or both shall be performed and completed before the press is operated. The employer shall maintain records of these inspections and the maintenance work performed. These requirements do not apply to those presses which comply with Section 2267 M. and N. of this Chapter. (4-7-83)

b. Modification. It shall be the responsibility of any person modifying a power press to furnish instructions with the modification to establish new or changed guidelines for use and care of the power press so modified. (4-7-83)

c. Training of Maintenance Personnel. It shall be the responsibility of the employer to insure the original and continuing competence of personnel caring for, inspecting and maintaining power presses. (4-7-83)

07. Operation of Power Presses. (4-7-83)

a. Employment of minors. The employer shall permit no one under 18 years of age to operate or assist in the operation of machinery covered in this Section, except that this Section shall not be deemed to prohibit the employment of persons who are 16 or 17 years of age in an apprenticeship training or student-learner program which meets the requirements of Child Labor Requirements in Non-Agricultural Occupations under the Fair Labor Standards Act. (4-7-83)

b. Instruction to Operators. The employer shall train and instruct the operator in the safe method of work before starting work on any operation covered by this Section. The employer shall insure by adequate supervision that correct operating procedures are being followed. (4-7-83)

c. Work Area. The employer shall provide clearance between machines so that movement of one operator will not interfere with the work of another. Ample room for cleaning machines, handling material, work pieces, and scrap shall also be provided. All surrounding floors shall be kept in good condition and free from obstructions, grease, oil and water. (4-7-83)

d. Overloading. The employer shall operate his presses within the tonnage and attachment weight ratings specified by the manufacturer. (4-7-83)

08. Compactors. General Requirements. An anti-repeat device shall be installed on compactors which will prohibit the compacting of material while the gate or door is raised or open. When adjustments or clearing of jams are necessary, means shall be provided for locking out the control energy. (4-7-83)

256. FORGING MACHINES.

01. Definitions. (4-7-83)

a. "Forging" means the product of work on metal formed to a desired shape by impace or pressure in hammers, forging machines (upsetters), presses, rolls, and related forming equipment. Forging hammers, counterblow equipment and high-energy-rate forging machines impart impact to the workpiece while most other types of forging equipment impart squeeze pressure in shaping the stock. Some metals can be forged at room temperature but the majority of metals are made more plastic for forging by heating. (4-7-83)

b. "Open Frame hammers (or blacksmith hammers)" mean hammers used primarily for the shaping of forgings by means of impact with flat dies. Open frame hammers generally are so constructed that the anvil assembly is separate from the operating mechanism and machine supports; it rests on its own independent foundation. Certain exceptions are forging hammers made with frame mounted on the anvil, e.g. the smaller, single-frame hammers are usually made with the anvil and frame in one piece. (4-7-83)

c. "Steam hammers" mean a type of drop hammer where the ram is raised for each stroke by a double-action steam cylinder and the energy delivered to the workpiece is supplied by the velocity and weight of the ram and attached upper die driven downward by steam pressure. Energy delivered during each stroke may be varied. (4-7-83)

d. "Gravity hammers" mean a class of forging hammer wherein energy for forging is obtained by the mass and velocity of a freely falling ram and the attached upper die. Examples: Board hammers and air-lift hammers. (4-7-83)

e. "Forging Presses" mean a class of forging equipment wherein the shaping of metal between dies is performed by mechanical or hydraulic pressure, and usually is accomplished with a single work stroke of the press for each die station. (4-7-83)

f. "Trimming presses" mean a class of auxiliary forging equipment which removes flash or excess metal from a forging. This trimming operation can also be done cold, as can coining, a product sizing operation. (4-7-83)

g. "High-energy-rate forging machines" mean a class of forging equipment wherein high ram velocities resulting from the sudden release of a compressed gas against a free piston impact to the workpiece. (4-7-83)

h. "Forging rolls" mean a class of auxiliary forging equipment wherein stock is shaped between power driven rolls bearing contoured dies. Usually used for performing, roll forging is often employed to reduce thickness and increase length of stock. (4-7-83)

i. "Ring rolls" mean a class for forging equipment used for shaping weldless rings from pierced discs or thick-walled, ring-shaped blanks between rolls which control wall thickness, ring diameter, height and contour. (4-7-83)

j. "Bolt-headers" mean the same as an upsetter or forging machine except that the diameter of stock fed into the machine is much smaller, i.e., commonly 3/4 inch or less. (4-7-83)

k. "Rivet making machines" mean the same as upsetters and boltheaders when producing rivets with stock diameter of 1 inch or more. Rivet making with less than 1 inch diameter is usually a cold forging operation, and therefore not included in Sections 2273 through 2283. (4-7-83)

l. "Upsetters (or forging machines or headers)" mean a type of forging equipment, related to the mechanical press, in which the main forming energy is applied horizontally to the workpiece which is gripped and held by prior action of the dies. (4-7-83)

02. General Requirements. (4-7-83)

a. Use of Lead. The safety requirements of this Section apply to lead casts or other use of lead in the forge shop or die shop. (4-7-83)

i. Thermostatic control of heating elements shall be provided to maintain proper melting temperature and prevent overheating. (4-7-83)

ii. Fixed or permanent lead pot installations shall be exhausted. (4-7-83)

iii. Portable units shall be used only in areas where good, general room ventilation is provided as specified in the General Occupational Health Standards, Chapter 1. (4-7-83)

iv. Personal protective equipment (gloves, goggles, aprons, and other items) shall be worn. (4-7-83)

v. A covered container shall be provided to store dross skimmings. (4-7-83)

vi. Equipment shall be kept clean, particularly from accumulations of yellow lead oxide. (4-7-83)

b. Inspection and Maintenance. It shall be the responsibility of the employer to maintain all forge shop equipment in a condition which will insure continued safe operation. This responsibility includes: (4-7-83)

i. Establishing periodic and regular maintenance safety checks and keeping records of these inspections. (4-7-83)

ii. Scheduling and recording inspection of guards and point of operation protection devices at frequent and regular intervals. (4-7-83)

iii. Training personnel for the proper inspection and maintenance of forging machinery and equipment. (4-7-83)

iv. All overhead parts shall be fastened or protected in such a manner that they will not fly off or fall in event of failure. (4-7-83)

c. Hammers and Presses. (4-7-83)

i. All hammers shall be positioned or installed in such a manner that they remain on or are anchored to foundations sufficient to support them. (4-7-83)

ii. All presses shall be installed in such a manner that they remain where they are positioned or they are anchored to foundations sufficient to support them. (4-7-83)

iii. Means shall be provided for disconnecting the power to the machine and for locking out or rendering cycling controls in- operable. (4-7-83)

iv. The ram shall be blocked when dies are being changed or other work is being done on the hammer. Blocks or wedges shall be made of material the strength and construction of which should meet or exceed the specifications and dimensions shown in Table 2283-A. (4-7-83)

v. Tongs shall be of sufficient length to clear the body of the worker in case of kickback, and shall not have sharp handle ends. The worker should be instructed in the proper body position when using tongs. Tongs should be checked periodically to see that they remain at the proper hardness level for the job. When rings or equivalent

devices for locking tongs are used they should be inspected periodically to insure safe condition. (4-7-83)

vi. Oil swabs, or scale removers, or other devices to remove scale shall be provided. These devices shall be long enough to enable a man to reach the full length of the die without placing his hand or arm between the dies. (4-7-83)

vii. Material handling equipment shall be of adequate strength, size, and dimension to handle diesetting operations safely. (4-7-83)

viii. A scale guard of substantial construction shall be provided at the back of every hammer, so arranged as to stop flying scale. (4-7-83)

ix. A scale guard of substantial construction shall be provided at the back of every press, so arranged as to stop flying scale. (4-7-83)

03. Hammers, general. (4-7-83)

a. Keys. Die keys and shims shall be made from a grade of material that will not unduly crack or splinter, and should not project more than 2 inches in front and 4 inches in back of ram or die. (4-7-83)

b. Foot Operated Devices. All foot operated devices (i.e., treadles, pedals, bars, valves, and switches) shall be substantially and effectively protected from unintended operation. (4-7-83)

04. Presses. All manually operated valves and switches shall be clearly identified and readily accessible. (4-7-83)

05. Power-Driven Hammers. (4-7-83)

a. Safety Cylinder Head. Every steam or airhammer shall have a safety cylinder head to act as a cushion if the rod should break or pull out of the ram. (4-7-83)

b. Shutoff Valve. Steam hammers shall be provided with a quick closing emergency valve in the admission pipeline at a convenient location. This valve shall be closed and locked in the "OFF" position while the hammer is being adjusted, repaired, or serviced, or when the dies are being changed. (4-7-83)

c. Cylinder draining. Steam hammers shall be provided with a means of cylinder draining, such as a self-draining arrangement or a quick-acting drain cock. (4-7-83)

d. Pressure Pipes. Steam or air piping shall conform to the Specifications of American National Standard ANSI B31.1-1967. Power Piping with Addenda, ANSI B31.1.06-1971. (4-7-83)

06. Gravity Hammers. (4-7-83)

a. Air-lift Hammers. (4-7-83)

i. Air-lift hammers shall have a safety cylinder head as required in Section 2277 A. (4-7-83)

ii. Air-lift hammers shall have an air shutoff valve as required in Section 2277 B. and should be conveniently located and distinctly marked for ease of identification. (4-7-83)

iii. Air-lift hammers shall be provided with two drain cocks: one on main head cylinder, and one on clamp cylinder. (4-7-83)

iv. Air piping shall conform to the specifications of the ANSWI B31.1.0-1967, Power Piping with Addenda ANSI B31.1.01-1971. (4-7-83)

b. Board Drop Hammers. (4-7-83)

i. A suitable enclosure shall be provided to prevent damaged or detached boards from falling. The board enclosure shall be securely fastened to the hammer. (4-7-83)

ii. All major assemblies and fittings which can loosen and fall shall be properly secured in place. (4-7-83)

07. Forging Presses. (4-7-83)

a. Mechanical Forging Presses. When dies are being changed or maintenance is being performed on the press, the following shall be accomplished: (4-7-83)

i. The power to the press shall be locked out. (4-7-83)

ii. The flywheel shall be at rest. (4-7-83)

iii. The ram shall be blocked with a material the strength of which shall meet or exceed the specifications or dimensions shown in Table 2283-A. (4-7-83)

b. Hydraulic Forging Presses. When dies are being changed or maintenance is being performed on the press, the following shall be accomplished: (4-7-83)

i. The hydraulic pumps and power apparatus shall be locked out. (4-7-83)

ii. The ram shall be blocked with a material the strength of which shall meet or exceed the specifications or dimensions in Table 2283-A. (4-7-83)

08. Trimming Presses. (4-7-83)

a. Hot Trimming Presses. The requirements of Section 2279 A. of this Chapter shall also apply to hot trimming presses. (4-7-83)

b. Cold Trimming Presses. Cold trimming presses shall be safeguarded in accordance with Sections 2264 through 2267 of this Chapter. (4-7-83)

09. Upsetters. (4-7-83)

a. General Requirements. All upsetters shall be installed so that they remain on their supporting foundations. (4-7-83)

b. Lockouts. Upsetters shall be provided with a means for locking out the power at its entry point to the machine and rendering its cycling controls inoperable. (4-7-83)

c. Manually Operated Controls. All manually operated valves and switches shall be clearly identified and readily accessible. (4-7-83)

d. Tongs. Tongs shall be of sufficient length to clear the body of the worker in case of kickback, and shall not have sharp handle ends. The worker should be instructed in the proper body position when using tongs. Tongs should be checked periodically to see that they remain at the proper hardness level for the job. When rings or equivalent devices for locking tongs are used, they should be inspected periodically to assure safe condition. (4-7-83)

e. Changing Dies. When dies are being changed, maintenance performed, or any work done on the machine, the power to the upsetter shall be locked out, and the flywheel shall be at rest. (4-7-83)

10. Other Forging Equipment. (4-7-83)

a. Boltheading. The provisions of Section 2281 shall apply to boltheading. (4-7-83)

b. Rivet Making. The provisions of Section 2281 shall apply to rivet making. (4-7-83)

11. Other Forge Facility Equipment. (4-7-83)

a. Billet Shears. A positive-type lock-out device for disconnecting the power to the shear shall be provided. (4-7-83)

b. Saws. Every saw shall be provided with a guard of not less than 1/8 inch sheet metal positioned to stop flying sparks. Suitable means should be provided to trap sparks below the saw. A tank of water placed below the saw is also desirable. (4-7-83)

c. Conveyors. Conveyor power transmission equipment shall be guarded in accordance with ANSI B20.1-1957, Safety Code for Conveyors, Cableways, and Related Equipment. (4-7-83)

d. Shot Blast. The cleaning chamber shall have doors or guards to protect operators. (4-7-83)

e. Grinding. Personal Protective equipment shall be used in grinding operations, and equipment shall be used and maintained in accordance with ANSI B7.1-1970, Safety Code for the Use, Care, and Protection of Abrasive Wheels, and with Sections 2251 through 2255 of this Chapter. (4-7-83)

f. This table shows the distances that guards shall be positioned from the danger line in accordance with the required openings. (4-7-83)

DIAGRAM available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

g. Explanation of diagram: this diagram shows the accepted safe openings between the bottom edge of a guard and feed table at various distances from the danger line (point of operation). The "Clearance Line" marks the distance required to prevent contact between guard and moving parts. The "Minimum guarding line" is the distance between the infeed side of the guard and the danger line which is one-half inch from the danger line. The various openings are such that for average size hands, an operator's fingers won't reach the point of operation. After installation of point of operation guards and before a job is released for operation, a check should be made to verify that the guard will prevent the operator's hands from reaching the point of operation. (4-7-83)

TABLE 2283-A, STRENGTH AND DIMENSIONS FOR WOOD RAM PROPS, available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

257. MECHANICAL POWER-TRANSMISSION APPARATUS.

01. Definitions. (4-7-83)

a. "Belts" include all power transmission belts, such as flat belts, round belts, V-belts, ect., unless otherwise specified. (4-7-83)

b. "Belt Shifter" means a device for mechanically shifting belts from tight to loose pulleys or vice versa, or for shifting belts on cones of speed pulleys. (4-7-83)

c. "Belt pole" (sometimes called a "Belt shipper" or "Shipper pole") means a device used in shifting belts on and off fixed pulleys on line or countershaft where there are no loose pulleys. (4-7-83)

d. "Exposed to contact" means that the location of an object is such that a person is likely to come into contact with it and be injured. (4-7-83)

e. "Flywheels" include flywheels, balance sheels, and flywheel pulleys mounted and revolving on crankshaft of engine or other shafting. (4-7-83)

f. "Maintenance runway" means any permanent runway or platform used for oiling, maintenance, running adjustment, or repair work, but not for passageway. (4-7-83)

g. "Nip-point belt and pulley guard" means a device which encloses the pulley and is provided with rounded or rolled edge slots through which the belt passes. (4-7-83)

h. "Point of Operation" means that point at which cutting, shaping, or forming is accomplished upon the stock and shall include such other points as may offer a hazard to the operator in inserting or manipulating the stock in the operation of the machine. (4-7-83)

i. "Prime Movers" include steam, gas, oil, and air engines, motors, steam and hydraulic turbines, and other equipment used as a source of power. (4-7-83)

j. "Sheaves" mean grooved pulleys and shall be so classified unless used as flywheels. (4-7-83)

02. General Requirements. (4-7-83)

a. This Section covers all types and shapes of power-transmission belts, except the following when operating at two hundred and fifty (250) feet per minute or less: (4-7-83)

i. Flat belts one (1) inch or less in width. (4-7-83)

ii. Flat belts two (2) inches or less in width which are free from metal lacings or fasteners. (4-7-83)

iii. Round belts one-half (1/2) inch or less in diameter. (4-7-83)

iv. Single strand V-belts, the width of which is thirteen thirty-seconds (13/32) inch or less. (4-7-83)

b. Vertical and inclined belts (Section 2289 C. and D.) if not more than two and one-half (2 1/2) inches wide and running at a speed of less than 1,000 feet per minute, and if free from metal lacings or fastenings may be guarded with a nip-point belt and pulley guard. (4-7-83)

c. For the Textile Industry, because of the presence of excessive deposits of lint, which constitute a serious fire hazard, the sides and face sections only of nip-point belt and pulley guards are required, provided the guard shall extend at least six (6) inches beyond the rim of the pulley on the in-running and off-running sides of the belt and at least two (2) inches away from the rim and face of the pulley in all other directions. (4-7-83)

d. These standards cover the principal features with which power transmission safeguards shall comply. (4-7-83)

03. Prime-Mover Guards. (4-7-83)

a. Flywheels. Flywheels located so that any part is seven (7) feet or less above floor or platform shall be guarded in accordance with the requirements of this Section: (4-7-83)

i. With an enclosure of sheet, perforated, or expanded metal, or woven wire; (4-7-83)

ii. With guard rails placed not less than fifteen (15) inches nor more than twenty (20) inches from rim. When flywheel extends into pit or is within 12 inches of floor, a standard toeboard shall also be provided; (4-7-83)

iii. When the upper rim of flywheel protrudes through a working floor, it shall be entirely enclosed or surrounded by a guardrail and toeboard. (4-7-83)

iv. For flywheels with smooth rims five (5) feet or less in diameter, where the preceding methods cannot be applied, the following may be used: A disk attached to the flywheel in such a manner as to cover the spikes of the wheel on the exposed side and present a smooth surface and edge, at the same time providing means for periodic inspection. An open space, not exceeding four (4) inches in width, may be left between the outside edge of

the disk and the rim of the wheel if desired, to facilitate turning the wheel over. Where a disk is used, the keys or other dangerous projections not covered by disk shall be cut off or covered. This section does not apply to flywheels with solid web centers. (4-7-83)

v. Adjustable guard to be used for starting engine or for running adjustments may be provided at the flywheel of gas or oil engines. A slot opening for jack bar will be permitted. (4-7-83)

vi. Wherever flywheels are above working areas, guards shall be installed having sufficient strength to hold the weight of the flywheel in the event of a shaft or wheel mounting failure. (4-7-83)

b. Cranks and Connecting Rods. Cranks and connecting rods, when exposed to contact shall be guarded in accordance with Sections 2297 and 2298, or by a guardrail as described in Section 2299 E. of this Chapter. (4-7-83)

c. Tail Rods or Extension Piston Rods. Tail rods or extension piston rods shall be guarded in accordance with Sections 2297 and 2298, or by a guardrail on sides and end, with a clearance of not less than fifteen (15) nor more than twenty (20) inches when rod is fully extended. (4-7-83)

d. Governor Balls. Governor balls six (6) feet or less from the floor or other working level, when exposed to contact, shall be provided with an enclosure extending to the top of the governor balls when at their highest position. The material used in the construction of this enclosure shall conform to Sections 2296 and 2298 of this Chapter. (4-7-83)

04. Shafting. (4-7-83)

a. Installation. (4-7-83)

i. Each continuous line of shafting shall be secured in position against excessive endwise movement. (4-7-83)

ii. Inclines and vertical shafts, particularly inclined idler shafts, shall be securely held in position against end-wise thrust. (4-7-83)

b. Guarding Horizontal Shafting. (4-7-83)

i. All exposed parts of horizontal shafting seven (7) feet or less from floor or working platform excepting runways used exclusively for oiling, or running adjustments, shall be protected by a stationary casing enclosing shafting completely or by a trough enclosing sides and top or sides and bottom of shafting as location requires. (4-7-83)

ii. Shafting under bench machines shall be enclosed by a stationary casing, or by a trough at sides and top or sides and bottom, as location requires. The sides of the trough shall come within at least six (6) inches of the under side of table, or if shafting is located near floor within six (6) inches of floor. In every case, the sides of trough shall extend at least two (2) inches beyond the shafting or protuberance. (4-7-83)

c. Guarding Vertical and Inclines Shafting. Vertical and inclines shafting seven (7) feet or less from floor or working platform, excepting maintenance runways shall be enclosed with a stationary casing in accordance with requirements of Sections 2297 and 2299. (4-7-83)

d. Projecting Shaft Ends. (4-7-83)

i. Projecting shaft ends shall present a smooth edge and shall not project more than one-half the diameter of the shaft unless guarded by nonrotating caps or safety sleeves. (4-7-83)

ii. Unused keyways shall be filled up or covered. (4-7-83)

e. Power-transmission apparatus located in basements. All mechanical power transmission apparatus

located in basements, towers, and rooms used exclusively for power transmission equipment shall be guarded in accordance with this Section, except that the requirements for safeguarding belts, pulleys, and shafting need not be complied with when the following requirements are met: (4-7-83)

i. The basement, tower, or room occupied by transmission equipment is locked against unauthorized entrance. (4-7-83)

ii. The vertical clearance in passageways between the floor and power transmission beams, ceiling, or any other objects, is not less than five feet six inches (5 ft. 6 in.). (4-7-83)

iii. The intensity of illumination conforms to the requirements of ANSI A11. 1-1965 (R-1970). (4-7-83)

iv. The footing is dry, firm, and level. (4-7-83)

v. The route followed by the oiler is protected in such a manner as to prevent accident. (4-7-83)

05. Pulleys. (4-7-83)

a. Guarding. Pulleys, any parts of which are seven (7) feet or less from the floor or working platform, shall be guarded in accordance with the standards specified in Sections 2297 and 2299. Pulleys serving as balance wheels (e.g., punch presses) on which the point of contact between belt and pulley is more than six feet six inches (6 ft. 6 in.) from the floor or platform may be guarded with a disk covering the spokes. (4-7-83)

b. Location of Pulleys. (4-7-83)

i. Unless the distance to the nearest fixed pulley, clutch, or hanger exceeds the width of the belt used, a guide shall be provided to prevent the belt from leaving the pulley on the side where insufficient clearance exists. (4-7-83)

ii. Where there are overhanging pulleys on line, jack, or countershafts with no bearing between the pulley and the outer end of the shaft, a guide to prevent the belt from running off the pulley should be provided. (4-7-83)

c. Broken Pulleys, pulleys with cracks, or pieces broken out of rims, shall not be used. (4-7-83)

d. Pulley Speeds. Pulleys intended to operate at rim speed in excess of manufacturers normal recommendations shall be specially designed and carefully balanced for the speed at which they are to operate. (4-7-83)

e. Compositions and Wood Pulleys. Composition or laminated wood pulleys shall not be installed where they are subjected to influences detrimental to their structural composition. (4-7-83)

06. Belt, Rope, Pulleys, and Chain Drives. Belts, ropes, pulleys and chain drives which are seven (7) feet or less from the floor or walkway shall be guarded. (4-7-83)

07. Gears, Sprockets, and Chains. (4-7-83)

a. All gears, sprocket wheels and chains which are seven (7) feet or less from the floor or walkway shall be guarded. (4-7-83)

b. Openings for Oiling. When frequent oiling must be done, openings with hinged or sliding self-closing covers shall be provided. All points not readily accessible shall have oil feed tubes if lubricant is to be added while machinery is in motion. (4-7-83)

08. Guarding Friction Drives. The driving point of all friction drives when exposed to contact shall be guarded, all arm or spoke friction drives and all web friction drives with holes in the web shall be entirely closed, and

all projecting belts on friction drives where exposed to contact shall be guarded. (4-7-83)

09. Keys, Setscrews, and Other Projections. All projecting keys, setscrews, and other projections in revolving parts shall be removed or made flush or guarded by metal covers. This section does not apply to keys or setscrews within gear or sprocket casings or other enclosures, not to keys, setscrews, or oilcups in hubs of pulleys less than twenty (20) inches in diameter where they are within the plane of the rim of the pulley. NOTE: It is recommended, however, that no projecting setscrews or oilcups be used in any revolving pulley or part of machinery. (4-7-83)

10. Collars and Couplings. (4-7-83)

a. Collars. All revolving collars, including split collars, shall be cylindrical, and screws or bolts used in collars shall not project beyond the largest periphery of the collar. (4-7-83)

b. Couplings. Shaft couplings shall be so constructed as to present no hazard from bolts, nuts, setscrews, or revolving surfaces. Bolts, nuts, and setscrews will, however, be permitted where they are covered with safety sleeves or where they are used parallel with the shafting and are counter-sunk or else do not extend beyond the flange of the coupling. (4-7-83)

11. Bearings and Facilities for Oiling. Self lubricating bearings are recommended and all drip cups and pans shall be securely fastened. (4-7-83)

12. Guarding of Clutches, Cutoff Couplings, and Clutch Pulleys. (4-7-83)

a. Guards. Clutches, cutoff couplings, or clutch pulleys having projecting parts where such clutches are located seven (7) feet or less above the floor or working platform, shall be enclosed by a stationary guard constructed in accordance with Section 2297 of this Chapter. A "U" type guard is permissible. (4-7-83)

b. Engine rooms. In engine rooms a guardrail, preferably with toeboard, may be used instead of the guard required by A. of this section, provided such a room is occupied only by engine room attendants. (4-7-83)

c. Bearings. A bearing support immediately adjacent to a friction clutch or cutoff coupling shall have self-lubricating bearings requiring attention at infrequent intervals. (4-7-83)

13. Belt Shifters, Clutches, Shippers, Poles, Perches, and Fasteners. (4-7-83)

a. Belt Shifters. (4-7-83)

i. Tight and loose pulleys on all installations made on or after August 27, 1971 shall be equipped with a permanent belt shifter provided with mechanical means to prevent belt from creeping from loose to tight pulley. It is recommended that old installations be changed to conform to this rule. (4-7-83)

ii. Belt shifter and clutch handles shall be rounded and be located as far as possible from danger of accidental contact, but within easy reach of the operator. Where belt shifters are not directly located over a machine or bench, the handles shall be cut off six feet six inches (6 ft. 6 in.) above floor level. (4-7-83)

iii. All belt and clutch shifters of the same type in each ship should move in the same direction to stop machines, i.e., either all right or all left. This does not apply to friction clutch on countershaft carrying two clutch pulleys with open and crossed belts respectively. In this case, the shifter handle has three positions and the machine is at a standstill when clutch handle is in the neutral or center position. (4-7-83)

b. Belt Shippers and Shipper Poles. The use of belt poles as substitutes for mechanical shifters is not recommended. Where necessity compels their use, they shall be of sufficient size to enable workmen to grasp them securely. (A 2 inch diameter or 1 1/2 by 2 inches cross-section is suggested.)Poles shall be smooth and preferably of straight grain hardwood, such as ash or hickory. The edges of rectangular poles should be rounded. Poles should extend from the top of the pulley to within about forty (40) inches of floor or working platform. (4-7-83)

c. Belt perches. Where loose pulleys or idlers are not practicable, belt perches in form of brackets, rollers, ect. shall be used to keep idle belts away from the shafts. Perches should be substantial and designed for the safe shifting of belts. (4-7-83)

d. Belt Fasteners. Belts which out of necessity must be shifted by hand and belts within seven (7) feet of the floor or working platform which are not guarded in accordance with Section 2297 of this Chapter shall not be fastened with metal in any case, nor with any other fastening which by construction or wear will constitute an accidental hazard. (4-7-83)

14. Standard Guards - General Requirements. (4-7-83)

a. Materials. (4-7-83)

i. Standard conditions shall be secured by the use of the following materials. Expanded metal, perforated or solid sheet metal, wire mesh on a frame of angle iron, or iron pipe securely fastened to floor or to frame of machine. (4-7-83)

ii. All metal should be free from burrs and sharp edges. (4-7-83)

iii. Wire mesh should be of the type in which the wires are securely fastened at every cross point either by welding, soldering, or galvanizing, except in case of diamond or square wire mesh made of No. 14 gage wire, 3/4 inch mesh or heavier. (4-7-83)

b. Methods of Manufacture. (4-7-83)

i. Expanded metal, sheet or perforated metal, and wire mesh shall be securely fastened to frame by one of the following methods: (a) With rivets or bolts spaced not more than five (5) inches center to center. In case of expanded metal or wire mesh, metal strips or clips shall be used to form a washer for rivets or bolts, (b) be welding to frame every four (4) inches, (c) by weaving through channel or angle frame, or if No. 14 gage 3/4 inch mesh or heavier is used by bending entirely around rod frames, (d) where openings in pipe railing are to be filled in with expanded metal, wire mesh or sheet metal, the filler material shall be made into panels with rolled edges or bound with "V" or "U" edging of No. 24 gage or heavier sheet metal fastened to the panels with bolts or rivets spaced not more than five (5) inches center to center. The bound panels shall be fastened to the railing by sheet metal clips spaced not more than five (5) inches center to center, (e) diamond or square mesh made of crimped wire fastened into channels, angle or round-iron frames, may also be used as a filler in guards. Size of mesh shall correspond to Table 2299 1-A. (4-7-83)

ii. Where the design of guards requires filler material of greater area than 12 square feet, additional frame members shall be provided to maintain panel area within this limit. (4-7-83)

iii. All joints of framework shall be made equivalent in strength to the material of the frame. (4-7-83)

15. Disk, Shield, and "U" Guards. (4-7-83)

a. Disk Guards. A disk guard shall consist of a sheet-metal dish not less than No. 22 gage fastened by "U" bolts or rivets to spikes of pulleys, flywheels, or gears. Where possibility of contact with sharp edges of the disk exists, the edge shall be rolled or wired. In all cases the nuts shall be provided with locknuts which shall be placed on the unexposed side of the wheel. (4-7-83)

b. Shield Guards. (4-7-83)

i. A shield guard shall consist of a frame filled in with wire mesh, expanded, perforated, or solid sheet metal. (4-7-83)

ii. If area of shield does not exceed six (6) square feet, the wire mesh or expanded metal may be fastened in a framework of 3/8 inch solid rod, 3/4 inch by 3/4 inch by 1/8 inch angle iron or metal construction of equivalent strength. Metal shields may have edges entirely rolled around a 3/8 inch solid iron rod. (4-7-83)

c. "U" Guards. A "U" guard consisting of a flat surface with edge members shall be designed to cover the under surface and lower edge of a belt, multiple chain, or rope drive. It shall be constructed of materials specified in Table 2299. 1-A and shall conform to the requirements of Sections 2299. c. and d. Edges shall be smooth and if size of guard requires, the edges shall be reinforced by rolling, wiring, or by binding with angle or flat iron. (4-7-83)

16. Approved Materials. (4-7-83)

a. Minimum Requirements. The materials and dimensions specified in this section shall apply to all guards, except horizontal overhead belts, rope, cable, or chain guards, more than seven (7) feet above the floor, or platform. (For the latter, see Table 2299. 1-A). (4-7-83)

i. Minimum dimensions of materials for the framework of all guards, except as noted in (c) of this section shall be angle iron 1 inch by 1 inch by 1/8 inch, metal pipe of 3/4 inch inside diameter or metal construction of equivalent strength.(a) All guards shall be rigidly braced every three (3) feet or fractional part of their height to some fixed part of machinery or building structure. Where guard is exposed to contact with moving equipment additional strength may be necessary, (b) the framework for all guards fastened to floor or working platform and without other support or bracing shall consist of 1 1/2 inch by 1 1/2 inch by 1/8 inch angle iron, metal pipe of 1 1/2 inch inside diameter, or metal construction of equivalent strength. All rectangular guards shall have at least four upright frame members each of which shall be carried to the floor and be securely fastened thereto. Cylindrical guards shall have at least three supporting members carried to floor, (c) guards thirty (30) inches or less in height and with a total surface area not in excess of ten (10) square feet may have a frame work of 3/8 inch solid rod, 3/4 inch by 3/4 inch by 1/8 inch angle, or metal construction of equivalent strength. The filling material shall correspond to the requirements of Table 2299-A. (4-7-83)

ii. The specifications given in Table 2299-A and a.i. of this section are minimum requirements; where guards are exposed to unusual wear, deterioration or impact, heavier material and construction should be used to protect amply against the specific hazards involved. (4-7-83)

b. Wood Guards. (4-7-83)

i. Wood guards may be used in the woodworking and chemical industries, in industries where the presence of fumes or where manufacturing conditions would cause the rapid deterioration of metal guards; also in construction work and in locations outdoors where extreme cold or extreme heat make metal guards and railings undesirable. In all other industries, wood guards shall not be used.(a) Wood shall be sound, tough, and free from any loose knots, (b) guards shall be made of planed lumber not less than one (1) inch rough board measure, and edges and corners rounded off, (c) wood guards shall be securely fastened together with wood screws, hardwood dowel pins, bolts, or rivets, (d) while no definite dimensions are given under this heading for framework or filler materials, wood guards shall be equal in strength and rigidity to metal guards specified in A.i. and ii. of this section and Table 2299.1-A, (e) for construction of standard wood railing, see E. of this section. (4-7-83)

c. Guards for Horizontal Overhead Belts. (4-7-83)

i. Guards for horizontal overhead belts shall run the entire length of the belt and follow the line of the pulley to the ceiling or be carried to the nearest wall, thus enclosing the belt effectively. Where belts are so located as to make it impracticable to carry the guard to wall or ceiling, construction of guard shall be such as to enclose completely the top and bottom runs of belt and the face of pulleys. (4-7-83)

ii. The guard and all its supporting members shall be securely fastened to wall or ceiling by gimlet-point lag screws or through bolts. In case of masonry construction, expansion bolts shall be used. The use of bolts placed horizontally through floor beams or ceiling rafters is recommended. (4-7-83)

iii. Suitable reinforcement shall be provided for the ceiling rafters or overhead floor beams, where such is necessary to sustain safely the weight and stress likely to be imposed by the guard. The interior surface of all guards, by which is meant the surface of the guard with which a belt will come in contact, shall be smooth and free from all projections of any character, except where construction demands it; protruding shallow roundhead rivets may be used. Overhead belt guards shall be at least one-quarter wider than the belt which they protect, except that this

clearance need not in any case exceed six (6) inches on each side. Overhead rope drive and block and roller-chain-drive guards shall be not less than six (6) inches wider than the drive on each side. In overhead silent chain-drive guards where the chain is held from lateral displacement on the sprockets, the side clearances required on drives of twenty (20) inch centers or under shall be not less than one-fourth inch from the nearest moving chain part, and on drives of over twenty (20) inch centers a minimum of one-half inch from the nearest moving chain part. (4-7-83)

iv. Table 2299 1-B gives the sizes of materials to be used and the general construction specifications of guards for belts ten (10) inches or more in width. No material for overhead belt guards should be smaller than that specified in Table 2299 1-B or belts ten (10) to fourteen (14) inches wide, even if the overhead belt is less than ten (10) inches in width. However, No. 20 gage sheet metal may be used as a filler on guards for belts less than ten (10) inches wide. Expanded metal, because of the sharp edges, should not be used as a filler in horizontal belt guards. (4-7-83)

v. For clearance between guards and belts, ropes or chains of various center to center dimensions between the shafts, see bottom of Table 2299 1-B. (4-7-83)

d. Guards for Horizontal Overhead-rope and Chain-drives. Overhead-rope and chain-drive guard construction shall conform to the rules for overhead-belt guard construction of similar width, except that the filler material shall be of the solid type as shown in Table 2299 1-B unless the fire hazard demands the use of open construction. A side guard member of the same solid filling material should be carried up in a vertical position two (2) inches above the level of the lower run of the rope or chain drive and two (2) inches within the periphery of the pulleys which the guard enclosed thus forming a trough. These side filler members should be reinforced on the edges with 1 1/2 inch by 1/4 inch flat steel, riveted to the filling material at not greater than eight (8) inch centers; the reinforcing strip should be fastened or bolted to all guard supporting members with at least one 3/8 inch rivet or bolt at each intersection, and the ends should be secured to the ceiling with lag screws or bolts. The filling material shall be fastened to the framework of the guard and the filler supports by 3/16 inch rivets spaced on 4 inch centers. The width of the multiple drive shall be determined by measuring the distance from the outside of the first to the outside of the last rope or chain in the group accommodated by the pulley. (4-7-83)

e. Guardrails and Toeboards. (4-7-83)

i. Guardrails shall be forty-two (42) inches in height with midrail between top rail and floor. (4-7-83)

ii. Posts shall be not more than eight (8) feet apart; they are to be permanent and substantial, smooth, and free from protruding nails, bolts, and splinters. If made of pipe, the post shall be 1 1/4 inches inside diameter or larger. If made of metal shapes or bars, their section shall be equal in strength to that of 1 1/2 by 1 1/2 by 3/16 inch angle iron. If made of wood, the posts shall be two by four (2 x 4) inches or larger. The upper rail shall be two by four inches or 2-one by four strips, one at the top and one at the side of posts. The midrail may be one by four (1 x 4) inches or more. The rails (metal shapes, metal bars, or wood), should be on that side of the posts which gives the best protection and support. Where panels are fitted with expanded metal or wire mesh as noted in Table 2299-A the middle rails may be omitted. Where guard is exposed to contact with moving equipment, additional strength may be necessary. (4-7-83)

iii. Toe boards shall be four (4) inches or more in height, or wood, metal or of metal grill not exceeding one (1) inch mesh. Toeboards at flywheel pits should preferably by placed as close to edge of the pit as possible. (4-7-83)

17. Care of Equipment. (4-7-83)

a. General. All power-transmission equipment shall be inspected at intervals not exceeding 60 days and be kept in good working condition at all times. (4-7-83)

b. Shafting. (4-7-83)

i. Shafting shall be kept in alignment, free from rust and excess oil or grease. (4-7-83)

ii. Where explosives, explosive dusts, flammable vapors or flammable liquids exist, the hazard of

static sparks from shafting shall be carefully considered. (4-7-83)

c. Bearings. Bearings shall be kept in alignment and properly adjusted. (4-7-83)

d. Hangers. Hangers shall be inspected to make certain that all supporting bolts and screws are tight and that supports of hanger boxes are adjusted properly. (4-7-83)

e. Pulleys. (4-7-83)

i. Pulleys shall be kept in proper alignment to prevent belts from running off. (4-7-83)

ii. One or both pulleys carrying of nonshifting belt should have crowned faces. (4-7-83)

iii. Cast-iron pulleys should be tested frequently with a hammer to disclose cracks in rim or spokes. It should be borne in mind that the sound is usually much different if the belt is or is not on the pulley. (4-7-83)

iv. Split pulleys should be inspected to as certain if all bolts holding together the sections of the pulley are tight. (4-7-83)

f. Care of Belts. (4-7-83)

i. Quarter-twist belts when installed without an idler can be used on drives running in one direction only. They will run off a pulley when direction of motion is reversed. (4-7-83)

ii. Inspection shall be made of belts, lacings, and fasteners and such equipment kept in good repair. (4-7-83)

iii. Where possible, dressing should not be applied when belt or rope is in motion; but, if this is necessary, it should be applied where belts or rope leave pulley, not where they approach. The same precautions apply to lubricating chains. In the case of V-belts, belt dressing is neither necessary nor advisable. (4-7-83)

g. Lubrication. The regular oilers shall wear tightfitting clothing and should use cans with long spouts to keep their hands out of danger. Machinery shall be oiled when not in motion, wherever possible. (4-7-83)

18. Alarm. Where an exposure is created by the operation, and the operators are not within sight or hearing of other employees, a suitable alarm device should be provided so that assistance will be available in case of accidents. (4-7-83)

258. MECHANICAL POWER PRESSES.

01. Definitions. (4-7-83)

a. "Antirepeat" means the part of the clutch/brake control system designed to limit the press to a single stroke if the tripping means is held operated. Antirepeat requires release of all tripping mechanisms before another stroke can be initiated. "Antirepeat" is also called single stroke reset or reset circuit. (4-7-83)

b. "Brake" means the mechanism used on a mechanical power press to stop and/or hold the crankshaft, either directly or through a gear train, when the clutch is disengaged. (4-7-83)

c. "Bolster Plate" means the plate attached to the top of the bed of the press having drilled holes or t-slots for attaching the lower die or die shoe. (4-7-83)

d. "Clutch" means the coupling mechanism used on a mechanical power press to couple the flywheel to the crankshaft, either directly or through a gear train. (4-7-83)

e. "Full revolution clutch" means a type of clutch that, when tripped, cannot be disengaged until the crankshaft has completed a full revolution and the press slide a full stroke. (4-7-83)

f. "Part revolution clutch" means a type of clutch that can be disengaged at any point before the crankshaft has completed a full revolution and the press slide a full stroke. (4-7-83)

g. "Direct drive" means the type of driving arrangement wherein no clutch is used; coupling and decoupling of the driving torque is accomplished by energization and deenergization of a motor. Even though not employing a clutch, direct drives match the operational characteristics of "part revolution clutches" because the driving power may be disengaged during the stroke of the press. (4-7-83)

h. "Concurrent" means acting in conjunction, and is used to describe a situation wherein two or more controls exist in an operated condition at the same time. (4-7-83)

i. "Continuous" means uninterrupted multiple strokes of the slide without intervening stops (or other clutch control action) at the end of individual strokes. (4-7-83)

j. "Counterbalance" means the mechanism that is used to balance or support the weight of the connecting rods, slide, and slide attachments. (4-7-83)

k. "Device" means a press control or attachment that: (4-7-83)

i. Restrains the operator from inadvertenely reaching into the point of operation, or (4-7-83)

ii. Prevents normal press operation if the operator's hands are inadvertently within the point of operation, or (4-7-83)

iii. Automatically withdraws the operator's hands if the operator's hands are inadvertently within the point of operation as the dies close. (4-7-83)

l. "Presence sensing device" means a device designed, constructed and arranged to create a sensing field or area and deactivate the clutch control of the press when an operator's hand and/or other parts of his body is within such field or area. (4-7-83)

m. "Gate or movable barrier device" means a movable barrier arranged to enclose the point of operation before the press stroke can be started. (4-7-83)

n. "Holdout or restraint device" means a mechanism, including attachments for operator's hands, that when anchored and adjusted prevent the operators hands from entering the point of operation. (4-7-83)

o. "Pull-out device" means a mechanism attached to the operator's hands and connected to the upper die or slide of the press, that is designed, when properly adjusted, to withdraw the operators hands as the dies close, if the operator's hands are inadvertently within the point of operation. (4-7-83)

p. "Sweep device" means a single or double arm (rod) attached to the upper die or slide of the press and designed to move the operator's hands to a safe position as the dies close, if the operator's hands are inadvertently within the point of operation. (4-7-83)

q. "Two hand control device" means a two-hand trip that further requires concurrent pressure from both hands of the operator during a substantial part of the die-closing portion of the stroke of the press. (4-7-83)

r. "Die" means the tooling used in a press for cutting or forming material. An upper and a lower die make a complete set. (4-7-83)

s. "Die builder" means any person who builds die for power presses. (4-7-83)

t. "Die set" means a tool holder held in alignment by guide posts and bushings and consisting of a lower shoe, an upper shoe or punch holder, and guide posts and bushing. (4-7-83)

u. "Die setter" means an individual who places or removes dies in or from mechanical power presses, and who, as a part of his duties, makes the necessary adjustments to cause the tooling to function properly and safely. (4-7-83)

v. "Die Setting" means the process of placing or removing dies in or from a mechanical power press, and the process of adjusting the dies, other tooling and safeguarding means to cause them to function properly and safely. (4-7-83)

w. "Die shoe" means a plate or block upon which a die holder is mounted. A die shoe functions primarily as a base for the complete die assembly, and, when used, is bolted or clamped to the bolster plate or the face of slide. (4-7-83)

x. "Ejector" means a mechanism for removing work or material from between the dies. (4-7-83)

y. "Face of slide" means the bottom surface of the slide to which the punch or upper die is generally attached. (4-7-83)

z. "Feeding" means the process of placing or removing material within or from the point of operation. (4-7-83)

aa. "Automatic feeding" means feeding wherein the material or part being processed is placed within or removed from the point of operation by a method or means not requiring action by an operator on each stroke of the press. (4-7-83)

bb. "Semiautomatic feeding" means feeding wherein the material or part being processed is placed within or removed from the point of operation by an auxiliary means controlled by operator on each stroke of the press. (4-7-83)

cc. "Manual feeding" means feeding wherein the material or part being processed is handled by the operator on each stroke of the press. (4-7-83)

dd. "Foot control" means the foot operated control mechanism designed to be used with a clutch or clutch/brake control system. (4-7-83)

ee. "Foot pedal" means the foot operated lever designed to operate the mechanical linkage that trips a full revolution clutch. (4-7-83)

ff. "Guard" means a barrier that prevents entry of the operator's hands or fingers into the point of operation. (4-7-83)

gg. "Die enclosure guard" means an enclosure attached to the die shoe or stipper, or both, in a fixed position. (4-7-83)

hh. "Fixed barrier guard" means a die space barrier attached to the press frame. (4-7-83)

ii. "Interlocked press barrier guard" means a barrier attached to the press frame and interlocked so that the press stroke cannot be started normally unless the guard itself, or its hinged or movable sections, enclose the point of operation. (4-7-83)

jj. "Adjustable barrier guard" means a barrier requiring adjustment for each job or die setup. (4-7-83)

kk. "Guide post" means the pin attached to the upper or lower die shoe, operating within the bushing on the opposing die shoe, to maintain the alignment of the upper and lower dies. (4-7-83)

ll. "Hand feeding tool" means any hand held tool designed for placing or removing material or parts to be processed within or from the point of operation. (4-7-83)

mm. "Inch" means an intermittent motion imparted to the slide (on machines using part revolution clutches) by momentary operation of the "inch" operating means. Operation of the "Inch" operating means engages the driving clutch so that a small portion of one stroke or indefinite stroking can occur, depending upon the length of time the "Inch" operating means is held operated."Inch" is a function used by the die setter for setup of dies and tooling, but is not intended for use during production operations by the operator. (4-7-83)

nn. "Job" means an intermittent motion imparted to the slide by momentary operation of the drive motor, after the clutch is engaged with the flywheel at rest. (4-7-83)

oo. "Knockout" means a mechanism for releasing material from either die. (4-7-83)

pp. "Liftout" means the mechanism also known as knockout. (4-7-83)

qq. "Operator's station" means the complete complement of controls used by or available to an operator on a given operation for stroking the press. (4-7-83)

rr. "Pinch point" means any point other than the point of operation at which it is possible for a part of the body to be caught between the moving parts of a press or auxiliary equipment, or between moving and stationary parts of a press or auxiliary equipment or between the material and moving part or parts of the press or auxiliary equipment. (4-7-83)

ss. "Point of Operation" means the area of the press where material is actually positioned and work is being performed during any process such as shearing, punching, forming, or assembling. (4-7-83)

t. "Press" means a mechanically powered machine that shears, punches, forms, or assembles metal or other material by means of cutting, shaping, or combination dies attached to slides. A press consists of a stationary bed or anvil, and a slide (or slides) having a controlled reciprocating motion toward and away from the bed surface, the slide being guided by a definite path by the frame of the press. (4-7-83)

uu. "Repeat" means an unintended or unexpected successive stroke of the press resulting from a malfunction. (4-7-83)

vv. "Safety block" means a prop that, when inserted between the upper and lower dies or between the bolster plate and the face of the slide prevents the slide from falling off its own deadweight. (4-7-83)

ww. "Single stroke" means one complete stroke of the slide, usually initiated from a full open (or up) position, followed by closing, (or down), and then a return to the full open position. (4-7-83)

xx. "Slide" means the main reciprocating press member. A slide is also called a ram, plunger, or platen. (4-7-83)

yy. "Stop control" means an operator control designed to immediately deactivate the clutch control and activate the brake to stop slide motion. (4-7-83)

zz. "Stripper" means a mechanism or die part for removing the parts or material from the punch. (4-7-83)

aaa. "Stroking selector" means the part of the clutch/brake that determines the type of stroking when the operating means is actuated. The stroking selector generally includes positions for "OFF" ("clutch control", "inch", "single stroke", and "continuous" (when continuous is furnished). (4-7-83)

bbb. "Trip or (tripping)" means activation of the clutch to "run" the press. (4-7-83)

ccc. "Turnover bar" means a bar used in die setting to manually turn the crankshaft of the press. (4-7-83)

ddd. "Two-hand trip" means a clutch actuating means, requiring the concurrent use of both hands of the

operator to trip the press. (4-7-83)

eee. "Unitized tooling" means a type of die in which the upper and lower members are incorporated into a self-contained unit so arranged as to hold the die members in alignment. (4-7-83)

fff. "Control system" means sensors, manual input and mode selection elements, interlocking and decision-making circuitry, and output elements to the press operating mechanism. (4-7-83)

ggg. "Brake monitor" means a sensor designed, constructed, and arranged to monitor the effectiveness of the press braking system. (4-7-83)

02. General Requirements. (4-7-83)

a. New Installations. The requirements of this section shall apply to all mechanical power presses installed on or after August 31, 1971 except that the requirements of Sections 2267 M., N. and 2268 E. of this Chapter shall be complied with by November 1, 1975. (4-7-83)

b. Former Installations. The requirements of this section shall apply to all mechanical power presses installed prior to August 31, 1971 except that the requirements of Sections 2267 and 2268 of this Chapter shall be complied with by November 1, 1975. (4-7-83)

c. All Installations. The requirements of this section pertaining to the care and use of mechanical power presses shall apply to all mechanical power press operations as of February 15, 1972. (4-7-83)

d. Reconstruction and Modification. It shall be the responsibility of any person reconstructing, or modifying a mechanical power press to do so in accordance with Section 2267. (4-7-83)

e. Excluded Machines. Press brakes, hydraulic and pneumatic power presses, bulldozers, hot bending and hot metal presses, forging presses and hammers, riveting machines and similar types of fastener applicators are excluded from the requirements of this section. (4-7-83)

03. Mechanical Power Press Guarding and Construction, General. (4-7-83)

a. Hazards to Personnel Associated with Broken or Falling Machine Components. Machine components shall be designed, secured, or covered to minimize hazards caused by breakage, or loosening and falling or release of mechanical energy (i.e. broken springs). (4-7-83)

b. Brakes. Friction brakes provided for stopping or holding a slide movement shall be inherently self-engaging by requiring power or force from an external source to cause disengagement; brake capacity shall be sufficient to stop the motion of the slide quickly and capable of holding the slide and its attachments at any point in its travel. (4-7-83)

c. Machines Using Full Revolution Positive Clutches. (4-7-83)

i. Machines using full revolution clutches shall incorporate a single-stroke mechanism. (4-7-83)

ii. If the single-stroke mechanism is dependent upon spring action, the spring(s) shall be of the compression type, operating on a rod or guided within a hold or tube, and designed to prevent interleaving of the spring coils in event of breakage. (4-7-83)

d. Foot Pedals (treadle). (4-7-83)

i. The pedal mechanism shall be protected to prevent unintended operation from falling or moving objects or by accidental stepping onto the pedal. (4-7-83)

ii. A pad with a non-slip contact area shall be firmly attached to the pedal. (4-7-83)

iii. The pedal return spring(s) shall be of the compression type, operating on a rod or guided within a hole or tube, or designed to prevent interleaving of spring coils in the event of breakage. (4-7-83)

iv. If pedal counterweights are provided, the path of the travel of the weight shall be enclosed. (4-7-83)

e. Hand Operated Levers. (4-7-83)

i. Hand-lever-operated power presses shall be equipped with a spring latch on the operating lever to prevent premature or accidental tripping. (4-7-83)

ii. The operating levers on hand-tripped presses having more than one operating station shall be interlocked to prevent the tripping of the press except by the "concurrent" use of all levers. (4-7-83)

f. Two-hand trip. (4-7-83)

i. A two-hand trip shall have the individual operator's hand controls protected against unintentional operation and have the individual operator's hand controls arranged by design and construction and/or separation to require the use of both hands to trip the press and use a control arrangement requiring concurrent operation of the individual operator's hand controls. (4-7-83)

ii. Two-hand trip systems on full revolutions clutch machines shall incorporate an anti-repeat feature. (4-7-83)

iii. If two-hand trip systems are used on multiple operator presses, each operator shall have a separate set of controls. (4-7-83)

g. Machines Using Part Revolution Clutches. (4-7-83)

i. The clutch shall release and the brake shall be applied when the external clutch engaging means is removed, deactivated, or deenergized. (4-7-83)

ii. A red color stop control shall be provided with the clutch/brake control system. Momentary operation of the stop control shall immediately deactivate the clutch and apply the brake. The stop control shall override any other control, and reactuation of the clutch shall require use of the operating (tripping) means which has been selected. (4-7-83)

iii. A means of selecting "OFF", "INCH", "SINGLE STROKE", and "CONTINUOUS" (when the continuous function is furnished) shall be supplied with the clutch/brake control to select type of operation of the press. Fixing of selection shall be by means capable of supervision by the employer. (4-7-83)

iv. The "INCH" operating means shall be designed to prevent exposure of the worker's hands within the point of operation by: (a) requiring the concurrent use of both hands to actuate the clutch, or (b) being a single control protected against accidental actuation and so located that the worker cannot reach into the point of operation while operating the single control. (4-7-83)

v. Two-hand controls for single stroke shall conform to the following requirements: (a) each hand control shall be protected against unintended operation and arranged by design, construction, and/or separation so that the concurrent use of both hands is required to trip the press (b) the control system shall be designed to permit an adjustment which will require concurrent pressure from both hands during the die closing portion of the stroke (c) the control system shall incorporate an anti-repeat feature (d) the control system shall be designed to require release of all operator's hand controls before an interrupted stroke can be resumed. This requirement pertains only to those single stroke two-hand controls manufactured and installed on or after August 31, 1971. (4-7-83)

vi. Controls for more than one operating station shall be designed to be activated and deactivated in complete sets of two operator's hand controls per operating station by means capable of being supervised by the employer. The clutch/brake control system shall be designed and constructed to prevent actuation of the clutch if all

operating stations are bypassed. (4-7-83)

vii. Those clutch/brake control systems which contain both single and continuous functions shall be designed so that completion of continuous circuits may be supervised by the employer. The initiation of continuous run shall require a prior action or decision by the operator in addition to the selection of "Continuous" on the stroking selector, before actuation of the operating means will result in continuous stroking. (4-7-83)

viii. If foot control is provided, the selection method between hand and foot stroking selector and shall be designed so that the selection may be supervised by the employer. (4-7-83)

ix. Foot operated tripping controls, if used, shall be protected so as to prevent operation from falling or moving objects, or from unintended operation by accidental stepping onto the foot control. (4-7-83)

x. The control of air-clutch machines shall be designed to prevent a significant increase in the normal stopping time due to failure within the operating valve mechanism, and to inhibit further operation if such failure does occur. These requirements shall apply only to those clutch/brake air-valve controls manufactured and installed on or after August 31, 1971 but shall not apply to machines intended only for continuous automatic feeding applications. (4-7-83)

xi. The clutch/brake control shall incorporate an automatic means to prevent initiation or continued activation of the Single Stroke or Continuous functions unless the press drive motor is energized and in the forward direction. (4-7-83)

xii. The clutch/brake control shall automatically deactivate in the event of failure of the power or pressure supply for the clutch engaging means. Reactivation of clutch shall require restoration of normal supply and the use of the tripping mechanism(s). (4-7-83)

xiii. The clutch/brake control shall automatically deactivate in the event of failure of the counterbalance(s) air supply. Reactivation of the clutch shall require restoration of normal air supply and use of the tripping mechanism(s). (4-7-83)

xiv. Selection of bar operation shall be by means capable of being supervised by the employer. A separate pushbutton shall be employed to activate the clutch, and the clutch shall be activated only if the driver motor is deenergized. (4-7-83)

h. Electrical. (4-7-83)

i. A main power disconnect switch capable of being locked only in the "OFF" position shall be provided with every power press control system. (4-7-83)

ii. The motor start button shall be protected against accidental operation. (4-7-83)

iii. All mechanical power press controls shall incorporate a type of drive motor starter that will disconnect the drive motor from the power source in event of control voltage or power source failure, and require operation of the motor start button to restart the motor when voltage conditions are restored to normal. (4-7-83)

iv. All AC control circuits and solenoid valve coils shall be powered by not more than a nominal 120-volt AC supply obtained from a transformer with an isolated secondary. Higher voltages that may be necessary for operation of machine or control mechanism shall be isolated form any control mechanism handled by the operator, but motor starters with integral Start-Stop buttons may utilize line voltage controls. All DC control circuits shall be powered by not more than nominal 240-volt DC supply isolated from any higher voltages. (4-7-83)

v. All clutch/brake control electrical circuits shall be protected against the possibility of an accidental ground in the control circuit causing false operation of the press. (4-7-83)

vi. Electrical clutch/brake control circuits shall incorporate features to minimize the possibility of an unintended stroke in event of the failure of a control component to function properly, including relays, limit switches,

and static output circuits. (4-7-83)

i. Slide Counterbalance System. (4-7-83)

i. Spring counterbalance systems when used shall incorporate means to retain system parts in event of breakage. (4-7-83)

ii. Spring counterbalances when used shall have the capability to hold the slide and its attachments at midstroke, without brake applied. (4-7-83)

iii. Air counterbalance cylinders shall incorporate means to retain the piston and rod in case of breakage or loosening. (4-7-83)

iv. Air counterbalance cylinders shall have adequate capability to hold the slide and its attachments at any point in stroke, without brake applied. (4-7-83)

v. Air counterbalance cylinders shall incorporate means to prevent failure of capability (sudden loss of pressure) in event of air supply failure. (4-7-83)

j. Air Controlling Equipment. Air controlling equipment shall be protected against foreign material and water entering the pneumatic system of the press. A means of air lubrication shall be provided when needed. (4-7-83)

k. Hydraulic Equipment. The maximum anticipated working pressures in any hydraulic system on a mechanical power press shall not exceed the safe working pressure rating of any component used in that system. (4-7-83)

l. Pressure Vessels. All pressure vessels used in conjunction with power presses shall conform to the American Society of Mechanical Engineers Code for Pressure Vessels, 1968 edition. (4-7-83)

m. Control Reliability. When required by Section 2267 E. of this Chapter, the control system shall be constructed so that a failure within the system does not prevent the normal stopping action from being applied to the press when required, but does prevent initiation of a successive stroke until the failure is corrected. The failure shall be detectable by a simple test, or indicated by the control system. This requirement does not apply to those elements of the control system which have no effect on the protection against point of operation injuries. (4-7-83)

n. Brake System Monitoring. When required by Section 2268 E. of this section, the brake monitor shall meet the following requirements: (4-7-83)

i. Be so constructed as to automatically prevent the activation of a successive stroke if the stopping time or braking distance deteriorates to a point where the safety distance being utilized does not meet the requirements set forth in Section 2268 C.iii.(e), or Section 2268 C.viii.(c), of this Chapter. The brake monitor used with the type B gate or movable barrier device shall be installed in a manner to detect slide top-stop overrun beyond the normal limit reasonably established by the employer. (4-7-83)

ii. Be installed on a press such that it indicates when the performance of the braking system has deteriorated to the extent described in i. of this Section: and (4-7-83)

iii. Be constructed and installed in a manner to monitor brake system performance on each stroke. (4-7-83)

04. Safeguarding the Point of Operation. (4-7-83)

a. General Requirements. (4-7-83)

i. It shall be the responsibility of the employer to provide and insure the usage of "point of operation guards" or properly applied and adjusted point of operation devices on every operation performed on a mechanical

power press. See Table 2268-A. (4-7-83)

ii. The requirement of i. above, shall not apply when the point of operation opening is one-fourth inch or less. See Table 2268-A. (4-7-83)

b. Point of Operation Guards. (4-7-83)

i. Every point of operation guard shall meet the following design, construction, application and adjustment requirements: (a) It shall prevent entry of hands or fingers into the point of operation by reaching through, over, under, or around the guard, (b) it shall conform to the maximum permissible openings of Table 2268-A, (c) it shall, in itself, create no pinch point between the guard and moving machine parts, (d) it shall utilize fasteners not readily removable by operator, so as to minimize the possibility of misuse or removal of essential parts, (e) it shall facilitate its inspection, and (f) it shall offer maximum visibility of the point of operation consistent with other requirements. (4-7-83)

TABLE 2268-A available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

ii. A die enclosure guard shall be attached to the die shoe or stripper in a fixed position. (4-7-83)

iii. A fixed barrier guard shall be attached securely to the frame of the press or to the bolster plate. (4-7-83)

iv. An interlocked press barrier guard shall be attached to the press from or bolster and shall be interlocked with the press clutch control so that the clutch cannot be activated unless the guard itself, or the hinges or movable sections of the guard are in position to conform to the requirements of Table 2268-A. (4-7-83)

v. The hinged or movable sections of an interlocked press barrier guard shall not be used for manual feeding. The guard shall prevent opening of the interlocked action and reaching into the point of operation prior to die closure or prior to the cessation of slide motion. See Section 2268. C.ii., of this Chapter regarding manual feeding through interlocked press barrier devices. (4-7-83)

vi. The adjustable barrier guard shall be securely attached to the press bed, bolster plate, or die shoe, and shall be adjusted and operated in conformity with Table 2268-A and the requirements of this Section. Adjustments shall be made only by authorized personnel whose qualifications include a knowledge of the provisions of Table 2268-A and this section. (4-7-83)

vii. A point of operation enclosure which does not meet the requirements of this Section and Table 2268-A shall be used only in conjunction with point of operation devices. (4-7-83)

c. Point of Operation Devices. (4-7-83)

i. Point of operation devices shall protect the operator by: (a) Preventing and/or stopping normal stroking of the press if the operator's hands are inadvertently placed in the point of operation; or(b) preventing the operator from inadvertently reaching into the point of operation or withdrawing his hands if they are inadvertently located in the point of operation as the dies close; or(c) preventing the operator from inadvertently reaching into the point of operation at all times; or(d) requiring application of both of the operator's hands to machine operating controls and locating such controls at such a safety distance from the point of operation that the slide completes the downward travel or stops before the operator can reach into the point of operation with his hands; or(e) enclosing the point of operation before a press stroke can be initiated and maintaining this closed condition until the motion of the slide had ceased; or(f) enclosing the point of operation before a press stroke can be initiated, so as to prevent an operator from reaching into the point of operation prior to die closure or prior to cessation of slide motion during the downward stroke. (4-7-83)

ii. The gate or movable barrier device shall protect the operator as follows: (a) A Type A gate or movable barrier device shall protect the operator in the manner specified in C. i. (e) of this Section, (b) a Type B gate or movable barrier device shall protect the operator in the manner specified in C. i. (e) of this Section. (4-7-83)

iii. A presence sensing point of operation device shall protect the operator as provided in C.i.(a) of this Section, and shall be interlocked into the control circuit to prevent or stop slide motion if the operator's hand or other part of his body is within the sensing field of the device during the downstroke of the press slide.(a) The device may not be used on machine using full revolution clutches, (b) the device may not be used as a tripping means to initiate slide motion, (c) the device shall be constructed so that a failure within the system does not prevent the normal stopping action from being applied to the press when required, but does prevent the initiation of a successive stroke until the failure is corrected. The failure shall be indicated by the system, (d) muting (bypassing of the protective function) of such device, during the upstroke of the press slide, is permitted for the purpose of parts ejection, circuit checking, and feeding(e) the safety distance (Ds) from the sensing field to the point of operation shall be greater than the distance determined by the following formula: Ds equals 63 inches per second multiplied by Ts where: Ds equals minimum safety distance in inches; 63 inches per second equals hand speed constant; Ts equals stopping time of the press measured at approximately 90 degree position of crankshaft rotation in seconds; (f) guards shall be used to protect all areas of entry to the point of operation not protected by the presence of a sensing device. (4-7-83)

iv. The pull-out device shall protect the operator as specified in C.i.(b) of this Section and shall include attachments for each of the operator's hands.(a) Attachments shall be connected to and operated only by the press slide or upper die, (b) attachment shall be adjusted to prevent the operator from reaching into the point of operation or to withdraw the operator's hands from the point of operation before the dies close, (c) a separate pull-out device shall be provided for each operator if more than one operator is used on a press, (d) each pull-out device that is used shall be visually inspected and checked for proper adjustment at the start of each operator shift, following a new die set-up, and when operators are changed. Necessary maintenance or repair or both shall be performed and completed before the press is operated. Records of inspections and maintenance shall be kept in accordance with Section 2270 of this Chapter. (4-7-83)

v. The sweep device shall protect the operator as specified in C.i.(b) of this Section, by removing his hands safely to a safe position if they are inadvertently located in the point of operation, as the dies close or prior to tripping the clutch. Devices operating in this manner shall have a barrier, attached to the sweep arm in such a manner as to prevent the operator from reaching into the point of operation, past the trailing edge of the sweep are on the downward stroke of the press. This device may not be used for point of operation safeguarding after December 31, 1976.(a) The sweep device must be activated by the slide or by motion of a foot pedal tripped, (b) the sweep device must be designed, installed and operated so as to prevent the operator from reaching into the point of operation before the dies close, (c) the sweep device must be installed so that it will not itself create an impact or shear hazard between the sweep arm and the press tie rods, dies, or any other part of the press or barrier, (d) partial enclosure conforming with this Section C.v. as to the area of entry which they protect, must be provided on both sides of the point of operation to prevent the operator from reaching around or behind the sweep device and into the point of operation after the dies start to close. Partial enclosures shall not themselves create a pinch point or shear hazard. (4-7-83)

vi. A holdout or a restraint device shall protect the operator as specified in C.i.(c) of this Section and shall include attachments for each of the operator's hands. Such attachments shall be securely anchored and adjusted in such a way that the operator is restrained from reaching into the point of operation. A separate set of restraints shall be provided for each operator if more than one operator is required on a press. (4-7-83)

vii. The two hand control device shall protect the operator as specified in C.i.(e) of this Section.(a) When used in press operations requiring more than one operator, separate two hand controls shall be provided for each operator, and shall be designed to require concurrent application of all operators' controls to activate the slide. The removal of a hand from any control button shall cause the slide to stop, (b) each two hand control shall meet the construction requirements of C. v. of this Section, (c) the safety distance (Ds) between each two hand control device and the point of operation shall be greater than the distance determined by the following formula: Ds equals 63 inches per second multiplied by Ts, where: Ds equals minimum safety distance in inches, 63 inches per second equals hand speed constant; Ts equals stopping time of the press measured at approximately 90 degree position of crankshaft rotation in seconds. (d) two hand control safety shall be fixed in position so that only a supervisor or safety engineer is capable of relocating the controls. (4-7-83)

viii. The two hand trip device shall protect the operator as specified in C.i.(e) of this Section.(a) When used in press operations requiring more than one operator, separate two hand trips shall be provided for each operator, and shall be designed to require concurrent application of all operators' controls to activate the slide, (b) each two

hand trip shall meet the construction requirements of Section 2267 F. of this Chapter, (c) the safety distance (Dm) between the two hand trip and the point of operation shall be greater than the distance determined by the following formula: Dm minus 63 inches per second multiplied by Tm; Dm equals minimum safety distance (inches); 63 inches/ second equals hand speed constant; Tm equals the maximum time the press takes for the die closure after it has been tripped (seconds). For full revolution clutch presses with only one engaging point Tm is equal to the time necessary for one and one half revolutions of the crankshaft. For full revolution clutch presses with more than one engaging point, Tm shall be calculated as follows: (4-7-83)

DIAGRAM available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

d. Hand Feeding Tools. Hand feeding tools are intended for placing and removing materials in and from the press. Hand feeding tools are not a point of operation guard or protection device and shall not be used in lieu of the "Guards" or devices required in this Section. (4-7-83)

e. Additional Requirements for Safeguarding. Where the operator feeds or removes parts by placing one or both hands in the point of operation, and a two hand control, presence sending device of Type B gate or movable barrier (on a part revolution clutch) is used for safeguarding. (4-7-83)

i. The employer shall use a control system and a broke monitor which comply with Section 2267 M. and N. of this chapter. This requirement shall be complied with by November 1, 1975. (4-7-83)

ii. The exception in Section 2267 G.v.(d) of this Chapter for two hand controls manufactured and installed before August 31, 1971 is not applicable under this Section 2268 E. (4-7-83)

iii. The control of air clutch machines shall be designed to prevent a significant increase in the normal stopping time due to a failure within the operating valve mechanism, and to inhibit further operation if such failure does occur, where a part revolution clutch is employed. The exception is Section 2267 G. x i. of this Chapter for controls manufactured and installed before August 31, 1971 is not applicable under this Section. (4-7-83)

05. Design, Construction, Setting and Feeding of Dies. (4-7-83)

a. General Requirements. Effective February 1, 1975 the employer shall: (4-7-83)

i. Use dies and operating methods designed to control or eliminate hazards to operating personnel, and (4-7-83)

ii. Furnish and enforce the use of hand tools for freeing and removing stuck work or scrap pieces from the die, so that no employee need reach into the point of operation for such purposes. (4-7-83)

b. Scrap Handling. The employer shall provide means for handling scrap from roll feed or random length stock operations. Scrap cutters used in conjunction with scrap handling systems shall be safeguarded in accordance with Section 2267 and 2284 of this Chapter. (4-7-83)

c. Guide Post Hazard. The hazard created by a guide post (when it is located in the immediate vicinity of the operator) when separated from its bushing by more than 1/4 inch shall be considered as a point of operation hazard and be protected in accordance with Section 2288 of this Chapter. (4-7-83)

d. Unitized Tooling. If unitized tooling is used, the opening between the top of the punch holder and the face of the slide, or striking pad, shall be safeguarded in accordance with the requirements of Section 2267 of this Chapter. (4-7-83)

e. Tonnage, Stroke and Weight Designation. All dies shall be: (4-7-83)

i. Stamped with the tonnage and stroke requirements, or have these characteristics recorded if these records are readily available to the die setter; (4-7-83)

ii. Stamped to indicate upper die weight when necessary for air counterbalance pressure adjustment; and (4-7-83)

iii. Stamped to indicate complete die weight when handling equipment may become overloaded. (4-7-83)

f. Die Fastening. Provision shall be made in both the upper and lower shoes for securely mounting the die to the bolster and slide. Where clamp caps or setscrews are used in conjunction with punch stems, additional means of securing the upper shoe to the slide shall be used. (4-7-83)

g. Die Handling. Handling equipment attach points shall be provided on all dies requiring mechanical handling. (4-7-83)

h. Diesetting. (4-7-83)

i. The employer shall establish a diesetting procedure that will insure compliance with Section 2267 of this Chapter. (4-7-83)

ii. The employer shall provide spring loaded turnover bars, for presses designed to accept such turnover bars. (4-7-83)

iii. The employer shall provide die stops or other means to prevent losing control of the die while setting or removing dies in presses which are inclined. (4-7-83)

iv. The employer shall provide and enforce the use of safety blocks for use whenever dies are being adjusted or repaired in the press. (4-7-83)

v. The employer shall provide brushes, swabs, lubricating rolls, and automatic or manual pressure guns so that operators and diesetters shall not be required to reach into the point of operation or other hazard areas to lubricate material, punches, or dies. (4-7-83)

06. Inspection, Maintenance, and Modification of Presses. (4-7-83)

a. Inspection and Maintenance Records. (4-7-83)

i. It shall be the responsibility of the employer to establish and follow a program of periodic and regular inspections of his power pressed to insure that all their parts, auxiliary equipment and safeguards are in a safe operating condition and adjustment. The employer shall maintain records of these inspections and the maintenance work performed. (4-7-83)

ii. Each press shall be inspected and tested no less than weekly to determine the condition of the clutch/brake mechanism, anti-repeat feature and single stroke mechanism. Necessary maintenance or repair or both shall be performed and completed before the press is operated. The employer shall maintain records of these inspections and the maintenance work performed. These requirements do not apply to those presses which comply with Section 2267 M. and N. of this Chapter. (4-7-83)

b. Modification. It shall be the responsibility of any person modifying a power press to furnish instructions with the modification to establish new or changed guidelines for use and care of the power press so modified. (4-7-83)

c. Training of Maintenance Personnel. It shall be the responsibility of the employer to insure the original and continuing competence of personnel caring for, inspecting and maintaining power presses. (4-7-83)

07. Operation of Power Presses. (4-7-83)

a. Employment of minors. The employer shall permit no one under 18 years of age to operate or assist in the operation of machinery covered in this Section, except that this Section shall not be deemed to prohibit the

employment of persons who are 16 or 17 years of age in an apprenticeship training or student-learner program which meets the requirements of Child Labor Requirements in Non-Agricultural Occupations under the Fair Labor Standards Act. (4-7-83)

b. Instruction to Operators. The employer shall train and instruct the operator in the safe method of work before starting work on any operation covered by this Section. The employer shall insure by adequate supervision that correct operating procedures are being followed. (4-7-83)

c. Work Area. The employer shall provide clearance between machines so that movement of one operator will not interfere with the work of another. Ample room for cleaning machines, handling material, work pieces, and scrap shall also be provided. All surrounding floors shall be kept in good condition and free from obstructions, grease, oil and water. (4-7-83)

d. Overloading. The employer shall operate his presses within the tonnage and attachment weight ratings specified by the manufacturer. (4-7-83)

08. Compactors. General Requirements. An anti-repeat device shall be installed on compactors which will prohibit the compacting of material while the gate or door is raised or open. When adjustments or clearing of jams are necessary, means shall be provided for locking out the control energy. (4-7-83)

259. FORGING MACHINES.

01. Definitions. (4-7-83)

a. "Forging" means the product of work on metal formed to a desired shape by impace or pressure in hammers, forging machines (upsetters), presses, rolls, and related forming equipment. Forging hammers, counterblow equipment and high-energy-rate forging machines impart impact to the workpiece while most other types of forging equipment impart squeeze pressure in shaping the stock. Some metals can be forged at room temperature but the majority of metals are made more plastic for forging by heating. (4-7-83)

b. "Open Frame hammers (or blacksmith hammers)" mean hammers used primarily for the shaping of forgings by means of impact with flat dies. Open frame hammers generally are so constructed that the anvil assembly is separate from the operating mechanism and machine supports; it rests on its own independent foundation. Certain exceptions are forging hammers made with frame mounted on the anvil, e.g. the smaller, single-frame hammers are usually made with the anvil and frame in one piece. (4-7-83)

c. "Steam hammers" mean a type of drop hammer where the ram is raised for each stroke by a double-action steam cylinder and the energy delivered to the workpiece is supplied by the velocity and weight of the ram and attached upper die driven downward by steam pressure. Energy delivered during each stroke may be varied. (4-7-83)

d. "Gravity hammers" mean a class of forging hammer wherein energy for forging is obtained by the mass and velocity of a freely falling ram and the attached upper die. Examples: Board hammers and air-lift hammers. (4-7-83)

e. "Forging Presses" mean a class of forging equipment wherein the shaping of metal between dies is performed by mechanical or hydraulic pressure, and usually is accomplished with a single workstroke of the press for each die station. (4-7-83)

f. "Trimming presses" mean a class of auxiliary forging equipment which removes flash or excess metal from a forging. This trimming operation can also be done cold, as can coining, a product sizing operation. (4-7-83)

g. "High-energy-rate forging machines" mean a class of forging equipment wherein high ram velocities resulting from the sudden release of a compressed gas against a free piston impact to the workpiece. (4-7-83)

h. "Forging rolls" mean a class of auxiliary forging equipment wherein stock is shaped between power

driven rolls bearing contoured dies. Usually used for performing, roll forging is often employed to reduce thickness and increase length of stock. (4-7-83)

i. "Ring rolls" mean a class for forging equipment used for shaping weldless rings from pierced discs or thick-walled, ring-shaped blanks between rolls which control wall thickness, ring diameter, height and contour. (4-7-83)

j. "Bolt-headers" mean the same as an upsetter or forging machine except that the diameter of stock fed into the machine is much smaller, i.e., commonly 3/4 inch or less. (4-7-83)

k. "Rivet making machines" mean the same as upsetters and boltheaders when producing rivets with stock diameter of 1 inch or more. Rivet making with less than 1 inch diameter is usually a cold forging operation, and therefore not included in Sections 2273 through 2283. (4-7-83)

l. "Upsetters (or forging machines or headers)" mean a type of forging equipment, related to the mechanical press, in which the main forming energy is applied horizontally to the workpiece which is gripped and held by prior action of the dies. (4-7-83)

02. General Requirements. (4-7-83)

a. Use of Lead. The safety requirements of this Section apply to lead casts or other use of lead in the forge shop or die shop. (4-7-83)

i. Thermostatic control of heating elements shall be provided to maintain proper melting temperature and prevent overheating. (4-7-83)

ii. Fixed or permanent lead pot installations shall be exhausted. (4-7-83)

iii. Portable units shall be used only in areas where good, general room ventilation is provided as specified in the General Occupational Health Standards, Chapter 1. (4-7-83)

iv. Personal protective equipment (gloves, goggles, aprons, and other items) shall be worn. (4-7-83)

v. A covered container shall be provided to store dross skimmings. (4-7-83)

vi. Equipment shall be kept clean, particularly from accumulations of yellow lead oxide. (4-7-83)

b. Inspection and Maintenance. It shall be the responsibility of the employer to maintain all forge shop equipment in a condition which will insure continued safe operation. This responsibility includes: (4-7-83)

i. Establishing periodic and regular maintenance safety checks and keeping records of these inspections. (4-7-83)

ii. Scheduling and recording inspection of guards and point of operation protection devices at frequent and regular intervals. (4-7-83)

iii. Training personnel for the proper inspection and maintenance of forging machinery and equipment. (4-7-83)

iv. All overhead parts shall be fastened or protected in such a manner that they will not fly off or fall in event of failure. (4-7-83)

c. Hammers and Presses. (4-7-83)

i. All hammers shall be positioned or installed in such a manner that they remain on or are anchored to foundations sufficient to support them. (4-7-83)

ii. All presses shall be installed in such a manner that they remain where they are positioned or they are anchored to foundations sufficient to support them. (4-7-83)

iii. Means shall be provided for disconnecting the power to the machine and for locking out or rendering cycling controls in- operable. (4-7-83)

iv. The ram shall be blocked when dies are being changed or other work is being done on the hammer. Blocks or wedges shall be made of material the strength and construction of which should meet or exceed the specifications and dimensions shown in Table 2283-A. (4-7-83)

v. Tongs shall be of sufficient length to clear the body of the worker in case of kickback, and shall not have sharp handle ends. The worker should be instructed in the proper body position when using tongs. Tongs should be checked periodically to see that they remain at the proper hardness level for the job. When rings or equivalent devices for locking tongs are used they should be inspected periodically to insure safe condition. (4-7-83)

vi. Oil swabs, or scale removers, or other devices to remove scale shall be provided. These devices shall be long enough to enable a man to reach the full length of the die without placing his hand or arm between the dies. (4-7-83)

vii. Material handling equipment shall be of adequate strength, size, and dimension to handle diesetting operations safely. (4-7-83)

viii. A scale guard of substantial construction shall be provided at the back of every hammer, so arranged as to stop flying scale. (4-7-83)

ix. A scale guard of substantial construction shall be provided at the back of every press, so arranged as to stop flying scale. (4-7-83)

03. Hammers, general. (4-7-83)

a. Keys. Die keys and shims shall be made from a grade of material that will not unduly crack or splinter, and should not project more than 2 inches in front and 4 inches in back of ram or die. (4-7-83)

b. Foot Operated Devices. All foot operated devices (i.e., treadles, pedals, bars, valves, and switches) shall be substantially and effectively protected from unintended operation. (4-7-83)

04. Presses. All manually operated valves and switches shall be clearly identified and readily accessible. (4-7-83)

05. Power-Driven Hammers. (4-7-83)

a. Safety Cylinder Head. Every steam or airhammer shall have a safety cylinder head to act as a cushion if the rod should break or pull out of the ram. (4-7-83)

b. Shutoff Valve. Steam hammers shall be provided with a quick closing emergency valve in the admission pipeline at a convenient location. This valve shall be closed and locked in the "OFF" position while the hammer is being adjusted, repaired, or serviced, or when the dies are being changed. (4-7-83)

c. Cylinder draining. Steam hammers shall be provided with a means of cylinder draining, such as a self-draining arrangement or a quick-acting drain cock. (4-7-83)

d. Pressure Pipes. Steam or air piping shall conform to the Specifications of American National Standard ANSI B31. 1-1967. Power Piping with Addenda, ANSI B31.1.06-1971. (4-7-83)

06. Gravity Hammers. (4-7-83)

a. Air-lift Hammers. (4-7-83)

i. Air-lift hammers shall have a safety cylinder head as required in Section 2277 A. (4-7-83)

ii. Air-lift hammers shall have an air shutoff valve as required in Section 2277 B. and should be conveniently located and distinctly marked for ease of identification. (4-7-83)

iii. Air-lift hammers shall be provided with two drain cocks: one on main head cylinder, and one on clamp cylinder. (4-7-83)

iv. Air piping shall conform to the specifications of the ANSWI B31.1.0-1967, Power Piping with Addenda ANSI B31.1.01-1971. (4-7-83)

b. Board Drop Hammers. (4-7-83)

i. A suitable enclosure shall be provided to prevent damaged or detached boards from falling. The board enclosure shall be securely fastened to the hammer. (4-7-83)

ii. All major assemblies and fittings which can loosen and fall shall be properly secured in place. (4-7-83)

07. Forging Presses. (4-7-83)

a. Mechanical Forging Presses. When dies are being changed or maintenance is being performed on the press, the following shall be accomplished: (4-7-83)

i. The power to the press shall be locked out. (4-7-83)

ii. The flywheel shall be at rest. (4-7-83)

iii. The ram shall be blocked with a material the strength of which shall meet or exceed the specifications or dimensions shown in Table 2283-A. (4-7-83)

b. Hydraulic Forging Presses. When dies are being changed or maintenance is being performed on the press, the following shall be accomplished: (4-7-83)

i. The hydraulic pumps and power apparatus shall be locked out. (4-7-83)

ii. The ram shall be blocked with a material the strength of which shall meet or exceed the specifications or dimensions in Table 2283-A. (4-7-83)

08. Trimming Presses. (4-7-83)

a. Hot Trimming Presses. The requirements of Section 2279 A. of this Chapter shall also apply to hot trimming presses. (4-7-83)

b. Cold Trimming Presses. Cold trimming presses shall be safeguarded in accordance with Sections 2264 through 2267 of this Chapter. (4-7-83)

09. Upsetters. (4-7-83)

a. General Requirements. All upsetters shall be installed so that they remain on their supporting foundations. (4-7-83)

b. Lockouts. Upsetters shall be provided with a means for locking out the power at its entry point to the machine and rendering its cycling controls inoperable. (4-7-83)

c. Manually Operated Controls. All manually operated valves and switches shall be clearly identified

and readily accessible. (4-7-83)

d. Tongs. Tongs shall be of sufficient length to clear the body of the worker in case of kickback, and shall not have sharp handle ends. The worker should be instructed in the proper body position when using tongs. Tongs should be checked periodically to see that they remain at the proper hardness level for the job. When rings or equivalent devices for locking tongs are used, they should be inspected periodically to assure safe condition. (4-7-83)

e. Changing Dies. When dies are being changed, maintenance performed, or any work done on the machine, the power to the upsetter shall be locked out, and the flywheel shall be at rest. (4-7-83)

10. Other Forging Equipment. (4-7-83)

a. Boltheading. The provisions of Section 2281 shall apply to boltheading. (4-7-83)

b. Rivet Making. The provisions of Section 2281 shall apply to rivet making. (4-7-83)

11. Other Forge Facility Equipment. (4-7-83)

a. Billet Shears. A positive-type lock-out device for disconnecting the power to the shear shall be provided. (4-7-83)

b. Saws. Every saw shall be provided with a guard of not less than 1/8 inch sheet metal positioned to stop flying sparks. Suitable means should be provided to trap sparks below the saw. A tank of water placed below the saw is also desirable. (4-7-83)

c. Conveyors. Conveyor power transmission equipment shall be guarded in accordance with ANSI B20.1-1957, Safety Code for Conveyors, Cableways, and Related Equipment. (4-7-83)

d. Shot Blast. The cleaning chamber shall have doors or guards to protect operators. (4-7-83)

e. Grinding. Personal Protective equipment shall be used in grinding operations, and equipment shall be used and maintained in accordance with ANSI B7.1-1970, Safety Code for the Use, Care, and Protection of Abrasive Wheels, and with Sections 2251 through 2255 of this Chapter. (4-7-83)

f. This table shows the distances that guards shall be positioned from the danger line in accordance with the required openings. (4-7-83)

DIAGRAM available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

g. Explanation of diagram. (7-1-93)

i. This diagram shows the accepted safe openings between the bottom edge of a guard and feed table at various distances from the danger line (point of operation). (4-7-83)

ii. The "Clearance Line" marks the distance required to prevent contact between guard and moving parts. (4-7-83)

iii. The "Minimum guarding line" is the distance between the infeed side of the guard and the danger line which is one-half inch from the danger line. (4-7-83)

iv. The various openings are such that for average size hands, an operator's fingers won't reach the point of operation. (4-7-83)

v. After installation of point of operation guards and before a job is released for operation, a check should be made to verify that the guard will prevent the operator's hands from reaching the point of operation. (4-7-83)

TABLE 2283-A, STRENGTH AND DIMENSIONS FOR WOOD RAM PROPS, available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

260. MECHANICAL POWER-TRANSMISSION APPARATUS.

01. Definitions. (4-7-83)

a. "Belts" include all power transmission belts, such as flat belts, round belts, V-belts, ect., unless otherwise specified. (4-7-83)

b. "Belt Shifter" means a device for mechanically shifting belts from tight to loose pulleys or vice versa, or for shifting belts on cones of speed pulleys. (4-7-83)

c. "Belt pole" (sometimes called a "Belt shipper" or "Shipper pole") means a device used in shifting belts on and off fixed pulleys on line or countershaft where there are no loose pulleys. (4-7-83)

d. "Exposed to contact" means that the location of an object is such that a person is likely to come into contact with it and be injured. (4-7-83)

e. "Flywheels" include flywheels, balance sheels, and flywheel pulleys mounted and revolving on crankshaft of engine or other shafting. (4-7-83)

f. "Maintenance runway" means any permanent runway or platform used for oiling, maintenance, running adjustment, or repair work, but not for passageway. (4-7-83)

g. "Nip-point belt and pulley guard" means a device which encloses the pulley and is provided with rounded or rolled edge slots through which the belt passes. (4-7-83)

h. "Point of Operation" means that point at which cutting, shaping, or forming is accomplished upon the stock and shall include such other points as may offer a hazard to the operator in inserting or manipulating the stock in the operation of the machine. (4-7-83)

i. "Prime Movers" include steam, gas, oil, and air engines, motors, steam and hydraulic turbines, and other equipment used as a source of power. (4-7-83)

j. "Sheaves" mean grooved pulleys and shall be so classified unless used as flywheels. (4-7-83)

02. General Requirements. (4-7-83)

a. This Section covers all types and shapes of power-transmission belts, except the following when operating at two hundred and fifty (250) feet per minute or less: (4-7-83)

i. Flat belts one (1) inch or less in width. (4-7-83)

ii. Flat belts two (2) inches or less in width which are free from metal lacings or fasteners. (4-7-83)

iii. Round belts one-half (1/2) inch or less in diameter. (4-7-83)

iv. Single strand V-belts, the width of which is thirteen thirty-seconds (13/32) inch or less. (4-7-83)

b. Vertical and inclined belts (Section 2289 C. and D.) if not more than two and one-half (2 1/2) inches wide and running at a speed of less than 1,000 feet per minute, and if free from metal lacings or fastenings may be guarded with a nip-point belt and pulley guard. (4-7-83)

c. For the Textile Industry, because of the presence of excessive deposits of lint, which constitute a serious fire hazard, the sides and face sections only of nip-point belt and pulley guards are required, provided the

guard shall extend at least six (6) inches beyond the rim of the pulley on the in-running and off-running sides of the belt and at least two (2) inches away from the rim and face of the pulley in all other directions. (4-7-83)

d. These standards cover the principal features with which power transmission safeguards shall comply. (4-7-83)

03. Prime-Mover Guards. (4-7-83)

a. Flywheels. Flywheels located so that any part is seven (7) feet or less above floor or platform shall be guarded in accordance with the requirements of this Section: (4-7-83)

i. With an enclosure of sheet, perforated, or expanded metal, or woven wire; (4-7-83)

ii. With guard rails placed not less than fifteen (15) inches nor more than twenty (20) inches from rim. When flywheel extends into pit or is within 12 inches of floor, a standard toeboard shall also be provided; (4-7-83)

iii. When the upper rim of flywheel protrudes through a working floor, it shall be entirely enclosed or surrounded by a guardrail and toeboard. (4-7-83)

iv. For flywheels with smooth rims five (5) feet or less in diameter, where the preceding methods cannot be applied, the following may be used: A disk attached to the flywheel in such a manner as to cover the spikes of the wheel on the exposed side and present a smooth surface and edge, at the same time providing means for periodic inspection. An open space, not exceeding four (4) inches in width, may be left between the outside edge of the disk and the rim of the wheel if desired, to facilitate turning the wheel over. Where a disk is used, the keys or other dangerous projections not covered by disk shall be cut off or covered. This section does not apply to flywheels with solid web centers. (4-7-83)

v. Adjustable guard to be used for starting engine or for running adjustments may be provided at the flywheel of gas or oil engines. A slot opening for jack bar will be permitted. (4-7-83)

vi. Wherever flywheels are above working areas, guards shall be installed having sufficient strength to hold the weight of the flywheel in the event of a shaft or wheel mounting failure. (4-7-83)

b. Cranks and Connecting Rods. Cranks and connecting rods, when exposed to contact shall be guarded in accordance with Sections 2297 and 2298, or by a guardrail as described in Section 2299 E. of this Chapter. (4-7-83)

c. Tail Rods or Extension Piston Rods. Tail rods or extension piston rods shall be guarded in accordance with Sections 2297 and 2298, or by a guardrail on sides and end, with a clearance of not less than fifteen (15) nor more than twenty (20) inches when rod is fully extended. (4-7-83)

d. Governor Balls. Governor balls six (6) feet or less from the floor or other working level, when exposed to contact, shall be provided with an enclosure extending to the top of the governor balls when at their highest position. The material used in the construction of this enclosure shall conform to Sections 2296 and 2298 of this Chapter. (4-7-83)

04. Shafting. (4-7-83)

a. Installation. (4-7-83)

i. Each continuous line of shafting shall be secured in position against excessive endwise movement. (4-7-83)

ii. Inclines and vertical shafts, particularly inclined idler shafts, shall be securely held in position against end-wise thrust. (4-7-83)

b. Guarding Horizontal Shafting. (4-7-83)

i. All exposed parts of horizontal shafting seven (7) feet or less from floor or working platform excepting runways used exclusively for oiling, or running adjustments, shall be protected by a stationary casing enclosing shafting completely or by a trough enclosing sides and top or sides and bottom of shafting as location requires. (4-7-83)

ii. Shafting under bench machines shall be enclosed by a stationary casing, or by a trough at sides and top or sides and bottom, as location requires. The sides of the trough shall come within at least six (6) inches of the under side of table, or if shafting is located near floor within six (6) inches of floor. In every case, the sides of trough shall extend at least two (2) inches beyond the shafting or protuberance. (4-7-83)

c. Guarding Vertical and Inclines Shafting. Vertical and inclines shafting seven (7) feet or less from floor or working platform, excepting maintenance runways shall be enclosed with a stationary casing in accordance with requirements of Sections 2297 and 2299. (4-7-83)

d. Projecting Shaft Ends. (4-7-83)

i. Projecting shaft ends shall present a smooth edge and shall not project more than one-half the diameter of the shaft unless guarded by nonrotating caps or safety sleeves. (4-7-83)

ii. Unused keyways shall be filled up or covered. (4-7-83)

e. Power-transmission apparatus located in basements. All mechanical power transmission apparatus located in basements, towers, and rooms used exclusively for power transmission equipment shall be guarded in accordance with this Section, except that the requirements for safeguarding belts, pulleys, and shafting need not be complied with when the following requirements are met: (4-7-83)

i. The basement, tower, or room occupied by transmission equipment is locked against unauthorized entrance. (4-7-83)

ii. The vertical clearance in passageways between the floor and power transmission beams, ceiling, or any other objects, is not less than five feet six inches (5 ft. 6 in.). (4-7-83)

iii. The intensity of illumination conforms to the requirements of ANSI A11. 1-1965 (R-1970). (4-7-83)

iv. The footing is dry, firm, and level. (4-7-83)

v. The route followed by the oiler is protected in such a manner as to prevent accident. (4-7-83)

05. Pulleys. (4-7-83)

a. Guarding. Pulleys, any parts of which are seven (7) feet or less from the floor or working platform, shall be guarded in accordance with the standards specified in Sections 2297 and 2299. Pulleys serving as balance wheels (e.g., punch presses) on which the point of contact between belt and pulley is more than six feet six inches (6 ft. 6 in.) from the floor or platform may be guarded with a disk covering the spokes. (4-7-83)

b. Location of Pulleys. (4-7-83)

i. Unless the distance to the nearest fixed pulley, clutch, or hanger exceeds the width of the belt used, a guide shall be provided to prevent the belt from leaving the pulley on the side where insufficient clearance exists. (4-7-83)

ii. Where there are overhanging pulleys on line, jack, or countershafts with no bearing between the pulley and the outer end of the shaft, a guide to prevent the belt from running off the pulley should be provided. (4-7-83)

c. Broken Pulleys, pulleys with cracks, or pieces broken out of rims, shall not be used. (4-7-83)

d. Pulley Speeds. Pulleys intended to operate at rim speed in excess of manufacturers normal recommendations shall be specially designed and carefully balanced for the speed at which they are to operate. (4-7-83)

e. Compositions and Wood Pulleys. Composition or laminated wood pulleys shall not be installed where they are subjected to influences detrimental to their structural composition. (4-7-83)

06. Belt, Rope, Pulleys, and Chain Drives. Belts, ropes, pulleys and chain drives which are seven (7) feet or less from the floor or walkway shall be guarded. (4-7-83)

07. Gears, Sprockets, and Chains. (4-7-83)

a. All gears, sprocket wheels and chains which are seven (7) feet or less from the floor or walkway shall be guarded. (4-7-83)

b. Openings for Oiling. When frequent oiling must be done, openings with hinged or sliding self-closing covers shall be provided. All points not readily accessible shall have oil feed tubes if lubricant is to be added while machinery is in motion. (4-7-83)

08. Guarding Friction Drives. The driving point of all friction drives when exposed to contact shall be guarded, all arm or spoke friction drives and all web friction drives with holes in the web shall be entirely closed, and all projecting belts on friction drives where exposed to contact shall be guarded. (4-7-83)

09. Keys, Setscrews, and Other Projections. All projecting keys, setscrews, and other projections in revolving parts shall be removed or made flush or guarded by metal covers. This section does not apply to keys or setscrews within gear or sprocket casings or other enclosures, not to keys, setscrews, or oilcups in hubs of pulleys less than twenty (20) inches in diameter where they are within the plane of the rim of the pulley. NOTE: It is recommended, however, that no projecting setscrews or oilcups be used in any revolving pulley or part of machinery. (4-7-83)

10. Collars and Couplings. (4-7-83)

a. Collars. All revolving collars, including split collars, shall be cylindrical, and screws or bolts used in collars shall not project beyond the largest periphery of the collar. (4-7-83)

b. Couplings. Shaft couplings shall be so constructed as to present no hazard from bolts, nuts, setscrews, or revolving surfaces. Bolts, nuts, and setscrews will, however, be permitted where they are covered with safety sleeves or where they are used parallel with the shafting and are counter-sunk or else do not extend beyond the flange of the coupling. (4-7-83)

11. Bearings and Facilities for Oiling. Self lubricating bearings are recommended and all drip cups and pans shall be securely fastened. (4-7-83)

12. Guarding of Clutches, Cutoff Couplings, and Clutch Pulleys. (4-7-83)

a. Guards. Clutches, cutoff couplings, or clutch pulleys having projecting parts where such clutches are located seven (7) feet or less above the floor or working platform, shall be enclosed by a stationary guard constructed in accordance with Section 2297 of this Chapter. A "U" type guard is permissible. (4-7-83)

b. Engine rooms. In engine rooms a guardrail, preferably with toeboard, may be used instead of the guard required by A. of this section, provided such a room is occupied only by engine room attendants. (4-7-83)

c. Bearings. A bearing support immediately adjacent to a friction clutch or cutoff coupling shall have self-lubricating bearings requiring attention at infrequent intervals. (4-7-83)

13. Belt Shifters, Clutches, Shippers, Poles, Perches, and Fasteners. (4-7-83)

a. Belt Shifters. (4-7-83)

i. Tight and loose pulleys on all installations made on or after August 27, 1971 shall be equipped with a permanent belt shifter provided with mechanical means to prevent belt from creeping from loose to tight pulley. It is recommended that old installations be changed to conform to this rule. (4-7-83)

ii. Belt shifter and clutch handles shall be rounded and be located as far as possible from danger of accidental contact, but within easy reach of the operator. Where belt shifters are not directly located over a machine or bench, the handles shall be cut off six feet six inches (6 ft. 6 in.) above floor level. (4-7-83)

iii. All belt and clutch shifters of the same type in each ship should move in the same direction to stop machines, i.e., either all right or all left. This does not apply to friction clutch on countershaft carrying two clutch pulleys with open and crossed belts respectively. In this case, the shifter handle has three positions and the machine is at a standstill when clutch handle is in the neutral or center position. (4-7-83)

b. Belt Shippers and Shipper Poles. The use of belt poles as substitutes for mechanical shifters is not recommended. Where necessity compels their use, they shall be of sufficient size to enable workmen to grasp them securely. (A 2 inch diameter or 1 1/2 by 2 inches cross-section is suggested.)Poles shall be smooth and preferably of straight grain hardwood, such as ash or hickory. The edges of rectangular poles should be rounded. Poles should extend from the top of the pulley to within about forty (40) inches of floor or working platform. (4-7-83)

c. Belt perches. Where loose pulleys or idlers are not practicable, belt perches in form of brackets, rollers, ect. shall be used to keep idle belts away from the shafts. Perches should be substantial and designed for the safe shifting of belts. (4-7-83)

d. Belt Fasteners. Belts which out of necessity must be shifted by hand and belts within seven (7) feet of the floor or working platform which are not guarded in accordance with Section 2297 of this Chapter shall not be fastened with metal in any case, nor with any other fastening which by construction or wear will constitute an accidental hazard. (4-7-83)

14. Standard Guards, General Requirements. (4-7-83)

a. Materials. (4-7-83)

i. Standard conditions shall be secured by the use of the following materials. Expanded metal, perforated or solid sheet metal, wire mesh on a frame of angle iron, or iron pipe securely fastened to floor or to frame of machine. (4-7-83)

ii. All metal should be free from burrs and sharp edges. (4-7-83)

iii. Wire mesh should be of the type in which the wires are securely fastened at every cross point either by welding, soldering, or galvanizing, except in case of diamond or square wire mesh made of No. 14 gage wire, 3/4 inch mesh or heavier. (4-7-83)

b. Methods of Manufacture. (4-7-83)

i. Expanded metal, sheet or perforated metal, and wire mesh shall be securely fastened to frame by one of the following methods: (a) With rivets or bolts spaced not more than five (5) inches center to center. In case of expanded metal or wire mesh, metal strips or clips shall be used to form a washer for rivets or bolts, (b) be welding to frame every four (4) inches, (c) by weaving through channel or angle frame, or if No. 14 gage 3/4 inch mesh or heavier is used by bending entirely around rod frames, (d) where openings in pipe railing are to be filled in with expanded metal, wire mesh or sheet metal, the filler material shall be made into panels with rolled edges or bound with "V" or "U" edging of No. 24 gage or heavier sheet metal fastened to the panels with bolts or rivets spaced not more than five (5) inches center to center. The bound panels shall be fastened to the railing by sheet metal clips spaced not more than five (5) inches center to center, (e) diamond or square mesh made of crimped wire fastened into

channels, angle or round-iron frames, may also be used as a filler in guards. Size of mesh shall correspond to Table 2299 1-A. (4-7-83)

ii. Where the design of guards requires filler material of greater area than 12 square feet, additional frame members shall be provided to maintain panel area within this limit. (4-7-83)

iii. All joints of framework shall be made equivalent in strength to the material of the frame. (4-7-83)

15. Disk, Shield, and "U" Guards. (4-7-83)

a. Disk Guards. A disk guard shall consist of a sheet-metal dish not less than No. 22 gage fastened by "U" bolts or rivets to spikes of pulleys, flywheels, or gears. Where possibility of contact with sharp edges of the disk exists, the edge shall be rolled or wired. In all cases the nuts shall be provided with locknuts which shall be placed on the unexposed side of the wheel. (4-7-83)

b. Shield Guards. (4-7-83)

i. A shield guard shall consist of a frame filled in with wire mesh, expanded, perforated, or solid sheet metal. (4-7-83)

ii. If area of shield does not exceed six (6) square feet, the wire mesh or expanded metal may be fastened in a framework of 3/8 inch solid rod, 3/4 inch by 3/4 inch by 1/8 inch angle iron or metal construction of equivalent strength. Metal shields may have edges entirely rolled around a 3/8 inch solid iron rod. (4-7-83)

c. "U" Guards. A "U" guard consisting of a flat surface with edge members shall be designed to cover the under surface and lower edge of a belt, multiple chain, or rope drive. It shall be constructed of materials specified in Table 2299. 1-A and shall conform to the requirements of Sections 2299.c. and d. Edges shall be smooth and if size of guard requires, the edges shall be reinforced by rolling, wiring, or by binding with angle or flat iron. (4-7-83)

16. Approved Materials. (4-7-83)

a. Minimum Requirements. The materials and dimensions specified in this section shall apply to all guards, except horizontal overhead belts, rope, cable, or chain guards, more than seven (7) feet above the floor, or platform. (For the latter, see Table 2299. 1-A). (4-7-83)

i. Minimum dimensions of materials for the framework of all guards, except as noted in (c) of this section shall be angle iron 1 inch by 1 inch by 1/8 inch, metal pipe of 3/4 inch inside diameter or metal construction of equivalent strength.(a) All guards shall be rigidly braced every three (3) feet or fractional part of their height to some fixed part of machinery or building structure. Where guard is exposed to contact with moving equipment additional strength may be necessary, (b) the framework for all guards fastened to floor or working platform and without other support or bracing shall consist of 1 1/2 inch by 1 1/2 inch by 1/8 inch angle iron, metal pipe of 1 1/2 inch inside diameter, or metal construction of equivalent strength. All rectangular guards shall have at least four upright frame members each of which shall be carried to the floor and be securely fastened thereto. Cylindrical guards shall have at least three supporting members carried to floor, (c) guards thirty (30) inches or less in height and with a total surface area not in excess of ten (10) square feet may have a frame work of 3/8 inch solid rod, 3/4 inch by 3/4 inch by 1/8 inch angle, or metal construction of equivalent strength. The filling material shall correspond to the requirements of Table 2299-A. (4-7-83)

ii. The specifications given in Table 2299-A and a. i. of this section are minimum requirements; where guards are exposed to unusual wear, deterioration or impact, heavier material and construction should be used to protect amply against the specific hazards involved. (4-7-83)

b. Wood Guards. (4-7-83)

i. Wood guards may be used in the woodworking and chemical industries, in industries where the presence of fumes or where manufacturing conditions would cause the rapid deterioration of metal guards; also in construction work and in locations outdoors where extreme cold or extreme heat make metal guards and railings

undesirable. In all other industries, wood guards shall not be used.(a) Wood shall be sound, tough, and free from any loose knots, (b) guards shall be made of planed lumber not less than one (1) inch rough board measure, and edges and corners rounded off, (c) wood guards shall be securely fastened together with wood screws, hardwood dowel pins, bolts, or rivets, (d) while no definite dimensions are given under this heading for framework or filler materials, wood guards shall be equal in strength and rigidity to metal guards specified in A. i. and ii. of this section and Table 2299.1-A, (e) for construction of standard wood railing, see E. of this section. (4-7-83)

c. Guards for Horizontal Overhead Belts. (4-7-83)

i. Guards for horizontal overhead belts shall run the entire length of the belt and follow the line of the pulley to the ceiling or be carried to the nearest wall, thus enclosing the belt effectively. Where belts are so located as to make it impracticable to carry the guard to wall or ceiling, construction of guard shall be such as to enclose completely the top and bottom runs of belt and the face of pulleys. (4-7-83)

ii. The guard and all its supporting members shall be securely fastened to wall or ceiling by gimlet-point lag screws or through bolts. In case of masonry construction, expansion bolts shall be used. The use of bolts placed horizontally through floor beams or ceiling rafters is recommended. (4-7-83)

iii. Suitable reinforcement shall be provided for the ceiling rafters or overhead floor beams, where such is necessary to sustain safely the weight and stress likely to be imposed by the guard. The interior surface of all guards, by which is meant the surface of the guard with which a belt will come in contact, shall be smooth and free from all projections of any character, except where construction demands it; protruding shallow roundhead rivets may be used. Overhead belt guards shall be at least one-quarter wider than the belt which they protect, except that this clearance need not in any case exceed six (6) inches on each side. Overhead rope drive and block and roller-chain-drive guards shall be not less than six (6) inches wider than the drive on each side. In overhead silent chain-drive guards where the chain is held from lateral displacement on the sprockets, the side clearances required on drives of twenty (20) inch centers or under shall be not less than one-fourth inch from the nearest moving chain part, and on drives of over twenty (20) inch centers a minimum of one-half inch from the nearest moving chain part. (4-7-83)

iv. Table 2299 1-B gives the sizes of materials to be used and the general construction specifications of guards for belts ten (10) inches or more in width. No material for overhead belt guards should be smaller than that specified in Table 2299 1-B or belts ten (10) to fourteen (14) inches wide, even if the overhead belt is less than ten (10) inches in width. However, No. 20 gage sheet metal may be used as a filler on guards for belts less than ten (10) inches wide. Expanded metal, because of the sharp edges, should not be used as a filler in horizontal belt guards. (4-7-83)

v. For clearance between guards and belts, ropes or chains of various center to center dimensions between the shafts, see bottom of Table 2299 1-B. (4-7-83)

d. Guards for Horizontal Overhead-rope and Chain-drives. Overhead-rope and chain-drive guard construction shall conform to the rules for overhead-belt guard construction of similar width, except that the filler material shall be of the solid type as shown in Table 2299 1-B unless the fire hazard demands the use of open construction. A side guard member of the same solid filling material should be carried up in a vertical position two (2) inches above the level of the lower run of the rope or chain drive and two (2) inches within the periphery of the pulleys which the guard enclosed thus forming a trough. These side filler members should be reinforced on the edges with 1 1/2 inch by 1/4 inch flat steel, riveted to the filling material at not greater than eight (8) inch centers; the reinforcing strip should be fastened or bolted to all guard supporting members with at least one 3/8 inch rivet or bolt at each inter Section, and the ends should be secured to the ceiling with lag screws or bolts. The filling material shall be fastened to the framework of the guard and the filler supports by 3/16 inch rivets spaced on 4 inch centers. The width of the multiple drive shall be determined by measuring the distance from the outside of the first to the outside of the last rope or chain in the group accommodated by the pulley. (4-7-83)

e. Guardrails and Toeboards. (4-7-83)

i. Guardrails shall be forty-two (42) inches in height with midrail between top rail and floor. (4-7-83)

ii. Posts shall be not more than eight (8) feet apart; they are to be permanent and substantial, smooth,

and free from protruding nails, bolts, and splinters. If made of pipe, the post shall be 1 1/4 inches inside diameter or larger. If made of metal shapes or bars, their section shall be equal in strength to that of 1 1/2 by 1 1/2 by 3/16 inch angle iron. If made of wood, the posts shall be two by four (2 x 4) inches or larger. The upper rail shall be two by four inches or 2-one by four strips, one at the top and one at the side of posts. The midrail may be one by four (1 x 4) inches or more. The rails (metal shapes, metal bars, or wood), should be on that side of the posts which gives the best protection and support. Where panels are fitted with expanded metal or wire mesh as noted in Table 2299-A the middle rails may be omitted. Where guard is exposed to contact with moving equipment, additional strength may be necessary. (4-7-83)

iii. Toe boards shall be four (4) inches or more in height, or wood, metal or of metal grill not exceeding one (1) inch mesh. Toeboards at flywheel pits should preferably by placed as close to edge of the pit as possible. (4-7-83)

17. Care of Equipment. (4-7-83)

a. General. All power-transmission equipment shall be inspected at intervals not exceeding 60 days and be kept in good working condition at all times. (4-7-83)

b. Shafting. (4-7-83)

i. Shafting shall be kept in alignment, free from rust and excess oil or grease. (4-7-83)

ii. Where explosives, explosive dusts, flammable vapors or flammable liquids exist, the hazard of static sparks from shafting shall be carefully considered. (4-7-83)

c. Bearings. Bearings shall be kept in alignment and properly adjusted. (4-7-83)

d. Hangers. Hangers shall be inspected to make certain that all supporting bolts and screws are tight and that supports of hanger boxes are adjusted properly. (4-7-83)

e. Pulleys. (4-7-83)

i. Pulleys shall be kept in proper alignment to prevent belts from running off. (4-7-83)

ii. One or both pulleys carrying of nonshifting belt should have crowned faces. (4-7-83)

iii. Cast-iron pulleys should be tested frequently with a hammer to disclose cracks in rim or spokes. It should be borne in mind that the sound is usually much different if the belt is or is not on the pulley. (4-7-83)

iv. Split pulleys should be inspected to as certain if all bolts holding together the sections of the pulley are tight. (4-7-83)

f. Care of Belts. (4-7-83)

i. Quarter-twist belts when installed without an idler can be used on drives running in one direction only. They will run off a pulley when direction of motion is reversed. (4-7-83)

ii. Inspection shall be made of belts, lacings, and fasteners and such equipment kept in good repair. (4-7-83)

iii. Where possible, dressing should not be applied when belt or rope is in motion; but, if this is necessary, it should be applied where belts or rope leave pulley, not where they approach. The same precautions apply to lubricating chains. In the case of V-belts, belt dressing is neither necessary nor advisable. (4-7-83)

g. Lubrication. The regular oilers shall wear tightfitting clothing and should use cans with long spouts to keep their hands out of danger. Machinery shall be oiled when not in motion, wherever possible. (4-7-83)

261. -- 269. (RESERVED).

270. HAND AND PORTABLE POWERED TOOLS AND EQUIPMENT.

01. General Requirements. Each employer shall be responsible for the safe condition of tools and equipment used by employees, including tools and equipment which may be furnished by employees. (4-7-83)

02. Compressed Air Used for Cleaning. Compressed air shall not be used for cleaning purposes except where reduced to less than 30 psi and then only with effective chip guarding and personal protective equipment. (4-7-83)

03. Compressed Air Tools. (4-7-83)

a. In the use of compressed air tools, care should be used to prevent the tool from being shot from the gun. (4-7-83)

b. When momentarily out of use the gun should be laid in such position that the tool cannot fly out if the pressure is accidentally released. When not in use, all tools should be removed from the gun. (4-7-83)

c. In disconnecting a compressed air tool from the air line, care should be exercised first to shut off the pressure and then to operate the tool to exhaust the pressure remaining in the hose. (4-7-83)

d. Compressed air hose or guns shall not be pointed at or brought into contact with the body of any person. (4-7-83)

04. Air Hammer. Before laying down an air hammer, remove tool from hammer unless it is held in place by safety catch. (4-7-83)

271. GUARDING OF PORTABLE POWERED TOOLS.

01. Portable Powered Tools. (4-7-83)

a. Portable Circular Saws. (4-7-83)

i. All portable power-drive circular saws having a blade diameter greater than 2 inches shall be equipped with guards above and below the base plate or shor. The upper guard shall cover the saw to the depth of the teeth, except for the minimum arc required to permit the base to be tilted for bevel cuts. The lower guard shall cover the saw to the depth of the teeth, except for the minimum arc required to allow proper retraction and contact with the work, the lower guard shall automatically and instantly return to covering position. (4-7-83)

ii. A.i. of this section does not apply to circular saws used in the meat industry for meat cutting purposes. (4-7-83)

b. Switches and controls. (4-7-83)

i. All hand held powered circular saws having a blade diameter greater than 2 inches, electric, hydraulic or pneumatic chain saws, and percussion tools without positive accessory holding means shall be equipped with a constant pressure switch or control that will shut off the power when the pressure is released. All hand held gasoline powered chain saws shall be equipped with a constant pressure throttle control that will shut off the power to the saw chain when the pressure is released. (4-7-83)

ii. All hand-held powered drills, tappers, fastener drivers, horizontal, vertical, and angle grinders with wheels greater than 2 inches in diameter, disc sanders with discs greater than 2 inches in diameter, belt sanders, reciprocating saws, saber, scroll, and jig saws with blade shanks greater than a nominal one-fourth inch, and other similarly operating powered tools shall be equipped with a constant pressure switch or control and may have a lock-on control provided that turnoff can be accomplished by a single motion of the same finger or fingers that turn it on. (4-7-83)

iii. All other hand-held powered tools such as, but not limited to, platen sanders, grinders with wheels 2 inches in diameter or less, disc sanders with discs 2 inches in diameter or less, routers, planers, laminate trimmers, nibblers, shears, saber, scroll, and jig saws with blade shanks a nominal one-fourth of an inch wide or less, may be equipped with either a positive "on-off" control, or other controls as described by B.i. and ii. of this section.(a) Saber, scroll, and jig saws with nonstandard blade holders may use blades with shanks which are nonuniform in width, provided the narrowest portion of the blade shank is an integral part in the mounting of the blade, (b) blade shank width shall be measured at the narrowest portion of the blade shank when saber, scroll, and jig saws have non-standard blade holders, (c) "nominal" in this section means +0.05 inch. (4-7-83)

iv. The operating control on hand-held power tools shall be so located as to minimize the possibility of its accidental operation, if such accidental operation would constitute a hazard to employees. (4-7-83)

v. This section does not apply to concrete vibrators, concrete breakers, powered tampers, jack hammers, rock drills, garden appliances, household and kitchen appliances, personal car appliances, medical or dental equipment, or to fixed machinery. (4-7-83)

c. Portable belt sanding machines. Belt sanding machines shall be provided with guards at each nip point where the sanding belt runs onto a pulley. These guards shall effectively prevent the hands or fingers of the operator from coming in contact with the nip points. The unused run of the sanding belt shall be guarded against accidental contact. (4-7-83)

d. Cracked saws. All cracked saws shall be removed from service. (4-7-83)

e. Grounding. Portable electric powered tools shall meet the electrical requirements of Chapter M of this Code, and the National Electrical Code. (4-7-83)

272. PNEUMATIC POWERED TOOLS AND HOSE.

01. Portable Tools. (4-7-83)

a. The operating trigger on portable hand-operated utilization equipment shall be so located as to minimize the possibility of its accidental operation and shall be arranged to close the air inlet valve automatically when the pressure of the operator's hand is removed. (4-7-83)

b. A tool retainer shall be installed on each piece of utilization equipment which, without such a retainer, may eject the tool. (4-7-83)

02. Airhose. Hose and hose connections used for conducting compressed air to utilization equipment shall be designed for the pressure and service to which they are subjected. (4-7-83)

273. PORTABLE ABRASIVE WHEELS.

01. Abrasive Wheel Terms. (4-7-83)

a. Mounted Wheels. Mounted wheels, usually 2-inch diameter or smaller, and of various shapes, may be either organic or inorganic bonded abrasive wheels. They are secured to plain or threaded steel mandrels. (4-7-83)

b. Tuck Pointing. Removal, by grinding, of cement, mortar, or other nonmetallic jointing material. (4-7-83)

c. Tuck Pointing Wheels. Tuck pointing wheels, usually Type 1, reinforced organic bonded wheels have diameter thickness and hole size dimension. They are subject to the same limitations of use and mounting as Type 1 wheels defined in J. of this section. LIMITATION: Wheels used for tuck pointing should be reinforced, organic bonded. (4-7-83)

d. Portable Grinding. A grinding operation where the grinding machine is designed to be hand held

and may be easily moved from one location to another. (4-7-83)

e. Organic Bonded Wheels. Organic wheels are wheels which are bonded by means of an organic material such as resin, rubber, shellac, or other similar bonding agent. (4-7-83)

f. Safety Guard. A safety guard is an enclosure designed to restrain the pieces of the grinding wheel and furnish all possible protection in the event that the wheel is broken in operation. (4-7-83)

g. Reinforced Wheels. The term "reinforced" as applied to grinding wheels shall define a class of organic wheels which contain strengthening fabric or filament. The term "reinforced" does not cover wheels using such mechanical additions as steel rings, steel cup backs or wire or tape winding. (4-7-83)

h. Type II Flaring Cup Wheels. Type II flaring cup wheels have double diameter dimensions d. and j., and in addition have thickness, hole size, rim and back thickness dimensions. Grinding is always performed on rim face, W dimension. Type II wheels are subject to all limitations of use and mounting listed for Type 6 straight sided cup wheels definition in I. of this section. (4-7-83)

DIAGRAM, Type II - Flaring-cup Wheel Side grinding wheel, available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

i. Type 6 Straight Cup Wheels. Type 6 cup wheels have diameter, thickness, hole size, rim thickness, and back thickness dimensions. Grinding is always performed on rim face, W dimension. LIMITATION: Minimum back thickness, E dimension, should not be less than 1/4 T dimension. In addition, when unthreaded hole wheels are specified, the inside flat, K dimension, must be large enough to accommodate a suitable flange. (4-7-83)

DIAGRAM, Type 6 - Straight-cup Wheel, available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

j. Type I Straight Wheels. Type 1 straight wheels have a diameter, thickness, and hole size dimensions and should be used only on the periphery. Type 1 wheels shall be mounted between flanges. LIMITATION: Hole dimension (h) should not be greater than 2/3 of wheel diameter dimension (d) for precision, cylindrical, centerless, or surface grinding applications. Maximum hole size for all other application should not exceed one-half wheel diameter. (4-7-83)

DIAGRAM, Type 1 - Straight Wheel, available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

02. General Requirements. (4-7-83)

a. All abrasive wheels shall be used only on machines provided with safety guards as defined in the following sections thru Section 2313. (4-7-83)

i. Exceptions: This requirement shall not apply to the following classes of wheels and conditions: (a) wheels used for internal work while within the work being ground, (b) mounted wheels used in portable operations 2 inches and smaller in diameter, (c) types 16, 17, 18, 18R, and 19 cones and plugs and threaded hole pot balls as illustrated and described in 1.4.11 of ANSI B7.1-1970 Safety Code for the Use, Care and Protection of Abrasive Wheels, where the work offers protection. (4-7-83)

b. The safety guard shall cover the spindle end, nut, and flange projections. The safety guard shall be mounted so as to maintain proper alignment with the wheel, and the strength of the fastenings shall exceed the strength of the guard. (4-7-83)

i. Exception: Safety guards on all operations where the work provides a suitable measure of protection to the operator, may be so constructed that the spindle end, nut, and outer flange are exposed; and (4-7-83)

ii. Exception: The spindle end, nut and outer flange may be exposed on portable machines designed for, and used with, type 6, 11, 27, and 28 abrasive wheels, cutting off wheels, and tuck pointing wheels. (4-7-83)

iii. Exception: the spindle end, nut, and outer flange may be exposed on machines designed as portable saws. (4-7-83)

03. Cup Wheels. Cup wheels (type 6 and 11) shall be guarded by: (4-7-83)

a. Safety guards as specified in section 2309 of this Chapter. (4-7-83)

b. Special "revolving cup guards" which mount behind the wheel and turn with it. They shall be made of steel or other material with adequate strength and shall enclose the wheel sides upward from the back for one-third of the wheel thickness. The mounting features shall conform with all regulations. (See Section 2313 of this Chapter). It is necessary to maintain clearance between the wheel side and the guard. The clearance shall not exceed one-sixteenth inch; or, (4-7-83)

c. Some other form of guard that will insure as good protection as that which would be provided by the guards specified in i. and ii. above. (4-7-83)

04. Vertical Portable Grinders. Safety guards used on machines known as right angle head or vertical portable grinders shall have a maximum exposure angle of 180 degrees, and the guard shall be located so as to be between the operator and the wheel during use. Adjustment of guard shall be such that pieces of an accidentally broken wheel will be deflected away from the operator. (See figure 2311-A). (4-7-83)

FIGURE 2311-A available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

05. Other Portable Grinders. The maximum angular exposure of the grinding wheel periphery and sides for safety guards used on other portable grinding machines shall not exceed 180 degrees and the top half of the wheel shall be enclosed at all times. (See Figures 2312-A and 2312-B). (4-7-83)

06. Mounting and Inspection of Abrasive Wheels. (4-7-83)

a. Immediately before mounting, all wheels shall be closely inspected and sounded by the user (ring test) to make sure they have not been damaged in transit, storage, or otherwise. The spindle speed of the machine shall be checked before mounting of the wheel to be certain that it does not exceed the maximum operating speed marked on the wheel. Wheels should be tapped gently; if they sound cracked (dead), they shall not be used. NOTE: Wheels should be tapped gently with a light nonmetallic implement, such as the handle of a screwdriver for light wheels, or a wooden mallet for heavier wheels. This is known as the "Ring Test". (4-7-83)

b. Grinding wheels shall fit freely on the spindle and remain free under all grinding conditions. The machine spindle shall be made to nominal (standard) size plus zero minus .002 inch, and the wheel hole shall be made suitably oversize to assure safety clearance under the conditions of operating heat and pressure. NOTE: A controlled clearance between the wheel hole and the machine spindle (or wheel sleeves or adaptors) is essential to avoid excessive pressure from mounting and spindle expansion. (4-7-83)

c. All contact surfaces of wheels, blotters, and flanges shall be flat and free of foreign matter.(4-7-83)

d. When a bushing is used in the wheel hole, it shall not exceed the width of the wheel and shall not contract the flanges. (4-7-83)

e. For requirements for the use of flanges and blotters see Section 2254 in Chapter V of this Code. NOTE: Excluded machinery. Natural sandstone wheels and metal, wooden, cloth, or paper discs, having a layer of abrasive on the surface are not covered by this section. (4-7-83)

274. SAFETY REQUIREMENTS FOR POWDER ACTUATED FASTENING SYSTEMS.

01. Scope. (4-7-83)

a. This standard provides safety requirements for a powder actuated fastening tool or machine which propels a stud, pin, fastener, or other object for the purpose of affixing it by penetration to another object. (4-7-83)

b. This standard does not apply to devices designed for attaching objects to soft construction materials, such as wood, plaster, tar, dry wallboard, and the like, or to stud welding equipment. (4-7-83)

02. Purpose. The purpose of this standard is to provide reasonable safety for life, limb, and property, by establishing requirements for design, construction, operation, service, and storage of powder actuated fastening tools, fasteners, and power loads. (4-7-83)

03. Definitions Applicable to this Section. (4-7-83)

a. Angle control. A safety feature designed to prevent a tool from operating when tilted beyond a predetermined angle. (4-7-83)

b. Approved. Meeting the requirements of this standard and acceptable to the Department of Labor and Industrial Services. (4-7-83)

c. Cased power load. A power load with the propellant contained in a closed case. (4-7-83)

d. Caseless power load. A power load with the propellant in solid form not requiring containment. (4-7-83)

e. Chamber (noun) - the location in the tool into which the power load is placed and in which it is actuated. (4-7-83)

f. Chamber (verb) - to fit the chamber according to manufacturer's specifications. (4-7-83)

g. Fasteners - any pins (unthreaded heads) or studs (threaded heads) driven by powder actuated tools. (4-7-83)

h. Fixture - a special shield that provides equivalent protection where the standard shield cannot be used. (4-7-83)

i. Head - that portion of a fastener that extends above the work surface after being properly driven. (4-7-83)

j. Misfire - a condition in which the power load fails to ignite after the tool has been operated. (4-7-83)

k. Powder actuated fastening system - a method comprising the use of a powder actuated tool, a power load, and a fastener. (4-7-83)

l. Powder acutated tool (also known as tool) - a tool that utilizes the expanding gases from a power load to drive a fastener. (4-7-83)

m. Power load - the energy source used in powder actuated tools. (4-7-83)

n. Qualified operator - a person who meets the requirements of Section 2324 A. and B. of this Chapter. (4-7-83)

o. Shield - a device, attached to the muzzle end of a tool, which is designed to confine flying particles. (4-7-83)

p. Spalled area - a damaged and non-uniform concrete or masonry surface. (4-7-83)

q. Test velocity - the measurement of fastener velocity performed in accordance with Section 2317 A.

xiii. (4-7-83)

r. Tools - tools can be divided into two types: direct acting and indirect acting; and three classes: low velocity, medium velocity, and high velocity. (4-7-83)

i. Direct-acting tool - a tool in which the expanding gas of the power load acts directly on the fastener to be driven. (4-7-83)

ii. Indirect-acting tool - a tool in which the expanding gas of the power load acts on a captive piston, which in turn drives the fastener. (4-7-83)

iii. Low velocity tool - a tool whose test velocity has been measured ten times while utilizing the highest velocity combination of: (a) The lightest commercially available fastener designed for that specific tool; (b) the strongest commercially available power load that will properly chamber in the tool; (c) the piston designed for that tool and appropriate for that fastener; that will produce an average test velocity from the ten tests not in excess of 100 meters per second (328 feet per second) with no single test having a velocity of over 108 m/s (354 ft/s). (4-7-83)

iv. Medium-velocity tool - a tool whose velocity has been measured ten times while utilizing the highest velocity combination of: (a) The lightest commercially available fastener designed for the tool; (b) the strongest commercially available power load that will properly chamber in the tool; (c) the piston designed for that tool and appropriate for that fastener; that will produce an average test velocity from ten tests in excess of 100 m/s (328 ft/s) but not in excess of 150 m/s (492 ft/s) with no single test having a velocity of 160 m/s (525 ft/s). (4-7-83)

v. High-velocity tool - a tool whose test velocity has been measured ten times while utilizing the combination of: (a) The lightest commercially available fastener designed for the tool; (b) the strongest commercially available power load which will properly chamber in the tool; that will produce an average velocity from the ten tests in excess of 150 m/s (492 ft/s). (4-7-83)

04. Requirements. (4-7-83)

a. General. (4-7-83)

i. The tool shall be designed to prevent inadvertent actuation. (4-7-83)

ii. The tool shall be designed to prevent actuation when dropped in any attitude from a height of 3 meters (10ft.) onto a smooth, hard surface such as concrete or steel, if such actuation can propel a fastener or any part thereof in free flight. (4-7-83)

iii. Actuation of the tool shall be dependent upon at least two separate and distinct operations by the operator, with at least one operation being separate from the operation of holding the tool against the work surface. (4-7-83)

iv. The tool shall be designed not to be operable other than against a work surface with a force on the work surface equal to 22 newtons (5 lbs.) greater than the weight of the tool or a minimum impact energy of 4 joules (3 ft-lb). (4-7-83)

v. All tools shall be designed so that compatible protective shields or fixtures, designed, built, and supplied by the manufacturer of the tool can be used (See B. ii., C. ii., D. i i. of this Section and Section 2320 H. of this Chapter). (4-7-83)

vi. The tool shall be designed so that a determinable means of varying the power levels is available for selecting a power level adequate to perform the desired work (See Section 2318 E. of this Chapter). (4-7-83)

vii. The tool shall be designed so that all principal functional parts can be checked for foreign matter that may affect operation. (4-7-83)

viii. The tool shall be designed so that all parts will be of adequate strength to resist maximum stresses

imposed on actuation when the tool is used in accordance with the manufacturer's instructions and is powered by any commercially available power load which will properly chamber in the tool. (4-7-83)

ix. Each tool shall bear a legible permanent model designation, which shall serve as a means of identification. Each tool shall also bear a legible, permanent manufacturer's unique serial number. (4-7-83)

x. A lockable container shall be provided for each tool. The works "POWER ACTUATED TOOL" shall appear in plain sight on the outside of the container. The following notice shall be attached on the inside cover of the container: WARNING, POWER ACTUATED TOOL TO BE USED ONLY BY A QUALIFIED OPERATOR AND KEPT UNDER LOCK AND KEY WHEN NOT IN USE. (4-7-83)

xi. Each tool shall bear a durable warning label with the following statement, or the equivalent: WARNING, FOR USE ONLY BY QUALIFIED OPERATORS ACCORDING TO MANUFACTURER'S INSTRUCTION MANUAL. (4-7-83)

xii. Each tool shall be supplied with the following: (a) Operator's instruction and service manual, (b) power load chart, (c) tool inspection record, (d) service tools and accessories. (4-7-83)

xiii. In determining tool test velocities the velocity of the fastener shall be measured in free flight at a distance of 2 meters (6 1/2 ft.) from the muzzle end of the tool, using accepted ballistic test methods. (4-7-83)

b. Design requirements: Low-velocity class. (4-7-83)

i. Low-velocity tools, indirect-acting type (piston), as defined in Section 2316, shall meet the requirements of Section 2317 A. (4-7-83)

ii. A shield shall be supplied with each tool. (4-7-83)

c. Design requirements - Medium velocity class. (4-7-83)

i. Medium-velocity tools, indirect-acting (piston) type, as defined in Section 2316, shall meet the requirements of Section 2317 A. (4-7-83)

ii. The tool shall have a shield at least 63 mm (2 1/2 in) in diameter mounted perpendicular to, and concentric with the muzzle end, when it is indexed to the center position. A special shield or fixture may be used when it provides equivalent protection (4-7-83)

iii. The tool shall be designed so that it cannot be actuated unless it is equipped with a shield or fixture. (4-7-83)

iv. The tool shall be designed with angle control so that it will not actuate when equipped with the standard shield indexed to the center position if the bearing surface of the shield is tilted more than 12 degrees from a flat surface. (4-7-83)

d. Design requirements - High-velocity class. (4-7-83)

i. High-velocity tools, direct-acting or indirect acting type, as defined in Section 2316 shall meet the requirements of Section 2317 A. (4-7-83)

ii. The tool shall have a shield at least 88 mm (3 1/2 in.) in diameter mounted perpendicular to, and concentric with, the muzzle end, when it is indexed to the center position. A special shield or fixture may be used when it provides equivalent protection. (4-7-83)

iii. The tool shall be designed so that it cannot be actuated unless it is equipped with a shield or fixture. (4-7-83)

iv. The tool shall be designed with angle control so that it will not actuate when equipped with the

standard shield indexed to the center position, if the bearing surface of the shield is tilted more than 8 degrees from a flat surface. (4-7-83)

05. Power loads. (4-7-83)

a. Identification of cased power loads. Cased power loads shall be coded to identify power load levels by case color and power load color as specified in Table 2319-A. (4-7-83)

b. Identification of caseless power loads. Caseless power loads shall be coded to identify power load levels by power load color as specified in Table 2319-A and by configuration. (4-7-83)

c. Power load use limitation. No power load (cased or caseless) shall be used if it will properly chamber in any existing commercially available tool and will cause a fastener to have a test velocity in excess of the maximum test velocities specified for the said tool. (4-7-83)

d. Identification of power load packages. Power load packages shall provide a visual number-color indication of the power level of the power load as specified in Table 2319-A. (4-7-83)

e. Optional power load variation where means other than power loads of varying power levels are to be used to control penetration, such means shall provide an equivalent power level variation. (4-7-83)

06. Fasteners. Fasteners for use in powder actuated tools shall be designed and manufactured to function compatibly with these tools and, when used in masonry, concrete, or steel, to effect properly the application for which they are recommended. (4-7-83)

07. Operation. (4-7-83)

a. Only tools meeting the requirements of this standard shall be used. (4-7-83)

b. Only qualified operators shall operate tools. (4-7-83)

c. The lowest velocity class of tool that will properly set the fastener shall be used. (4-7-83)

d. Tools shall be operated in strict accordance with the manufacturer's instructions. (4-7-83)

e. Eye or face protection, or both, shall be worn by operators, assistants, and adjacent personnel when tool is in use. Hearing protection shall be used when making fastenings in confined areas. (4-7-83)

f. Each day, prior to use, the operator shall inspect the tool to determine that it is in proper working condition in accordance with the testing methods recommended by the manufacturer of the tool. (4-7-83)

g. Any tool found not to be in proper working condition shall be immediately removed from service and tagged "DEFECTIVE"; it shall not be used until it has been properly repaired in accordance with the manufacturer's instructions. (4-7-83)

h. The proper shield, fixture, adaptor, or accessory, suited for the application, as recommended and supplied by the manufacturer, shall be used. (4-7-83)

i. Only those types of fasteners and power loads recommended by the tool manufacturer shall be used. (4-7-83)

j. Before fastening into any questionable material, the operator shall determine its suitability by using a fastener as a center punch. If the fastener point does not easily penetrate, is not blunted, and does not fracture the material, initial test fastenings shall then be made in accordance with the tool manufacturer's recommendations. (See Section 2321 C.) (4-7-83)

k. No tool shall be loaded unless it is being prepared for immediate use. If the work is interrupted after

loading, the tool shall be unloaded at once. (4-7-83)

l. Tools shall not be loaded until just prior to the intended firing time. Neither loaded nor empty tools are to be pointed at any person; hands shall be kept clear of the open barrel end. (4-7-83)

m. The tool shall always be held perpendicular to the work surface when fastening into any material, except for specific applications recommended by the tool manufacturer. (4-7-83)

n. In the event of a misfire, the operator shall hold the tool firmly against the work surface for a period of thirty seconds and then follow the explicit instructions set forth in the manufacturer's instructions. (4-7-83)

o. Power loads of different power levels and types shall be kept in separate compartments or containers. (4-7-83)

p. A sign, at least 20 x 25 cm (8 x 10 in), using boldface type no less than 2.5 cm (1 in) in height, shall be posted in plain sight on all construction projects where tools are used. The sign shall bear wording similar to the following: POWER ACTUATED TOOL IN USE. (4-7-83)

08. Limitations of use. (4-7-83)

a. The tool shall not be used in an explosive or flammable atmosphere. (4-7-83)

b. A tool shall never be left unattended in a place where it would be available to unauthorized persons. (4-7-83)

c. Fasteners shall not be driven into very hard or brittle materials including, but not limited to, cast iron, glazed tile, hardened steel, glass block, natural rock, hollow tile, or most brick. (See Section 2320 J.) (4-7-83)

d. Fasteners shall not be driven into easily penetrated or thin materials or materials of questionable resistance, unless backed by a material that will prevent the fastener from passing completely through the other side. (4-7-83)

e. Fasteners shall not be driven closer than 7.5 cm (3 in) from the unsupported edge of masonry materials except for specific applications recommended by the tool manufacturer. (4-7-83)

f. Fasteners shall not be driven closer than 13 mm (1/2 in) from the edge of steel except for specific applications recommended by the tool manufacturer. (4-7-83)

g. Fasteners shall not be driven into concrete unless material thickness is at least three times the fastener shank penetration. (4-7-83)

h. Fasteners shall not be driven into any spalled area. (4-7-83)

i. Fasteners shall not be driven through existing holes unless a specific guide means, as recommended and supplied by the tool manufacturer, is used to ensure positive alignment. (4-7-83)

09. Maintenance and storage. (4-7-83)

a. The tool shall be serviced and inspected for worn or damaged parts at regular intervals as recommended by the tool manufacturer. Prior to the tool being put back into use, all worn or damaged parts shall be replaced by a qualified person using only parts supplied by the tool manufacturer. A record of this inspection shall be noted and dated on the tool inspection record. (4-7-83)

b. Instruction manuals, maintenance tools, and accessories supplied with the tool shall be stored in the tool container when not in use. (4-7-83)

c. Powder actuated tools and power loads shall be locked in a container and stored in a safe place

when not in use and shall be accessible only to authorized personnel. (4-7-83)

10. Authorized Instructor. (4-7-83)

a. Only persons trained and authorized by the tool manufacturer or by an authorized representative of the tool manufacturer shall be qualified to instruct and qualify operators for the manufacturer's powder actuated tools. (4-7-83)

b. All authorized instructors shall have read and be familiar with this standard, and shall be capable of: (4-7-83)

i. Disassembling, servicing, and re-assembling the tool. (4-7-83)

ii. Recognizing any worn or damaged parts or defective operation. (4-7-83)

iii. Recognizing and clearly identifying the colors used to identify power load levels. (4-7-83)

iv. Using the tool correctly within the limitations of its use. (4-7-83)

v. Training and testing operators prior to issuing a qualified operators card. (4-7-83)

c. All authorized instructors shall have in their possession a valid authorized instructor's card issued and signed by an authorized representative of the manufacturer. The card shall be wallet size of approximately 6 x 9 cm (2 1/2 x 3 1/2 in) and the face of the card shall bear text similar to that shown in Figure 2323-A. (4-7-83)

d. A list of all instructors authorized by the manufacturer to instruct and qualify operators shall be maintained by the tool manufacturer and be made available to the Department of Labor and Industrial Services upon request. (4-7-83)

e. An instructor's card may be revoked by the authorizing agent or the DLIS upon request. (4-7-83)

f. An instructor's card may be revoked by the authorizing agent or the DLIS, if he is known to have issued a qualified operator's card in violation of any regulation contained in this standard. When an instructor is no longer authorized to issue qualified operator's cards, he shall surrender his card to the authorizing agent or to the DLIS. (4-7-83)

11. Qualified Operator. (4-7-83)

a. The operator shall be trained by an authorized instructor to be familiar with the provisions of this standard and the instructions provided by the manufacturer for operation and maintenance. The operator shall also be capable of: (4-7-83)

i. Reading and understanding the manufacturer's instruction manual. (4-7-83)

ii. Cleaning the tool correctly. (4-7-83)

iii. Recognizing any worn or damaged parts or defective operation. (4-7-83)

iv. Recognizing the number color code system used in this standard to identify power load levels. In the event the operator is unable to distinguish the colors used, he shall be given special instruction to enable him to avoid error. (4-7-83)

v. Using the tool correctly within the limitations of its use and demonstrating his competence by operating the tool in the presence of the instructor. (4-7-83)

b. After training, the operator shall, to substantiate his competency, satisfactorily complete a written examination provided by the manufacturer of the tool. (4-7-83)

i. The operator's written examination shall consist of questions to establish the operator's competence with respect to: (a) The requirements of this standard; (b) the powder actuated fastening system; and (c) the specific details of operation and maintenance of the tool(s) involved. (4-7-83)

ii. The examination shall provide a statement, attested to by the instructor, that the applicant can (or cannot) readily distinguish the colors used to identify power load levels. (See Section 2318) (4-7-83)

c. Each applicant who meets the requirements as set forth in A. and B. of this Section shall receive a qualified operator's card, issued and signed by both the instructor and applicant. While using the tool, the operator shall have this card in his possession. (4-7-83)

d. The qualified operator's card supplied by the manufacturer shall be wallet size of approximately 6 x 9 cm (2 1/2 x 3 1/2 in) and the face of the card shall bear text similar to that shown in Figure 2324-A. (4-7-83)

e. There shall be printed on the card a notation reading: Revocation of card - Failure to comply with any of the rules and regulation for safe operation of powder actuated fastening tools shall be cause for the immediate revocation of this card. (4-7-83)

275. POWER LAWNMOWERS.

01. Terms. (4-7-83)

a. Blade Tip Circle - The path described by the outermost point of the blade as it is rotated about its shaft axis. (4-7-83)

b. Guards - A part or an assembly provided for shielding a hazardous area of a machine. (4-7-83)

c. Catcher Assemblies - Parts or combinations of parts which provide a means for collecting grass clippings or debris. (4-7-83)

d. Walk-behind Mower - A mower either pushed or self-propelled and normally guided by the operator walking behind the unit. (4-7-83)

e. Operator Area - Walk-behind Mowers. For discharge interference purposes, that area confined within a circle no smaller than 30 inches in diameter, the center of which is located to the rear of the mower on its longitudinal centerline 30 inches behind the nearest blade tip circle. (4-7-83)

f. Power Reel Mower - A lawncutting machine utilizing a power source to rotate one or more helically formed blades about a horizontal axis to provide a shearing action with a stationary cutter bar or bed knife. (4-7-83)

g. Power Rotary Mower - A lawncutting machine utilizing a power source to rotate one or more cutting blades about a vertical axis. (4-7-83)

h. Lowest Blade Position - The lowest blade position under static conditions. (4-7-83)

i. Riding Mower - A powered, self-propelled lawn cutting vehicle on which the operator rides and controls the machine. (4-7-83)

j. Sulky Type Mower - Normally a walk-behind mower which has been converted to a riding mower by the addition of a sulky. (4-7-83)

k. Deadman Control - A control designed so that it will automatically interrupt power to a drive when the operator's actuating force is removed. (4-7-83)

02. General Requirements. (4-7-83)

a. Power lawnmowers of the walk-behind, riding-rotary types, and reel power lawn mowers designed for use by employees shall meet the design specifications in "American National Standard Safety Specifications for Power Lawnmowers" ANSI B71.1-1968. These specifications do not apply to sulky-type mowers, flail mowers, sickle-bar mowers, or mowers designed for commercial use. (4-7-83)

b. All power-drive chains, belts and gears shall be so positioned or otherwise guarded to prevent the operators accidental contact therewith, during normal starting, mounting, and operation of the machine. (4-7-83)

c. A shut-off device shall be provided to stop operation of the motor or engine. This device shall require manual and intentional reactivation to restart the motor or engine. (4-7-83)

d. All positions of the operating controls shall be clearly identified. (4-7-83)

e. The words, "Caution. Be sure the operating control(s) is in neutral before starting the engine", or similar wording shall be clearly visible at an engine starting control point on self-propelled mowers. (4-7-83)

03. Walk-Behind and Riding Rotary Mowers. (4-7-83)

a. The mower blade shall be enclosed except on the bottom and the enclosure shall extend to or below the lowest cutting point of the blade in the lowest blade position. (4-7-83)

b. Guards which must be removed to install a catcher assembly shall comply with the following: (4-7-83)

i. Warning instructions shall be affixed to the mower near the opening stating that the mower shall not be used without either the catcher assembly or the guard in place. (4-7-83)

ii. The catcher assembly or the guard shall be shipped and sold as part of the mower. (4-7-83)

iii. The instruction manual shall state that the mower shall not be used without either the catcher assembly or the guard in place. (4-7-83)

iv. The catcher assembly, when properly and completely installed, shall not create a condition which violates the limits given for the guarded opening. (4-7-83)

c. Openings in the blade enclosure, intended for the discharge of grass, shall be limited to a maximum vertical angle of the opening of 30 degrees. Measurements shall be taken from the lowest blade position. (4-7-83)

d. The total effective opening area of the grass discharge opening(s) shall not exceed 1,000 square degrees on units having a width of cut less than 27 1/2 inches, or 2,000 square degrees on units having a width of cut 27 1/2 inches or over. (4-7-83)

e. The word "Caution" or stronger wording, shall be placed on the mower at or near each discharge opening. (4-7-83)

f. Blade(s) shall stop rotating from the manufacturer's specified maximum speed within 15 seconds after declutching, or shutting off power. (4-7-83)

g. In a multipiece blade, the means of fastening the cutting members to the body of the blade or disc shall be so designed that they will not become worn to a hazardous condition before the cutting members themselves are worn beyond use. (4-7-83)

h. The maximum tip speed of any blade shall be 19,000 feet per minute. (4-7-83)

04. Walk-Behind Rotary Mowers. (4-7-83)

a. The horizontal angle of the opening(s) in the blade enclosure, intended for the discharge of grass, shall not contact the operator area. (4-7-83)

b. There shall be one of the following at all openings in the blade enclosure intended for the discharge of grass: (4-7-83)

i. A minimum unobstructed horizontal distance of 3 inches from the end of the discharge chute to the blade tip circle. (4-7-83)

ii. A rigid bar fastened across the discharge opening, secured to prevent removal without the use of tools. The bottom of the bar shall be no higher than the bottom edge of the blade enclosure. (4-7-83)

c. The highest point(s) on the front of the blade enclosure, except discharge openings, shall be such that any line extending a maximum of 15 degrees downward from the horizontal toward the blade shaft axis shall not intersect the horizontal plane within the blade tip circle. The highest point(s) on the blade enclosure front, except discharge-openings, shall not exceed 1 1/4 inches above the lowest cutting point of the blade in the lowest blade position. Mowers with a swingover handle are to be considered as having no front in the blade enclosure and therefore shall comply with Section 2327 A. (4-7-83)

d. The mower handle shall be fastened to the mower so as to prevent loss of control by intentional uncoupling while in operation. (4-7-83)

e. A positive upstop or latch shall be provided for the mower handle in the normal operating position(s). The upstop shall not be subject to unintentional disengagement during normal operation of the mower. The upstop or latch shall not allow the center or the handle grips to come closer than 17 inches horizontally behind the closest path of the mower blade(s) unless manually disengaged. (4-7-83)

f. A swing-over handle, which complies with the above requirements will be permitted. (4-7-83)

g. Wheel drive disengaging controls, except deadman controls, shall move opposite to the direction of the vehicle motion in order to disengage the drive. Deadman controls shall comply with Section 2325 K. and may operate in any direction to disengage the drive. (4-7-83)

05. Riding Rotary Mowers. (4-7-83)

a. The highest point(s) of all openings in the blade enclosure front shall be limited by a vertical angle of opening of 15 degrees and a maximum distance of 1 1/4 inches above the lowest cutting point of the blade position. (4-7-83)

b. Opening(s) shall be placed so that grass or debris will not discharge directly toward any part of an operator seated in a normal operator position. (4-7-83)

c. There shall be one of the following at all openings in the blade enclosure intended for the discharge of grass: (4-7-83)

i. A minimum unobstructed horizontal distance of 6 inches from the end of the discharge chute to the blade tip circle. (4-7-83)

ii. A rigid bar fastened across the discharge opening, secured to prevent removal without the use of tools. The bottom of the bar shall be no higher than the bottom edge of the blade enclosure. (4-7-83)

d. Mowers shall be provided with stops to prevent jackknifing or locking of the steering mechanism. (4-7-83)

e. Vehicle stopping means shall be provided. (4-7-83)

f. Hand-operated wheel drive disengaging controls shall move opposite to the direction of vehicle

motion in order to disengage the drive. Foot-operated wheel drive disengaging controls shall be depressed to disengage the drive. Deadman controls, both hand and foot operated, shall comply with Section 2325 K., and may operate in any direction to disengage the drive. (4-7-83)

276. JACKS.

01. Jack Terms. (4-7-83)

a. Jack - A jack is an appliance for lifting and lowering or moving horizontally a load by application of a pushing force. NOTE: Jacks may be of the following types: lever and ratchet, screw and hydraulic. (4-7-83)

b. Rating - The rating of a jack is the maximum working load for which it is designed to lift safely that load throughout its specified amount of travel. NOTE: To raise the rated load of a jack, the point of application of the load, the applied force, and the length of the lever arm should be those designated by the manufacturer for the particular jack considered. (4-7-83)

02. Loading and Marking. (4-7-83)

a. The operator shall make sure that the jack used has a rating sufficient to lift and sustain the load. (4-7-83)

b. The rated load shall be legibly and permanently marked in a prominent location on the jack by casting, stamping, or other suitable means. (4-7-83)

03. Operation and Maintenance. (4-7-83)

a. In the absence of a firm foundation the base of the back shall be blocked. If there is a possibility of slippage of the cap, a block shall be placed in between the cap and the load. (4-7-83)

b. The operator shall watch the stop indicator, which shall be kept clean, in order to determine the limit of travel. The indicated limit shall not be overrun. (4-7-83)

c. After the load has been raised it shall immediately be cribbed, blocked, or otherwise secured. (4-7-83)

d. Hydraulic jacks exposed to freezing temperatures shall be supplied with an adequate antifreeze liquid. (4-7-83)

e. All jacks shall be properly lubricated at regular intervals. The lubricating instructions of the manufacturer should be followed, and only lubricants recommended by him should be used. (4-7-83)

f. Each jack shall be thoroughly inspected at times which depend upon the service conditions. Inspections shall be not less frequent than the following: (4-7-83)

i. For constant or intermittent use at one locality, once every 6 months; (4-7-83)

ii. For jacks sent out of shop for special work, when sent out and when returned; (4-7-83)

iii. For a jack subjected to abnormal load or shock, immediately before and immediately thereafter. (4-7-83)

g. Repair or replacement parts shall be examined for possible defects. (4-7-83)

h. Jacks which are out of order shall be tagged accordingly, and shall not be used until repairs are made. (4-7-83)

277. -- 279. (RESERVED).

280. WELDING, CUTTING, AND BRAZING.

01. Definitions. (4-7-83)

a. "Welder" and "welding operator" means any operator of electric or gas welding and cutting equipment. (4-7-83)

b. Approved means listed or approved by a nationally recognized testing laboratory, such as Factory Mutual Engineering Corp., or Underwriters' Laboratories, Inc. (4-7-83)

c. All other welding terms are used in accordance with American Welding Society terms and definitions - A3.0-1969. (4-7-83)

281. INSTALLATION AND OPERATION OF OXYGEN FUEL GAS SYSTEMS FOR WELDING AND CUTTING.

01. General Requirements. (4-7-83)

a. Flammable Mixture. Mixtures of fuel gases and air or oxygen may be explosive and shall be guarded against. No device or attachment facilitating or permitting mixtures of air or oxygen with flammable gases prior to consumption, except at the burner or in a standard torch, shall be allowed unless approved for the purpose. (4-7-83)

b. Maximum Pressure. Under no condition shall acetylene be generated, piped (except in approved cylinder manifolds) or utilized at a pressure in excess of 15 psi gage pressure or 30 psi absolute pressure. (The 30 psi absolute pressure limit is intended to prevent unsafe use of acetylene in pressurized chambers such as caissons, underground excavations or tunnel constructions.)This requirement does not apply to storage of acetylene dissolved in a suitable solvent in cylinders manufactured and maintained according to U. S. Department of Transportation requirements, or to acetylene for chemical use. The use of liquid acetylene shall be prohibited. (4-7-83)

c. Apparatus. Only approved apparatus such as torches, regulators, or pressure-reducing valves, acetylene generators, and manifolds shall be used. (4-7-83)

d. Personnel. Workmen in charge of the oxygen or fuel-gas supply equipment including generators, any oxygen or fuel-gas distribution piping systems shall be instructed and judged competent by their employers for this important work before being left in charge. Rules and instructions covering the operation and maintenance of oxygen or fuel-gas supply equipment including generators and oxygen or fuel-gas distribution piping systems shall be readily available. (4-7-83)

282. CYLINDERS AND CONTAINERS.

01. Approval and Marking. (4-7-83)

a. All portable cylinders used for the storage and shipment of compressed gases shall be constructed and maintained in accordance with the regulations of the U. S. Department of Transportation, 49 CFR Parts 171-179. (4-7-83)

b. Compressed gas cylinders shall be legibly marked, for the purpose of identifying the gas content, with either the chemical or the trade name of the gas. Such marking shall be by means of stencilling, stamping, or labeling, and shall not be readily removable. Whenever practical, the marking shall be located on the shoulder of the cylinder. NOTE: This method conforms to the America Standard Method for Marking Portable Compressed Gas Containers to Identify the Material Contained, ANSI Z48.1-154. (4-7-83)

c. Compressed gas cylinders shall be equipped with connections complying with the American National Standard Compressed Gas Cylinder Valve Outlet and Inlet Connections, ANSI B57.1-1965. (4-7-83)

d. All cylinders with a water weight capacity of over 30 pounds shall be equipped with means of connecting a valve protection cap or with a collar or recess to protect the valve. (4-7-83)

e. All compressed gas cylinders whether empty or full shall be secured in an upright position at all times except, if necessary, for short periods of time while cylinders are actually being hoisted or carried. (4-7-83)

02. Storage of Cylinders - General. (4-7-83)

a. Cylinders shall be kept away from radiators and other sources of heat. (4-7-83)

b. Inside of buildings, cylinders shall be stored in a well-protected, well-ventilated, dry location, at least 20 feet from highly combustible materials such as oil or excelsior. Cylinders should be stored in definitely assigned places away from elevators, stairs, or gangways. Assigned storage spaces shall be located where cylinders will not be knocked over or damaged by passing or falling objects, or subject to tampering by unauthorized persons. Cylinders shall not be kept in unventilated enclosures such as lockers and cupboards. (4-7-83)

c. Empty cylinders shall have their valves closed. (4-7-83)

d. Valve protection caps, where cylinder is designed to accept a cap, shall always be in place, hand-tight, except when cylinders are in use or connected for use. (4-7-83)

03. Fuel-Gas Cylinder Storage. (4-7-83)

a. Inside a building, cylinders except those in actual use or attached ready for use, shall be limited to a total gas capacity of 2,000 cubic feet or 300 pounds of liquified petroleum gas. (4-7-83)

b. For storage in excess of 2,000 cubic feet total gas capacity of cylinders or 300 pounds of liquified petroleum gas, a separate room or compartment conforming to the requirements specified in Section 2411 F.viii. and x., shall be provided, or cylinders shall be kept outside or in a special building. Special buildings, rooms or compartments shall have no open flame for heating or lighting and shall be well ventilated. They may also be used for storage of calcium carbide in quantities not to exceed 600 pounds, when contained in metal containers complying with section 2412 A.i. and ii. Signs should be conspicuously posted in such rooms reading "Danger - No Smoking, Matches, or Open Lights", or other equivalent wording. (4-7-83)

c. Acetylene cylinders shall be stored valve end up. (4-7-83)

04. Oxygen Storage. (4-7-83)

a. Oxygen cylinders shall not be stored near highly combustible material, especially oil and grease; or near reserve stocks of carbide and acetylene or other fuel-gas cylinders, or near any other substance likely to cause or accelerate fire; or in an acetylene generator compartment. (4-7-83)

b. Oxygen cylinders stored in outside generator houses shall be separated from the generator or carbide storage rooms by a noncombustible partition having a fire resistant rating of at least 1 hour. This partition shall be without openings and shall be gastight. (4-7-83)

c. Oxygen cylinders in storage shall be separated from fuel-gas cylinders or combustible materials (especially oil or grease), a minimum distance of 20 feet or by a noncombustible barrier at least 5 feet high having a fire-resistant rating of at least one-half hour. (4-7-83)

d. Where a liquid oxygen system is to be used to supply gaseous oxygen for welding or cutting and the system has a storage capacity of more than 13,000 cubic feet of oxygen (measured at 14. 7 psi and 70 degrees F.), connected in service or ready for service, or more than 25,000 cubic feet of oxygen (measured at 14. 7 psi and 70 degrees F.), including unconnected reserved on hand at the site, it shall comply with the provisions of the Standard for Bulk Oxygen Systems at Consumer Sites, NFRA No. 566-1965. (4-7-83)

05. Operating Procedures. (4-7-83)

a. Cylinders, cylinder valves, couplings, regulators, hose, and apparatus shall be kept free from oily or greasy substances. Oxygen cylinders or apparatus shall not be handled with oily hands or gloves. A jet of oxygen must never be permitted to strike any oily surface, greasy clothes, or enter a fuel oil or other storage tank. (4-7-83)

b. When transporting cylinders by a crane or derrick, a cradle, boat, or suitable platform shall be used. Slings or electric magnets shall not be used for this purpose. Valve-protection caps, where cylinder is designed to accept a cap, shall always be in place. (4-7-83)

c. Cylinders shall not be dropped or struck or permitted to strike each other violently. (4-7-83)

d. Valve protection caps shall not be used for lifting cylinders from one vertical position to another. Bars shall not be used under valves or valve protection caps to pry cylinders loose when frozen to the ground or otherwise fixed; the use of warm (not boiling) water is recommended. Valve protection caps are designed to protect cylinder valves from damage. (4-7-83)

e. Unless cylinders are secured on a special truck regulators shall be removed and valve protection caps, when provided for, shall be put in place before cylinders are moved. (4-7-83)

f. Cylinders not having fixed hand wheels shall have keys, handles, or non-adjustable wrenches on valve stems while these cylinders are in service. In multiple cylinder installations only one key or handle is required for each manifold. (4-7-83)

g. Cylinder valves shall be closed before moving cylinders. (4-7-83)

h. Cylinder valves shall be closed when work is finished. (4-7-83)

i. Valves of empty cylinders shall be closed. (4-7-83)

j. Cylinders shall be kept far away from the actual welding or cutting operation so that sparks, hot slag or flame will not reach them, or fire-resistant shields shall be used. (4-7-83)

k. Cylinders shall not be placed where they might become part of an electric current. Contacts with third rails, trolley wires, ect., shall be avoided. Cylinders shall be kept away from radiators, piping systems, layout tables, ect., that may be used for grounding electric circuits such as for arc welding machines. Any practice such as the tapping of an electrode against a cylinder to strike an arc shall be prohibited. (4-7-83)

l. Cylinders shall never be used as rollers or supports, whether full or empty. (4-7-83)

m. The numbers and markings stamped into cylinders shall not be tampered with. (4-7-83)

n. No person, other than the gas supplier, shall attempt to mix gases in a cylinder. No one, except the owner of the cylinder or person authorized by him, shall refill a cylinder. (4-7-83)

o. No one shall tamper with safety devices in cylinders or valves. (4-7-83)

p. Cylinders shall not be dropped or otherwise roughly handled. (4-7-83)

q. Unless connected to a manifold, oxygen from a cylinder shall not be used without first attaching an oxygen regulator to the cylinder valve. Before connecting the regulator to the cylinder valve, the valve shall be opened slightly for an instant and then closed. (Always stand to one side of the outlet when opening the cylinder valve.) (4-7-83)

r. A hammer or wrench shall not be used to open cylinder valve. If valves cannot be opened by hand, the supplier shall be notified. (4-7-83)

s. Cylinder valves shall not be tampered with nor should any attempt be made to repair them. If troubles are experienced, the supplier should be sent a report promptly indicating the character of the trouble and the cylinder's serial number. Supplier's instructions as to its disposition shall be followed. (4-7-83)

t. Complete removal of the stem from a diaphragm type cylinder valve shall be avoided. (4-7-83)

u. Fuel-gas cylinders shall be placed with valve end up whenever they are in use. Liquified gases shall be stored and shipped with the valve end up. (4-7-83)

v. Cylinders shall be handled carefully. Cylinders shall not be subjected to rough handling, knocks, or falls which are liable to damage the cylinder, valve or safety devices and cause leakage. (4-7-83)

w. Before connecting a regulator to a cylinder valve, the valve shall be opened slightly and closed immediately. The valve shall be opened while standing to one side of the outlet; never in front of it. Fuel-gas cylinder valves shall not be cracked near other welding work or near sparks, flame, or other possible sources of ignition. (4-7-83)

x. Before a regulator is removed from a cylinder valve, the cylinder valve shall be closed and the gas released from the regulator. (4-7-83)

y. Nothing shall be placed on top of an acetylene cylinder when in use which may damage the safety device or interfere with the quick closing of the valve. (4-7-83)

z. If cylinders are found to have leaky valves or fittings which cannot be stopped by closing of the valve, the cylinders shall be taken outdoors away from sources of ignition and slowly emptied. (4-7-83)

aa. A warning should be placed near cylinders having leakage, fuse plugs, or other leaking safety devices not to approach them with a lighted cigarette or other source of ignition. Such cylinders should be plainly tagged; the supplier should be promptly notified and his instructions followed as to their return. (4-7-83)

bb. Safety devices shall not be tampered with. (4-7-83)

cc. Fuel-gas shall not be used from cylinders through torches or other devices equipped with shutoff valves without reducing the pressure through a suitable regulator attached to the cylinder valve or manifold. (4-7-83)

dd. The cylinder valve shall always be opened slowly. (4-7-83)

ee. An acetylene cylinder valve shall not be opened more than one and one-half (1 1/2) turns of the spindle, and preferably no more than three-fourths (3/4) of a turn. (4-7-83)

ff. Where a special wrench is required, it shall be left in position on the stem of the valve while the cylinder is in use so that the fuel-gas flow can be quickly turned off in case of emergency. In the case of manifolded or coupled cylinders at least one such wrench shall always be available for immediate use. (4-7-83)

gg. When cylinders are transported by powered vehicle, they shall be secure in a vertical position. (4-7-83)

hh. A suitable cylinder truck, cart, chain, or other steadying device shall be used to prevent all cylinders from being knocked over while in use, or in storage, empty or full. (4-7-83)

06. Manifolding of Cylinders. (4-7-83)

a. Fuel-gas manifolds. (4-7-83)

i. Manifolds shall be approved either separately for each component part or as an assembled unit. (4-7-83)

ii. Except as provided in A iii. of this Section, fuel or gas cylinders connected to one manifold inside a building shall be limited to a total capacity not exceeding 300 pounds of liquified petroleum gas or 3,000 cubic feet of other fuel-gas. More than one such manifold with connected cylinders may be located in the same room provided the manifolds are at least 50 feet apart or separated by a fire-resistant barrier at least 5 feet high having a fire-resistance rating of at least one-half hour. (4-7-83)

iii. Fuel-gas cylinders connected to one manifold having an aggregate capacity exceeding 300 pounds be located outdoors, or in a separate building or room constructed in accordance with Section 2411 F.viii. and x. of this Chapter. (4-7-83)

iv. Separate manifold buildings or rooms may also be used for the storage of drums of calcium carbide and cylinders containing fuel gases as provided in Section 2405. Such building or rooms shall have no open flames for heating or lighting and shall be well ventilated. (4-7-83)

v. High-pressure fuel gas manifolds shall be provided with approved pressure regulating devices. (4-7-83)

b. High-Pressure Oxygen Manifolds (for use with cylinders having a DOT service pressure above 200 PSIG). (4-7-83)

i. Manifolds shall be approved either separately for each component or as an assembled unit.(4-7-83)

ii. Oxygen manifolds shall not be located in an acetylene generator room. Oxygen manifolds shall be separated from fuel-gas cylinders or combustible materials (especially oil and grease), a minimum distance of 20 feet or by a noncombustible barrier at least 5 feet high have a fire-resistance rating of at least 1/2 hour. (4-7-83)

iii. Except as provided in iv. below, oxygen cylinders connected to one manifold shall be limited to a total gas capacity of 6,000 cubic feet. More than one such manifold with connected cylinders may be located in the same room provided the manifolds are at least 50 feet apart or separated by a noncombustible barrier at least 5 feet high having a fire-resistance rating of at least one-half hour. (4-7-83)

iv. An oxygen manifold, to which cylinders having an aggregate capacity of more than 6,000 cubic feet of oxygen are connected, should be located outdoors or in a separate noncombustible building. Such a manifold, if located inside a building having other occupancy, shall be located in a separate room of noncombustible construction having a fire-resistance rating of at least one-half hour or in an area with no combustible material within 20 feet of the manifold. (4-7-83)

v. An oxygen manifold or oxygen bulk supply system which has storage capacity of more than 13,000 cubic feet of oxygen (measured at 14. 7 psi and 70 degrees F), connected in service or ready for service, or more than 25,000 cubic feet of oxygen (measured at 14. 7 psi and 70 degrees F), including unconnected reserves on hand at the site, shall comply with the provisions of the Standard for Bulk Oxygen Systems at Consumer Sites, NFPA No. 566-1965. (4-7-83)

vi. High-pressure oxygen manifolds shall be provided with approved pressure-regulating devices. (4-7-83)

c. Low Pressure Oxygen Manifolds (for use with cylinders having a DOT service pressure not exceeding 200 psi). (4-7-83)

i. Manifolds shall be of substantial construction suitable for use with oxygen at a pressure of 250 psi. They shall have a minimum bursting pressure of 1,000 psig and shall be protected by a safety relief device which will relieve at a maximum pressure of 500 psig. NOTE:DOT-4L200 cylinders have safety devices which relieve at a maximum pressure of 250 psig (or 235 psig if vacuum insulation is used). (4-7-83)

ii. Hose and hose connections subject to cylinder pressure shall comply with Section 2410 E. Hose shall have a minimum bursting pressure of 1,000 psig. (4-7-83)

iii. The assembled manifold including leads shall be tested and proven gas-tight at a pressure of 300 psig. The fluid used for testing oxygen manifolds shall be oil-free and not combustible. (4-7-83)

iv. The location of manifolds shall comply with B ii., iii., iv., and v. of this Section. (4-7-83)

v. The following sign shall be conspicuously posted at each manifold: Low Pressure Manifold, Do not Connect High-Pressure Cylinders; Maximum Pressure, 250 psig. (4-7-83)

d. Portable Outlet Headers. (4-7-83)

i. Portable outlet headers shall not be used indoors except for temporary service where the conditions preclude a direct supply from outlets located on the service piping system. (4-7-83)

ii. Each outlet on the service piping from which oxygen or fuel-gas is withdrawn to supply a portable outlet header shall be equipped with a readily accessible shutoff valve. (4-7-83)

iii. Hose and hose connections used for connecting the portable outlet header to the service piping shall comply with E. of this Section. (4-7-83)

iv. Master shutoff valves for both oxygen and fuel-gas shall be provided at the entry end of the portable outlet header. (4-7-83)

v. Portable outlet headers for fuel-gas service shall be provided with an approved hydraulic backpressure valve installed at the inlet and preceding the service outlets, unless an approved pressure-reducing regulator, an approved backflow check valve, or an approved hydraulic backpressure valve is installed at each outlet. Outlets provided on headers for oxygen service may be fitted for use with pressure-reducing regulators or for direct hose connection. (4-7-83)

vi. Each service outlet on portable outlet headers shall be provided with a valve assembly that includes a detachable outlet seal cap, chained or otherwise attached to the body of the valve. (4-7-83)

vii. Materials and fabrication procedures for portable outlet headers shall comply with Section 2409 A., B., and C. of this Chapter. (4-7-83)

viii. Portable outlet headers shall be provided with frames which will support the equipment securely in the correct operating position and protect them from damage during handling and operation. (4-7-83)

e. Manifold Operating Procedures. (4-7-83)

i. Cylinder manifolds shall be installed under the supervision of someone familiar with the proper practices with reference to their construction and use. (4-7-83)

ii. All component parts used in the methods of manifolding described in A.i. through v. of this Section shall be approved as to materials, design and construction either separately or as an assembled unit. (4-7-83)

iii. All manifolds and parts used in methods of manifolding shall be used only for the gas or gases for which they are approved. (4-7-83)

iv. When acetylene cylinders are coupled, approved flash arresters shall be installed between each cylinder and the coupler block. For outdoor use only, and when the number of cylinders coupled does not exceed three, one flash arrester installed between the coupler block and regulator is acceptable. (4-7-83)

v. Each fuel-gas cylinder lead should be provided with a backflow check valve. (4-7-83)

vi. The aggregate capacity of fuel-gas cylinders connected to a portable manifold inside a building shall not exceed 3,000 cubic feet of gas. (4-7-83)

vii. Acetylene and liquefied fuel-gas cylinders shall be manifolded in a vertical position. (4-7-83)

viii. The pressure in the gas cylinders connected to and discharged simultaneously through a common manifold shall be approximately equal. (4-7-83)

07. Service Piping Systems. (4-7-83)

a. Materials and Design. (4-7-83)

i. Piping and fittings shall comply with Section 2, Industrial Gas and Air Piping Systems, of the American National Standard Code for Pressure Piping, ANSI B31. 1-1967, insofar as it does not conflict with ii. and iii. of this Section. (4-7-83)

ii. Pipe shall be schedule 40 and fittings shall be at least standard weight in sizes up to and including 6-inch nominal. (4-7-83)

iii. Copper tubing shall be Types K or L in accordance with the Standard Specification for Seamless Copper Water Tube, ASTM B88-66a. (4-7-83)

iv. Piping shall be steel wrought iron, brass, or copper pipe, or seamless copper, brass, or stainless steel tubing except as provided in v. through x. of this Section. (4-7-83)

v. Oxygen piping and fittings at pressures in excess of 700 psig shall be stainless steel or copper alloys. (4-7-83)

vi. Hose connections and hose complying with Section 2410 E. of this Chapter may be used to connect the outlet of a manifold pressure regulator to piping providing the working pressure of the piping is 250 psig or less and the length of the hose does not exceed 5 feet. Hose shall have a minimum bursting pressure of 1,000 psig. (4-7-83)

vii. When oxygen is supplied to a service piping system from a low-pressure oxygen manifold without an intervening pressure regulating device, the piping system shall have a minimum design pressure of 250 psig. A pressure regulating device shall be used at each station outlet when the connected equipment is for use at pressures less than 250 psig. (4-7-83)

viii. Piping for acetylene or acetylenic compounds shall be steel or wrought iron. (4-7-83)

ix. Unalloyed copper shall not be used for acetylene or acetylenic compounds except in listed equipment. (4-7-83)

b. Piping Joints. (4-7-83)

i. Joints in steel or wrought iron piping shall be welded, threaded, or flanged. Fittings, such as ells, tees, couplings, and unions may be rolled, forged, or cast steel, maleable iron, or nodular iron. Gray or white cast iron fittings are prohibited. (4-7-83)

ii. Joints in brass or copper pipe shall be welded, brazed, threaded, or flanged. If of the socket type, they shall be brazed with silver-brazing alloy or similar high melting point (not less than 800 degrees F.) filler metal. (4-7-83)

c. Installation. (4-7-83)

i. Distribution lines shall be installed and maintained in a safe operating condition. (4-7-83)

ii. Piping located inside or outside of buildings may be placed above or below ground. All piping shall be run as directly as practicable, protected against physical damage, proper allowance being made for expansion and contraction, jarring and vibration. Pipe laid underground in earth shall be located below the frost line and protected

against corrosion. After assembly piping shall be thoroughly blown out with air or nitrogen to remove foreign materials. For oxygen piping, only oil-free air, oil-free nitrogen, or oil-free carbon dioxide shall be used. (4-7-83)

iii. Only piping which has been welded or brazed shall be installed in tunnels, trenches, or ducts. Shut-off valves shall be located outside such conduits. Oxygen piping may be placed in the same tunnel, trench or duct with fuel-gas pipelines, provided there is good natural or forced ventilation. (4-7-83)

iv. Low points in piping carrying moist gas shall be drained into drip pots constructed so as to permit pumping or draining out the condensate at necessary intervals. Drain valves shall be installed for this purpose having outlets normally closed with screw caps or plugs. No drips located out of doors, underground, and not readily accessible, valves may be used at such points if they are equipped with means to secure them in the closed position. Pipes leading to the surface of the ground shall be cased or jacketed where necessary to prevent loosening or breaking. (4-7-83)

v. Gas cocks or valves shall be provided for all buildings at points where they will be readily accessible for shutting off the gas supply to these buildings in any emergency. Underground valve boxes or manholes should be avoided whenever possible. There shall also be provided a shutoff valve in the discharge line from the generator, gas holder, manifold or other source of supply. (4-7-83)

vi. Shutoff valves shall not be installed in such a manner that the safety relief device can be rendered ineffective. (4-7-83)

vii. Fitting and lengths of pipe shall be examined internally before assembly and, if necessary, freed from scale or dirt. Oxygen piping and fittings shall be washed out with a suitable solution which will not react with the oxygen. NOTE: Hot water solutions of caustic soda or trisodium phosphate are effective cleaning agents for this purpose. (4-7-83)

viii. Piping shall be thoroughly blown out after assembly to remove foreign materials. For oxygen piping, oil-free air, oil free nitrogen, or oil-free carbon dioxide shall be used. For other piping, air or inert gas may be used. (4-7-83)

ix. When flammable gas lines or other parts of equipment are being purged of air or gas, open lights or other sources of ignition shall not be permitted near uncapped openings. (4-7-83)

x. No welding or cutting shall be performed on an acetylene or oxygen pipeline, including the attachment of hangers or supports, until the line has been purged. Only oil-free air, oil-free nitrogen, or oil-free carbon dioxide shall be used to purge oxygen lines. (4-7-83)

d. Paintings and Signs. (4-7-83)

i. Underground pipe and tubing and outdoor ferrous pipe and tubing shall be covered or painted with a suitable material for protection against corrosion. (4-7-83)

ii. Above ground piping systems shall be marked in accordance with the American National Standard Scheme for the Identification of Piping Systems, ANSI A13.1-1956. (4-7-83)

iii. Station outlets shall be marked to indicate the name of the gas. (4-7-83)

e. Testing. (4-7-83)

i. Piping systems shall be tested and proved gastight at 1 1/2 times the maximum operating pressure, and shall be thoroughly purged of air before being placed in service. The material used for testing oxygen lines shall be oil free and noncombustible. Flames shall not be used to detect leaks. (4-7-83)

ii. When flammable gas lines or other parts of equipment are being purged of air or gas, sources of ignition shall not be permitted near uncapped openings. (4-7-83)

08. Protective Equipment, Hose, and Regulators. (4-7-83)

a. General. Equipment shall be installed and used only for the service for which it is approved and as recommended by the manufacturer. (4-7-83)

b. Pressure Relief Devices. Service piping systems shall be protected by pressure relief devices set to function at not more than the design pressure of the systems, and discharging upwards to a safe location. (4-7-83)

c. Piping Protective Equipment. (4-7-83)

i. The fuel-gas and oxygen piping systems, including portable outlet headers shall incorporate the protective equipment shown in Figures 2410-A, B, & C. When only a portion of a fuel-gas system is to be used with oxygen, only that portion need comply with this paragraph i. (4-7-83)

ii. Approved protective equipment (designated Pf in Figures 2410-A, B, & C) shall be installed in fuel-gas piping to prevent: (a) Backflow of oxygen into the fuel gas supply system; (b) passage of a flashback into the fuel gas supply system; (c) excessive back pressure of oxygen in the fuel gas supply system. The three functions of the protective equipment may be combined in one device or may be provided by separate devices. (4-7-83)

iii. The protective equipment shall be located in the main supply line, as in Figure 2410-A or at the head of each branch line as in Figure 2410-B, or at least location where fuel gas is withdrawn, as in Figure 2410-C. Where branch lines are of 2-inch pipe size or larger or of substantial length, protective equipment (designated as Pf) shall be located as shown in either Figure 2410-B or C. (4-7-83)

Figures 2410-A, 2410-B, 2410-C available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

iv. Backflow protection shall be provided by an approved device that will prevent oxygen from flowing into the fuel-gas system or fuel from flowing into the oxygen system (see Sf, Figures 2410-A and B.) (4-7-83)

v. Flash back protection shall be provided by an approved device that will prevent flame from passing into the fuel-gas system. (4-7-83)

vi. Back-pressure protection shall be provided by an approved pressure-relief device set at a pressure not greater than the pressure rating of the backflow or the flashback protection device, whichever is lower. The pressure-relief device shall be located on the downstream side of the backflow and flashback protection devices. The vent from the pressure-relief device shall be at least as large as the relief device inlet and shall be installed without low points that may collect moisture. If low points are unavoidable, drip pots with drains closed with screw plugs or caps shall be installed at the low points. The vent terminus shall not endanger personnel or property through gas discharge; shall be located away from ignition sources; and shall terminate in a hood or bend. (4-7-83)

vii. If pipeline protective equipment incorporates a liquid, the liquid level shall be maintained, and a suitable antifreeze may be used to prevent freezing. (4-7-83)

viii. Fuel gas for use with equipment not requiring oxygen shall be withdrawn upstream of the piping protective devices. (4-7-83)

d. Station Outlet Protection. (4-7-83)

i. A check valve pressure regulator, hydraulic seal, or combination of these devices shall be provided at each station outlet, including those on portable headers to prevent backflow, as shown in Figures 2410-A, B, and C and designated as Sf and So. (4-7-83)

ii. When approved pipeline protective equipment (designated Pf) is located at the station outlet as in Figure 2410-C, no additional check valve, pressure regulator, or hydraulic seal is required. (4-7-83)

iii. A shutoff valve (designated Vf and Vo) shall be installed at each station outlet and shall be located on the upstream side of other station outlet equipment. (4-7-83)

iv. If the station outlet is equipped with a detachable regulator, the outlet shall terminate in a union connection that complies with the Regulator Connection Standards, 1958, Compressed Gas Association. (4-7-83)

v. If the station outlet is connected directly to a hose, the outlet shall terminate in a union connection complying with the Standard Hose Connection Specifications, 1957, Compressed Gas Association. (4-7-83)

vi. Station outlets may terminate in pipe threads to which permanent connections are to be made, such as to a machine. (4-7-83)

vii. Station outlets shall be equipped with a detachable outlet seal cap secured in place. This cap shall be used to seal the outlet except when a hose, a regulator, or piping is attached. (4-7-83)

viii. When station outlets are equipped with approved backflow and flashback protective devices, as many as four torches may be supplied from each station outlet through rigid piping, provided each outlet from such piping is equipped with a shutoff valve and provided the fuel-gas capacity of any one torch does not exceed 15 cubic feet per hour. This rule does not apply to machines. (4-7-83)

e. Hose and Hose Connections. (4-7-83)

i. Hose for oxygen gas service shall comply with Specification for Rubber Welding Hose, 1958, Compressed Gas and Rubber Manufacturers Association. (4-7-83)

ii. The generally recognized colors are red for acetylene and other fuel-gas hose, green for oxygen hose, and black for inert gas and air hose. (4-7-83)

iii. When parallel lengths of oxygen and acetylene hose are taped together for convenience and to prevent tangling, not more than 4 inches out of 12 inches shall be covered by tape. (4-7-83)

iv. Hose connections shall comply with the Standard Hose Connection Specifications, 1957, Compressed Gas Association. (4-7-83)

v. Hose connections shall be clamped or otherwise securely fastened in a manner that will withstand, without leakage, twice the pressure to which they are normally subjected in service, but in no case less than a pressure of 300 psi. Oil free air or an oil free inert gas shall be used for this test. (4-7-83)

vi. Hose showing leaks burns, worn places, or other defects rendering it unfit for service shall be repaired or replaced. (4-7-83)

f. Pressure-Reducing Regulators. (4-7-83)

i. Pressure-reducing regulators shall be used only for the gas and pressures for which they are intended. The regulator inlet connections shall comply with Regulator Connection Standards, 1958, Compressed Gas Association. (4-7-83)

ii. When regulators or parts of regulators, including gages, need repair, the work shall be performed by skilled mechanics who have been properly instructed. (4-7-83)

iii. Gages on oxygen regulators shall be marked USE NO OIL! (4-7-83)

iv. Union nuts and connections on regulators shall be inspected before use to detect faulty seats which may cause leakage of gas when the regulators are attached to the cylinder valves. (4-7-83)

09. Acetylene Generators. (4-7-83)

a. Approval and Marking. (4-7-83)

i. Generators shall be of an approved construction and shall be plainly marked with the maximum rate of acetylene in cubic feet per hour for which they are designed; the weight and size of carbide necessary for a single charge; the manufacturer's name and address; and the name or number of generator. (4-7-83)

ii. Carbide shall be of the size marked on the generator nameplate. (4-7-83)

b. Rating and Pressure Limitations. (4-7-83)

i. The total hourly output of a generator shall not exceed the rate for which it is approved and marked. Unless specifically approved for higher ratings, carbide feed generators shall be rated at 1 cubic foot per hour per pound of carbide required for a single complete charge. (4-7-83)

ii. Relief valves shall be regularly operated to insure proper functioning. Relief valves for generating chambers shall be set to open at a pressure not in excess of 15 psig. Relief valves for hydraulic back pressure valves shall be set to open at a pressure not in excess of 20 psig. (4-7-83)

iii. Non-automatic generators shall not be used for generating acetylene at pressures exceeding 1 psig and all water overflows shall be visible. (4-7-83)

c. Location. The space around the generator shall be ample for free, unobstructed operation and maintenance and shall permit ready adjustment and charging. (4-7-83)

d. Stationary Acetylene Generators (automatic and nonautomatic). (4-7-83)

i. The foundation shall be so arranged that the generator will be level and so that no excessive strain will be placed on the generator or its connections. Acetylene generators shall be grounded. (4-7-83)

ii. Generators shall be placed where water will not freeze. The use of common salt or other corrosive chemicals for protection against freezing is not permitted. (For heating systems see Section 2411 F. xiii.) (4-7-83)

iii. Except when generators are prepared in accordance with Section 2411 C. x., sources of ignition shall be prohibited in outside generator houses or inside generator rooms. (4-7-83)

iv. Water shall not be supplied through a continuous connection to the generator except when the generator is provided with an adequate open overflow or automatic water shutoff which will effectively prevent overfilling of the generator. Where a noncontinuous connection is used, the supply line shall terminate at a point not less than 2 inches above the regularly provided opening for filling so that the water can be observed as it enters the generator. (4-7-83)

v. Unless otherwise specifically approved, generators shall not be fitted with continuous drain connections leading to sewers, but shall discharge through an open connection into a suitably vented outdoor receptacle or residue pit which may have such connections. An open connection for the sludge drawoff is desirable to enable the generator operator to observe leakage from the drain valve or sludge cock. (4-7-83)

vi. Each generator shall be provided with a vent pipe of Schedule 40 galvanized iron or steel, except that outside of buildings, vent pipes larger than 4 inches in diameter may be not less than 14 gage galvanized tubing or sheet steel. (4-7-83)

vii. The escape or relief pipe shall be rigidly installed without traps and so that any condensation will drain back to the generator. (4-7-83)

viii. The escape or relief pipe shall be carried full size to a suitable point outside the building. It shall terminate in a hood or bend located at least 12 feet above the ground, preferably above the roof, and as far away as practicable from windows or other openings into buildings and as far away as practicable from sources of ignition such as flues or chimneys and tracks used by locomotives. Generating chamber relief pipes shall not be

interconnected but shall be separately led to the outside air. The hood or bend shall be so constructed that it will not be obstructed by rain, snow, ice, insects, or birds. The outlet shall be at least 3 feet from combustible construction. (4-7-83)

ix. Gas holders shall be constructed on the gasometer principle, the bell being suitably guided. The gas bell shall move freely without tendency to bind and shall have a clearance of at least 2 inches from the shell. (4-7-83)

x. The gas holder may be located in the generator room, in a separate room or out of doors. In order to prevent collapse to the gas bell or infiltration of air due to a vacuum caused by the compressor or booster pump or cooling of the gas, a compressor or booster cutoff shall be provided at a point 12 inches or more above the landing point of the bell. When the gas holder is located indoors, the room shall be ventilated in accordance with Section 2411 F.x. and heated and lighted in accordance with Section 2411 F.xi.(a). (4-7-83)

xi. When the gas holder is not located within a heated building, gas holder seals shall be protected against freezing. (4-7-83)

xii. Means shall be provided to stop the generator feeding mechanism before the gas holder reaches the upper limit of its travel. (4-7-83)

xiii. When the gas holder is connected to only one generator, the gas capacity of the holder shall be not less than one-third of the hourly rating of the generator. (4-7-83)

xiv. If acetylene is used from the gas holder without increase in pressure at some points but with increase in pressure by a compressor or booster pump at other points, approved piping protective devices shall be installed in each supply line. The low pressure protective device shall be located between the gas holder and the shop piping, and the medium-pressure protective device shall be located between the compressor or booster pump and the shop piping (see Figure 2411-A). Approved protective equipment is used to prevent: backflow of oxygen into the fuel -gas supply system; passage of a flashback into the fuel-gas supply system; and excessive backpressure of oxygen in the fuel-gas supply system. The three functions of the protective equipment may be combined in one device or may be provided by separate devices. (4-7-83)

FIGURE 2411-A available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

xv. The compressor or booster shall be of an approved type. (4-7-83)

xvi. Wiring and electrical equipment in compressor or booster pump rooms or enclosures shall conform to the provisions of the National Electrical Code, Part 5, NFPA - 1971, Article 501, (ANSI-C1-1971) for Class I, Division 2 locations. (4-7-83)

xvii. Compressors and booster pump equipment shall be located in well-ventilated areas away from open flames, electrical or mechanical sparks, or other ignition sources. (4-7-83)

xviii. Compressor or booster pumps shall be provided with pressure relief valves which will relieve pressure exceeding 15 psig to a safe outdoor location as provided in 2411 B. ii. or by (4-7-83)

xix. Compressor or booster pumps discharge outlets shall be provided with protective equipment. (See Section 2411 D.v.) (4-7-83)

e. Portable Acetylene Generators. (4-7-83)

i. All portable generators shall be of a type approved for portable use. (4-7-83)

ii. Portable generators shall not be used within 10 feet of combustible material other than the floor. (4-7-83)

iii. Portable generators shall not be used in rooms of total volume less than 35 times the total gas-

generating capacity per charge of all generators in the room. Generators shall not be used in rooms having a ceiling height of less than 10 feet. (To obtain the gas-generating capacity in cubic feet per charge, multiply the pounds of carbide per charge by 4.5). (4-7-83)

iv. Portable generators shall be protected against freezing. The use of salt or other corrosive chemical to prevent freezing is prohibited. (4-7-83)

v. Portable generators shall be cleaned and recharged and the air mixture blown off outside buildings. (4-7-83)

vi. When charged with carbide, portable generators shall not be moved by crane or derrick. (4-7-83)

vii. When not in use, portable generators shall not be stored in rooms in which open flames are used unless the generators contain no carbide and have been thoroughly purged of acetylene. Storage rooms shall be well ventilated. (4-7-83)

viii. When portable acetylene generators are to be transported and operated on vehicles, they shall be securely anchored to the vehicles. If transported by truck, the motor shall be turned off during charging, cleaning and generating periods. (4-7-83)

ix. Portable generators shall be located at a safe distance from the welding position so that they will not be exposed to sparks, slag, or misdirection of the torch flame or overheating from hot materials or processes. (4-7-83)

f. Outside Generator Houses and Inside Generator Rooms for Stationary Acetylene Generators. (4-7-83)

i. No opening in any outside generator house shall be located within 5 feet of any opening in another building. (4-7-83)

ii. Walls, floors and roofs of outside generator houses shall be of noncombustible construction. (4-7-83)

iii. When a part of the generator house is to be used for the storage or manifolding of oxygen cylinders, the space to be so occupied shall be separated from the generator carbide storage section by partition walls continuous from floor to roof or ceiling, of the type of construction stated in Section 2411 F. (4-7-83)

iv. Such separation walls shall be without openings and shall be jointed to the floor, other walls and ceiling or roof in a manner to effect a permanent gas-tight joint. (4-7-83)

v. Exit doors shall be so located so as to be readily accessible in case of emergency. (4-7-83)

vi. Explosion venting for outside generator houses and inside generator room shall be provided in exterior walls and roofs. The venting areas shall be equal to not less than 1 square foot per 50 cubic feet of room volume and may consist of any one or any combination of the following: walls or light, noncombustible material preferably single-thickness, single- strength glass; lightly fastened hatch covers; lightly fastened swinging doors in exterior wall opening outward; lightly fastened walls opening outward; lightly fastened walls or roof designed to relieve at a maximum pressure of 25 pounds per square foot. (4-7-83)

vii. The installation of acetylene generators within buildings shall be restricted to buildings not exceeding one story in height: provided however, that this will not be construed as prohibiting such installations on the roof or top floor of a building exceeding such height. (4-7-83)

vii. Generators installed inside buildings shall be enclosed in a separate room of ample size. (4-7-83)

viii. The walls, partitions, floors, and ceilings of inside generator rooms shall be of noncombustible construction having a fire-resistance rating of at least 1 hour. The walls or partitions shall be continuous from floor to

ceiling and shall be securely anchored. At least one wall of the room shall be an exterior wall. (4-7-83)

ix. Openings from an inside generator room to other parts of the building shall be protected by a swinging type self- closing fire door for a Class B opening and having a rating of at least 1 hour. Windows in partitions shall be wired glass and approved metal frames with fixed sash. Installation shall be in accordance with the Standard for the Installation of Fire Doors and Windows, NFPA 80-1970. (4-7-83)

x. Inside generator rooms or outside generator houses shall be well ventilated with vents located at floor and ceiling levels. (4-7-83)

xi. Heating shall be by steam, hot water, enclosed electrically heated elements or other indirect means. Heating by flames or fires shall be prohibited in outside generator houses or inside generator rooms, or in any enclosure communicating with them. (4-7-83)

xii. Generator houses or rooms shall have natural light during daylight hours. Where artificial lighting is necessary, it shall be restricted to electric lamps installed in a fixed position. Unless specifically approved for use in atmospheres containing acetylene, such lamps shall be provided with enclosures of glass or other noncombustible material so designed and constructed as to prevent gas vapors from reaching the lamp or socket and to resist breakage. Rigid conduit with threaded connections shall be used. (4-7-83)

xiii. Lamps installed outside of wired glass panels set in gas-tight frames in the exterior walls or roof of the generator house or room are acceptable. (4-7-83)

xiv. Electric switches, telephones, and all other electrical apparatus which may cause a spark, unless specifically approved for use inside acetylene generator rooms, shall be located outside the generator house or in a room or space separated from the generator room by a gas-tight partition, except that where the generator system is designed so that no carbide fill opening or other part of the generator is open to the generator house or room during the operation of the generator and so that residue is carried in closed piping from the residue discharge valve to a point outside the generator house or room, electrical equipment in the generator house or room shall conform to the provisions of the National Electrical Code, Part 5, NFPA -1971, Article 501, (ANSI C1-1971) for Class I, Division 2 location. (4-7-83)

g. Maintenance and Operation. (4-7-83)

i. Unauthorized persons shall not be permitted in outside generator houses or inside generator rooms. (4-7-83)

ii. Operating instructions shall be posted in a conspicuous place near the generator or kept in a suitable place available for ready reference. (4-7-83)

iii. When recharging generators, the order or operations specified in the instructions supplied by the manufacturer shall be followed. (4-7-83)

iv. In the case of batch type generators, when the charge is exhausted and before additional carbide is added, the generator chamber shall always be flushed out with water renewing the water supply in accordance with the instruction card furnished by the manufacturer. (4-7-83)

v. The water-carbide residue mixture drainer from the generator shall not be discharged into sewer pipes or stored in areas near open flames. Clear water from residue settling pits may be discharged into sewer pipes. (4-7-83)

vi. The carbide added each time the generator is recharged shall be sufficient to refill the space provided for carbide without ramming the charge. Steel of other ferrous tools shall not be used in distributing the charge. (4-7-83)

vii. Generator water chambers shall be kept filled to proper level at all times except while draining during the recharging operation. (4-7-83)

viii. Whenever repairs are to be made or the generator is to be charged or carbide is to be removed, the water chamber shall be filled to the proper level. (4-7-83)

ix. Previous to making repairs involving welding, soldering, or other hot work or other operations which produce a source of ignition, the carbide charge and feed mechanism shall be completely removed. All acetylene shall be expelled by completely flooding the generator shell with water and the generator shall be disconnected from the piping system. The generator shall be kept filled with water, if possible or positioned to hold as much water as possible. (4-7-83)

x. Hot repairs shall not be made in a room where there are generators unless all the generators and piping have been purged of acetylene. Hot repairs should preferably be made out of doors. (4-7-83)

10. Calcium Carbide Storage. (4-7-83)

a. Packaging. (4-7-83)

i. Calcium carbide shall be contained in metal packages of sufficient strength to prevent rupture. The packages shall be provided with a screw top or equivalent. These packages shall be constructed water and air-tight. Solder shall not be used in such a manner that the package will fail is exposed to fire. (4-7-83)

ii. Packages containing calcium carbide shall be conspicuously marked "Calcium Carbide - Dangerous If Not Kept Dry" or with equivalent warning. (4-7-83)

iii. Caution: Metal tools, even the so-called spark resistant type may cause ignition of an acetylene and air mixture when opening carbide containers. (4-7-83)

iv. Sprinkler systems shall not be installed in carbide storage rooms. (4-7-83)

b. Storage Indoors. (4-7-83)

i. Calcium carbide in quantities not to exceed 600 pounds may be stored in dry, waterproof, and well-ventilated locations. (4-7-83)

ii. Calcium carbide not exceeding 600 pounds may be stored indoors in the same room with fuel-gas cylinders. (4-7-83)

iii. Packages of calcium carbide, except for one of each size, shall be kept sealed. The seals shall not be broken when there is carbide in excess of 1 pound in any unsealed package of the same size of carbide in the room. (4-7-83)

iv. Calcium carbide exceeding 600 pounds but not exceeding 5,000 pounds shall be stored: (a) In accordance with B. v. of this Section, (b) in an inside generator room or outside generator house; or (c) in a separate room in a one-story building which may contain other occupancies, but without cellar or basement beneath the carbide storage section. Such rooms shall be constructed in accordance with F. viii. and xi. and ventilated in accordance with F.xi. These rooms shall be used for no other purpose. (4-7-83)

v. Calcium carbide in excess of 5,000 pounds shall be stored in one-story buildings without cellar or basement and used for no other purpose, or in outside generator houses. The location of such storage buildings shall be away from congested mercantil and manufacturing districts. If the storage building is of noncombustible construction it may adjoin other one-story buildings if separated therefrom by unpierced firewalls; if it is detached less than 10 feet from such building or buildings, there shall be no opening in any of the mutually exposing sides of such building within 10 feet. If the storage building is of combustible construction, it shall be at least 20 feet from any other one or two-story building, and at least 30 feet from any other building exceeding two stories. (4-7-83)

c. Storage Outdoors. (4-7-83)

i. Calcium carbide in unopened metal containers may be stored outdoors. (4-7-83)

ii. Carbide containers to be stored outdoors shall be examined to make sure that they are airtight and watertight. Periodic re-examinations shall be made for rusting or other damage to a container that might affect its water or air tightness. (4-7-83)

iii. The bottom tier of each row shall be placed on wooden planking or equivalent so that the containers will not come in contact with the ground or ground water. (4-7-83)

iv. Storage areas shall be at least 10 feet from lines of adjoining property that may be built upon. (4-7-83)

v. Containers of carbide which have been in storage the longest shall be used first. (4-7-83)

11. Public Exhibitions and Demonstrations. (4-7-83)

a. Installation Requirements. Installation and operation of welding, cutting, and related equipment shall be done by, or under the supervision of a competent operator to insure the personal protection of viewers and demonstrator as well as the protection from fire, of materials in and around the site and the building itself. (4-7-83)

b. Procedures. (4-7-83)

i. Cylinders containing compressed gases for use at the site shall not be charged in excess of one-half their maximum permissible content. (Cylinders of non-liquefied gases shall be charged to not more than one-half of their maximum permissible charged pressure in psig. Cylinders of liquefied gases shall be charged to not more than one-half the maximum permissible capacity in pounds). (4-7-83)

ii. Cylinders located at the site shall be connected for use except that enough additional cylinders may be stored at the site to furnish approximately 1 days consumption of each gas used. Other cylinders shall be stored, in an approved storage area preferably outdoors, but this storage area shall not be located near a building. (4-7-83)

iii. Cylinders in excess of 40 pounds total weight being transported to or from the site shall be carried on a hand or motorized truck. (4-7-83)

iv. The site shall be constructed, equipped and operated in such a manner that the demonstration will be carried out so as to minimize the possibility of injury to viewers. (4-7-83)

v. Sites involving the use of compressed gases shall be located so as not to interfere with the egress of people during an emergency. (4-7-83)

vi. The fire department shall be notified in advance of use of the site. (4-7-83)

vii. Each site shall be provided with a portable fire extinguisher of appropriate size and type and with a pail of water. (4-7-83)

viii. The public and combustible materials at the site shall be protected from flames, sparks, and molten metal. (4-7-83)

ix. Hoses shall be located and protected so that they will not be physically damaged. (4-7-83)

x. Cylinder valves shall be closed when equipment is unattended. (4-7-83)

xi. Where caps are provided for valve protection, such caps shall be in place except when the cylinders are in service or connected ready for service. (4-7-83)

xii. Cylinders shall be located or secured so that they cannot be knocked over. (4-7-83)

283. APPLICATION, INSTALLATION AND OPERATION OF ARC WELDING AND CUTTING EQUIPMENT.

01. General. (4-7-83)

a. Equipment Selection. Welding equipment shall be chosen for safe application to the work to be done as specified in Section 2415 of this Chapter. (4-7-83)

b. Installation. Welding equipment shall be installed safely as specified by Section 2416 of this Chapter. (4-7-83)

c. Instruction. Workmen designated to operate arc welding equipment shall have been properly instructed and qualified to operate such equipment as specified in Section 2417 of this Chapter. (4-7-83)

02. Application of Arc Welding Equipment. (4-7-83)

NOTE: Assurance of consideration of safety in design is obtainable by choosing apparatus complying with the requirements of Electric Arc Welding Apparatus NEMA EW-1-1962, National Electrical Manufacturers Association or the Safety Standard of Transformer-Type Arc Welding Machines. ANSI C33. 2-1956, Underwriters Laboratories. (4-7-83)

a. Environmental Conditions. (4-7-83)

i. Standard machines for arc welding service shall be designed and constructed to carry their rated load with rated temperature rises where the temperature of the cooling air does not exceed 40 degrees C. and where the altitude does not exceed 3,300 feet, and shall be suitable for operation in atmospheres containing gases, dust, and light rays produced by the welding arc. (4-7-83)

ii. Unusual service conditions may exist, and in such circumstances, machines shall be especially designed to safely meet the requirements of the service. Chief among these conditions are exposed to: (a) Unusually corrosive fumes, (b) steam or excessive humidity, (c) excessive oil vapor, (d) flammable gases, (e) abnormal vibration or shock, (f) excessive dust, (g) weather, (h) unusual seacoast or shipboard conditions. (4-7-83)

b. Voltage. Open circuit (no load) voltages or arc welding and cutting machines should be as low as possible consistent with satisfactory welding or cutting being done. (4-7-83)

i. Alternate current machines: (a) Manual arc welding and cutting - 80 volts, (b) automatic (machine or mechanized) arc welding and cutting - 100 volts. (4-7-83)

ii. Direct - current machines: (a) Manual arc welding and cutting - 100 volts, (b) automatic (machine or mechanized) arc welding and cutting 100 volts. (4-7-83)

iii. When special welding and cutting processes require values of open circuit voltages higher than the above means shall be provided to prevent the operator from making accidental contact with the high voltage by adequate insulation or other means. NOTE: For a.c. welding under wet conditions or warm surroundings where perspiration is a factor, the use of reliable automatic controls for reducing no load voltage is recommended to reduce the shock hazard. (4-7-83)

c. Design. (4-7-83)

i. A controller intergrally mounted in an electric motor driven welder shall have capacity for carrying rated motor current, shall be capable of making and interrupting stalled rotor current of the motor, and may serve as the running overcurrent device if provided with the number of over-current units as specified by the National Electric Code, Part 5 of NFPA-1971 (ANSI-C1-1971). Starters with magnetic under voltage release should be used with machines installed more than one to a circuit to prevent circuit overload caused by simultaneously starting of several motors upon return of voltage. (4-7-83)

ii. On all types of arc welding machines, control apparatus shall be enclosed except for the operating wheels, levers, or handles. NOTE: Control handles and wheels should be large enough to be easily grasped by a gloved hand. (4-7-83)

iii. Input power terminals, tap change devices and live metal parts connected to input circuits shall be completely and accessible only by means of tools. (4-7-83)

iv. Terminals for welding leads should be protected from accidental electrical contact by employees or by metal objects i.e., vehicles, crane hooks, ect. Protection may be obtained by use of: dead-front receptacles for plug connections, recessed openings with nonremovable hinged covers, heavy insulating sleeving or taping or other equivalent electrical and mechanical protection. If a welding lead terminal which is intended to be used exclusively for connection to the work is connected to the grounded enclosure, it must be done by a conductor at least two AWG sizes smaller than the grounding conductor and the terminal shall be marked to indicate that it is grounded. (4-7-83)

v. No connections for portable control devices such as push buttons to be carried by the operator shall be connected to an a.c. circuit of higher than 120 volts. Exposed metal parts of portable control devices operating on circuits above 50 volts (4-7-83)

vi. Auto transformers or a.c. reactors shall not be used to draw welding current directly from any a.c. power source having a voltage exceeding 80 volts. (4-7-83)

03. Installation of Arc Welding Equipment. (4-7-83)

a. General. Installation including power supply shall be in accordance with the requirements of the National Electrical Code, Part 5 of NFPA-1971 (ANSI-C1-1971). (4-7-83)

b. Grounding. (4-7-83)

i. The frame or case of the welding machine (except engine driven machines) shall be grounded under the conditions and according to the methods prescribed in National Electrical Code, Part 5 of NFPA 1971 (ANSI-C-1-1971). (4-7-83)

ii. Conduits containing electrical conductors shall not be used for completing a work-lead circuit. Pipe-lines shall not be used as a permanent part of a work-lead circuit, but may be used during construction, extension or repair providing current is not carried through threaded joints, flanged bolted joints, or caulked joints and that special precautions are used to avoid sparking at connection of the work-lead cable. (4-7-83)

iii. Chains, wire ropes, cranes, hoists, and elevators shall not be used to carry welding current.(4-7-83)

iv. Where a structure, conveyor, or fixture is regularly employed as a welding current return circuit, joints shall be bonded or provided with adequate current collecting devices and appropriate periodic inspection should be conducted to ascertain that no condition of electrolysis or shock, or fire hazard exists by virtue of such use. (4-7-83)

v. All ground connections shall be checked to determine that they are mechanically strong and electrically adequate for the required current. (4-7-83)

c. Supply Connections and Conductors. (4-7-83)

i. A disconnecting switch or controller shall be provided at or near each welding machine which is not equipped with such a switch or controller mounted as an integral part of the machine. The switch shall be in accordance with the National Electrical Code, Part 5 of NFPA-1971 (ANSI-C-1-1971). Overcurrent protection shall be provided as specified in the National Electrical Code, Part 5 of NFPA-1971 (ANSI-C-1-1971). A disconnect switch with overload protection or equivalent disconnect and protection means, permitted by the National Electrical Code, Part 5 of NFPA-1971 (ANSI-C-1-1971) shall be provided for each outlet intended for connection to a portable welding machine. (4-7-83)

ii. For individual welding machines, the rated current carrying capacity of the supply conductors shall be not less than the rated primary current of the welding machines. (4-7-83)

iii. For groups of welding machines, the rated current carrying capacity of the rated primary currents of the welding machines supplied. The conductor rating shall be determined in each case according to the machine loading based on the use to be made of each welding machine and the allowance permissible in the event that all the welding machines supplied by the conductors will not be in use at the same time. (4-7-83)

iv. In operations involving several welders on one structure, d.c. welding process requirements may require the use of both polarities; or supply circuit limitations for a.c. welding may require distribution of machines among the phases of the required distribution of machines among the phases of the supply circuit. In such cases, no load voltages between electrode holders will be 2 times normal in d.c. or 1, 1.4, 1.73, or 2 times normal on a.c. machines. Similar voltage differences will exist if both a.c. and d.c. welding are done on the same structure. (a) All d.c. machines shall be connected with the same polarity, (b) all a.c. machines shall be connected to the same phase of the supply circuit and with the same instantaneous polarity. (4-7-83)

04. Operation and Maintenance. (4-7-83)

a. General. Workmen assigned to operate or maintain arc welding equipment shall be acquainted with the requirements of Sections 2414 through 2416 and 2424 through 2443, of this Chapter, if doing gas-shielded arc welding, also Recommended Safe Practices for Gas-Shielded Arc Welding, A6.1-1966 American Welding Society. (4-7-83)

b. Machine Hook Up. Before starting operations, all connections to the machine shall be checked to make certain they are properly made. The work load shall be firmly attached to the work; magnetic work clamps shall be freed from adherent metal particles of spatter on contact surfaces. Coiled welding cable shall be spread out before use to avoid serious over-heating and damage to insulation. (4-7-83)

c. Grounding. Grounding of the welding machine frame shall be checked. Special attention shall be given to safety ground connections of portable machines. (4-7-83)

d. Leaks. There shall be no leaks of cooling water, shielding gas or engine fuel. (4-7-83)

e. Switches. It shall be determined that proper switching equipment for shutting down the machine is provided. (4-7-83)

f. Manufacturers' Instructions. Printed rules and instructions covering operation of equipment supplied by the manufacturers shall be strictly followed. (4-7-83)

g. Electrode Holders. Electrode holders when not used shall be so placed that they cannot make electrical contact with persons, conducting objects, fuel or compressed gas tanks. (4-7-83)

h. Electric Shock. Cables with splices within 10 feet of the holder shall not be used. The welder should not coil or loop welding electrode cable around parts of his body. (4-7-83)

i. Maintenance. (4-7-83)

i. The operator should report any equipment defect or safety hazard to his supervisor and the use of the equipment shall be discontinued until its safety has been assured. Repairs shall be made only by qualified personnel. (4-7-83)

ii. Machines which have become wet shall be thoroughly dried and tested before being used. (4-7-83)

iii. Work and electrode lead cables should be frequently inspected for wear and damage. Cables with damaged insulation or exposed bare conductors shall be replaced. Jointing lengths of work and electrode cables shall be done by the use of connecting means specifically intended for the purpose. The connecting means shall have insulation adequate for the service conditions. (4-7-83)

284. WELDING.

01. General. (4-7-83)

a. Installation. All equipment shall be installed by a qualified electrician in conformance with the National Electrical Code, Part 5 of NFPA-1971 (ANSI-C-1-1971). There shall be a safety-type disconnecting switch or a circuit breaker or circuit interrupter to open each power circuit to the machine, conveniently located at or near the machine, so that the power can be shut off when the machine or its controls are to be serviced. (4-7-83)

b. Thermal Protection. Ignition tubes used in resistance welding equipment shall be equipped with a thermal protection switch. (4-7-83)

c. Personnel. Workmen designated to operate resistance welding equipment shall have been properly instructed and judged competent to operate such equipment. (4-7-83)

d. Guarding. Controls of all automatic or air and hydraulic clamps shall be arranged or guarded to prevent the operator from accidentally activating them. (4-7-83)

02. Spot and Seam Welding Machines (Nonportable). (4-7-83)

a. Voltage. All external weld initiating control circuits shall operate on low voltage, not over 120 volts. (4-7-83)

b. Capacitor welding. Stored energy or capacitor discharge type of resistance welding equipment and control panels involving high voltage (over 550 volts) shall be suitably insulated and protected by complete enclosures, all doors of which shall be provided with suitable interlocks and contacts wired into the control circuit (similar to elevator interlock). Such interlocks or contacts shall be so designed as to effectively interrupt power and short circuit all capacitors when the door or panel is open. A manually operated switch or suitable positive device shall be installed, in addition to the mechanical interlocks or contacts, as an added safety measure assuring absolute discharge of all capacitors. (4-7-83)

c. Interlocks. All doors and access panels of all resistance welding machines and control panels shall be kept locked and interlocked to prevent access by unauthorized persons, to live portions of the equipment. (4-7-83)

d. Guarding. All press welding machine operations, where there is a possibility of the operators fingers being under the point of operation, shall be effectively guarded by the use of a device such as an electronic eye safety circuit, two hand controls or protections similar to that prescribed for punch press operations in Sections 2464 through 2470 in Chapter 24 of this Code. All chains, gears, operating bus linkage, and belts shall be protected by adequate guards, in accordance with Sections 2484 through 2499.1 in Chapter X of this Code. (4-7-83)

e. Shields. The hazard of flying sparks shall be wherever practical, eliminated by installing a shield guard of safety glass or suitable fire resistant plastic at the point of operation. Additional shields or curtains shall be installed as necessary to protect passing persons from flying sparks. (See Section 2429 A.iii. of this Chapter.) (4-7-83)

f. Foot Switches. All foot switches shall be guarded to prevent accidental operation of the machine. (4-7-83)

g. Stop Buttons. Two or more safety emergency stop buttons shall be provided on all special multispot welding machines, including 2-post and 4-post weld presses. (4-7-83)

h. Safety Pins. On large machines, four safety pins with plugs and receptacles (one in each corner) shall be used so that when safety pins are removed and inserted in the ram or platen, the press becomes inoperative. (4-7-83)

i. Grounding. Where technically practical, the secondary of all welding transformers used in

multispot, protection and seam welding machines shall be grounded. This may be done by permanently grounding one side of the welding secondary current circuit. Where not technically practical, a center tapped grounding reactor connected across the secondary of the use of a safety disconnect switch in conjunction with the welding control are acceptable alternates. Safety disconnect shall be arranged to open both sides of the line when welding current is not present. (4-7-83)

03. Portable Welding Machines. (4-7-83)

a. Counter-balance. All portable welding guns shall have suitable counter-balanced devices for supporting the guns, including cables, unless the design of the gun or fixture makes counterbalancing impractical or unnecessary. (4-7-83)

b. Safety Chains. All portable welding guns, transformers and related equipment that is suspended from overhead structures, eye beams, trolleys, ect., shall be equipped with safety chains or cables. Safety chains or cables shall be capable of supporting the total shock load in the event of failure of any component of the support system. (4-7-83)

c. Clevis. When trolleys are used to support portable welding equipment, they shall be equipped with suitable forged steel clevis for the attachment of safety chains. Each clevis shall be capable of supporting the total shock load of the suspended equipment in the event of trolley failure. (4-7-83)

d. Switch Guards. All initiating switches, including retraction and dual schedule switches, located on the portable welding gun shall be equipped with suitable guards capable of preventing accidental initiation through contact with fixturing, operator's clothing, ect. Initiating switch voltage shall not exceed 24 volts. (4-7-83)

e. Moving Holder. The movable holder, where it enters the gun frame shall have sufficient clearance to prevent the shearing of fingers carelessly placed on the operating movable holder. (4-7-83)

f. Grounding. The secondary and case of all portable welding transformers shall be grounded. Secondary grounding may be by center tapped secondary or by a center tapped grounding reactor connected across the secondary. (4-7-83)

04. Flash Welding Equipment. (4-7-83)

a. Ventilation and Flash Guard. Flash welding machines shall be equipped with a hood to control flying flash. In cases of high production, where materials may contain a film of oil, and where toxic elements and metal fumes are given off, ventilation shall be provided in accordance with Sections 2432 through 2443 of this Chapter. (4-7-83)

b. Fire Curtains. For the protection of the operators of nearby equipment, fire-resistant curtains or suitable shields shall be set up around the machine and in such a manner that the operators movements are not hampered. (4-7-83)

c. If the welding process cannot be isolated, all persons who may be exposed to the hazard of arc flash shall be properly protected. (4-7-83)

05. Hazards and Precautions. A job hazard analysis shall be made, by qualified personnel, of the operations to be performed on each welding machine to determine the safeguards and personal protective equipment that shall be used for each job. (4-7-83)

06. Maintenance. Periodic inspection shall be made by qualified maintenance personnel and records of the same maintained. The operator shall be instructed to report any equipment defects to his supervisor and the use of the equipment shall be discontinued until safety repairs have been completed. (4-7-83)

285. FIRE PREVENTION AND PROTECTION.

01. Basic Precautions. For elaboration of these basic precautions and of the special precautions of

Section 2425, as well as a delineation of the fire protection and prevention responsibilities of welders and cutters, their supervisors (including outside contractors) and those in management on whose property cutting and welding is to be performed, see Standard for Fire Prevention in Use of Cutting and Welding Processes, NFPA Standard 51B, 1962. The basic precaution for fire prevention in welding or cutting work are: (4-7-83)

a. Fire Hazards. If the object to be welded or cut cannot be readily moved, all movable fire hazards in the vicinity shall be taken to a safe place. (4-7-83)

b. Guards. If the object to be welded or cut cannot be moved and if all the fire hazards cannot be removed, then guards shall be used to confine the heat, sparks, and slag, and to protect the immovable fire hazards. (4-7-83)

c. Restrictions. If the requirements stated in i. and ii. cannot be followed, then welding and cutting shall not be performed. (4-7-83)

02. Special Precautions. When the nature of the work to be performed falls within the scope of Section 2424 A.ii. certain additional precautions may be necessary. (4-7-83)

a. Combustible Material. Whenever there are floor openings or cracks in the flooring that cannot be closed, precautions shall be taken so that no readily combustible materials on the floor below will be exposed to sparks which might drop through the floor. The same precautions shall be observed with regard to cracks or holes in walls, open doorways and open or broken windows. (4-7-83)

b. Fire Extinguishers. Suitable fire extinguishing equipment shall be maintained in a state of readiness for instant use. Such equipment may consist of pails of water, buckets of sand, hose or portable extinguishers depending upon the nature and quantity of the combustible material exposed. (4-7-83)

c. Fire Watch. (a) Fire watchers shall be required whenever welding or cutting is performed in locations where other than a minor fire might develop, if any of the following conditions exist: (1) appreciable combustible material, in building construction or contents, closer than 35 feet to the point of operation. (2) Wall or floor openings within a 35-foot radius expose combustible material in adjacent areas including concealed spaces in walls or floors. (3) Appreciable combustibles are more than 35 feet away but are easily ignited by sparks. (4) Combustible materials are adjacent to the opposite side of metal partitions, walls, ceilings, or roofs and are likely to be ignited by conduction or radiation. (b)Fire watchers shall have fire extinguishers equipment readily available and be trained in its use. They shall be familiar with facilities for sounding an alarm in the event of a fire. They shall watch for fires in all exposed areas, try to extinguish them only when obviously within the capacity of the equipment available, or otherwise sound the alarm. A fire watch shall be maintained for at least a half-hour after completion of welding or cutting operations to detect and extinguish possible smoldering fires. (4-7-83)

d. Authorization. Before cutting or welding, the area shall be inspected by the individual responsible for authorizing cutting and welding procedures. He shall designate precautions to be followed in granting authorization to proceed preferably in the form of a written permit. (4-7-83)

e. Floors. Where combustible materials such as paper clippings, wood shavings or textile fibers are on the floor, the floor shall be swept clean for a radius of 35 feet. Combustible floors shall be kept wet, covered with damp sand, or protected by fire-resistant shields. Where floors have been wet down, personnel operating arc welding and cutting equipment shall be protected from possible shock. (4-7-83)

f. Prohibited Areas. Cutting or welding shall not be permitted in the following areas or situations: (a) In areas not authorized by management.(b) In sprinklered buildings while such protection is impaired.(c) In the presence of explosive atmospheres (mixtures of flammable gases, vapors, liquids, or dusts with air), or explosive atmospheres that may develop inside uncleaned or improperly prepared tanks or equipment which have previously contained such materials, or that may develop in areas with an accumulation of combustible dusts. (d) In areas near the storage of large quantities of exposed, readily ignitable materials, such as bulk sulphur, baled paper, or cotton. (4-7-83)

g. Relocation of Combustibles. Where practicable, all combustibles shall be relocated at least 35 feet

from the work site. Where relocation is impossible, combustibles shall be protected with a flameproof cover or otherwise shielded with metal or asbestos guards or curtains. Edges of covers at the floor should be tight to prevent sparks from going under them. This precaution is also important at overlaps where several covers are used to protect a large pile. (4-7-83)

h. Ducts. Ducts and conveyor systems that might carry sparks to distant combustibles shall be suitably protected or shut down. (4-7-83)

i. Combustible Walls. Where cutting or welding is done near walls, partitions, ceiling or roof of combustible construction, fire resistant shields or guards shall be provided to prevent ignition. (4-7-83)

j. Noncombustible walls. If welding is to be done on a metal wall, partition, ceiling or roof, precautions shall be taken to prevent ignition of combustibles on the other side, due to conduction or radiation, preferably by relocation of combustibles. Where combustibles are not relocated, a fire watch on the opposite side from the work shall be provided, to prevent ignition. (4-7-83)

k. Combustible Cover. Welding shall not be attempted on a metal partition, wall, ceiling, or roof having a combustible covering not on walls or partitions of combustible sandwich-type panel construction. (4-7-83)

l. Pipes. Cutting or welding on pipes or other metal in contact with combustible walls, partitions, ceilings, or roofs shall not be undertaken if the work is close enough to cause ignition. (4-7-83)

m. Management. Management shall recognize its responsibility for the safe usage of cutting and welding equipment on its property, and: (a) based on fire potentials of plant facilities, establish areas for cutting and welding, in other areas.(b) Designate an individual responsible for authorizing cutting and welding operations in areas not specifically designed for such processes.(c) Insist that cutters or welders and their supervisors are suitably trained in the safe operation of their equipment and the safe use of the process.(d) Advise all contractors about flammable materials or hazardous conditions of which they may not be aware. (4-7-83)

n. Supervisor. The supervisor: (a) shall be responsible for the safe handling of the cutting or welding equipment and the safe use of the cutting and welding process, (b) shall determine the combustible materials and hazardous areas present or likely to be present in the work location, (c) shall protect combustibles from ignition by the following: (1) Have the work moved to a location free from dangerous combustibles.(2) If the work cannot be moved, have the combustibles moved to a safe distance from the work or have the combustibles properly shielded against ignition. (3) See that cutting and welding are so scheduled that plant operations that might expose combustibles to ignition are not started during cutting or welding.(d) Shall see that authorizations from the proper management representative are secured.(e) Shall determine that the cutter or welder secures his approval that conditions are safe before going ahead. (f) Shall determine that fire protection and extinguishing equipment are properly located at the site.(g) Where fire watchers are required, he shall see that they are available at the site. (4-7-83)

o. Fire Prevention Precautions. Cutting or welding shall be permitted only in areas that are or have been made fire safe. Within the confines of an operating plant or building, cutting and welding should preferably be done in a specific area designed for such work, such as a maintenance shop or a detached outside location. Such areas should be of non-combustible and flammable contents, and suitably segregated from adjacent areas. When work cannot be moved practically, as in most construction work, the area shall be made safe by removing combustibles or protecting combustibles from ignition areas. (4-7-83)

03. Welding or Cutting Containers. (4-7-83)

a. Used Containers. No welding, cutting or other hot work shall be performed on used drums, barrels, tanks or other containers until they have been cleaned so thoroughly as to make absolutely certain that there are no flammable materials present or any substances such as greases, tars, acids, or other materials which when subjected to heat, might produce flammable or toxic vapors. Any pipe lines or connections to the drum or vessel shall be disconnected or blanked. (4-7-83)

b. Venting and Purging. All hollow spaces, cavities or containers shall be vented to permit the escape

of air or gases before preheating, cutting, or welding. Purging with inert gas is recommended. (4-7-83)

04. Confined Spaces. (4-7-83)

a. Accidental Contact. When arc welding is to be suspended for any substantial period of time, such as during lunch or overnight, all electrodes shall be removed from the holders and holders carefully located so that accidental contact cannot occur and the machine be disconnected from the power source. (4-7-83)

b. Torch Valve. In order to eliminate the possibility of gas escaping through leaks or improperly closed valves, when gas welding or cutting, the torch valves shall be closed and the gas supply to the torch positively shut off at some point outside the confined area whenever the torch is not to be used for a substantial period of time, such as during lunch hour or overnight. Where practicable, the torch and hose shall also be removed from the confined space. (4-7-83)

286. PROTECTION OF EMPLOYEES.

01. General. (4-7-83)

a. Railing. A welder or helper working on a platform, scaffold or runways shall be protected against falling. This may be accomplished by the use of railings, safety belts, life lines, or some other equally effective safeguards. (4-7-83)

b. Welding Cable. Welders shall place welding cable and other equipment so that it is clear of passageways, ladders, and stairways. (4-7-83)

02. Eye Protection. (4-7-83)

a. Selection. (4-7-83)

i. Helmets or hand shields shall be used during all arc welding or arc cutting operations, excluding submerged arc welding. Goggles should also be worn during arc welding or cutting operations to provide protection against injurious rays from adjacent work, and from flying objects. The goggles may have either clear or colored glass, depending upon the amount of exposure to adjacent welding operations. Helpers or attendants shall be provided with proper eye protection. (4-7-83)

ii. Goggles or other suitable eye protection shall be used during all gas welding or oxygen cutting operations. Spectacles without side shields, with suitable filter lenses are permitted for use during gas welding operation on light work, for torch brazing or for inspection. (4-7-83)

iii. All operators and attendants of resistance welding or resistance brazing equipment shall use transparent face shields or goggles, depending on the particular job, to protect their faces or eyes, as required. (4-7-83)

iv. Eye protection in the form of suitable goggles shall be provided where needed for brazing operations not covered in A. i., ii. and iii. of this Section. (4-7-83)

b. Specifications for Protectors. (4-7-83)

i. Helmets and hand shields shall be made of a material which is an insulator for heat and electricity. Helmets, shields and goggles shall be not readily flammable and shall be capable of understanding sterilization. (4-7-83)

ii. Helmets and hand shields shall be arranged to protect the face, neck and ears from direct radiant energy from the arc. (4-7-83)

iii. Helmets shall be provided with filter plates and cover plates designed for easy removal. (4-7-83)

iv. All parts shall be constructed of a material which will not readily corrode or discolor the skin. (4-7-83)

v. Goggles shall be ventilated to prevent fogging of the lenses as much as possible. (4-7-83)

vi. Cover lenses or plates should be provided to protect each helmet, hand shield or goggle filter lens or plate. (4-7-83)

vii. All glass for lenses shall be tempered, substantially free from striae, air bubbles, waves and other flaws. Except when a lens is ground to provide proper vision, the front and rear surfaces of lenses and windows shall be smooth and parallel. (4-7-83)

viii. Lenses shall bear some permanent distinctive (4-7-83)

ix. The following is a guide for the selection of the proper shade numbers. These recommendations may be varied to suit the individual's needs. (4-7-83)

x. All filter lenses and plates shall meet the test for transmission of radiant energy prescribed in ANSI Z87.1-1968 American National Standard Practice for Occupational and Educational Eye and Face Protection. (4-7-83)

c. Protection From Arc Welding Rays. Where work permits, the welder should be enclosed in an individual booth painted with a finish of low reflectivity such as zinc oxide (an important factor for absorbing ultra-violet radiations) and lamp black, or shall be enclosed with noncombustible screens similarly painted. Booths and screens shall permit circulation of air at floor level. Workers or other persons adjacent to the welding areas shall be protected from the rays by noncombustible or flame proof screens or shields or shall be required to wear appropriate goggles. (4-7-83)

03. Protective Clothing. (4-7-83)

a. General Requirements. Employees exposed to the hazards created by welding, cutting, or brazing operations shall be protected by personal protective equipment in accordance with the requirements of Chapter C of this Code. (4-7-83)

b. Specified Protective Clothing. Protective means which may be employed are as follows: (4-7-83)

i. Except when engaged in light work, all welders should wear flameproof gauntler gloves. (4-7-83)

ii. Flameproof aprons made of leather, asbestos, or other suitable material may also be desirable as protection against radiated heat and sparks. (4-7-83)

iii. Woolen clothing is preferable to cotton because it is not so readily ignited and helps protect the welder from changes in temperature. Cotton clothing, if used, should be chemically treated to reduce the combustibility. All outer clothing such as jumpers or overalls should be reasonably free of gas, oil, or grease. (4-7-83)

iv. Sparks may lodge in rolled-up sleeves or pockets of clothing, or cuffs of overalls or trousers. It is therefore recommended that sleeves and collars be kept buttoned and pockets be eliminated from the front of overalls and aprons. Trousers or overalls should not be turned up on the outside. NOTE: For heavy work, fire-resistant leggings, high boots, or other equivalent means should be used. (4-7-83)

v. In production work, a sheet metal screen in front of the workers legs can provide further protection against sparks and molten metal in cutting operations. (4-7-83)

vi. Capes or shoulder covers made of leather or other suitable materials should be worn during overhead cutting or welding operations. Leather skull caps may be worn under helmets to prevent head burns. (4-7-83)

vii. For overhead welding and cutting, or welding and cutting in extremely confined spaces, ear protection is sometimes desirable. (4-7-83)

viii. When there is a hazard or exposure to sharp or heavy falling objects, or a hazard of bumping in confined spaces, hard hats or head protectors shall be used. (4-7-83)

04. Work in Confined Spaces. (4-7-83)

a. General. As used herein, confined space is intended to mean a relatively small or restricted space such as a tank, boiler, pressure valve, or small compartment of a ship. (4-7-83)

b. Ventilation. Ventilation is a prerequisite to work in confined spaces. For ventilation requirements see Section 2432 through 2443 of this Chapter. (4-7-83)

c. Securing Cylinders and Machinery. When welding or cutting is being performed in any confined spaces the gas cylinders and welding machines shall be left on the outside. Before operations are started, heavy portable equipment mounted on wheels shall be securely blocked to prevent accidental movement. (4-7-83)

d. Lifelines. Where a welder must enter a confined space through a manhole or other small opening, means shall be provided for quickly removing him in case of emergency. When safety belts and lifelines are used for this purpose, they shall be so attached to the welder's body that his body cannot be jammed in a small exit opening. An attendant with a pre-planned rescue procedure shall be stationed outside to observe the welder at all times and be capable of putting rescue operations into effect. (4-7-83)

e. Electrode Removal. When arc welding is to be suspended for any substantial period of time, such as during lunch or overnight, all electrodes shall be removed from the holders and the holders carefully located so that accidental contact cannot occur and the machine disconnected from the power source. (4-7-83)

f. Gas Cylinder Shutoff. In order to eliminate the possibility of gas escaping through leaks or improperly closed valves, when gas welding or cutting, the torch valves shall be closed and the fuel-gas and oxygen supply shut off at some point outside the confined area whenever the torch is not to be used for a substantial period of time, such as during lunch hour or overnight. Where practicable, the torch and hose shall also be removed from the confined space. (4-7-83)

g. Warning Sign. After welding operations are completed, the welder shall mark the hot metal or provide some other means of warning other workers. (4-7-83)

287. HEALTH PROTECTION AND VENTILATION.

01. General. (4-7-83)

a. Contamination. The requirements in this section have been established on the basis of the following three factors in arc and gas welding which govern the amount of contamination to which welders may be exposed. (4-7-83)

i. Dimensions of space in which welding is to be done (with special regard to height of ceiling). (4-7-83)

ii. Number of welders. (4-7-83)

iii. Possible evolution of hazardous fumes, gases, or dust according to the metals involved. (4-7-83)

b. Ventilation. It is recognized that in individual instances other factors may be involved in which case ventilation or respiratory protective devices should be provided as needed to meet the equivalent requirements of this Section. Such factors would include: (4-7-83)

i. Atmospheric Conditions. (4-7-83)

ii. Heat Generated. (4-7-83)

iii. Presence of volatile solvents. (4-7-83)

c. Screen. When welding must be performed in a space entirely screened on all sides, the screens shall be so arranged that no serious restriction of ventilation exists. It is desirable to have the screens so mounted that they are about 2 feet above the floor unless the work is performed at so low a level that the screen must be extended nearer to the floor to protect nearby workers from the glare of welding. (4-7-83)

d. Maximum Allowable Concentration. Local exhaust or general ventilating systems shall be provided and arranged to keep the amount of toxic fumes, gases, or dusts below the maximum allowable concentration as specified in Chapter X. NOTE:A number of potentially hazardous materials are employed in fluxes, coatings, coverings, and filler metals used in welding and cutting or are released to the atmosphere during welding and cutting. These include but are not limited to the materials itemized in Sections 2436 through 2442. (4-7-83)

e. Precautionary Labels. The employer shall ascertain the potentially hazardous materials, associated with welding, cutting, ect. and inform the employee of the same either through signs, labels or other appropriate means. (4-7-83)

i. All filler metals and fusible granular materials shall carry the following notice, as a minimum, on tags, boxes or other containers, "CAUTION" Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. Use adequate ventilation. See ANSI Z49.1-1967 Safety in Welding and Cutting published by the American Welding Society. (4-7-83)

ii. Brazing (welding filler metals containing significant amounts shall carry the following notice on tags, boxes, or other containers: WARNING CONTAINS CADMIUM-POISONOUS FUMES MAY BE FORMED ON HEATING. Do not breathe fumes. Use only with adequate ventilation such as fume collectors, exhaust ventilators, or air supplied respirators. See ANSI Z49.1-1967. If chest pain, cough or fever develops after use, call physician immediately. Keep children away when using. (4-7-83)

iii. Brazing and gas welding fluxes containing flourine compounds shall have a cautionary wording to indicate that they contain flourine compounds. One such cautionary wording recommended by the American Welding Society for brazing and gas welding fluxes reads as follows: CAUTION CONTAINS FLOURIDES. This flux when heated gives off fumes that may irritate eyes, nose and throat.(a) Avoid fumes - use only in well ventilated spaces, (b) avoid contact of flux with eyes or skin, (c) do not take internally. (4-7-83)

02. Ventilation for General Welding and Cutting. (4-7-83)

a. General. Mechanical ventilation shall be provided when welding and cutting is done on metals not covered in Sections 2436 through 2442 of this Chapter (for specific material, see the ventilation requirements of Sections 2436 through 2442 of this Chapter.) (4-7-83)

i. In a space of less than 10,000 cubic feet per welder. (4-7-83)

ii. In a room having a ceiling height of less than 16 feet. (4-7-83)

iii. In confined spaces or where the welding space contains partitions, balconies, or other structural barriers to the extent that they significantly obstruct cross ventilation. (4-7-83)

b. Minimum Rate. Such ventilation shall be at the minimum rate of 2,000 cubic feet per minute per welder, except where local exhaust hoods and booths as per Section 2434 of this Section, or airline respirators approved by the U. S. Bureau of Mines for such purposes are provided. Natural ventilation is considered sufficient for welding or cutting operations where the restrictions in A. of this Section are not present. (4-7-83)

03. Local Exhaust Hoods and Booths. (4-7-83)

a. Mechanical local exhaust ventilation may be by means of either of the following: (4-7-83)

i. Hoods. Freely movable hoods intended to be placed by the welder as near as practicable to the work being welded and provided with a rate of airflow sufficient to maintain a velocity in the direction of the hood of 100 linear feet per minute in the zone of welding when the hood is at its most remote distance from the point of welding. The rates of ventilation required to accomplish this control velocity using a 3-inch wide flanged suction opening are shown in the following table: (4-7-83)

b. Fixed Enclosure. A fixed enclosure with a top and not less than two sides which surround the welding or cutting operation and with a rate of airflow sufficient to maintain a velocity away from the welder of not less than 100 linear feet per minute. (4-7-83)

04. Ventilation in Confined Spaces. (4-7-83)

a. Air Replacement. All welding and cutting operations carried on in confined spaces shall be adequately ventilated to prevent the accumulation of toxic materials or possible oxygen deficiency. This applies not only to the welder, but also to helpers and other personnel in the immediate vicinity. All air replacing that withdrawn shall be clean and respirable. (4-7-83)

b. Airline Respirators. In such circumstances where it is impossible to provide such ventilation, airline respirators or hose masks approved by the U. S. Bureau of Mines for this purpose shall be used. (4-7-83)

c. Self-Contained Units. In areas immediately hazardous to life, hose masks with blowers or self-contained breathing equipment shall be used. The breathing equipment shall be approved by the U. S. Bureau of Mines. (4-7-83)

d. Outside Helper. Where welding operations are carried on in confined spaces and where welders and helpers are provided with hose masks, hose masks with blowers or self-contained breathing equipment approved by the U. S. Bureau of Mines, a worker shall be stationed on the outside of such confined spaces to insure the safety of those working within. (4-7-83)

e. Oxygen for Ventilation. Oxygen shall not be used for ventilation. (4-7-83)

05. Fluorine Compounds. General. In confined spaces, welding, or cutting involving fluxes, coverings, or other materials which contain fluorine compounds shall be done in accordance with Section 2435. A fluorine compound is one that contains fluorine, as an element in chemical combination, not as a free gas. NOTE: Maximum allowable concentration. The need for local exhaust ventilation or airline respirators for welding or cutting in other than confined spaces will depend upon the individual circumstances. However, experience has shown that such protection is desirable for fixed-location production welding and for all production welding and for all production welding on stainless steels. Where air samples taken at the welding location indicate that the fluorides liberated are below the maximum allowable concentration, such protection is not necessary. (4-7-83)

06. Zinc. (4-7-83)

a. Confined Spaces. In confined spaces welding or cutting involving zinc-bearing base or filler metals or metals coated with zinc-bearing materials shall be done in accordance with Section 2435 of this Chapter. (4-7-83)

b. Indoors. Indoors, welding or cutting involving zinc-bearing base or filler metals coated with zinc-bearing materials shall be done in accordance with Section 2434 A. and B. of this Chapter. (4-7-83)

07. Lead. (4-7-83)

a. Confined Spaces. In confined spaces, welding involving lead-base metals (erroneously called lead-burning) shall be done in accordance with Section 2435 of this Chapter. (4-7-83)

b. Indoors. Indoors, welding involving lead-base metals shall be done in accordance with Section

2434 A. and B. of this Chapter. (4-7-83)

c. Local Ventilation. In confined spaces or indoors, welding or cutting involving metals containing lead, other than as an impurity, or involving metals containing lead, or coated with lead-bearing materials, including paint shall be done using local exhaust ventilation or airline respirators. Outdoors, such operations shall be done using respiratory protective equipment approved by the U. S. Bureau of Mines for such purposes. In all cases, workers in the immediate vicinity of the cutting operation shall be protected as necessary by local exhaust ventilation or airline respirators. (4-7-83)

d. Welding or cutting indoors, outdoors, or in confined spaces involving beryllium-containing base or filler metals shall be done by using local exhaust ventilation and airline respirators unless atmospheric tests under the most adverse conditions have established that the workers' exposure is within the acceptable concentration. In all cases, workers in the immediate vicinity of the welding or cutting operations shall be protected as necessary by local exhaust ventilation or airline respirators. (4-7-83)

08. Cadmium. (4-7-83)

a. General. Welding or cutting indoors or in confined spaces involving cadmium-bearing or cadmium-coated base metals shall be done using local exhaust ventilation or airline respirators unless atmospheric tests under the most adverse conditions have established that the workers' exposure is within the acceptable concentration. Outdoors, such operations shall be done using respiratory protective equipment such as fume respirators approved by the U. S. Bureau of Mines for such purposes. (4-7-83)

b. Confined Space. Welding, or cutting indoors or in confined spaces involving cadmium-bearing filler metals shall be done using ventilation as prescribed in Sections 2424 or 2435 of this Chapter, if the work is to be done in a confined space. (4-7-83)

09. Mercury. Welding or cutting indoors or in a confined space involving metals coated with mercury-bearing materials including paint, shall be done using local exhaust ventilation or airline respirators unless atmospheric tests under the most adverse conditions have established that the workers' exposure is within the acceptable concentration. Outdoors, such operations shall be done using respiratory protective equipment approved by the U. S. Bureau of Mines for such purposes. (4-7-83)

10. Cleaning Compounds. (4-7-83)

a. Manufacturer's Instructions. In the use of cleaning material, because of their possible toxicity of flammability, appropriate precautions such as manufacturer's instructions shall be followed. (4-7-83)

b. Degreasing. Degreasing or other cleaning operations involving chlorinated hydrocarbons shall be so located that no vapors from these operations will reach or be drawn into the atmosphere surrounding any welding operation. In addition, trichloreothrylene and perchlorethylene should be kept out of atmospheres penetrated by the ultraviolet radiation of gas-shielded welding operations. (4-7-83)

11. Cutting of Stainless Steels. Oxygen cutting, using either a chemical flux or iron powder or gas-shielded arc cutting of stainless steel, shall be done using mechanical ventilation adequate to remove the fumes generated. (4-7-83)

12. First-Aid Equipment. First-aid equipment shall be available at all times. On every shift of welding operations there should be present employees trained to render first aid. All injuries shall be reported as soon as possible for medial attention. First aid shall be rendered until medical attention can be provided. (4-7-83)

288. INDUSTRIAL APPLICATIONS.

01. Transmission Pipeline. (4-7-83)

a. General. The requirements of Sections 2414 through 2417, 2428 through 2431, and 2432 through 2443 of this Chapter, shall be observed. (4-7-83)

b. Field Shop Operations. Where field shop operations are involved for fabrication of fittings, river crossings, road crossings, and pumping and compressor stations, the requirements of Sections 2401, 2414 through 2417, 2424 through 2427, 2428 through 2431 and 2432 through 2443 shall be observed. (4-7-83)

c. Electric Shock. When arc welding is performed in wet conditions, or under conditions of high humidity, special protection against electric shock shall be supplied. (4-7-83)

d. Pressure Testing. In pressure testing of pipelines, the workers and the public shall be protected against injury by the blowing out of closures or other pressures restraining devices. Also, protection shall be provided against expulsion of loose dirt that may have become trapped in the pipe. (4-7-83)

e. Construction Standards. The welded construction of transmission pipelines shall be conducted in accordance with the Standard for Welding Pipe Lines and Related Facilities, API Std., 1104-1968. (4-7-83)

f. Flammable Substance Lines. The connection, by welding, of branches to pipelines carrying flammable substance shall be performed in accordance with Welding or Hot Tapping on Equipment Containing Flammables, API Std., PSD No. 2201-1962. (4-7-83)

g. X-ray Inspection. The use of X-rays and radioactive isotopes for the inspection of welded pipeline joints shall be carried out in conformance with the American National Standard Safety Standard for Non-Medical X-ray and Sealed Gamma-Ray Sources. ANSI Z64.1-1963. (4-7-83)

02. Mechanical Piping Systems. (4-7-83)

a. General. The requirements of Sections 2401, 2414 through 2417, 2424 through 2427, 2428 through 2431, and 2432 through 2443 of this Chapter shall be observed. (4-7-83)

b. X-ray Inspection. The use of X-rays and radioactive isotopes for the inspection of welded piping joints shall be in conformance with the American National Standard Safety Standard for Non-Medical X-ray and Sealed Gamma Ray Sources, ANSI Z54.1-1963. (4-7-83)

03. Welding, Cutting, and Heating in Way of Preservative Coatings. (4-7-83)

a. Before welding, cutting, or heating is commenced on any surface covered by a preservative coating whose flammability is not known, a test shall be made by a competent person to determine its flammability. Preservative coatings shall be considered to be highly flammable when scrapings burn with extreme rapidity. (4-7-83)

b. Precautions should be taken to prevent ignition of highly flammable hardened preservative coatings. When coatings are determined to be highly flammable, they shall be stripped from the area to be heated to prevent ignition. (4-7-83)

c. Protection against toxic preservative coatings: In enclosed spaces, all surfaces covered with toxic preservatives shall be stripped of all toxic coatings for a distance of at least 4 inches from the area of heat application, or the employees shall be protected by airline respirators, meeting the requirements specified in these rules for this type of work. (4-7-83)

d. The preservative coatings shall be removed a sufficient distance from the area to be heated to ensure that the temperature of the unstripped metal will not be appreciably raised. Artificial cooling of the metal surrounding the heating area may be used to limit the size of the area required to be cleaned. (4-7-83)

289. (RESERVED).

290. LADDERS AND SCAFFOLDS.

01. Definitions. The following terms shall give the meaning ascribed in this section when referred to in

this Chapter unless the context requires otherwise. (4-7-83)

a. Ladders. A ladder is an appliance usually consisting of two side rails joined at regular intervals by crosspieces called steps, rungs, or cleats, on which a person may step in ascending or descending. (4-7-83)

b. Stepladder. A stepladder is a self-supporting portable ladder, nonadjustable in length, having flat steps and a hinged back. Its size is designated by the overall length of the ladder measured along the front edge of the side rails. (4-7-83)

c. Single ladder. A single ladder is a non self-supporting portable ladder, non-adjustable in length, consisting of but one section. Its size is designated by the overall length of the side rails. (4-7-83)

d. Extension ladder. An extension ladder is a non self-supporting portable ladder adjustable in length. It consists of two or more sections traveling in guides or brackets so arranged as to permit length adjustment. Its size is designated by the sum of the lengths of the sections measured along the side rails. (4-7-83)

e. Platform ladder. A self-supporting ladder of fixed size with a platform provided at the working level. The size is determined by the distance along the front rail from the platform to the base of the ladder. (4-7-83)

f. Sectional ladder. A sectional ladder is a non self-supporting ladder, non-adjustable in length, consisting of two or more sections of ladder so constructed that the sections may be combined to function as a single ladder. Its size is designated by the overall length of the assembled sections. (4-7-83)

g. Trestle ladder. A trestle ladder is a self-supporting portable ladder, non-adjustable in length, consisting of sections hinged at the top to form equal angles with the base. The size is designated by the length of the side rails measured along the front edge. (4-7-83)

h. Extension trestle ladder. An extension trestle ladder is a self-supporting portable ladder, adjustable in length, consisting of a trestle ladder base and a vertically adjustable single ladder, with suitable means for locking the ladders together. The size is designated by the length of the trestle ladder base. (4-7-83)

i. Special purpose ladder. A special purpose ladder is a portable ladder which represents either a modification or a combination of design or construction features in one of the general purpose types of ladders previously defined, in order to adapt the ladder to special or specific uses. (4-7-83)

j. Trolley ladder. A trolley ladder is a semi-fixed ladder, non-adjustable in length, supported by attachments to an overhead track, the plane of the ladder being at right angles to the plane of motion. (4-7-83)

k. Side-rolling ladder. A side-rolling ladder is a semifixed ladder, non-adjustable in length, supported by attachments to a guide rail, which is generally fastened to shelving, the plane of the ladder being also the plane of motion. (4-7-83)

l. Wood characteristics. Wood characteristics are distinguishing features which by their extent and number determine the quality of a piece of wood. (4-7-83)

m. Wood irregularities. Wood irregularities are natural characteristics in or on wood that may lower its durability, or utility. (4-7-83)

n. Cross grain. Cross grain (slope of grain) is a deviation of the fiber direction from a line parallel to the sides of the piece. (4-7-83)

o. Knot. A knot is a branch or limb, imbedded in the tree and cut through in the process of lumber manufacture, classified according to size, quality, and occurrence. The size of the knot is determined as the average diameter on the surface of the piece. (4-7-83)

p. Pitch and bark pockets. A pitch pocket is an opening extending parallel to the annual growth rings containing or that has contained, pitch, either solid or liquid. A bark pocket is an opening between annual growth

rings that contains bark. (4-7-83)

q. Shake. A shake is a separation along the grain, most of which occurs between the rings of annual growth. (4-7-83)

r. Check. A check is a lengthwise separation of wood, most of which occurs across the rings of annual growth. (4-7-83)

s. Wane. Wane is bark, or the lack of wood from any cause, on the corner of a piece. (4-7-83)

t. Decay. Decay is disintegration of wood substance due to action of wood-destroying fungi. It is also known as dote or rot. (4-7-83)

u. Compression failure. A compression failure is a deformation (buckling) of the fibers due to excessive compression along the grain. (4-7-83)

v. Compression wood. Compression wood is an aberrant (abnormal) and highly variable type of wood structure occurring in softwood species. The wood commonly has density somewhat higher than does normal wood, but somewhat lower stiffness and density strength for its weight in addition to high longitudinal shrinkage. (4-7-83)

w. Low-density. Low-density wood is that which is exceptionally light in weight and usually deficient in strength properties for the species. (4-7-83)

x. Fixed ladder. A fixed ladder is a ladder permanently attached to a structure, building, or equipment. (4-7-83)

y. Individual rung ladder. An individual rung ladder is a fixed ladder each rung of which is individually attached to a structure, building, or equipment. (4-7-83)

z. Pitch. Pitch is the included angle between the horizontal and the ladder, measured on the opposite side of the ladder from the climbing side. (4-7-83)

aa. Fastenings. A fastening is a device to attach a ladder to a structure, building or equipment. (4-7-83)

bb. Rungs. Rungs are ladder cross-pieces of circular or oval cross-section on which a person may step in ascending or descending. (4-7-83)

cc. Cleats. Cleats are ladder crosspieces of rectangular cross-section placed on edge on which a person may step in ascending or descending. (4-7-83)

dd. Steps. Steps are the flat cross-pieces of a ladder on which a person may step in ascending or descending. (4-7-83)

ee. Cage. A cage is a guard that may be referred to as a cage or basket guard which is an enclosure that is fastened to the side rails of the fixed ladder or to the structure to encircle the climbing space of the ladder for the safety of the person who must climb the ladder. (4-7-83)

ff. Well. A well is a permanent complete enclosure around a fixed ladder, which is attached to the walls of the wells. Proper clearance for a well will give the person who must climb the ladder the same protection as a cage. (4-7-83)

gg. Ladder safety device. A ladder safety device is any device, other than a cage or well, designed to eliminate or reduce the possibility of accidental falls and which may incorporate such features as life belts, friction brakes, and sliding attachments. (4-7-83)

hh. Grab bars. Grab bars are individual handholds placed adjacent to or as an extension above ladders for the purpose of providing access beyond the limits of the ladder. (4-7-83)

ii. Through ladder. A through ladder is one from which a man getting off at the top must step through the ladder in order to reach the landing. (4-7-83)

jj. Side-step ladder. A side-step ladder is one from which a man getting off at the top must step sideways from the ladder in order to reach the landing. (4-7-83)

291. PORTABLE WOOD LADDERS.

01. Application. This section is intended to prescribe rules and establish minimum requirements for the construction, care, and use of the common types of portable wood ladders, in order to insure safety under normal conditions of usage. (4-7-83)

02. Materials. Requirements applicable to all wood parts. All wood parts shall be free from sharp edges and splinters; sound and free by accepted visual inspection from shake, wane, compression failures, decay or other irregularities except as hereinafter provided. Low density wood shall be used. (4-7-83)

03. Construction Requirements. (4-7-83)

a. Portable Stepladders. (4-7-83)

i. Stepladders longer than 20 feet shall not be supplied. Stepladders as hereinafter specified shall be of three types:

TYPE I - Industrial stepladder, 3-20 feet for heavy duty, such as utilities, contractors, and industrial use.
TYPE II - Commercial stepladder, 3-12 feet for medium duty, such as painters, officers, and light industrial use.
TYPE III - Household stepladders, 3-6 feet for light duty, such as light household use. (4-7-83)

ii. A uniform step spacing shall be employed which shall be not more than 12 inches. Steps shall be parallel and level when the ladder is in position for use. (4-7-83)

iii. The minimum width between side rails at the top, inside to inside, shall be not less than 11 1/2 inches. From top to bottom the side rails shall spread at least 1 inch for each foot of length of stepladder. (4-7-83)

iv. A metal spreader or locking device of sufficient size and strength to securely hold the front and back sections in open position shall be a component of each stepladder. The spreader shall have all sharp points covered or removed to protect the user. For Type III ladders, the pail shelf and spreader may be confined in one unit (the so called shelf-lock ladder). (4-7-83)

b. Single Ladder. Single ladders longer than 30 feet shall not be supplied. (4-7-83)

c. Two Section Ladder. Two section extension ladders longer than 60 feet shall not be supplied. All ladders of this type shall consist of two sections, one to fit within the side rails of the other, and arranged in such a manner that the upper section can be raised and lowered. (4-7-83)

d. Trestle and extension trestle ladder. Trestle ladders, or extension sections or base sections of extension trestle ladders longer than 20 feet shall not be supplied. (4-7-83)

e. Painters Stepladders. Painters stepladders longer than 12 feet shall not be supplied. (4-7-83)

f. Trolley and side rolling ladders. Trolley and side rolling ladders longer than 20 feet shall not be supplied. (4-7-83)

g. Job made ladders. (4-7-83)

i. Job made ladders shall be constructed for the intended use. (4-7-83)

ii. Job made ladders (single ladders) shall not exceed 30 feet in length between supports (base and top landing). If ladders are to connect different landings, or if the length required exceeds this maximum length, two or more separate ladders shall be used, offset with a platform between each ladder. Guardrails and toeboards shall be erected on the exposed sides of platforms. (4-7-83)

iii. The width of single ladders shall be at least 15 inches, but not more than 20 inches, between rails at the top. (4-7-83)

iv. Side rails shall be parallel or placed top to bottom by not more than one quarter of an inch for each 2 feet of length. (4-7-83)

v. Wood side rails of ladders having cleats shall be not less than 1 1/2 inches thick and 3 1/2 inches deep (2" x 4" nominal) when made of Group 2 or 3 woods. (See Table 2504-A) Wood side rails of group 4 woods may be used in the same cross- section of dimensions for single ladders up to 20 feet in length. (4-7-83)

TABLE 2504-A,
Average density of wood used in ladders.

SPECIES GROUP 1	DENSITY (lbs./ft)
White Ash	41
Beech	48
Birch	44
Rock Elm	43
Hickory	50
Locust	47
Hard Maple	42
Red Maple	36
Red Oak	43
White Oak	46
Pecan	46
Persimmon	50
GROUP II	
Douglas Fir (Coast Region)	34
Western Larch	38
Southern Yellow Pine	37
GROUP III	
Red Alder	28
Oregon Ash	38
Alaska Cedar	31
Pumpkin Ash	37

SPECIES GROUP 1	DENSITY (lbs./ft)
Port Orchard Cedar	30
Cucumber	34
Cypress	32
Soft Elm	36
Douglas Fir (Rocky Mtn. Region)	30
Oregon Maple	34
Gum	34
West Coast Hemlock	30
Magnolia	35
Noble Fir	27
Norway Pine	31
Poplar	28
Redwood	25
Eastern Spruce	28
Sitka Spruce	28
Sycamore	35
Tamarack	37
Tupelo	35
GROUP IV	
Aspen	27
Basswood	25
Buckeye	25
Butternut	27
Incense Cedar	25
Western Red Cedar	23
Black Cottonwood	24
White Fir	26
Hackberry	37
Eastern Hemlock	28
Holly	39
Soft Maple	33
Lodgepole Pine	29

SPECIES GROUP 1	DENSITY (lbs./ft)
Idaho White Pine	28
Northern White Pine	25
Ponderosa Pine	28
Sugar Pine	26

vi. It is preferable that side rails be continuous. If splicing is necessary to attain the required length, however, the splice must develop the full strength of a continuous side rail of the same length. (4-7-83)

vii. 2 inch by 2 inch lumber shall be used for side rails of single ladders up to 16 feet long; 3 inch by 6 inch lumber shall be used for single ladders from 16 feet to 30 feet in length. (4-7-83)

viii. Wood Cleats shall have the following minimum dimensions when made of Group I woods (See Table 2504-B). (4-7-83)

TABLE 2504-B

Length of Cleats (inches)	Thickness (inches)	Width (inches)
Up to and including 20	3/4	3
Over 20 and up to & including 30	3/4	3 3/4

ix. Cleats may be made of species of any other group of wood (see Table 2504-A) provided equal or greater strength is maintained. (4-7-83)

x. Cleats shall be inset into the edges of the side rails one-half inch, or filler blocks shall be used on the rails between the cleats. The cleats shall be secured to each rail with three 10d common wire nails or other fasteners of equivalent strength (4-7-83)

xi. Cleats shall be uniformly spaced 12 inches top to top. This uniform spacing also includes the space between the platform or floor level and the lowest step and also the space between the top of the step and the platform, level or landing. (4-7-83)

04. Care and use of portable wood ladders. (4-7-83)

a. Care. To insure safety and serviceability the following precautions on the care of ladders shall be observed: (4-7-83)

i. Ladders shall be maintained in good condition at all times the joint between the steps and side rails shall be tight, all hardware and fittings securely attached, and the moveable parts shall operate freely without binding or undue play. (4-7-83)

ii. Metal bearings of locks, wheels, pulleys, etc., shall be frequently lubricated. (4-7-83)

iii. Frayed or badly worn rope shall be replaced. (4-7-83)

iv. Safety feet and other auxiliary equipment shall be kept in good condition to insure proper performance. (4-7-83)

v. Ladders shall be inspected frequently and those which have developed defects shall be withdrawn from service for repair or destruction and tagged or marked as "DANGEROUS, DO NOT USE". (4-7-83)

vi. Rungs shall be kept free of grease and oil. (4-7-83)

b. Use. The following safety precautions shall be observed in connection with the use of ladders. (4-7-83)

i. Portable rung and cleat ladders shall, where possible, be used at such a pitch that the horizontal distance from the top support to the foot of the ladder is one-quarter of the working length of the ladder (the length along the ladder between the foot and the top support). The ladder shall be so placed as to prevent slipping, or it shall be lashed, or held in position. Ladders shall not be used in a horizontal position as platforms, runways, or scaffolds. (4-7-83)

ii. Ladders for which dimensions are specified should not be used by more than one man at a time nor with ladder jacks and scaffold planks where use by more than one man is anticipated. In such cases, specially designed ladders with larger dimensions of the parts should be procured. (4-7-83)

iii. Portable ladders shall be so placed that the side rails have a secure footing. The top rest for portable rung and cleat ladders shall be reasonably rigid and shall have ample strength to support the applied load. (4-7-83)

iv. Ladders shall not be placed in front of doors opening toward the ladder unless the door is blocked open, locked or guarded. (4-7-83)

v. Ladders shall not be placed on boxes, barrels, or other unstable bases to obtain additional height. (4-7-83)

vi. Ladders with broken or missing steps, rungs, or cleats, broken side rails, or other faulty equipment shall not be used; improvised repairs shall not be made. (4-7-83)

vii. Ladders made by fastening cleats across a single rail shall not be used. (4-7-83)

viii. Ladders shall not be used as guys, braces, or skids, or for other than their intended purposes. (4-7-83)

ix. Tops of ordinary types of stepladders shall not be used as steps. (4-7-83)

x. On two-section extension ladders, the minimum overlap for the two sections in use shall be as follows: (4-7-83)

Diagram available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

xi. No ladder should be used to gain access to a roof, balcony, or platform unless the top of the ladder extends at least three feet above the point of support where the ladder touches the roof, balcony, or platform. (4-7-83)

xii. Middle and top sections of sectional or window cleaner's ladders should not be used for bottom section unless the user equips them with safety shoes. (4-7-83)

xiii. The user should equip all portable rung ladders with nonslip bases when there is a hazard of slipping. Nonslip bases are not intended as a substitute for care in safety placing, lashing, or holding a ladder that is being used upon oily metal, concrete or slippery surface. (4-7-83)

xiv. The bracing on the back legs of stepladders is designed solely for increasing stability and not for climbing. (4-7-83)

xv. Portable ladder feet shall be placed on a substantial base, and the area around the top and bottom of the ladder shall be kept clean. (4-7-83)

xvi. When working from a ladder over 25 feet from the ground or floor, the ladder shall be secured at both top and bottom. (4-7-83)

xvii. No type of work shall be performed on a ladder over 25 feet from the ground or floor that requires the use of both hands to perform the work, unless a safety belt is worn and the safety lanyard is secured to the ladder. (4-7-83)

292. PORTABLE METAL LADDERS.

01. Requirements. (4-7-83)

a. General. Specific design and construction requirements are not a part of this section because of the wide variety of metals and design possibilities. However, the design shall be such as to produce a ladder without structural defects or accident hazards such as sharp edges, burrs, etc. The metal selected shall be of sufficient strength and shall be protected against corrosion unless inherently corrosion resistant. (4-7-83)

i. The spacing of rungs or steps shall be on 12 inch centers. (4-7-83)

ii. Rungs and steps shall be corrugated, knurled, dimpled, coated with skid-resistant material, or otherwise treated to minimize the possibility of slipping. (4-7-83)

b. General Specifications, Straight and Extension Ladders. (4-7-83)

i. The minimum width between side rails of a straight ladder or any section of an extension ladder shall be 12 inches. (4-7-83)

ii. The length of single ladders or individual sections of ladders shall not exceed 30 feet. Two-section ladders shall not exceed 48 feet in length and over two-section ladders shall not exceed 60 feet in length. (4-7-83)

iii. Based on the nominal length of the ladder, each section of a multisection ladder shall overlap the adjacent section by at least the number of feet stated in the following:

Nominal length of ladder (ft)	Overlap (ft)
up to & incl. 36	3
over 36 up to & incl. 48	4
over 48 up to 60	5

iv. Extension ladders shall be equipped with positive tops which will insure the overlap specified in the table above. (4-7-83)

c. General Specifications - Stepladders. (4-7-83)

i. Stepladders shall not exceed 20 feet in length. (4-7-83)

ii. The bottoms of the four rails are to be supplied with insulating nonslip material. (4-7-83)

iii. Steps shall be corrugated, knurled, dimpled, coated with skid-resistant materials or otherwise treated to minimize the possibility of slipping. (4-7-83)

iv. A metal spreader or locking device of sufficient size and strength to securely hold the front and back sections in the open position shall be a component of each stepladder. The spreader shall have all sharp points or edges covered or removed. (4-7-83)

d. General Specifications - Platform Ladders. (4-7-83)

i. The length of a platform ladder shall not exceed 20 feet. The length of a platform ladder shall be measured along the front rail from the floor to the platform. (4-7-83)

02. Care, Maintenance, and use of Portable Metal Ladders. (4-7-83)

a. General. To get maximum serviceability, safety, and to eliminate unnecessary damage of equipment, good safe practices in the use and care of ladder equipment shall be employed by the users. The following rules and regulations are essential to the life of the equipment and the safety of the user. (4-7-83)

b. Care of Ladders. (4-7-83)

i. Ladders shall be handled with care and not subject to unnecessary dropping, jarring, or misuse. (4-7-83)

ii. Ladders shall be maintained in good usable condition at all times. Hardware fittings and accessories shall be checked frequently and kept in good working condition. (4-7-83)

iii. Ropes or cables shall be inspected frequently and replaced if defective. (4-7-83)

iv. Complete ladder inspection shall be periodical. If a ladder is involved in any of the following, immediate inspection is necessary: (a) If ladders tip over, inspect ladder for side rail dents or bends, or excessively dented rungs; check all rung to-side-rail connections; check hardware connections; check rivets for shear, (b) if ladders are exposed to excessive heat as in the case of fire, the ladder should be inspected visually for damage and tested for deflection and strength characteristics. In doubtful cases, refer to manufacturer. (4-7-83)

v. If ladders are to be subjected to certain acids or alkali solutions, a protective coating such as asphalt and varnish should be applied to the equipment. (4-7-83)

vi. If ladders are exposed to oil and grease, or slippery materials, they shall be cleaned as soon as possible. (4-7-83)

vii. Ladders having defects are to be marked and taken out of service until repair can be made. (4-7-83)

c. Use of Ladders. (4-7-83)

i. Portable non self-supporting ladders shall be erected at a pitch of 75 1/2 degrees for maximum balance and strength. (A simple rule for setting up a ladder at the proper angle is to place the base a distance from the vertical wall equal to one-fourth the working length of the ladder.) (4-7-83)

ii. The ladder base section must be placed with a secure footing. Safety shoes of good substantial design should be installed on all ladders. Where ladders with no safety shoes or spikes are used on hard, slick surfaces, a foot ladder board should be employed. (4-7-83)

iii. The area around the top and bottom of the ladder shall be kept clean. (4-7-83)

iv. The top of the ladder must be placed with the top rails supported, unless equipped with a single support attachment. Such an attachment should be substantial and large enough to support the ladder under the load. (4-7-83)

v. The side rails shall extend less than three feet above the landing or platform. When this is not practical, grab nails, which provide a secure grip for an employee moving to or from the point of access shall be installed. (4-7-83)

vi. Ladders should not be used as a brace, skid, guy, or gin pole, gangway, or for other uses than that for which they were intended, unless specifically recommended for use by the manufacturer. (4-7-83)

vii. Portable metal ladders shall not be used for electrical work or where they may contact electrical conductors. (4-7-83)

293. FIXED LADDERS.

01. Design Requirements. Design considerations. All ladders, appurtenances, and fastenings shall be designed to meet the following load requirements: (4-7-83)

a. The minimum design live load shall be a single concentrated load of 200 lbs. (4-7-83)

b. The number and position of additional concentrated live load units of 200 lbs. each as determined from anticipated usage of the ladder shall be considered in the design. (4-7-83)

c. The live loads imposed by persons occupying the ladder shall be considered to be concentrated at such points as will cause the maximum stress in the structural member being considered. (4-7-83)

d. The weight of the ladder and attached appurtenances together with the live load shall be considered in the design of rails and fastenings. (4-7-83)

e. For fixed ladders consisting of wood side rails and wood rungs or cleats, used at a pitch in the range of 75 degrees to 90 degrees and intended for use by no more than one person per section, single ladders as described in Section 2503a. and b. and Section 2504 g. are acceptable. (4-7-83)

02. Specific Features. (4-7-83)

a. Rungs and Cleats. (4-7-83)

i. All rungs shall have a minimum diameter of three- fourth inch for metal ladders, except as covered in G. i. of this section, and a minimum diameter of 1 1/8 inches for wood ladders. (4-7-83)

ii. The distance between rungs, cleats, and steps shall not exceed 12 inches and shall be uniform throughout the length of the ladder. (4-7-83)

iii. The minimum clear length of rungs or cleats shall be 16 inches. (4-7-83)

iv. Rungs, cleats, and steps shall be free of splinters, sharp edges, burrs, or projections which may be a hazard. (4-7-83)

v. The rungs of an individual-rung ladder shall be so designed that the foot cannot slide off the end. (A suggested design is shown in figure 2509-A at the end of this section). (4-7-83)

b. Side Rails. Side rails which might be used as a climbing aid shall be of such cross sections as to afford adequate gripping surface without sharp edges, splinters or burrs. (4-7-83)

c. Fastenings. Fastenings shall be an integral part of fixed ladder design. (4-7-83)

d. Splices. All splices made by whatever means shall have smooth transition with original members and with no sharp or extensive projections. (4-7-83)

e. Electrolytic Action. Adequate means shall be employed to protect dissimilar metals from electrolytic action when such metals are joined. (4-7-83)

f. Welding. All welding shall be in accordance with the "Code for Welding in Building Construction" (AWSD1.0-1966). (4-7-83)

g. Protection from Deterioration. (4-7-83)

i. Metal ladders and appurtenances shall be painted or otherwise treated to resist corrosion formed by individual metal rungs imbedded in concrete, which serve as access to pits and to other areas under floors, are frequently located in an atmosphere that causes corrosion and rusting. To increase rung life in such atmosphere, individual metal rungs shall have a minimum diameter of 1 inch or shall be painted or otherwise treated to resist corrosion and rusting. (4-7-83)

ii. Wood ladders, when used under conditions where decay may occur, shall be treated with a nonirritating preservative, and the details shall be such as to prevent or minimize the accumulation of water on wood parts. (4-7-83)

iii. When different types of materials are used in the construction of a ladder, the materials used shall be so treated as to have no harmful effect one upon the other. (4-7-83)

03. Clearance. (4-7-83)

a. Climbing Side. On fixed ladders, the perpendicular distance from the centerline of the rungs to the nearest permanent object on the climbing side of the ladder shall be 36 inches for a pitch of 76 degrees, and 30 inches for a pitch of 90 degrees (Figure 2910-A of this section), with minimum clearance for intermediate pitches varying between these two limits in proportion to the slope except as provided in C and E of this section. (4-7-83)

b. Ladders without cages or wells. A clear width of at least 15 inches shall be provided each way from the centerline of the ladder in the climbing space, except when cages or wells are necessary. (4-7-83)

c. Ladders with cages or baskets. Ladders equipped with cage or basket are excepted from the provisions of A. and B. of this section, but shall conform to the provisions of Section 2511 A.v. Fixed ladders in smooth-walled wells are excepted from the provisions of A of this section, but shall conform to the provisions of Section 2511 A.vi. (4-7-83)

d. Clearance in Back of Ladder. The distance from the centerline of rungs, cleats, or steps to the nearest permanent object in back of the ladder shall be not less than 7 inches, except that when unavoidable obstructions are encountered, minimum clearances as shown in Figure 2510-B shall be provided. (4-7-83)

e. Clearance in Back of Grab Bar. The distance from the centerline of the grab bar to the nearest permanent object in back of the grab bars shall be not less than 4 inches. Grab bars shall not protrude on the climbing side beyond the rungs of the ladder which they serve. (4-7-83)

f. Step-across Distance. The step-across distance from the nearest edge of ladder to the nearest edge of equipment or structure shall be not more than 12 inches, or less than 2 1/2 inches. (Figure 2510-B). (4-7-83)

g. Hatch Cover. Counterweighted hatch covers shall open a minimum of 60 degrees from the horizontal. The distance from the centerline of rungs or cleats to the edge of the hatch opening on the climbing side shall be not less than 24 inches for offset wells or 30 inches for straight wells. There shall be no protruding potential hazards within 24 inches of the centerline of rungs or cleats; any such hazards within 30 inches of the centerline of the rungs or cleats shall be fitted with deflector plates placed at an angle of 60 degrees from the horizontal as indicated in Figure 2510-D. The relationship of a fixed ladder to an acceptable counterweighted hatch cover is illustrated in Figure 2510-A. (4-7-83)

04. Special Requirements. (4-7-83)

a. Cages or Wells. (4-7-83)

i. Cages or wells (except on chimney ladders) shall be built as shown on the applicable drawings, covered in detail in Figures 2511-B, C, and D or of equivalent construction. (4-7-83)

ii. Cages or wells (except as provided in E of this section) conforming to the dimensions shown in Figures 2511-B, C, and D shall be provided on ladders of more than 20 feet to a maximum unbroken length of 30 feet. (4-7-83)

iii. Cages shall extend a minimum of 42 inches above the top of landing, unless other acceptable protection is provided. (4-7-83)

iv. Cages shall extend down the ladder to a point not less than 7 feet nor more than 8 feet above the base of the ladder, with bottom flared not less than 4 inches, or portion of cage opposite ladder shall be carried to the base. (4-7-83)

v. Cages shall not extend less than 27 nor more than 28 inches from the center line of the rungs of the ladder. Cage shall not be less than 27 inches in width. The inside shall be clear of projections. Vertical bars shall be located at a maximum spacing of 40 degrees around the circumference of the cage; this will give a maximum spacing of approximately 9 1/2 inches, center to center. (4-7-83)

vi. Ladder wells shall have a clear width of at least 15 inches measured each way from the centerline of the ladder. Smooth walled wells shall be a minimum of 27 inches from the centerline of rungs to the well wall on the climbing side of the ladder. Where other obstructions on the climbing side of the ladder exist, there shall be a minimum of 30 inches from the centerline of the rungs. (4-7-83)

b. Landing Platforms. (4-7-83)

i. When ladders are used to ascend to heights exceeding 20 feet (except on chimneys), landing platforms shall be provided for each 30 feet of height or fraction thereof, except that, where no cage, well, or ladder safety device is provided, landing platforms shall be provided for each 20 feet of height or fraction thereof. Each ladder section shall be offset from adjacent sections. Where installation conditions (even for a short, unbroken length) require that adjacent sections be offset, landing platforms shall be provided at each offset. (4-7-83)

ii. Where a man has to step a distance greater than 12 inches from the centerline of the rung structure or equipment, a landing platform shall be provided. The minimum step-across distance shall be 2 1/2 inches. (4-7-83)

iii. All landing platforms shall be equipped with standard railings and toeboards, so arranged as to give safe access to the ladder. Platforms shall be not less than 24 inches in width and 30 inches in length. (4-7-83)

iv. One rung of any section of ladder shall be located at the level of the landing laterally served by the ladder. Where access to the landing is through the ladder, the same rung spacing as used on the ladder shall be used from the landing platform to the first rung below the landing. (4-7-83)

c. Ladder Extensions. The side rail of through or side-step ladder extensions shall extend 3 1/2 feet above parapets and landings. For through ladder extensions, the rungs shall be omitted from the extension and shall have not less than 18 nor more than 24 inches clearance between rails. For sidestep or offset fixed ladder sections, at landings, the side rails and rungs shall be carried to the next regular rung beyond or above the 3 1/2 feet minimum (Figure 2511-E). (4-7-83)

d. Grab Bars. Grab bars shall be spaced by a continuation of the rung spacing when they are located in the horizontal position. Vertical grab bars shall have the same spacing as the ladder side rails. Grab bar diameters shall be the equivalent of the round-rung diameters. (4-7-83)

e. Ladder Safety Devices. Ladder safety devices may be used on tower, water tank, and chimney ladders over 20 feet in unbroken length in lieu of cage protection. No landing platform is required in these cases. All ladder safety devices such as those that incorporate lifebelts, friction brakes, and sliding attachments shall meet the design requirements of the ladders which they serve. (4-7-83)

05. Pitch. (4-7-83)

a. Preferred Pitch. The preferred pitch of fixed ladders shall be considered to come in the range of 75 degrees and 90 degrees with the horizontal (Figure 2511-E). (4-7-83)

b. Substandard Pitch. Fixed ladders shall be considered as substandard if they are installed within the

substandard pitch range of 60 and 75 degrees with the horizontal. Substandard fixed ladders are permitted only where it is found necessary to meet conditions of installation. This substandard pitch range shall be considered as a critical range to be avoided, if possible. (4-7-83)

c. Scope of Coverage of this Section. This section covers only fixed ladders within the pitch range of 60 and 90 degrees with the horizontal. (4-7-83)

d. Pitch Greater than 90 Degrees. Ladders having a pitch in excess of 90 degrees with the horizontal are prohibited. (4-7-83)

06. Maintenance and Use. (4-7-83)

a. All ladders shall be maintained in safe condition. All ladders shall be inspected regularly with the intervals between inspections being determined by use and exposure. (4-7-83)

i. NOTE: For illustrations, see Figures 2409-A, 2410-A through 2410-D, and 2411-A through 2411-F. (4-7-83)

b. When ascending or descending, the climber must face the ladder. (4-7-83)

c. Workmen shall not ascend or descend ladders while carrying tools or materials which will interfere with the free use of both hands. (4-7-83)

294. SAFETY REQUIREMENTS FOR SCAFFOLDING.

01. Definitions. The following terms shall have the meaning ascribed in this section when referred to in Sections 2915 through 2917 unless the context requires otherwise. (4-7-83)

a. Bearer. A horizontal member of a scaffold upon which the platform rests and which may be supported by ledgers. (4-7-83)

b. Boatswain's Chair. A seat supported by slings attached to a suspended rope, designed to accommodate one workman in a sitting position. (4-7-83)

c. Brace. A tie that holds one scaffold member in a fixed position with respect to another member. (4-7-83)

d. Bricklayer's Square Scaffold. A scaffold composed of framed wood squares which support a platform limited to light and medium duty. (4-7-83)

e. Carpenter's Bracket Scaffold. A scaffold consisting of wood or metal brackets supporting a platform. (4-7-83)

f. Coupler. A device for locking together the component parts of a tubular metal scaffold. The material used for the couplers shall be of a structural grade aluminum. The use of gray cast iron is prohibited. (4-7-83)

g. Crawling Board or Chicken Ladder. A plank with cleats spaced and secured at equal intervals, for use by a worker on roofs, not designed to carry any material. (4-7-83)

h. Double Pole or Independent Pole Scaffold. A scaffold supported from the base by a double row of uprights, independent of support from the walls and constructed of uprights, ledgers, horizontal platform bearers and diagonal bracing. (4-7-83)

i. Float or Ship Scaffold. A scaffold hung from overhang supports by means of ropes and consisting of a substantial platform having diagonal bracing underneath, resting upon and securely fastened to two parallel plank bearers at right angles to the span. (4-7-83)

j. Guardrail. A rail secured to uprights and erected along the exposed sides and ends of platforms. (4-7-83)

k. Heavy Duty Scaffold. A scaffold designed and constructed to carry a working load not to exceed 75 pounds per square foot. (4-7-83)

l. Horse Scaffold. A scaffold for light or medium duty, composed of horses supporting a work platform. (4-7-83)

m. Interior Hung Scaffold. A scaffold suspended from the ceiling or roof structure. (4-7-83)

n. Ladder Jack Scaffold. A light duty scaffold supported by brackets attached to ladders. (4-7-83)

o. Ledger (Stringer). A horizontal scaffold member which extends from post to post and which supports the put logs or bearer forming a tie between the posts. (4-7-83)

p. Light Duty Scaffold. A scaffold designed and constructed to carry a working load not to exceed 25 pounds per square foot. (4-7-83)

q. Manually Propelled Mobile Scaffold. A portable rolling scaffold supported by casters. (4-7-83)

r. Mason's Adjustable Multiple-point Suspension Scaffold. A scaffold having a continuous platform supported by bearers suspended by wire rope from overhead supports, so arranged and operated as to permit the raising or lowering of the platform to desired working position. (4-7-83)

s. Maximum Intended Load. The total of all loads including the working load, the weight of the scaffold, and such other loads as may be reasonably anticipated. (4-7-83)

t. Medium Duty Scaffold. A scaffold designed and constructed to carry a working load not to exceed 50 pounds per square foot. (4-7-83)

u. Mid-rail. A rail approximately midway between the guardrail and platform, used when required, and secured to the uprights erected along the exposed sides and ends of platforms. (4-7-83)

v. Needle Beam Scaffold. A light duty scaffold consisting of needle beams supporting a platform. (4-7-83)

w. Outrigger Scaffold. A scaffold supported by outriggers or thrustouts projecting beyond the wall or face of the building or structure, the inboard ends of which are secured inside of such a building or structure.(4-7-83)

x. Putlog. A scaffold member upon which the platform rests. (4-7-83)

y. Roofing Bracket. A bracket used in sloped roof construction, having provisions for fastening to the roof or supported by ropes fastened over the ridge and secured to some suitable object. (4-7-83)

z. Runner. The lengthwise horizontal bracing or bearing members or both. (4-7-83)

aa. Scaffold. Any temporary elevated platform and its supporting structure used for supporting workmen or materials or both. (4-7-83)

bb. Single-point adjustable Suspension Scaffold. A manually or power-operated unit designed for light duty use, supported by a single wire rope from an overhead support so arranged and operated as to permit the raising or lowering of the platform to desired working positions. (4-7-83)

cc. Single Pole Scaffold. Platforms resting on putlogs or crossbeams, the outside ends of which are supported on ledgers secured to a single row of posts or uprights and the inner ends of which are supported on or in a

wall. (4-7-83)

dd. Stone Setters' Adjustable Multiple point Suspension Scaffold. A swinging-type scaffold having a platform supported by hangers suspended at four points so as to permit the raising or lowering of the platform to the desired working position by the use of hoisting machines. (4-7-83)

ee. Toeboard. A barrier secured along the sides and ends of a platform, to guard against the falling of material. (4-7-83)

ff. Tube and Coupler Scaffold. An assembly consisting of tubing which serves as posts, bearers, braces, ties, and runners, a base supporting the posts, and special couplers which serve to connect the uprights and to join the various members. (4-7-83)

gg. Tubular Welded Frame Scaffold. A sectional, panel, or frame metal scaffold substantially built up of prefabricated welded sections which consist of posts and horizontal bearer with intermediate members. Panels or frames shall be braced with diagonal or cross braces. (4-7-83)

hh. Two-point Suspension Scaffold (Swinging Scaffold). A scaffold, the platform of which is supported by hangers (stirrups) at two points, suspended from overhead supports so as to permit the raising or lowering of the platform to the desired working position by tackle or hoisting machines. (4-7-83)

ii. Window Jack Scaffold. A scaffold, the platform of which is supported by a bracket or jack which projects through a wind opening. (4-7-83)

jj. Working Load. Load imposed by men, materials, and equipment. (4-7-83)

02. General Requirements For All Scaffolds. (4-7-83)

a. Scaffolds shall be furnished and erected in accordance with this standard for persons engaged in work that cannot be done safely from the ground or from solid construction, except that ladders used for such work shall conform to Sections 2501 through 2516 of this Chapter. (4-7-83)

b. The footing or anchorage for scaffolds shall be sound, rigid, and capable of carrying the maximum intended load without settling or displacement. Unstable objects such as barrels, boxes, loose brick, or concrete blocks shall not be used to support scaffolds or planks. (4-7-83)

c. Guardrails and toeboards shall be installed on all open sides and ends of platforms more than 8 feet above the ground or floor except: (4-7-83)

i. Scaffolding wholly within the interior of a building and covering the entire floor area of any room therein and not having any side exposed to a hoistway, elevator shaft, stairwell, or other floor openings; and (4-7-83)

ii. Needle-beam scaffolds and floats in use by structural iron workers. (4-7-83)

iii. Guardrails should all be 2 x 4 inches or equivalent, installed no less than 36 inches or not more than 42 inches high, with a midrail, when required, or 1 x 4 inch nominal lumber or equivalent. Supports should be at intervals not to exceed ten feet. Toeboards shall be a minimum of 4 inches nominal lumber in height. (4-7-83)

d. Scaffolds and their components shall be capable of supporting without failure at least four times the maximum intended load. (4-7-83)

e. Scaffolds and other devices mentioned or described in these standards shall be maintained in safe condition. Scaffolds shall not be altered or moved horizontally while they are in use or occupied. (4-7-83)

f. Any scaffold damaged or weakened from any cause shall be immediately repaired and shall not be used until repairs have been completed. (4-7-83)

g. Nails or bolts used in the construction of scaffolds shall be of adequate size and in sufficient numbers at each connection to develop the designed strength of the scaffold. Nails shall not be subjected to a straight pull and shall be driven full length. (4-7-83)

h. All planking or platforms shall be overlapped (minimum 12 inches) or secured from movement. (4-7-83)

i. An access ladder or equivalent safe access shall be provided. (4-7-83)

j. Scaffold planks shall extend over their end supports not less than 6 inches nor more than 18 inches. (4-7-83)

k. The poles, legs, or uprights of scaffolds shall be plumb, and securely and rigidly braced to prevent swaying and displacement. (4-7-83)

l. Materials being hoisted onto a scaffold shall have a tag line. (4-7-83)

m. Overhead protection shall be provided for workmen working on a scaffold when they are exposed to overhead hazards. (4-7-83)

n. Scaffolds shall be provided with a screen between the toeboard and the guardrail, extending along the entire opening, consisting of No. 18 gauge U. S. Standard Wire one-half inch mesh or the equivalent, where persons are required to work or pass under the scaffolds. (4-7-83)

o. Employees shall not be required to work on scaffolds when there is a hazard from high winds, storms, or snow or ice build-up on the scaffolding. (4-7-83)

p. Tools, materials, and debris shall not be allowed to accumulate in quantities to cause a hazard. (4-7-83)

q. Only treated or protected fiber rope shall be used for or near any work involving the use of corrosive substances or chemicals. (4-7-83)

r. Wire or fiber rope used for scaffolding suspension shall be capable of supporting at least six times the intended load. (4-7-83)

s. When acid solutions are used for cleaning buildings over 50 feet in height, wire rope supported scaffolds shall be used. (4-7-83)

t. The use of shore scaffolds or lean-to scaffolds is prohibited. (4-7-83)

u. Scaffolds shall be secured to permanent structures, through use of anchor bolts, reveal bolts, or other equivalent means. Window cleaners anchor bolts shall not be used. (4-7-83)

v. Special precautions shall be taken to protect scaffold members, including any wire or fiber rope, when using a heat-producing process. (4-7-83)

w. When screw shackles are used to support staging, etc., the pin must be wired or pinned so that the shackle will not become unscrewed by strain or stress. (4-7-83)

x. All hooks on blocks used for raising scaffolding shall be provided with a safety latch or be "moused at the throat" to prevent the hook from becoming dislodged. (4-7-83)

y. Lifeline size shall be 3/4 inch manila rope or equivalent with a minimum breaking strength of 5,400 pounds. Safety belts lanyard shall be a minimum of 1/2 inch nylon or equivalent with a maximum length to provide for a fall of no greater than 6 feet. This rope shall have a minimum breaking strength of 5,400 pounds. (4-7-83)

z. Scaffolds shall not be loaded in excess of the working load for which they are intended. (4-7-83)

03. Specific Construction Requirements for Scaffolds. The following types of scaffold systems shall be constructed and maintained in accordance with the requirements of Sections 1926.451 and 1926.452 of the Idaho Occupational Safety and Health Code for Construction, also known as Idaho Safety Code 2, and also shall comply with Section 2517 and 2518 of this Chapter. (4-7-83)

a. Wood pole scaffolds. (4-7-83)

b. Tube and coupler scaffolds. (4-7-83)

c. Tubular welded frame scaffolds. (4-7-83)

d. Manually propelled mobile scaffolds. (4-7-83)

e. Elevating and rotating work platforms. (4-7-83)

f. Outrigger scaffolds. (4-7-83)

g. Mason's adjustable multiple-point suspension scaffolds. (4-7-83)

h. Swinging scaffolds (two-point suspension). (4-7-83)

i. Stone setters adjustable multiple point suspension scaffolds. (4-7-83)

j. Single-point adjustable suspension scaffolds. (4-7-83)

k. Boatswain's chair. (4-7-83)

l. Carpenter's bracket scaffolds. (4-7-83)

m. Bricklayer's square scaffolds. (4-7-83)

n. Horse scaffolds. (4-7-83)

o. Needle beam scaffolds. (4-7-83)

p. Plasterer's, decorator's and large area scaffolds. (4-7-83)

q. Interior hung scaffolds. (4-7-83)

r. Ladder jack scaffolds. (4-7-83)

s. Window jack scaffolds. (4-7-83)

t. Roofing brackets. (4-7-83)

u. Crawling boards or chicken ladders. (4-7-83)

v. Float or ship scaffolds. (4-7-83)

w. Form scaffolds. (4-7-83)

04. Scope. Establish safety requirements for the construction, operation, maintenance, and use of scaffolds used in the construction, alteration, demolition and maintenance of buildings, and structures. (4-7-83)

295. MANUALLY PROPELLED MOBILE LADDER STANDS AND SCAFFOLDS (TOWERS).

01. Definitions. The following terms shall have the meaning ascribed in the section when referred to in Sections 2519 through 2524 unless the context requires otherwise. (4-7-83)

a. Bearer. A horizontal member of a scaffold upon which the platform rests and which may be supported by ledgers. (4-7-83)

b. Brace. A tie that holds one scaffold member in a fixed position with respect to another member. (4-7-83)

c. Climbing ladder. A separate ladder with equally spaced rungs usually attached to the scaffold structure for climbing and descending. (4-7-83)

d. Coupler. A device for locking together the components of a tubular metal scaffold which shall be designed and used to safely support the maximum intended loads. (4-7-83)

e. Design Working Load. The maximum intended load, being the total of all loads including the weight of the men, materials, equipment and platform. (4-7-83)

f. Equivalent. Alternative design or features, which will provide an equal degree or factor of safety. (4-7-83)

g. Guardrail. A barrier secured to uprights and erected along the exposed sides and ends of platforms to prevent falls of persons. (4-7-83)

h. Handrail. A rail connected to a ladder stand running parallel to the slope and/or top step. (4-7-83)

i. Ladder Stand. A mobile fixed size self-supporting ladder consisting of a wide flat tread ladder in the form of stairs. The assembly may include handrails. (4-7-83)

j. Ledger (stringer). A horizontal scaffold member which extends from post to post and which supports the bearer forming a tie between the posts. (4-7-83)

k. Mobile Scaffold (Tower). A light, medium, or heavy duty scaffold mounted on casters or wheels. (4-7-83)

l. Mobile."Manually Propelled". (4-7-83)

m. Mobile Work Platform. Generally a fixed work level one frame high on casters or wheels with bracing diagonally from platform to vertical frame. (4-7-83)

n. Runner. The lengthwise horizontal bracing and/or bearing members. (4-7-83)

o. Scaffold. Any temporary elevated platform and its necessary vertical, diagonal, and horizontal members used for supporting workmen and materials. (Also known as a scaffold tower.) (4-7-83)

p. Toeboard. A barrier at platform level erected along the exposed sides and ends of a scaffold platform to prevent falls of materials. (4-7-83)

q. Tube and coupler scaffold. An assembly consisting of tubing which serves as posts, bearers, braces, ties, and runners, a base supporting the posts, and uprights and serves to joint the various members, usually used in fixed locations. (4-7-83)

r. Tubular Welded Frame Scaffold. A sectional, panel, or frame metal scaffold substantially built up of prefabricated welded sections, which consist of posts and bearers with intermediate connecting members and braced with diagonal or cross braces. (4-7-83)

s. Tubular Welded Sectional Folding Scaffold. A sectional folding metal scaffold either of ladder frame or inside stairway design, substantially built of prefabricated welded sections, which consist of end frames, platform frame, inside inclined stairway form and braces, or hinged connected diagonal and horizontal braces, capable of being folded into a flat package when the scaffold is not in use. (4-7-83)

t. Work Level. The elevated platform used for supporting workmen and their materials, comprising the necessary vertical, horizontal, and diagonal braces, guardrails, and ladder for access to the work platform. (4-7-83)

02. General Requirements. (4-7-83)

a. Application. This section is intended to prescribe rules and requirements for the design, construction, and use of mobile work platforms (including ladder stands but not including aerial ladders) and rolling (mobile) scaffolds (towers). This standard is promulgated to aid in providing for the safety of life, limb, and property, by establishing minimum standards for structural design requirements and for the use of mobile work platforms and towers. (4-7-83)

b. Working Loads (4-7-83)

i. Work platforms and scaffolds shall be capable of carrying the design load under varying circumstances depending upon the conditions of use. Therefore, all parts and appurtenances necessary for their safe and efficient utilization must be integral parts of the design. (4-7-83)

ii. Specific design and construction requirements are not a part of this section because of the wide variety of materials and design possibilities. However, the design shall be such as to produce a mobile ladder stand or scaffold that will safely sustain the specified loads. The material selected shall be of sufficient strength to meet the test requirements and shall be protected against corrosion or deterioration.(a) The design working load of ladder stands shall be calculated on the basis of: Light - Designed and constructed to carry a working load of 25 pounds per sq. ft.; Medium - Designed and constructed to carry a working load of 50 pounds per sq. ft.; Heavy - Designed and constructed to carry a working load of 75 pounds per sq. ft. all ladder stands and scaffolds shall be capable of supporting at least four times the design working load. (4-7-83)

iii. Materials used in mobile ladder stands and scaffolds shall be of standard manufacture and conform to specifications of this section for strength, dimensions, and weights, and shall be selected to safely support the design working load. (4-7-83)

iv. Nails, bolts, or other fasteners used in the construction of ladders, scaffolds, and towers shall be of adequate size and in sufficient numbers at each connection to develop the designed strength of the unit. Nails shall be driven full length. (All nails should be immediately withdrawn from dismantled lumber.) (4-7-83)

v. All exposed surfaces shall be free from sharp edges, burrs, or other safety hazards. (4-7-83)

c. Work Levels. (4-7-83)

i. The maximum work level height shall not exceed four times the minimum or least base dimension of any mobile ladder stand or scaffold. Where the basic mobile unit does not meet this requirement, suitable outrigger frames shall be employed to achieve this least base dimension, or provisions shall be made to guy or brace the unit against tipping. (4-7-83)

ii. The minimum platform width for any work level shall not be less than 20 inches for mobile scaffolds (towers). Ladder stands shall have a minimum step width of 16 inches. (4-7-83)

iii. The supporting structure for the work level shall be rigidly braced, using adequate cross bracing or diagonal bracing with rigid platforms at each work level. (4-7-83)

iv. The steps of ladder stands shall be fabricated from slip resistant treads. (4-7-83)

v. The work level platform of scaffolds (towers) shall be of wood, aluminum, or plywood planking, steel or expanded metal, for the full width of the scaffold, except for necessary openings. Work platforms shall be secured in place. All planking shall be 2-inch (nominal) scaffold grade minimum 1,500 F. (stress grade) construction grade lumber or equivalent. (4-7-83)

vi. All scaffold work levels 10 feet or higher above the ground or floor shall have a standard (4-inch nominal) toeboard. (4-7-83)

vii. All work levels 10 feet or higher above the ground or floor shall have a guardrail of 2 x 4 inch nominal lumber or the equivalent installed no less than 36 inches or more than 42 inches high, with a midrail, when required, of at least 1 x 4 inch nominal lumber of equivalent. (4-7-83)

viii. A climbing ladder, stairway, or equivalent shall be provided for proper access and egress, and shall be affixed or built into the scaffold and so located that its use will not have a tendency to tip the scaffold. A landing platform shall be provided at intervals not to exceed 30 feet. (4-7-83)

d. Wheels or Casters. (4-7-83)

i. Wheels or casters shall be properly designed for strength and dimensions to support four times the design working load. (4-7-83)

ii. All scaffold casters shall be provided with a positive wheel and/or swivel lock to prevent movement. Ladder stands shall have at least two of the four casters and shall be of the swivel type. (4-7-83)

iii. Where leveling of the elevated work platform is required, screw jacks or other suitable means for adjusting the height shall be provided in the base section of each mobile unit. (4-7-83)

03. Mobile Tubular Welded Frame Scaffolds. (4-7-83)

a. General. Units shall be designed to comply with the requirements of this section. (4-7-83)

b. Bracing. Scaffolds shall be properly braced by cross braces and/or diagonal braces for securing vertical members together laterally. The cross braces shall be of a length that will automatically square and align vertical members to the erected scaffold is always plumb, square, and rigid. (4-7-83)

c. Spacing. Spacing of panels or frames shall be consistent with the loads imposed. The frames shall be placed one on top of the other with coupling or stacking pins to provide proper vertical alignment of the legs. (4-7-83)

d. Locking. Where uplift may occur, panels shall be locked together vertically by pins or other equivalent means. (4-7-83)

e. Erection. Only the manufacturer of a scaffold or his qualified designated agent shall be permitted to erect or supervise the erection of scaffolds exceeding 50 feet in height above the base, unless such structure is approved in writing by a registered professional engineer or erected in accordance with instructions furnished by the manufacturer. (4-7-83)

04. Mobile Tubular Welded Sectional Folding Scaffolds. (4-7-83)

a. General. Units including sectional stairway and sectional ladder scaffolds shall be designed to comply with the requirements of Section 2520 of this Chapter. (4-7-83)

b. Stairway. An integral stairway and work platform shall be incorporated into the structure of each sectional folding stairway scaffold. (4-7-83)

c. Bracing. An integral set of pivoting and hinged folding diagonal and horizontal braces and a

detachable work platform shall be incorporated into the structure of each sectional folding ladder scaffold. (4-7-83)

d. Sectional Folding Stairway Scaffolds. Sectional folding stairway scaffolds shall be designed as medium duty scaffolds except for high clearance. These special base sections shall be designed as light duty scaffolds. When upper sectional folding stairway scaffolds are used with a special high clearance base, the load capacity of the entire scaffold shall be reduced accordingly. The width of a sectional folding stairway scaffold shall not exceed 4 1/2 feet. The maximum length of a sectional folding stairway scaffold shall not exceed 6 feet. (4-7-83)

e. Sectional Folding Ladder Scaffolds. Sectional folding ladder scaffolds shall be designed as light duty scaffolds including special base (open end) sections which are designed for high clearance. For certain special applications the six-foot (6') folding ladder scaffolds, except for special high clearance base sections, shall be designed for use as medium duty scaffolds. The width of a sectional folding ladder scaffold shall not exceed 4 1/2 feet. The maximum length of a sectional folding ladder scaffold shall not exceed 6'6" for an eight foot unit or 10'6" for a ten foot long unit. (4-7-83)

f. End Frames. The end frames of sectional ladder and stairway scaffolds shall be designed so that the horizontal bearers provide supports for multiple planking levels. (4-7-83)

g. Erection. Only the manufacturer of the scaffold or his qualified designated agent shall be permitted to erect or supervise the erection of scaffolds exceeding 50 feet in height above the base, unless such structure is approved in writing by a licensed professional engineer, or erected in accordance with instructions furnished by the manufacturer to comply with requirements of this section. (4-7-83)

05. Mobile Tube and Coupler Scaffolds. (4-7-83)

a. Design. Units shall be designed to comply with the applicable requirements of Section 2520 of this Chapter. (4-7-83)

b. Material. The material used for the couplers shall be of a structural type, such as a drop forged steel, malleable iron or structural grade aluminum. The use of gray cast iron is prohibited. (4-7-83)

c. Erection. Only the manufacturer of the scaffold or his qualified designated agent shall be permitted to erect or supervise the erection of scaffolds exceeding 50 feet in height above the base, unless such structure is approved in writing by a licensed professional engineer, or erected in accordance with instructions furnished by the manufacturer to comply with requirements in this section. (4-7-83)

06. Mobile Work Platforms. (4-7-83)

a. Design. Units shall be designed for the use intended and shall comply with the requirements of Section 2520 of this Chapter. (4-7-83)

b. Base Width. The minimum width of the base of mobile work platforms shall not be less than 20 inches. (4-7-83)

c. Bracing. Adequate rigid diagonal bracing to vertical members shall be provided. (4-7-83)

07. Mobile Ladder Stands. (4-7-83)

a. Design. Units shall comply with applicable requirements of Section 2520 of this Chapter. (4-7-83)

b. Base Width. The minimum base width shall conform to Section 2520 C.i. The maximum length of the base section shall be the total length of combined steps and top assembly, measured horizontally, plus 5/8 inch per step of rise. (4-7-83)

c. Steps. Steps shall be uniformly spaced and sloped, with a rise of not less than 9 inches, nor more than 10 inches, and a depth of not less than 7 inches. The slope of the steps section shall be a minimum of 55 degrees

and a maximum of 60 degrees measured from the horizontal. (4-7-83)

d. Handrails. (4-7-83)

i. Units having more than 5 steps or 60 inches vertical height to the top step shall be equipped with handrails. (4-7-83)

ii. Handrails shall be a minimum of 29 inches high. Measurements shall be taken vertically from the center of the step. (4-7-83)

e. Loading. The load (See section 2520 B.ii.) shall be applied uniformly to a 3 1/2 inch wide area front to back at the center of the width span with a safety factor of four. (4-7-83)

296. -- 299. (RESERVED).

300. POWER PLATFORMS FOR EXTERIOR BUILDING MAINTENANCE.

01. Definitions. (4-7-83)

a. Angulated roping. A system of platform suspension in which the upper wire rope sheaves or suspension points are closer to the plane of the building face than the corresponding attachment points on the platform, thus causing the platform to press against the face of the building during its vertical travel. (4-7-83)

b. ANSI. American National Standards Institute. (4-7-83)

c. Babbitted Fastenings. The method of providing wire rope attachments in which the ends of the wire strands are bent back and are held in a tapered socket by means of poured molten babbitt metal. (4-7-83)

d. Brake-disc type. A brake in which the holding effect is obtained by frictional resistance between one or more faces of discs keyed to the rotating member to be held and fixed discs keyed to the stationary or housing member (pressure between the discs being applied axially). (4-7-83)

e. Brake-self-energizing band type. An essentially unidirectional brake in which the holding effect is obtained by the snubbing action of a flexible band wrapped about a cylindrical wheel or drum affixed to the rotating member to be held, the connections and linkages being so arranged that the motion of the brake wheel or drum will act to increase the tension or holding force of the band. (4-7-83)

f. Brake-shoe type. A brake in which the holding effect is obtained by applying the direct pressure of two or more segmental friction elements held to a stationary member against a cylindrical wheel or drum affixed to the rotating member to be held. (4-7-83)

g. Building face rollers. A specialized form of guide roller designed to contact a portion of the outer face of wall structure of the building, and to assist in stabilizing the operator's platform during vertical travel. (4-7-83)

h. Continuous pressure. Operation by means of buttons or switches, any one of which may be used to control the movement of the working platform or roof car, only as long as the button or switch is manually maintained in the actuating position. (4-7-83)

i. Control. A system governing starting, stopping, direction, acceleration, speed, and retardation of moving members. (4-7-83)

j. Controller. A device or group of devices, usually contained in a single enclosure, which serves to control in some predetermined manner the apparatus to which it is connected. (4-7-83)

k. Electrical ground. A conducting connection between an electrical circuit or equipment and the earth, or some conducting body which serves in place of the earth. (4-7-83)

l. Guide Roller. A rotating, bearing-mounted, generally cylindrical member, operating separately or as part of a guide shoe assembly, attached to the platform, and providing rolling contact with building guideways or other building contact members. (4-7-83)

m. Guide Shoe. An assembly of rollers, slide members, or the equivalent, attached as a unit to the operator's platform, and designed to engage with the building members provided for the vertical guidance of the operator's platform. (4-7-83)

n. Interlock. A device actuated by the operation of some other device with which it is directly associated, to govern succeeding operations of the same or allied devices. (4-7-83)

o. Operating Device. A pushbutton, lever, or other manual device used to actuate a control. (4-7-83)

p. Power Platform. Equipment to provide access to the exterior of a building for maintenance, consisting of a suspended power-operated working platform, a roof car, or other suspension means, and the requisite operating and control devices. (4-7-83)

q. Rated Load. The combined weight of employees, tools, equivalent, and other material which the working platform is designed and installed to lift. (4-7-83)

r. Relay, direction. An electrically energized contactor responsive to an initiating control circuit, which in turn causes a moving member to travel in a particular direction. (4-7-83)

s. Relay, Potential for Vertical Travel. An electrically energized contactor responsive to initiating control circuit, which in turn controls the operation of a moving member in both directions. This relay usually operates in conjunction with direction relays, as covered under the definition "relay direction". (4-7-83)

t. Roof car. A structure for the suspension of a working platform, providing for its horizontal movement to working positions. (4-7-83)

u. Roof-powered platform. A powered platform having the raising and lowering mechanism located on a roof car. (4-7-83)

v. Self-powered platform. A powered platform having the raising and lowering mechanism located on the working platform. (4-7-83)

w. Traveling cable. A cable made up of electrical or communication conductors or both, and providing electrical connection between the working platform and the roof car or other fixed point. (4-7-83)

x. Weatherproof. Equipment so constructed or protected that exposure to the weather will not interfere with its proper operation. (4-7-83)

y. Working Platform. The suspended structure arranged for vertical travel which provides access to the exterior of the building or structure. (4-7-83)

z. Yield Point. The stress at which the material exhibits a permanent set of 0.2 percent. (4-7-83)

aa. Zinced Fastenings. The method of providing wire rope attachments in which the splayed or fanned wire ends are held in a tapered socket by means of poured molten zinc. (4-7-83)

02. General Requirements. (4-7-83)

a. Application. (4-7-83)

i. These standards establish safety requirements for the design, construction, installation, operation, maintenance, inspection, and use of power-operated platforms for exterior building maintenance. The requirements of

these standards do not apply to temporary equipment used for construction work; or to devices which are raised and lowered manually. (4-7-83)

ii. The purpose of these standards is to provide for the safety of life and limb of users of exterior powered platforms, as well as of others who may be exposed. The equipment described in Sections 2601 through 2605 of this Chapter is intended for use by one or more workmen who are engaged in exterior work, such as window cleaning, caulking, metal polishing, and general exterior building maintenance or repairs. (4-7-83)

b. Existing and New Equipment. These standards apply to all powered platforms installed subsequent to August 27, 1971 with the exception of powered platforms installed for emergency purposes. (4-7-83)

c. Design Requirements. All new powered platforms for exterior building maintenance purchased and used after August 27, 1971 shall meet all of the design, construction, installation, and maintenance requirements of Part II and III of the American National Standard Safety Requirements for Powered Platforms for Exterior Building Maintenance ANSI A 120. 1-1970 and of these sections. (Reference shall be made to appropriate parts of ANSI A120.1-1970 for detail specifications for equipment and special installations.) (4-7-83)

d. Limitation. The requirements of these standards apply only to electric powered platforms. It is not the intent of this section to prohibit the use of other types of power. Installation of powered platforms using other types of power is permitted, provided such platforms have adequate protective devices for the type of power used, and otherwise provide for reasonable safety of life and limb to users of equipment and to others who may be exposed. (4-7-83)

e. Types of Powered Platforms. (4-7-83)

i. For the purpose of applying this standard, powered platforms are divided into two basic types, Type F and Type T. (4-7-83)

ii. Powered platforms designated as Type F shall meet all of the requirements of Section 2603. A basic requirement of Type F equipment is that the work platform is suspended by at least four wire ropes and designed so that failure of any one wire rope will not substantially alter the normal position of the working platform. Another basic requirement of Type F equipment is that only one layer of hoisting rope is permitted on winding drums. Type F powered platforms may be either roof-powered or self-powered. (4-7-83)

iii. Powered platforms designated as Type T shall meet all the requirements of section 2604. A basic requirement of Type T equipment is that the working platform is suspended by at least two wire ropes. Failure of one wire rope would not permit the working platform to fall to the ground, but would upset its normal position. The employer shall require employees working on Type T equipment to wear safety belts, which are attached by lifelines to either the working platform of the building structure. Type T powered platform may be either roof-powered or self powered. (4-7-83)

v. The requirements of these standards apply to powered platforms with winding drum type hoisting machines. It not the intent of these standards to prohibit powered platforms using other types of hoisting machines such as, but not limited to, traction drum hoisting machines, air powered machines, hydraulic powered machines, and internal combustion machines. Installation of powered platforms with other types of hoisting machines is permitted, provided adequate protective devices are used, and provided reasonable safety of life and limb to users of the equipment and to others who may be exposed is assured. (4-7-83)

03. Type F Powered Platforms. (4-7-83)

a. Roof Car, General. (4-7-83)

i. A roof car shall be provided whenever it is necessary to move the working platform horizontally to working or storage positions. (4-7-83)

ii. The maximum rated speed at which a power traversed roof car may be moved in a horizontal direction shall be 50 feet per minute. (4-7-83)

b. Movement and Positioning of Roof Car. (4-7-83)

i. Provision shall be made to protect against having the roof car leave the roof or enter roof areas not designed for travel. (4-7-83)

ii. The horizontal motion of the roof cars shall be positively controlled so as to insure proper movement and positioning of the roof car. (4-7-83)

iii. Roof car positioning devices shall be provided to insure that the working platform is placed and retained in proper position for vertical travel and during storage. (4-7-83)

iv. Mechanical stops shall be provided to prevent the traversing of the roof car beyond its normal limits of travel. Such stops shall be capable of withstanding a force equal to 100% of the inertial effect of the roof car in motion with traversing power applied. (4-7-83)

v. The operating device of a power-operated roof car for traversing shall be located on the roof car, the working platform, or both, and shall be of the continuous pressure weatherproof electric type. If more than one operating device is provided, they shall be so arranged that traversing is possible only from one operating device at a time. (4-7-83)

vi. The operating device shall be so connected that it is not operable until: (a) The working platform is located at its uppermost position of travel and is not in contact with the building face or fixed vertical guides in the face of the building.(b) All protective devices and interlocks are in a position for traversing. (4-7-83)

c. Roof Car Stability. Roof car stability shall be determined by either i. or ii. of this section, whichever is greater. (4-7-83)

i. The roof car shall be continuously stable, considering overturning moment as determined by 125% rated load, plus maximum dead load and the prescribed wind loading. (4-7-83)

ii. The roof car and its anchorages shall be capable of resisting accidental over-tensioning of the wire ropes suspending the working platform and this calculated value shall include the effect of one and one-half times the value. For this calculation, the simultaneous effect of one-half wind load shall be included, and the design stresses shall not exceed those referred to in Section 2602 C. (4-7-83)

iii. If the load on the motor is at any time in excess of three times that required for lifting the working platform with its rated load, the motor shall stall. (4-7-83)

d. Access to the Roof Car. Safe access to the roof car and from the roof car to the working platform shall be provided. If the access to the roof car at any point of its travel is not over the roof area or where otherwise necessary for safety, self-closing, self-locking gates shall be provided. Applicable provisions of the American National Standard Safety Requirements for Floor and Wall Openings, Railings, and Toeboard, A12.1-1967 shall apply. (4-7-83)

e. Means for Maintenance, Repair and Storage. Means shall be provided to run the roof car away from the roof perimeter, where necessary, and to provide a safe area for maintenance, repairs, and storage. Provisions shall be made to secure the machine in the stored position. (For stored machines subject to wind forces, see special design and anchorage requirements for "wind forces" in Part II, section 10.5.1.1 of ANSI A120. 1-1970, American National Standard Safety Requirements for Powered Platforms for Exterior Building Maintenance.) (4-7-83)

f. General Requirements for Working Platforms. The working platform shall be of girder or truss construction and shall be adequate to support its rated load under any position of loading, and comply with the provisions set forth in Section 2602 C. of this Chapter. (4-7-83)

g. Load Rating Plate. Each working platform shall bear a manufacturer's load rating plate, conspicuously posted; stating the maximum permissible rated load. Load rating plates shall be made of non-corrosive

material and shall have letters and figures stamped, etched, or cast on the surface. The minimum height of the letters and figures shall be one-fourth inch. (4-7-83)

h. Minimum Size. The working platform shall have a minimum net width of 24 inches. (4-7-83)

i. Guard Rails. Working platforms shall be furnished with permanent guard rails not less than 36 inches high, and not more than 42 inches high at the front (building side). At the rear, and on the sides, the rail shall not be less than 42 inches high. An intermediate guardrail shall be provided around the entire platform between the top guardrail and the toeboard. (4-7-83)

j. Toeboards. A 4-inch toeboard shall be provided along all sides of the working platform. (4-7-83)

k. Open Spaces Between Guardrails and Toeboards. The spaces between the intermediate guardrail and platform toeboard on the building side of the working platform, and between the top guardrail and the toeboard on other sides of the platform, shall be filled with metallic mesh or similar material that will reject a ball 1 inch in diameter. The installed mesh shall be capable of withstanding a load of 100 pounds applied horizontally over any area of 144 square inches. If the space between the platform and the building face does not exceed 8 inches, and the platform is restrained by guides, the mesh may be omitted on the front side. (4-7-83)

l. Flooring. The platform flooring shall be of the nonskid type and if of open construction, shall reject a 9/16 inch diameter ball, or be provided with a screen below the floor to reject a 9/16 inch diameter ball. (4-7-83)

m. Access Gates. Where access gates are provided, they shall be self-closing and self-locking. (4-7-83)

n. Operating Device for Vertical Movement of the Working Platform. (4-7-83)

i. The normal operating device for the working platform shall be located on the working platform and shall be of the continuous pressure weatherproof electric type. (4-7-83)

ii. The operating device shall be operable only when all electrical protective devices and interlocks on the working platform are in position for normal service, and the roof car, if provided, is at an established operating point. (4-7-83)

o. Emergency Electric Operative Device. (4-7-83)

i. In addition, on roof powered platforms, an emergency electric operating device shall be provided near the hoisting machine for use in the event of failure of the normal operating device for the working platform, or failure of the traveling cable system. The emergency operating device shall be mounted in a locked compartment and shall have a legend mounted thereon reading: "For Emergency Operation Only. Establish Communication With Personnel on Working Platform Before Use." (4-7-83)

ii. A key for unlocking the compartment housing the emergency operating device shall be mounted in a break-glass receptacle located near the emergency operating device. (4-7-83)

p. Manual Cranking for Emergency Operation. Emergency operation of the main drive machine may be provided to allow manual cranking. This provision for manual operation shall be designed so that not more than two persons will be required to perform this operation. The access to this provision shall include a means to automatically make the machine inoperative electrically while under the emergency manual operation. The design shall be such that the emergency brake is operative at or below governor tripping speed during manual operation. (4-7-83)

q. Arrangement and Guarding of Hoisting Equipment. (4-7-83)

i. Hoisting equipment shall consist of a power-drive drum or drum contained in the roof car (roof powered platforms) or contained on the working platform (self-powered platform). (4-7-83)

ii. The hoisting equipment shall be power-operated in both up and down directions. (4-7-83)

iii. Guard or other protective devices shall be installed wherever rotating shafts or other mechanisms or gears may expose personnel to a hazard. (4-7-83)

iv. Friction devices or clutches shall not be used for connecting the main driving mechanism to the drum or drums. Belt or chain driven machines are prohibited. (4-7-83)

r. Hoisting Motors. (4-7-83)

i. Hoisting motors shall be electric and of weatherproof construction. (4-7-83)

ii. Hoisting motors shall be in conformance with applicable provisions of V. of this section: Electrical wiring and equipment. (4-7-83)

iii. Hoisting motors shall be directly connected to the hoisting machinery. Motor couplings, if used, shall be of steel construction. (4-7-83)

s. Brakes. The hoisting machine shall have two independent braking means, each designed to stop and hold the working platform with 125% of rated load. (4-7-83)

t. Hoisting Ropes and Rope Connections. (4-7-83)

i. Working platforms shall be suspended by wire ropes of either 6 x 19 or 6 x 37 classification, preformed or nonpreformed. (4-7-83)

ii. The minimum grade of the wire rope shall be improved plow steel. Ropes shall be fabricated of individual wires on which the zinc coating has been applied at an intermediate size, and the wire then drawn to finished size and to the same tolerances and with the same mechanical properties as for uncoated wire of equal grade. (4-7-83)

iii. The minimum factor of safety shall be ten, and shall be calculated by the following formula: F = S x N W Where: S = Manufacturer's rated breaking strength of one rope. N = Number of ropes under load. W = Maximum static load on all ropes with the platform and its rated load at any point of its travel. (4-7-83)

iv. Hoisting ropes shall be sized to conform with the required factor of safety, but in no case shall the size be less than 5/16 inch diameter. (4-7-83)

v. Winding drums shall have at least three turns of rope remaining when the platform has landed at the lowest possible point of its travel. (4-7-83)

vi. The lengthening or repairing of wire rope by the joining of two or more lengths is prohibited. (4-7-83)

vii. The nondrum ends of the hoisting ropes shall be provided with individual shackle rods which will permit individual adjustment of rope lengths, if required. (4-7-83)

viii. Reverse bends in rope arrangement should be avoided. More than two reverse bends in each rope is prohibited. (4-7-83)

u. Rope Tag Data. (4-7-83)

i. A metal data tag shall be securely attached to one of the wire rope fastenings. This data tag shall bear the following wire rope data: (a) The diameter in inches, (b) construction classification, (c) whether nonpreformed or preformed, (d) the grade of material used, (e) the manufacturer's rated breaking strength, (f) name of the manufacturer of the rope, (g) the month and year the ropes were installed, (h) name of the person or firm who installed the ropes. (4-7-83)

ii. Noncorrosive metal data tags shall be used. The minimum height of the letters, stamped or etched, shall be 1/16 inch. (4-7-83)

iii. A new tag shall be installed at each rope renewal. When ropes are refastened, the original tag shall be retained and a supplemental tag showing the date of refastening and the name of the person or firm who refastened the ropes shall be provided. (4-7-83)

v. Electrical Wiring and Equipment. (4-7-83)

i. All electrical equipment and wiring shall conform to the requirement of the National Electrical Code, NFPA 70-1971; ANSI C1-1971 (Rev. of 1968), except as modified by ANSI A120. 1 1970 "American National Standard Safety Requirements for Powered- Platforms for Exterior Building Maintenance".(a) NOTE: For detail design specifications for electrical equipment, see Part 2, ANSI A120. 1-1970. (4-7-83)

ii. All motors and operation and control equipment shall be supplied from a single power source. (4-7-83)

iii. The power supply for the powered platform shall be an independent circuit supplied through a fused disconnect switch. (4-7-83)

iv. Electrical conductor parts of the power supply system shall be protected against accidental contact. (4-7-83)

v. Electrical grounding shall be provided.(a) Provisions for electrical grounding shall be included with the power-supply system.(b) Controller cabinets, motor frames, hoisting machines, the working platform, roof car and roof car track system, and noncurrent carrying parts of electrical equipment, where provided, shall be grounded.(c) The controller, where used, shall be so designed and installed that a single ground or short circuit will not prevent both the normal and final stopping device from stopping the working platform. (d) Means shall be provided on the roof car and working platform for grounding portable electric tools.(e) The working platform shall be grounded through a grounding connection in a traveling cable. Electrically powered tools utilized on the working platform shall be grounded. (4-7-83)

vi Electrical receptacles located on the roof or other exterior location shall be of a weatherproof type and shall be located so as not to be subject to contact with water or accumulated snow. The receptacles shall be grounded and the electric cable shall include a grounding conductor. The receptacle and plug shall be a type designed to avoid hazard to persons inserting or withdrawing the plug. Provisions shall be made to prevent application of cable strain directly to the plug and receptacle. (4-7-83)

vii. Electric runway conductor systems shall be of the type designed for use in exterior locations and shall be located so as not to be subject to contact with water or accumulated snow. The conductors, collectors, and disconnecting means shall conform to the same requirements as those for cranes and hoists in Article 610 of the National Electrical Code, NFPA 70-1971; ANSI C1-1971 (Rev. of 1968). A grounded conductor shall parallel the power conductors and be so connected that it cannot be opened by the disconnecting means. The system shall be designed to avoid hazard to persons in the area. (4-7-83)

viii. Electrical protective devices and interlocks of the weatherproof type shall be provided. (4-7-83)

ix. Where the installation includes a roof car, electric contact(s) shall be provided and so connected that the operating devices for the working platform shall be operative only when the roof car is located and mechanically retained at an established operating point. (4-7-83)

x. Where the powered platform includes a power operated roof car, the operating device for the roof car shall be inoperative when the roof car is mechanically retained at an established operating point. (4-7-83)

xi. An electric contact shall be provided and so connected that it will cause the down direction relay for vertical travel to open if the tension in the traveling cable exceeds safe limits. (4-7-83)

xii. An automatic overload device shall be provided to cut off the electrical power to the circuit in all hoisting motors for travel in the up direction, should the load applied to the hoisting ropes at either end of the working platform exceed 125% of its normal tension with rated load as shown on the manufacturer's data plate on the working platform. (4-7-83)

xiii. An automatic device shall be provided for each hoisting rope which will cut off the electrical power to the hoisting motor or motors in the down direction and apply the brakes if any hoisting rope becomes slack. (4-7-83)

xiv. Upper and lower directional limit devices shall be provided to prevent the travel of the working platform beyond the normal upper and lower limits of travel. (4-7-83)

xv. Operation of a directional limit device shall prevent further motion in the appropriate direction, if the normal limit of travel has been reached. (4-7-83)

xvi. Directional limit devices, if driven from the hoisting machine by chains, tapes, or cables, shall incorporate a device to disconnect the electric power from the hoisting machine and apply both the primary and secondary brakes in the event of failure of the driving means. (4-7-83)

xvii. Final Terminal Stopping Devices of the Working Platform: (a) Final terminal stopping devices for the working platform shall be provided as a secondary means of preventing the working platform from over-traveling at the terminals.(b) The device shall be set to function as close to each terminal landing as practical, but in such a way that under normal operating conditions it will not function when the working platform is stopped by the normal terminal stopping device.(c) Operation of the final terminal stopping device shall open the potential relay for vertical travel, thereby disconnecting the electric power from the hoisting machine, and applying both the primary and secondary brakes.(d) The final terminal stopping device for the upper limit of travel shall be mounted so that it is operated directly by the motion of the working platform itself. (4-7-83)

xviii. Emergency stop switches shall be provided in or adjacent to each operating device. (4-7-83)

xix. Emergency stop switches shall: (a) Have red operating buttons or handles; (b) Be conspicuously and permanently marked "stop"; (c) Be the manually opened and manually closed type; (d) Be positively opened with the opening not solely dependent on springs. (4-7-83)

xx. The manual operation of an emergency stop switch associated with an operating device for the working platform shall open the potential relay for vertical travel, thereby disconnecting the electric power from the hoisting machine and applying both the primary and secondary brakes. (4-7-83)

xxi. The manual operation of the emergency stop switch associated with the operating device for a powerdrive roof car shall cause the electrical power to the traverse machine to be interrupted and the traverse machine brake to apply. (4-7-83)

w. Requirements for Emergency Communications. (4-7-83)

i. Communication equipment shall be provided for each powered platform for use in an emergency. (4-7-83)

ii. Two-way communication shall be established between personnel on the roof and personnel on the stalled working platform before any emergency operation of the working platform is undertaken by personnel on the roof. (4-7-83)

iii. The equipment shall permit two-way voice communication between the working platform and: (a) designated personnel continuously available while the powered platform is in use; and (b) designated personnel on roof-powered platforms, undertaking emergency operation of the working platform by means of the emergency operating device located near the hoisting machine. (4-7-83)

iv. The emergency communication equipment shall be one of the following types: (a) Telephone connected to the central telephone exchange system; or (b) Telephone on a limited system or an approved two-way radio system, provided designated personnel are available to receive a message during the time the powered platform is in use. (4-7-83)

04. Type T Powered Platforms. (4-7-83)

a. Roof Car. The requirements of Section 2603 A. through 2603 E. shall apply to Type T powered platforms. (4-7-83)

b. Working Platform. The requirements of Section 2603 F. through P. apply to Type T powered platforms. (4-7-83)

i. The working platform shall be suspended by at least two wire ropes. (4-7-83)

ii. The maximum rated speed at which the working platform of self powered platforms may be moved in a vertical direction shall not exceed 35 feet per minute. (4-7-83)

c. Hoisting Equipment. The requirements of Section 2603 Q. and R. shall apply to Type T powered platforms. (4-7-83)

d. Brakes. Brake requirements of Section 2603 S. shall apply. (4-7-83)

e. Hoisting Ropes and Rope Connections. (4-7-83)

i. Section 2603 T.i. through vi. and viii. shall apply to Type T powered platforms. (4-7-83)

ii. Adjustable shackle rods in Section 2603 T. vii. shall apply to Type T powered platforms if the working platform is suspended by more than two wire ropes. (4-7-83)

f. Electrical Wiring and Equipment. (4-7-83)

i. The requirements of Section 2603 v. i. through vi. shall apply to Type T powered platforms."Circuit protection limitation", "powered platforms electrical service system" all operating services and control equipment shall comply with the specifications contained in Part 2, Section 26, of ANSI A120. 1 -1970. (4-7-83)

ii. For electrical protective devices, the requirements of Section 2603 v.i.through viii.shall apply to Type T powered platforms. Requirements for the "circuit potential limitation" shall be in accordance with the Specifications contained in Part 2, Section 26, of ANSI A120. 1-1970. (4-7-83)

g. Emergency Communications. All the requirements of Section 2603 W. shall apply to Type T powered platforms. (4-7-83)

h. Safety Belts and Lifelines. (4-7-83)

i. Each employee on the working platform of Type T powered platforms shall be provided with a safety belt with means for attachment to a lifeline on the roof or to the working platform. It is recommended that safety belts, lines and other components, including fastening means and anchorages to the working platform, building or structure, be capable of withstanding a static load of 4,000 pounds without damage or permanent deformation of any part. (4-7-83)

ii. Fastening devices should be of the self-closing type, equipped with a locking device to prevent accidental opening of the fastening device. (4-7-83)

iii. Harness-type belts are recommended. If body-type belts are used, it is recommended that the portion of the belt bearing on the front of the wearer's body have a minimum width of 3 inches. (4-7-83)

iv. It is recommended that the line used to connect the belt to the platform, or to a lifeline attached to the building, have a maximum length of 5 feet. (4-7-83)

05. Inspections and Tests. (4-7-83)

a. Inspections and Tests of New Installations and Alterations. All powered platform installations shall, on their completion, and before being placed in service, be subjected to an acceptance test in the field to determine that all parts of the installation conform to applicable requirements of these safety and health standards, and that all safety and operating equipment functions as required. A similar inspection and test shall be made following a major alteration to an existing installation. (4-7-83)

b. Periodic Inspections and Tests. Each installation shall undergo a periodic inspection and test at least every twelve months. All parts of the equipment shall be inspected, and where necessary, tested to determine that they are in safe operating condition. (4-7-83)

c. Maintenance, Inspections, and Tests. Each installation shall undergo maintenance inspection and test every 30 days, except where the cleaning cycle is less than 30 days, such inspection and test shall be made prior to each cleaning cycle. The results of these inspections and tests shall be recorded in a log which is available for review by the Director or his designated representative. Each log entry shall include the date of the inspection or test and shall be signed by the person making the inspection or test. (4-7-83)

d. Special Inspection of Governors and Secondary Brakes. (4-7-83)

i. Special inspections and tests of the governor and secondary braking system shall be made at intervals not exceeding one year. (4-7-83)

ii. The inspection and test shall include a verification that the initiating device for the secondary breaking operates at the proper overspeed. (4-7-83)

iii. If adequate tests cannot be performed in the field, the initiating device may be removed from the powered platform and sent to a shop equipped to make such a test. (4-7-83)

iv. The inspection shall include a verification of the proper functioning of the secondary brake. If an adequate test cannot be performed in the field, the hoisting machine may be removed from the building and sent to a shop equipped to make such a test. (4-7-83)

v. If any hoisting machine or initiating device for the secondary brake system is removed from the building for testing, all reinstalled and directly related components shall be reinspected prior to returning the powered platform installation to service. (4-7-83)

e. Adverse Weather. The operation of powered platforms during severe weather conditions is prohibited. (4-7-83)

f. Maintenance. (4-7-83)

i. Required Maintenance. All parts of equipment on which safe operation depends shall be maintained in proper working order so that they perform the function for which they are intended. (4-7-83)

ii. Broken or worn parts, worn switch contacts, brushes, and short flexible conductors of electrical devices, which may interfere with safe operation, shall be replaced promptly. Electrical receptacles and plugs shall be replaced promptly when worn or damaged. All electrical connections shall be kept tight. (4-7-83)

iii. Components of the electrical service and traveling cables shall be replaced when damaged or substantially abraded. (4-7-83)

iv. Gears, shafts, bearings, brakes, and hoisting drums shall be maintained in proper alignment. Gears shall be replaced promptly when there is evidence of appreciable wear. (4-7-83)

g. Cleaning. (4-7-83)

i. Controller contactors and relays shall be kept clean and free from dirt. (4-7-83)

ii. All other parts shall be kept clean, if their proper functioning would be affected by the presence of dirt or other contaminants. (4-7-83)

h. Periodic Reshackling of Hoisting Ropes. The hoisting ropes shall be reshackled at the nondrum ends at intervals not exceeding 24 months. In reshackling the ropes, a sufficient length shall be cut from the end or the rope to remove damaged or fatigued portions. (4-7-83)

i. Making Safety Devices Inoperative. No person shall at any time make any required safety device or electrical protective device inoperative, except when necessary during tests, inspections, and maintenance. Immediately upon completion of such tests, inspections, and maintenance, the devices shall be restored to their normal operating condition. (4-7-83)

j. Damaged Rope. Wire ropes shall be replaced whenever there are six or more broken wires in any one lay of the wire rope, or whenever the ropes are damaged or in a deteriorated condition. (4-7-83)

k. Roof Track System. Roof track systems tiedowns, or similar equipment, if provided, shall be maintained in proper working order so that they perform the function for which they are intended. (4-7-83)

l. Building Face Guiding Members. T-rails, indented mullions, or equivalent guides located in the face of the building, if provided, shall be maintained in proper working order so that they perform the function for which they are intended. Brackets for cable stabilizers, if provided, shall similarly be maintained in proper working order. (4-7-83)

301. VEHICLE-MOUNTED ELEVATING AND ROTATING WORK PLATFORMS.

01. Definitions. (7-1-93)

a. Aerial device. Any vehicle-mounted device, telescoping or articulating or both, which is used to position workmen and/or materials. (4-7-83)

b. Aerial ladder. An aerial device consisting of a single- or multiple-section extensible ladder. (4-7-83)

c. Articulating boom platform. An aerial device with two or more hinged boom sections. (4-7-83)

d. Extensible boom platform. An aerial device (except ladders) with a telescopic or extensible boom. Telescopic derricks with personnel platform attachments shall be considered to be extensible boom platforms when used with a personnel platform. (4-7-83)

e. Electric line truck. A truck used to transport men, tools and materials, and to serve as a traveling workshop for electric power line construction and maintenance work. It is sometimes equipped with a boom and auxiliary equipment for setting poles, digging holes and elevating material and/or men. (4-7-83)

f. Mobile Unit. A combination of an aerial device, its vehicle and related equipment. (4-7-83)

g. Platform. Any personnel carrying device (basket or bucket) which is a component of an aerial device. (4-7-83)

h. Vehicle. Any carrier that is not manually propelled. (4-7-83)

i. Vertical tower. An aerial device designed to elevate a platform in a substantially vertical axis. (4-7-83)

02. General Requirements. (4-7-83)

a. Unless otherwise provided in this section, aerial devices (aerial lifts) acquired on or after July 1, 1975, shall be designed and constructed in conformance with the applicable requirements of the American National Standard for "Vehicle Mounted Elevating and Rotating Work Platforms," ANSI A92.2-1969, including appendix. Aerial lifts acquired for use before July 1, 1975 which do not meet the requirements of ANSI A92.2-1969, may not be used after July 1, 1976 unless they shall have been notified so as to conform with the applicable design and construction requirements of ANSI A92.2-1969. Aerial devices include the following types of vehicle-mounted aerial devices used to elevate personnel and/or material to job sites above ground: (4-7-83)

i. Extensible boom platforms; (4-7-83)

ii. Aerial ladders; (4-7-83)

iii. Articulating boom platforms; (4-7-83)

iv. Vertical towers; and (4-7-83)

v. A combination of any of the above. (4-7-83)

vi. Aerial equipment may be made of metal, wood fiberglass reinforced plastic (FRP), or other material; may be powered or manually operated and are deemed to be aerial lifts whether or not they are capable of rotating about a substantially vertical axis. (4-7-83)

b. Aerial lifts may be "field modified" for uses other than those intended by the manufacturer, provided the modification has been certified in writing by the manufacturer or by any other equivalent entity, such as a nationally recognized testing laboratory, to be in conformity with all applicable provisions of ANSI A92.2-1969 and this section, and to be at least safe as the equipment was before modification. (4-7-83)

c. The requirements of this section do not apply to firefighting equipment or electric line trucks used in the construction and maintenance of power distribution lines by telecommunications employees, line clearance tree trimming employees, electric contractor employees and electric utility employees, except with the requirement that a vehicle be a stable support for the aerial device. (4-7-83)

d. When operating aerial lifts proximate to, under, over, by or near electric power lines, the requirements of this section shall apply. (4-7-83)

i. The following clearances shall be maintained: (a) For lines rated at 50kV or less, the minimum clearance between the lines and any part of the aerial lift shall be at least 10 feet; When the lines are rated in excess of 50kV, the minimum clearance between the lines and any part of the aerial lift shall be at least 10 feet plus 0.4 inch for each kilovolt in excess of 50 kV, or twice the length of the line insulator, but never less than 10 feet; (4-7-83)

ii. Where the electric power transmission or distribution lines have been de-energized and visibility grounded at the point of work, or where insulating barriers, not a part of or an attachment to the aerial lift, have been erected to prevent physical contact with the lines. (4-7-83)

iii. Proximity warning devices may be used but not in lieu of meeting the requirements contained in this section. (4-7-83)

iv. The owner of the lines or his authorized representative shall be notified and provided with all pertinent information before the commencement of operations near electric lines. (4-7-83)

v. Any overhead wire shall be considered to be an energized line until the owner of the line or his authorized representative states that it is deenergized. (4-7-83)

03. Specific Requirements. (4-7-83)

a. Ladder Trucks and Tower Trucks. Before the truck is moved for highway travel, aerial ladders shall be secured in the lower traveling position by the locking device above the truck cab, and the manually operated device at the base of the ladder, or by other equally effective means (e.g. cradles, which present rotation of the ladder in combination with positive acting linear actuators). (4-7-83)

b. Extensible and articulating Boom Platforms. (4-7-83)

i. Lift controls shall be tested each day prior to use to determine that such controls are in safe working condition. (4-7-83)

ii. Only trained persons shall operate an aerial lift. (4-7-83)

iii. Belting off to an adjacent pole, structure, or equipment while working from an aerial lift shall not be permitted. (4-7-83)

iv. Employees shall always stand firmly on the floor of the basket, and shall not sit or climb on the edge of the basket or use planks, ladders, or other devices for a work position. (4-7-83)

v. A body belt shall be worn and a lanyard attached to the boom or basket when working from an aerial lift. (4-7-83)

vi. Boom and basket load limits specified by the manufacturer shall not be exceeded. (4-7-83)

vii. The brakes shall be set and outriggers, when used, shall be positioned on pads or a solid surface. Wheel chocks shall be installed before using an aerial lift on an incline. (4-7-83)

viii. An aerial lift truck may not be moved when the boom is elevated in a working position with men in the basket, except for equipment which is specifically designed for this type of operation in accordance with the provisions of Section 2607 of this Chapter. (4-7-83)

ix. Articulating boom and extensible boom platforms, primarily designed as personnel carriers, shall have both platform (upper) and lower controls. Upper controls shall be in or beside the platform within easy reach of the operator. Lower controls shall provide for overriding the upper controls. Controls shall be plainly marked as to their function. Lower level controls shall not be operated unless permission has been obtained from the employee in the lift except in case of emergency. (4-7-83)

x. Climbers shall not be worn while performing work from an aerial lift. (4-7-83)

xi. Before moving an aerial lift for travel, the boom(s) shall be inspected to see that it is properly cradled and outriggers are in stowed position, except as provided in viii. of this section. (4-7-83)

c. Bursting Safety Factor. All critical hydraulic and pneumatic components shall comply with the provisions of the American National Standards Institute Standard ANSI A92.2-1969, Section 4.9, Bursting Safety Factor. Critical Components are those in which a failure would result in a free fall or free rotation of the boom. All noncritical components shall have a bursting safety factor of at least two to one. (4-7-83)

d. Welding Standards. All welding shall conform to the following Automotive Welding Society (AWS) Standards, as applicable: (4-7-83)

i. Standard Qualification Procedure AWS B3.0-41. (4-7-83)

ii. Recommended Practices for Automotive Welding Design, AWS D8.4-61. (4-7-83)

iii. Standard Qualification of Welding Procedures and Welders for Piping and Tubing AWS D10.9-69. (4-7-83)

iv. Specifications for Welding Highway and Railway Bridges, AWS D2.0-69. (4-7-83)

302. MANLIFTS.

01. Definitions. (4-7-83)

a. Handhold (Handgrip). A handhold is a device attached to the belt which can be grasped by the passenger to provide a means of maintaining balance. (4-7-83)

b. Open Type. One which has a handgrip surface fully exposed and capable of being encircled by the passenger's fingers. (4-7-83)

c. Closed type. A cup-shaped device open at the top in the direction of travel of the step for which it is to be used, and closed at the bottom into which the passenger may place his fingers. (4-7-83)

d. Limit switch. A device, the purpose of which is to cut off the power to the motor and apply the brakes to stop the carrier in the event that a loaded step passes the terminal landing. (4-7-83)

e. Manlift. A device consisting of a power-driven endless belt moving in one direction only, and provided with steps or platforms and handholds attached to it for the transportation of personnel from floor to floor. (4-7-83)

f. Rated speed. Rated speed is the speed for which the device is designed and installed. (4-7-83)

g. Split-rail switch. An electric limit switch operated mechanically by the rollers on the manlift steps. It consists of an additional hanged or "Split" rail, mounted on the regular guardrail, over which the step rollers pass. It is spring-loaded in the "split" position. If the step supports no load, the rollers will "bump" over the switch; if a loaded step should pass over the section, the split rail will be forced straight, tripping the switch and opening the electrical circuit. (4-7-83)

h. Step (Platform). A step is a passenger carrying unit. (4-7-83)

i. Travel. The travel is the distance between the centers of the top and bottom pulleys. (4-7-83)

02. General Requirements. (4-7-83)

a. Application. These standards apply to the construction, maintenance, inspection, and operation of manlifts in relation to accident causing hazards. Manlifts covered by these standards consist of platforms or brackets and accompanying handholds mounted on, or attached to an endless belt, operating vertically in one direction only and being supported by, and driven through pulleys, at the top and bottom. These manlifts are intended for conveyance of persons only. It is not intended that these standards cover moving stairways, elevators with enclosed platforms ("Paternoster" elevators), gravity lifts, nor conveyors used only for conveying material. These standards apply to manlifts used to carry only personnel trained and authorized by the employer in their use. (4-7-83)

b. Exceptions for New and Existing Equipment. The purpose of these standards is to provide reasonable safety for life and limb. (4-7-83)

c. Design Requirements. All new manlifts installations and equipment installed after the effective date of these standards shall meet the design requirements of the "American National Safety Standard for Manlifts ANSI A90.1-1969", and the requirements of this section. (4-7-83)

d. Reference to Other Codes. The following codes are applicable to this section. Safety Code for Mechanical Power Transmission Apparatus ANSI B15.1-1952 (R1958) and Chapter 26 of this Code; National Electrical Code, NFPA 70-1971, ANSI C1-1971 (R 1968) and Chapter D of this Code; Safety Code for Fixed Ladders, ANSI A14.3-1956 and Safety Requirements for Floor and Wall openings, Railings and Toeboards, ANSI A12.1-1967. (4-7-83)

e. Floor Openings. (4-7-83)

i. Allowable Size. Floor openings for both the "up" and "down" runs shall be not less than 28 inches nor more than 36 inches in width for a 12-inch belt not less than 34 inches nor more than 40 inches for a 16-inch belt and shall extend not less than 24 inches, nor more than 28 inches from the face of the belt. (4-7-83)

ii. Uniformity. All floor openings for a given manlift shall be uniform in size and shall be approximately circular, and each shall be located vertically above the opening below it. (4-7-83)

f. Landing. (4-7-83)

i. Vertical Clearance. The clearance between the floor or mounting platform and the lower edge for the conical guard above it required by F. of this Section shall not be less than 7 feet 6 inches. Where this clearance cannot be obtained, no access to the manlift shall be provided and the manlift runway shall be enclosed where it passes through such floor. (4-7-83)

ii. Clear Landing Space. The landing space adjacent to the floor openings shall be free from obstruction and kept clear at all times. This landing space shall be at least 2 feet in width from the edge of the floor opening used for mounting and dismounting. (4-7-83)

iii. Lighting and Landing. Adequate lighting not less than 5 foot candles, shall be provided at each floor landing at all times when the lift is in operation. (4-7-83)

iv. Landing Surface. The landing surfaces at the entrances and exits to the manlift shall be constructed and maintained as to provide safe footing at all times. (4-7-83)

v. Emergency Landings. Where there is a travel of 50 feet or more between floor landings, one or more emergency landings shall be provided so that there will be a landing (either floor or emergency) for every 25 feet or less of manlift travel. (4-7-83)

a. Emergency landings shall be accessible from both the "up" and "down" rungs of the manlift and shall give access to the ladder required in i. of this Section. Emergency landings shall be completely enclosed with a standard railing and toeboard. c. Platforms constructed to give access to bucket elevators or other equipment for the purpose of inspection, lubrication, and repair may also serve as emergency landings under this rule. All such platforms will then be considered part of the emergency landing and shall be provided with standard railings and toeboards. (4-7-83)

g. Guards on Underside of Floor Openings. (4-7-83)

i. Fixed Type. On the ascending side of the manlift floor openings shall be provided with a bevel guard or cone meeting the following requirements. (a). The cone shall make an angle of not less than 45 degrees with the horizontal. An angle of 60 degrees or greater shall be used where ceiling heights permit. (b). The lower edge of this guard shall extend at least 42 inches outward from any handhold on the belt. It shall not extend beyond the upper surface of the floor above. (c). The cone shall be made of not less than No. 18 U. S. Gauge Sheet steel or material of equivalent strength or stiffness. The lower edge shall be rolled to a minimum diameter of one-half inch and the interior shall be smooth with no rivets, bolts or screws protruding. (4-7-83)

ii. Floating Type. In lieu of the fixed guards specified in i. above, a floating type safety cone may be used, such floating cones to be mounted on hinges at least 6 inches below the under side of the floor and so constructed as to actuate a limit switch should a force of 2 pounds be applied on the edge of the cone closest to the hinge. The depth of this floating cone need not exceed 12 inches. (4-7-83)

h. Protection of Entrances and Exits. (4-7-83)

i. Guardrail Requirement. The entrances and exits at all floor landings affording access to the manlift shall be guarded by a maze (staggered railing) or a handrail equipped with self-closing gates. (4-7-83)

ii. Construction. The rails shall be standard guardrails with toeboards meeting the provisions of the Safety Requirements for Floor and Wall Openings, Railings and Toeboards, ANSI A12.1-1967 and Chapter 5 of this Code. (4-7-83)

iii. Gates. Gates, if used, shall open outward and shall be self-closing. Corners of gates shall be rounded. (4-7-83)

iv. Maze. Maze or staggered openings shall offer no direct passage between enclosure and outer floor space. (4-7-83)

v. Except where building layout prevents, entrances at all landings shall be in the same relative position. (4-7-83)

vi. If located in buildings to which the public has access, such manlift or manlifts shall be located in an enclosure protected by self-closing spring-locked doors. Keys to such doors shall be limited to authorized personnel. (4-7-83)

i. Guards for Openings. (4-7-83)

i. Construction. The floor opening at each landing shall be guarded on sides not used for entrance or exit by a standard railing and toeboard or by panels or wire mesh of not less than Number 10 U. S. Gage, expanded metal or not less than Number 13 U. S. gage or sheet metal of equivalent strength. (4-7-83)

ii. Guardrails in Stairwells. When belt manlift is installed in a stairwell, a standard guardrail shall be placed between the floor openings of the manlift and the stairways. (4-7-83)

iii. Height and Location. Such rails or guards shall be at least forty-two (42) inches in height on the "up" running side and sixty-six (66) inches on the "down" running side. If a guardrail is used the section of the guard above the rail may be of the construction specified in i. of this Section, may consist of vertical or horizontal bars which will reject a ball six (6) inches in diameter. Rails or guards shall be located not more than one (1) foot from the edge of the floor opening. (4-7-83)

iv. Safeguards Required. Expanded metal, sheet metal or wood guards must be installed to cover the area from the floor to seven (7) feet above the floor on each exposed side of the belt manlift at each floor landing, so persons cannot place their hands in the area where the step rollers travel. (4-7-83)

j. Bottom Arrangement. (4-7-83)

i. Bottom Landing. At the bottom landing, the clear area shall be not smaller than the area enclosed by the guardrails on the floors above and any wall in front of the down-running side of the belt shall be not less than 48 inches from the face of the belt. This space shall not be encroached upon by stairs or ladders. (4-7-83)

ii. Location of Lower Pulley. The lower (boot) pulley shall be installed so that it is supported by the lowest landing served. The sides of the pulley support shall be guarded to prevent contact with the pulley or the steps. (4-7-83)

iii. Mounting Platform. A mounting platform shall be provided in front or to one side of the uprun at the lowest landing, unless the floor level is such that the following requirements can be met: The floor or platform shall be at or above the point at which the upper surface of the ascending step completes its turn and assumes a horizontal position. (4-7-83)

iv. Guardrails. To guard against persons walking under a descending step, the area on the downside of the manlift shall be guarded in accordance with H. of this Section. To guard against a person getting between the mounting platform and an ascending step, the area between the belt and the platform shall be protected by a guardrail. (4-7-83)

k. Top Arrangements. (4-7-83)

i. Clearance from Floor. A top clearance shall be provided of at least 11 feet above the top terminal landing. This clearance shall be maintained from a plane through each face of the belt to a vertical cylindrical plane having a diameter 2 feet greater than the diameter of the floor opening, extending upward from the top floor to the ceiling on the uprunning side of the belt. No encroachment of structural or machine supporting members within this space will be permitted. (4-7-83)

ii. Pulley Clearance. (a)There shall be a clearance of at least 5 feet between the center of the head pulley shaft and any ceiling obstruction. (b)The center of the head pulley shaft shall be not less than 6 feet above the top terminal landing. (4-7-83)

iii. Emergency Grab Rail. An emergency grab bar or rail and platform shall be provided at the head pulley when the distance to the head pulley is over 6 feet above the top landing, otherwise only a grab bar or rail is to be provided to permit the rider to swing free should the emergency stops become inoperative. (4-7-83)

l. Emergency Exit Ladder. A fixed metal ladder accessible from both the "up" and "down" run of the manlift shall be provided for the entire travel of the manlift. Such ladder shall be in accordance with ANSI A14. 3-1956, Safety Code for Fixed Ladders, and Sections 2610 through 2616 in Chapter 26 of this Code. (4-7-83)

m. Superstructure Bracing. Manlift rails shall be secured in such a manner as to avoid spreading, vibration, and misalignment. (4-7-83)

n. Illumination. (4-7-83)

i. General. Both runs of the manlift shall be illuminated at all times when the lift is in operation. An intensity of not less than 1 foot candle shall be maintained at all points. See F.iii. for illumination requirements at landings. (4-7-83)

ii. Control of illumination. Lighting of manlift runways shall be by means of circuits permanently tied into the building circuits (no switches), or shall be controlled by switches at each landing. Where separate switches are provided at each landing, any switch shall turn on all lights necessary to illuminate the entire runway. (4-7-83)

o. Weather Protection. The entire manlift and its driving mechanism shall be protected from the weather at all times. (4-7-83)

03. Mechanical Requirements. (4-7-83)

a. Machines, General. (4-7-83)

i. Brakes. Brakes provided for stopping and holding a manlift shall be inherently self-engaging, by requiring power or force from an external source to cause disengagement. The brake shall be electrically released, and shall be applied to the motor shaft for direct-connected units or to the input shaft for belt driven units. The brake shall be capable of stopping and holding the manlift when the descending side is loaded with 250 lbs. on each step. (4-7-83)

ii. Belt (a)The belts shall be of hardwoven canvas, rubber coated canvas, leather, or other material meeting the strength requirements of Section 2610.C. of this Chapter, having a coefficient of friction such that when used in conjunction with an adequate tension device it will meet the brake test specified in i. above. (b) The width of the belt shall be not less than 12 inches for a travel not exceeding 100 feet, not less than 14 inches for a travel greater than 100 feet but not exceeding 150 feet and 16 inches for a travel exceeding 150 feet. (c) A belt that has become torn while in use on a manlift shall not be spliced and put back in service. (d) Belt Fastenings. Belts shall be fastened by a lapped splice or shall be butt spliced with a strap on the side of the belt away from the pulley. For lapped splices, the overlap of the belt at the splice shall be not less than three feet where the total travel of the manlift does not exceed one hundred feet and not less than four feet, if the travel exceeds one hundred feet. (e) Where butt splices are used, the straps shall extend not less than three feet on one side of the butt for a travel not in excess of one hundred feet, and four feet for a travel in excess of one hundred feet. (f) For 12 inch belts, the joint shall be fastened with not less than 20 special elevator bolts, each a minimum diameter of 1/4 inch. These bolts shall be arranged symmetrically in five

rows so arranged as to cover the area of the joint effectively. The minimum number of bolts for a belt width of 14 inches shall be not less than 23 and for belt widths of 16 inches, the number of bolts shall be not less than 27. (g) Pulleys. Drive pulleys and idler (boot) pulleys shall have a diameter not less than given in Table 2611-A. (4-7-83)

TABLE 2611-A

Belt Construction	Minimum Strength (lb. per inch of width)	Minimum Pully
(Diameter inches)		
5 ply	1500	20
6 ply	1800	20
7 ply	2100	22

NOTE: Table 2611-A is included solely for the purpose of determining the minimum diameter of pulley required for the listed number of plys of belt construction.

(h) Pulley Protection. The machine shall be so designed and constructed as to catch and hold the driving pulley in event of shaft failure. (4-7-83)

b. Speed. No manlift designed for a speed in excess of 80 feet per minute shall be installed. (4-7-83)

c. Platforms or Steps. (4-7-83)

i. Minimum Depth. Steps or platforms shall be not less than 12 inches nor more than 14 inches deep, measured from the belt to the edge of the step or platform. (4-7-83)

ii. Width. The width of the step or platform shall be not less than the width of the belt to which it is attached. (4-7-83)

iii. Distance Between Steps. The distance between steps shall be equally spaced and not less than 16 feet measured from the upper surface of one step to the upper surface of the next step above it. (4-7-83)

iv. Angle of Step. The surface of the step shall make approximately a right angle with the "up" and "down" run of the belt and shall travel in the approximate horizontal position with the "up" and "down" run of the belt. (4-7-83)

v. Surface. The upper or working surfaces of the step shall be of a material having inherent nonslip characteristics (coefficient of friction not less than 0.5) or shall be covered completely by a nonslip tread securely fastened to it. (4-7-83)

vi. Strength of Step Supports. When subjected to a load of 400 pounds applied at the approximate center of the step, step frames, or supports and their guides shall be of adequate strength to: (a) Prevent the disengagement of any step roller. (b)Prevent any appreciable misalignment. (c) Prevent any visible deformation of the steps or its support. (4-7-83)

vii. Prohibition of Steps Without Handholds. No steps shall be provided unless there is a corresponding handhold above or below it meeting the requirements of D. of this Section. If a step is removed for repairs or permanently, the handholds immediately above and below it shall be removed before the lift is again placed in service. (4-7-83)

d. Handholds. (4-7-83)

i. Location. Handholds attached to the belt shall be provided and installed so that they are not less than 4 feet nor more than 4 feet 8 inches above the step tread. These shall be so located as to be available on both the

"up" and "down" run of the belt. (4-7-83)

ii. Size. The grab surface of the handhold shall be not less than 4 1/2 inches in width, not less than 3 inches in depth, and shall provide 2 inches of clearance from the belt. Fastenings for handholds shall be located not less than 1 inch from the edge of the belt. (4-7-83)

iii. Strength. The handhold shall be capable of withstanding without damage, a load of 300 pounds applied parallel to the run of the belt. (4-7-83)

iv. Prohibition of Handhold Without Steps. No handhold shall be provided without a corresponding step. If a handhold is removed permanently or temporarily, the corresponding step and handhold for the opposite direction of travel shall also be removed before the lift is again placed in service. (4-7-83)

v. Type. All handholds shall be of the closed type. (4-7-83)

e. Up Limit Stops. (4-7-83)

i. Requirements. Two separate automatic stop devices shall be provided to cut off the power and apply the brake when a loaded step passes the upper terminal landing. One of these shall consist of a split-rail switch mechanically operated by the step roller and located not more than 6 inches above the top terminal landing. The second automatic stop device may consist of any of the following: (a) Any split-rail switch placed 6 inches above and on the side opposite the first limit switch. (b)An electronic device. (c) A switch actuated by a lever, rod, or plate, the latter to be placed on the "up" side of the head pulley so as to just clear a passing step. (4-7-83)

ii. Emergency Stop Switch, treadle type in pit on down side. An emergency stop treadle switch shall be placed in the areas below the lowest landing on the "down" side. This switch must stop the mechanism if a person should fail to get off at the lowest landing and be ejected from the step as it approaches its position to travel around the boot pulley. (4-7-83)

iii. Manual Reset Location. After the manlift has been stopped by a stop device it shall be necessary to reset the automatic stop manually. The device shall be so located that a person resetting it shall have a clear view of both the "up" and "down" runs of the manlift. It shall not be possible to reset the device from any step or platform. (4-7-83)

iv. Cut-off Point. The initial limit stop device shall function so that the manlift will be stopped before the loaded step has reached a point of 24 inches above the top terminal landing. (4-7-83)

v. Electrical Requirements (a)Where such switches open the main motor circuit directly they shall be of the multiple type. (b)Where electronic devices are used they shall be so designed and installed that failure will result in shutting off the power of the driving motor. (c)Where flammable vapors or dusts may be present, all electrical installations shall be in accordance with the National Electric Code, NFPA - 1971; and ANSI C1-1971 (R1968), requirements for such locations. (d)Unless of the oil immersed type controller contacts carrying the main motor current shall be copper to carbon or equal, except where the circuit is broken at two or more points simultaneously. (4-7-83)

f. Emergency Stop. (4-7-83)

i. General. An emergency stop means shall be provided. (4-7-83)

ii. Location. This stop means shall be within easy reach of the ascending and descending runs of the belt. (4-7-83)

iii. Operations. This stop means shall be so connected with the control lever or operating mechanism that it will cut off the power and apply the brake when pulled in the direction of travel. (4-7-83)

iv. Rope. If rope is used, it shall be not less than 3/8-inch in diameter. Wire rope, unless marlin-covered, shall not be used. (4-7-83)

g. Instruction and Warning Signs. (4-7-83)

i. Instruction signs at Landings or Belt. Signs of conspicuous and easily read style giving instructions for the use of the manlift shall be posted at each landing or stenciled on the belt. (a)Such signs shall be of letters not less than 1-inch in height and of a color having contrast with the surface on which it is stenciled or painted (white or yellow on black or black on white or gray). (b)The instructions shall read approximately as follows:

Face the Belt
Use the handholds
To Stop... Pull Rope

ii. Top Floor Warning Sign and Light. (a)At the top floor an illuminated sign shall be displayed bearing the following warning:

"TOP FLOOR. . . GET OFF"

Signs shall be in block letters not less than 2 inches in height. This sign shall be located within easy view of an ascending passenger and not more than 2 feet above the top terminal landing. (b)In addition to the sign required by a red warning light of not less than 40-watt rating shall be provided immediately below the upper landing terminal and so located as to shine in the passenger's face. (4-7-83)

iii. Bottom of Manlift Warning Signs, Light and Buzzer (a)Sign or Light. A sign or light warning the passenger he is approaching the bottom landing shall be posted above bottom landing in a conspicuous place. Sign or light to be similar in size to top warning light and sign noted above. (b)An Electric Buzzer. An electric buzzer shall be installed five (5) feet above the bottom landing on the down side to warn the rider that he is approaching the bottom landing and the buzzer shall be activated automatically by the weight of the load on a step. (4-7-83)

iv. Visitor Warning. A conspicuous sign having the following legend -- AUTHORIZED PERSONNEL ONLY - shall be displayed at each landing. The sign shall be of block letters not less than 2 inches in height and shall be of a color offering high contrast with the background color. (4-7-83)

04. Operating Rules. Proper Use of Manlifts. No freight, packaged goods, pipe, lumber or construction materials of any kind shall be handled on any manlift. (4-7-83)

05. Periodic Inspection. (7-1-93)

a. Frequency. All manlifts shall be inspected by a competent designated person at intervals of not more than 30 days. Limit switches shall be checked weekly. Manlifts found to be unsafe shall not be operated until properly repaired. (4-7-83)

b. Items Covered. This periodic inspection shall cover but is not limited to the following items: steps, step fastenings, rails, rail supports and fastenings, rollers and slides, belt and belt tension, handholds and fastenings, floor landings, guardrails, lubrication, limit switches, warning signs and lights, illumination, drive pulley, bottom (boot) pulley and clearance, pulley supports, motor driving mechanism, brake, electrical switches, vibration and misalignment, "skip" on up or down run when mounting step (indicating worn gears). (4-7-83)

c. Inspection log. A written record shall be kept of findings at each inspection. Records of inspection shall be made available to the Director of Labor & Industrial Services or his duly authorized representative. (4-7-83)

303. -- 309. (RESERVED).

310. WINDOW WASHING.

01. Requirements. (4-7-83)

a. Window cleaning requirements for all buildings for which construction or alteration bids are let

after January 1, 1969 shall be constructed to provide necessary equipment, fasteners and other means so as to comply with all provisions of the American National Standards Institute (A39.1 - 1969). (4-7-83)

b. All window cleaning shall be performed in compliance with standards as provided in ANSI A39. 1 - 1969. (4-7-83)

02. Definitions. (4-7-83)

a. "Building" means a building more than one story in height or having window sills more than twelve (12) feet above grade, which is a place of employment. (4-7-83)

b. The term "outside" means wholly without the building and/or establishment. (4-7-83)

c. The term "window cleaning" means all methods of cleaning windows. (4-7-83)

d. The term "safety belt" means the equipment which is attached to the body of the window cleaner while cleaning windows. (4-7-83)

e. "Waist band" means that part of the safety belt which is attached to the body of the window cleaner. (4-7-83)

f. "Terminal strap" means the strap or rope which is attached to the waist band and to which the belt terminals are attached. (4-7-83)

g. A "safe manner" means the method employed in cleaning windows in which the employee is protected: (4-7-83)

i. By standing or sitting on the sill while protected by a safety device, (4-7-83)

ii. By working from a ladder, (4-7-83)

iii. By working from a scaffold, or (4-7-83)

iv. By working from a boatswain's chair. (4-7-83)

h. "Belt terminal" means that part of the safety belt which is fastened to the terminal strap to be attached to the anchor during the operation of window cleaning. (4-7-83)

i. The term "anchor" means the fitting, fastened to the window frame or wall, to which the belt terminal is attached. (4-7-83)

j. The term "single-head anchor" means an anchor having one head. (4-7-83)

k. The term "double-head anchor" means an anchor having two heads. (4-7-83)

l. The term "machine bolt" means the bolts used to install anchors in steel window frames.q (4-7-83)

m. "Grade" means the ground, the floor, the sidewalk, the roof, or any approximately level solid surface of sufficient area and having sufficient structural strength to be considered as a safe place to work. (4-7-83)

03. Application. These orders shall apply to all window cleaning done in places of employment. (4-7-83)

04. Protection of persons engaged at window cleaning. (4-7-83)

a. The employer shall not require nor permit any window in such building to be cleaned from the outside unless means are provided to enable such work to be done in a safe manner as provided in these standards.

(4-7-83)

b. All employees required to clean windows shall use safety devices as required herein. (4-7-83)

05. General. (4-7-83)

a. In every building hereafter erected, having windows so constructed that it is usual and/or practicable for a person to stand on the sill in order to clean said window, there shall be installed window cleaner's safety anchors approved by the American Standard Association. (4-7-83)

b. When an employee is sitting on the window sill with his legs inside the room, he shall wear a safety belt equipped with a safety line. One end of the line shall be tied to a radiator, or any other substantial anchorage inside the room, unless the window opening is equipped with anchors in which case he shall attach his safety belt to said anchors. (4-7-83)

c. No safety device shall be used in window cleaning operations until it has the approval of the American Standard Association. (4-7-83)

d. The use of lag screws is prohibited in new or replacement installations hereafter made. (4-7-83)

e. Window cleaners shall not pass from one window to another window sill on the outside of a building unless one terminal is connected at all times. (4-7-83)

f. No employee who has not been properly trained to handle such equipment shall be assigned to work on scaffolds or boatswains chairs. (4-7-83)

g. All window cleaning safety devices hereafter approved shall bear identification marks to identify the approval of the American Standard Association. (4-7-83)

06. Belt Terminals, Anchors and Bolts. (4-7-83)

a. All anchors and belt terminals shall be capable of withstanding the following tests: (4-7-83)

i. To withstand an impact test of an iron weight of 32 pounds falling free a distance of four feet and striking the head of the anchor without fracture. (4-7-83)

ii. A drip test of 350 pounds dead weight (not sand) falling a distance of four feet without fracture. The connection between the weight and anchor being a standard safety belt or ropes or cables not over six feet long. (4-7-83)

iii. To withstand a tension pull of 6000 pounds without fracture. This tension to be applied through a belt terminal and in the direction which the anchor must withstand in service when a man falls. (4-7-83)

b. All metals used in the manufacture of anchors and belt terminals shall have a minimum ultimate tensile strength of 55,000 pounds per square inch, with an elongation of at least 25% in two inches and shall have a corrosion resistance of 60% as compared to copper. The belt terminal may be excepted from the corrosive resistance and elongation requirements of this order if of material and design of obvious superiority. (4-7-83)

c. All anchors installed hereafter shall be double-headed. These heads to be so designed or spaced that it will be impossible to attach the belt terminal to a single head. The Department of Labor and Industrial Services may approve a single-headed anchor upon sufficient tests and proofs. (4-7-83)

07. Belts. (4-7-83)

a. An approved safety belt of tanned leather, canvas, or any other approved material shall be used when the operator is required to stand on the sill while cleaning the window. The safety belt shall be capable of withstanding a drop test of 350 pounds dead weight (not sand) falling a distance of four feet without failure, one

terminal only being attached. The connection between the weight and the belt shall be the waist band of the belt. (4-7-83)

b. The safety belt shall be kept in repair. (4-7-83)

c. Window cleaners using a safety belt shall attach one belt terminal to anchors before stepping out onto the sill. During the operation of window cleaning, both belt terminals shall be attached to the anchors. (4-7-83)

d. The fittings on the waist band through which the terminal strap or rope passes shall be impossible for the safety terminals to pass through them. (4-7-83)

e. Metal thimbles shall be provided where ropes or straps are secured to eyes or rings. (4-7-83)

f. Suitable length terminal straps shall be provided for windows more than six feet wide between mullions. (4-7-83)

08. Anchor Installations. (4-7-83)

a. Locations: Anchors shall be attached to the side frames of the window or to the building at a point not less than 42 inches nor more than 51 inches (approximately) above the window sill. Care shall be taken when screwing up anchor fastenings, to prevent producing excess stresses. (4-7-83)

b. Wood - Existing and New Buildings. When anchors are attached to wood construction, through bolts of not less than 1/2 inch diameter, extending at least through the window frame with washers and nuts inside, shall be used as anchor fasteners. Means shall be provided to keep the nut from backing off. (4-7-83)

i. Wall flanges shall be not less than 1 1/4 inches in diameter, or equivalent area. (4-7-83)

c. Concrete - New Buildings: Anchors attached to concrete poured in place in buildings hereafter erected, shall be installed while the concrete is being placed. Such anchors shall extend not less than five inches into the concrete and shall have a cross-sectional area of not less than 1/4 of an inch and shall be provided with a fluke at the end of the anchor not less than 1 inch in length. (4-7-83)

d. Masonry - New Buildings: Anchors attached to masonry, other than concrete poured in place, in buildings hereafter erected, shall be installed while the wall is under construction and shall be shaped to build into the joints between masonry units. Such anchors shall be not less than 1/4 of an inch at all unexposed points and shall have a fluke or flukes having a holding surface of not less than one inch in length that shall be firmly imbedded in the masonry. (4-7-83)

e. Masonry and Concrete - Existing Buildings. Anchors installed on buildings of masonry and concrete construction heretofore erected, shall be attached to the window frames as required in these standards, or by other methods approved by the Department of Labor and Industrial Services. (4-7-83)

f. Hollow Metal - Existing and New Buildings: Anchors shall be attached to hollow metal construction by one of the following methods: (4-7-83)

i. At least two nickel steel bolts not less than 5/16 of an inch thick and not less than six inches long, placed on the inside of the frame and secured by means of nuts and lock washers. In cases where it is impracticable to provide nuts and lock washers, the reinforcing plate may be tapped to receive 5/16 inch diameter bolts, and the bolts shall extend through the plate. (4-7-83)

ii. Where the screw bolt is an integral part of the anchor, it shall be at least 1/2 inch in diameter and shall be secured by means of a nut and lock washer, or any other method approved by the Department of Labor and Industrial Services. (4-7-83)

iii. All anchors and anchor fastenings shall be provided with means to prevent them from turning, backing off or becoming loose. (4-7-83)

g. Solid Metal - Existing and New Buildings: Anchors shall be attached to solid metal construction by one of the following methods: (4-7-83)

i. At least two nickel steel bolts not less than 5/16 of an inch in diameter passing through the frame, and secured by means of nuts and lock washers. In cases where it is impracticable to provide nuts and lock washers, the metal frame shall be reinforced with a 5/16 inch thick plate and tapped to receive at least two 5/16 inch diameter nickel steel bolts, and the bolts shall extend through the reinforcing plate. (4-7-83)

ii. Where the screw bolt is an integral part of the anchor, it shall be at least 1/2 inch in diameter and shall be secured by means of a nut and lock washer, or any other method approved by the Department of Labor & Industrial Services. (4-7-83)

iii. All anchors and anchor fastenings shall be provided with means to prevent them from turning, backing off or becoming loose. (4-7-83)

09. Reversible and Pivot Windows. (4-7-83)

a. When it is necessary to clean reversible and pivot windows either of which is prevented from properly operating by obstructions or by the design of said windows, they shall be provided with safety devices of approved design. (4-7-83)

b. Horizontally pivoted sash. Provision shall be made so that the outside of horizontally pivoted windows may be cleaned without necessitating the window washer leaning against or putting his weight on the sash. (4-7-83)

10. Ladders. (4-7-83)

a. All movable ladders shall be provided with rough surface feet or other suitable means to prevent slipping. (4-7-83)

b. A person shall be placed at the foot of all ladders over 18 feet in length. (4-7-83)

c. No person shall be required to stand within four rungs of the top of any ladder. (4-7-83)

d. No ladder shall be used where the base of the ladder is above grade except where it is securely fastened so as to prevent it from slipping or falling. (4-7-83)

11. Boatswain's Chair. An employee shall be secured in his boatswain's chair with a safety belt or rope, and shall have a short rope with a sliding hitch between his body or the chair and the hoisting line. (4-7-83)

311. -- 319. (RESERVED).

320. MATERIALS HANDLING AND STORAGE, INCLUDING CRANES, DERRICKS, ETC., AND RIGGING.

01. Use of Mechanical Equipment. Where mechanical handling equipment is used, sufficient safe clearances shall be allowed for aisles, at leading docks, through doorways and wherever turns of passageways shall be kept clear and in good repair, with no obstruction across or in aisles that could create a hazard. Permanent aisles and passageways shall be appropriately marked. (4-7-83)

02. Secure Storage. Storage of material shall not create a hazard. Bags, containers, bundles, etc., stored in tiers shall be stacked, blocked, interlocked and limited in height so that they are stable and secure against sliding or collapse. (4-7-83)

03. Housekeeping. Storage areas shall be kept free from accumulation of materials that constitute hazards from tripping, fire, explosion, or pest harborage. Vegetation control will be exercised when necessary.

(4-7-83)

04. Drainage. Proper drainage shall be provided. (4-7-83)

05. Clearance Limits. Clearance signs to warn of clearance limits shall be provided. (4-7-83)

06. Rolling Railroad Cars. (4-7-83)

a. Derail and/or bumper blocks shall be provided on spur railroad tracks where a rolling car could contact other cars being worked, enter a building, work or traffic area. (4-7-83)

b. A clearly audible warning system shall be employed when cars are being moved by car pullers or locomotives, and when the person responsible for the moving does not have assurance that the area is clear, and it is safe to move the car or cars. (4-7-83)

07. Guarding. Covers and/or guardrails shall be provided to protect personnel from the hazards of open pits, tanks, vats, ditches, etc. (4-7-83)

08. Conveyors. Conveyors shall be constructed, operated, and maintained in accordance with the provisions of ANSI B20. 1 - 1957. The following additional provisions shall also apply where applicable: (4-7-83)

a. When the return strand of a conveyor operates within seven feet of the floor there shall be a trough provided of sufficient strength to carry the weight resulting from a broken chain. (4-7-83)

b. If the strands are over a passageway, a means shall be provided to catch and support the ends of the chain in the of (4-7-83)

c. When the working strand of a conveyor crosses within three feet of the floor level in passageways, the trough in which it works shall be bridged the full width of the passageway. (4-7-83)

d. Whenever conveyors pass adjacent to or over working areas or passageways used by personnel, protective guards shall be installed. These guards shall be designed to catch and hold any load or materials which may fall off or become dislodged and injure a worker. (4-7-83)

e. Walking on rolls prohibited. Employees shall not be allowed to walk on the rolls of rollertype conveyors except for emergency. (4-7-83)

f. Guarding Shaftway and Material Entrances of Elevator Type Conveyors. Guards, screens or barricades of sufficient strength and size to prevent material from falling shall be installed on all sides of the shaftway of elevator-type conveyors except at openings where material is loaded or unloaded. Automatic shaftway gates or suitable barriers shall be installed at each floor level where material is loaded or unloaded from the platform.(4-7-83)

g. Emergency Conveyor Stops. Conveyors shall be provided with an emergency stopping device which can be reached from the conveyor. Such device shall be located near the material entrance to each barker, chipper, saw, or similar type of equipment except where the conveyor leading into such equipment is under constant control of an operator who has full view of the material entrance and is located where he cannot possibly fall onto the conveyor. (4-7-83)

h. Safe Access to Conveyors. Where conveyors are in excess of 7 feet in height, means shall be provided to safely permit essential inspection and maintenance operations. (4-7-83)

i. Worn Parts. Any part showing signs of significant wear shall be inspected carefully and replaced prior to reaching a condition where it may create a hazard. (4-7-83)

j. Replacement of Parts. Replacement parts shall be equal to or exceed the manufacturer's specifications. (4-7-83)

09. Servicing Multi-Piece Rim Wheels. Servicing Multi-Piece Rim Wheels. These requirements apply to the servicing of vehicles wheels which have tube-type tires mounted on multipiece rims as defined below in Definitions. (4-7-83)

10. Definitions. (4-7-83)

a. "Charts" means the United States Department of Transportation, National Highway Traffic Safety Administration, (NHTSA) publications entitled "Safety Precautions for Mounting and Demounting Tube type Truck/ Bus tires" and "Multi-piece Rim/Wheel Matching Chart", or any other publications containing, at a minimum, the same instructions, safety precautions and other information contained on those charts that are applicable to the types of multi-piece rim wheels being serviced. (4-7-83)

b. "Installing a Wheel" means the transfer and attachment of an assembled wheel onto a vehicle axle hub."Removing" means the opposite of installing. (4-7-83)

c. "Mounting a Tire" means the assembly or putting together of rim components, tube, liner (flap) and tire to form a wheel including inflation."Demounting" means the opposite of mounting. (4-7-83)

d. "Multi-piece Rim" means a vehicle wheel rim consisting of two or more parts, one of which is a side or locking ring designed to hold the tire on the rim by interlocking components when the tube is inflated, regardless of the sizes of the component parts. (4-7-83)

e. "Restraining device" means a mechanical apparatus such as safety cage, rack, or safety bar arrangement or other machinery or equipment specifically designed for this purpose, that will constrain all multi-piece rim wheel components following their release during an explosive separation of the wheel components. (4-7-83)

f. "Rim manual" means a publication containing instructions from the manufacturer or other qualified organization for correct mounting, demounting, maintenance and safety precautions peculiar to the multi-piece rim being serviced. (4-7-83)

g. "Service" or "Servicing" means the mounting and demounting of multi-piece rim wheels, and related activity such as inflating, deflating, installing, removing, maintaining, handling or storing of multi-piece rim wheels, including inflating and deflating of wheels installed on vehicles. (4-7-83)

h. "Service Area" means that part of an employer's premises for the servicing of multi-piece rim wheels, or any other place where an employee services multi-piece rim wheels. (4-7-83)

i. "Trajectory" means any potential path or route that a lock ring, side ring, rim base and/or time may travel during an explosive rim separation, and includes paths which may deviate from that perpendicular to the assembled position of the components on the rim base at the time of separation. (4-7-83)

j. "Wheel" means an assemblage of time, tube, and multi-piece rim components. (4-7-83)

11. Employee Training. (4-7-83)

a. The employer shall provide a training program to train and instruct all employees who service multi-piece rim wheels in the hazards involved in servicing multi-piece rim wheels and the safety procedures to be followed. (4-7-83)

b. The employer shall assure that no employee services any multi-piece rim wheel unless the employee has been trained and instructed in correct procedures of mounting, demounting, and all related services, activities, and correct safety precautions for the rim type being serviced, and the safe operating procedures described in Section 2814 of this Chapter. (4-7-83)

c. Information to be used in the training program shall include at a minimum, the data contained on the charts and the contents of this standard. (4-7-83)

d. Where an employer knows or has reason to believe that any of his employees is unable to read and understand the charts or rim manual, the employer shall assure that the employee is instructed concerning the contents of the charts and rim manuals in a manner which the employee is able to understand. (4-7-83)

e. The employer shall assure that each employee demonstrates and maintains his ability to service multi-piece rim wheels safely, including performance of the following tasks: (4-7-83)

i. Demounting of tires (including deflation); (4-7-83)

ii. Inspection of wheel components; (4-7-83)

iii. Mounting of tires (including inflation within a restraining device); (4-7-83)

iv. Use of the restraining device; (4-7-83)

v. Handling of wheels; (4-7-83)

vi. Inflation of tires when a wheel is mounted on the vehicle; (4-7-83)

vii. Installation and removal of wheels. (4-7-83)

f. The employer shall evaluate each employee's ability to perform these tasks and to service multi-piece rim wheels safely and shall provide additional training as necessary to assure that each employee maintains his proficiency. (4-7-83)

12. Tire Servicing Equipment. (4-7-83)

a. The employer shall furnish and shall assure that employees use a restraining device in servicing multi-piece rim wheels. (4-7-83)

b. Each restraining device shall have the capacity to withstand the maximum force that would be transferred to it during an explosive wheel separation occurring at 150% of maximum tire specification pressure for the wheels being serviced. (4-7-83)

c. Restraining devices shall be capable of preventing rim components from being thrown outside or beyond the frame of the device for any wheel position within the device. (4-7-83)

d. Restraining devices shall be inspected prior to each day's use and after any explosive separation of wheel components and any restraining devices exhibiting any of the following defects shall be immediately removed from service: (4-7-83)

i. Cracks at welds; (4-7-83)

ii. Cracked or broken components; (4-7-83)

iii. Bent or sprung components due to excessive corrosion. (4-7-83)

e. Restraining devices removed from service in accordance with D.i. above through iv. of this Section shall not be returned to service until they are inspected, repaired, if necessary, and are certified either by the manufacturer or by a Registered Professional Engineer as meeting the strength requirements of Sections A., B., and C. of this Section. (4-7-83)

f. A clip-on-chuck with a sufficient length of hose to permit the employee to stand clear of the potential trajectory of the wheel components, and an in line valve with gauge or a pressure regulator preset to a desired value shall be furnished by the employer and used to inflate tires. (4-7-83)

g. Current charts shall be available in the service area. (4-7-83)

h. A current rim manual containing instructions for the type of rims being serviced shall be available in the service area. (4-7-83)

i. The employer shall assure that only tools recommended in the rim manual for the type of wheel being serviced are used to service multi-piece rim wheels. (4-7-83)

13. Wheel Component Acceptability. (4-7-83)

a. Wheel components shall not be interchanged except as provided in the charts, or in the applicable rim manuals. (4-7-83)

b. Wheel components shall be inspected prior to assembly. Rim bases, side rings, or lock rings which are bent out of shape, pitted from corrosion, broken or cracked, shall not be used and shall be rendered unusable and discarded. (4-7-83)

c. Mating surfaces of the rim gutter, rings and tire shall be free of any dirt, surface rust, scale or rubber buildup prior to mounting and inflation. (4-7-83)

14. Safe Operating Procedures. The employer shall establish a safe operating procedure for servicing multi-piece rim wheels and shall assure that employees are instructed in and follow that procedure. The procedure shall include at least the following elements: (4-7-83)

a. Tire shall be completely deflated before demounting by removal of the valve core. (4-7-83)

b. Tires shall be completely deflated by removing the valve core, before a wheel is removed from the axle in either of the following situations: (a) When the tire has been driven under inflated at 80% or less of its recommended pressure, or (b) When there is obvious or suspected damage to the tire or wheel components. (4-7-83)

c. Rubber lubricant shall be applied to bead and rim mating surfaces during assembly of the wheel and inflation of the tire. (4-7-83)

d. Tires shall be inflated only when contained by a restraining device, except that when the wheel assembly is on a vehicle, tires that are underinflated but have more than 80% of the recommended pressure, may be inflated while the wheel is on the vehicle if remote control inflation equipment is used and no employees are in the trajectory, and except as provided in A. i. of this section. (4-7-83)

e. When a tire is being partially inflated without a restraining device for the purpose of seating the lock ring or to round out the tube, such inflation shall not exceed 3 psig (0.21 kg/cm2). (4-7-83)

f. Whenever a tire is in a restraining device the employee shall not rest or lean any part of his body or equipment on or against the restraining device. (4-7-83)

g. After tire inflation, the tire, rim and rings shall be inspected while still within the restraining device to make sure that they are properly seated and locked. If further adjustment to the tire, rim or rings is necessary, the tire shall be deflated by removal of the valve core before the adjustment is made. (4-7-83)

h. Cracked, broken, bent or otherwise damaged rim components shall not be reworked, welded, brazed, or otherwise heated. (4-7-83)

i. No attempt shall be made to correct the seating of side and lock rings by hammering, striking or forcing the components while the tire is pressurized. (4-7-83)

j. Whenever multi-piece rim wheels are being handled, employees shall stay out of the trajectory unless the employer can demonstrate that performance of the servicing makes the employee's presence in the trajectory necessary. (4-7-83)

321. POWERED INDUSTRIAL TRUCKS.

01. Definitions. These definitions are applicable to all sections of this Chapter. The term "approved truck" or "approved industrial truck" means a truck that is listed or approved for tire safety purposes for the intended use by a nationally recognized testing laboratory, e.g. Underwriters' Laboratories, Inc.; Factory Mutual Engineering Corp., using nationally recognized testing standards. (4-7-83)

02. General Requirements. (4-7-83)

a. These requirements are applicable to all parts of Sections 2815 through 2833 of this Chapter. (4-7-83)

b. This section contains safety requirements relating to fire protection design, maintenance, and use of fork trucks, tractors, platform lift trucks, motorized hand trucks, and other specialized industrial trucks, powered by electric motors, or internal combustion engines. This section does not apply to compressed gas-operated industrial trucks, nor to farm vehicles, to vehicles intended primarily for earth moving or over-the-road hauling. (4-7-83)

c. All new powered industrial trucks acquired and used by an employer after the effective date of these standards shall meet the design and construction requirements for powered industrial trucks established in the "American National Standard for Powered Industrial Trucks Part II, ANSI B56.1-1969", except for vehicles intended primarily for earth moving or over-the-road hauling. (4-7-83)

d. Approved trucks shall bear a label or some other identifying mark indicating approval by the testing laboratory as meeting the specifications and requirements of ANSI B56.1-1969. (4-7-83)

e. Modifications and additions which affect capacity and safe operation shall not be performed by the customer or user without manufacturers prior written approval. Capacity, operation, and maintenance instruction plates, tags, or decals shall be changed accordingly. (4-7-83)

f. If the truck is equipped with front end attachments other than factory installed attachments, it shall be marked to identify the attachments and show the approximate weight of the truck and attachment combination at maximum elevation with load laterally centered. (4-7-83)

g. The user shall see that all nameplates and markings are in place and are maintained in a legible condition. (4-7-83)

03. Designations. For the purpose of this standard, there are eleven different designations of industrial trucks or tractors as follows: D, DS, DY, E, ES, EE, EX, G, GS, LP, AND LPS. (4-7-83)

a. The D designated units are units similar to the G units except that they are diesel engine powered instead of gasoline engine powered. (4-7-83)

b. The DS designated units are diesel powered units that are provided with additional safeguards to the exhaust, fuel and electrical systems. They may be used in some locations where a D unit may not be considered suitable. (4-7-83)

c. The DY designated units are diesel powered units that have all the safeguards of the DS units and in addition do not have any electrical equipment, including the ignition, and are equipped with temperature limitation features. (4-7-83)

d. The E designated units are electrically powered units that have minimum acceptable safeguards against inherent fire hazards. (4-7-83)

e. The ES designated units are electrically powered units that, in addition to all of the requirements for the E units are provided with additional safeguards to the electrical system to prevent emission of hazardous sparks and to limit surface temperatures. They may be used in some locations where the use of an E unit may not be

considered suitable. (4-7-83)

f. The EE designated units are electrically powered units that have, in addition to all of the requirements for the E and ES units, the electric motors and all other electrical equipment completely enclosed. In certain locations the EE unit may be used where the use of an E and ES unit may not be considered suitable. (4-7-83)

g. The EX designated units are electrically powered units that differ from E, Es, or EE units in that the electrical fittings and equipment are so designed, constructed and assembled that the units may be used in certain atmospheres containing flammable vapors or dusts. (4-7-83)

h. The G designated units are gasoline powered units having minimum acceptable safeguards against inherent fire hazards. (4-7-83)

i. The GS designated units are gasoline powered units having minimum acceptable safeguards against inherent fire hazards. (4-7-83)

j. The LP designated unit is similar to the G unit except that liquefied petroleum gas is used for fuel instead of gasoline. (4-7-83)

k. The LPS designated units are liquefied petroleum gas powered units that are provided with additional safeguards to the exhaust, fuel, and electrical systems. They may be used in some locations where the use of an LP unit may not be considered suitable. (4-7-83)

l. The atmosphere or location shall have been classified as to whether it is hazardous or nonhazardous prior to the consideration of industrial trucks being used therein and the type of industrial trucks required shall be as provided in Section 2819 of this chapter, for such location. (4-7-83)

04. Designated Locations. (4-7-83)

a. The industrial trucks specified under B. of this section are the minimum types required by industrial trucks having greater safeguards may be used if desired. (4-7-83)

b. For specific areas of use, see Table 2818-A following this section, which tabulates the information contained in this section. References in parentheses are to the corresponding classification as used in the National Electrical Code NFPA No. 70-1971; ANSI Standard CI-1971 (Rev. of 1968) for the convenience of persons familiar with those classifications. (4-7-83)

i. Power-operated industrial trucks shall not be used in atmospheres containing hazardous concentration of acetylene, butadiene, ethylene oxide, hydrogen (or gases or vapors equivalent in hazard to Hydrogen, such as manufactured gas), propylene oxide, acetaldehyde, cyclopropane, diethyl ether, ethylene, isoprene, or unsymmetrical dimenthyl hydrazine (UDMH).(a)Power-operated industrial trucks shall not be used in atmospheres containing hazardous concentrations of metal dust, including aluminum, magnesium, and their commercial alloys, other metals of similarly hazardous characteristics, or in atmospheres containing carbon black, coal or coke dust except approved power-operated industrial trucks designated as EX may be used in such atmospheres.(b)In atmospheres where dust of magnesium, aluminum or aluminum bronze may be present, fuses, switches, motor controllers, and circuit breakers of trucks shall have enclosures specifically approved for such locations. (4-7-83)

ii. Only approved power operated industrial trucks designated as EX may be used in atmospheres containing acetone, acrylonitrile, alcohol, ammonia, benzine, bensol, butane, ethylene dichloride, gasoline, hexane, lacquer solvent vapors, naphtha, natural gas, propane, propylene, of zylenes in quantities sufficient to produce explosives or ignitable mixtures and where such concentrations of these gases or vapors exist continuously, intermittently or periodically under normal operating conditions or may exist frequently because of repair, maintenance operations, leakage, breakdown or faulty operation of equipment. (4-7-83)

iii. Power operated industrial trucks designated as DY, EE, or EX may be used in locations where volatile flammable liquids or flammable gases are handled, processed or used, but in which the hazardous liquids,

vapors or gases will normally be confined within closed containers or closed systems from which they can escape only in case of accidental rupture or breakdown of such containers or systems, or in the case of abnormal operation of equipment; also in locations in which hazardous concentrations of gases or vapors are normally prevented by positive mechanical ventilation but which might become hazardous through failure or abnormal operation of the ventilation equipment; or in locations which are adjacent to Class I, Division I locations, and to which hazardous concentration of gases or vapors might occasionally be communicated unless such communication is prevented by adequate positive-pressure ventilation from a source of clear air, and effective safeguards against ventilation failure are provided. (4-7-83)

iv. In locations used for the storage of hazardous liquids in sealed containers or liquefied or compressed gases in containers approved power-operated industrial trucks designated as DS, ES, GS, or LPS may be used. This classification includes locations where volatile flammable liquids or flammable gases or vapors are used, but which would become hazardous only in case of an accident or of some unusual operation condition. The quantity of hazardous material that might escape in case of accident, the adequacy of ventilating equipment, the total area involved and the record of the industry or business with respect to explosions or fires are all factors that should receive consideration in determining whether or not the DS or DY, ES, EE, GS, LPS designated truck possesses sufficient safeguards for the location. Piping without valves, checks, meters and similar devices would not ordinarily be deemed to introduce a hazardous condition even though used for hazardous liquids or gases. Locations used for the storage of hazardous liquids or of liquefied or compressed gases in sealed containers would not normally be considered hazardous unless subject to other hazardous conditions also.(a)Only approved power operated industrial trucks designated as EX shall be used in atmospheres in which combustible dust is or may be in suspension continuously, intermittently, or periodically under normal operating conditions, in quantities sufficient to produce explosive or ignitable mixtures, or where mechanical failure of abnormal operation of machinery or equipment might cause such mixtures to be produced.(b)The EX classification usually includes the working areas of grain handling and storage plants, room containing grinders or pulverizers, cleaners, graders, scalpers, open conveyors or spouts, open bins or hoppers, mixers, or blenders, automatic or hopper scales, packing machinery, elevator heads and boots, stock distributors, dust and stock collectors, (except all-metal collectors vented to the outside), and all similar dust producing machinery and equipment in grain processing plants, starch plants, sugar pulverizing plants, malting plants, hay grinding plants, and other occupancies of similar nature; coal pulverizing plants (except where the pulverizing equipment is essentially dust tight); all working areas where metal dusts and powders are produced, processed, handled, packed, or stored (except in tight containers); and other similar locations where combustible dust may, under normal operating conditions, be present in the air in quantities sufficient to produce explosive or ignitable mixtures. (4-7-83)

v. Only approved power operated industrial trucks designated as DY, EE, or EX shall be used in atmospheres in which combustible dust will not normally be in suspension in the air or will not be likely to be thrown into suspension by the normal operation of equipment or apparatus in quantities sufficient to produce explosive or ignitable mixtures but where deposits or accumulations of such dust may be ignited by arcs or sparks originating in the truck. (4-7-83)

vi. Only approved power operated industrial trucks designated as DY, EE, or EX shall be used in locations which are hazardous because of the presence of easily ignitable fibers or flyings but in which such fibers or flyings are not likely to be in suspension in the air in quantities sufficient to produce ignitable mixtures. (4-7-83)

vii. Only approved power operated industrial trucks designated as DS, DY, ES, EE, EX, GS, or LPS shall be used in locations where easily ignitable fibers are stored or handled including outside storage, but are not being processed or manufactured. Industrial trucks designated as E, which have been previously used in these locations may be continued in use. (4-7-83)

viii. On piers and wharves handling general cargo, any approved power operated industrial truck designated as Type D, E, G, or LP may be used, or trucks which conform to the requirements for these types may be used. (4-7-83)

ix. If storage warehouses and outside storage locations are hazardous only the approved power operated industrial truck specified for such locations in Section 2818 shall be used. If not classified as hazardous, any approved power operated industrial truck designated as Type D, E, G, or LP may be used, or trucks which conform to the requirements for these types may be used. (4-7-83)

x. If general industrial or commercial properties are hazardous, only approved power operated industrial trucks specified for such locations in this section shall be used. If not classified as hazardous, any approved power operated industrial truck designated as Type D, E, G, or LP may be used, or trucks which conform to the requirements of these types may be used. (4-7-83)

05. Converted Industrial Trucks. Power operated industrial trucks that have been originally approved for the use of gasoline for fuel, when converted to the use of liquefied petroleum gas fuel in accordance with Section 2832 may be used in those locations where G, GS, or LP and LPS designated trucks have been specified in the preceding sections. (4-7-83)

06. Safety Guards. (4-7-83)

a. High lift rider trucks shall be fitted with an overhead guard manufactured in accordance with Section 2816 unless operating conditions do not permit. (4-7-83)

b. If the type of load presents a hazard, the user shall equip fork trucks with a vertical load backrest extension manufactured in accordance with section 2816.B. of this Chapter. (4-7-83)

07. Fuel Handling and Storage. (4-7-83)

a. The storage and handling of liquid fuels such as gasoline and diesel fuel shall be in accordance with NFPA Flammable and Combustible Liquids Code (NFPA No. 30-1969). (4-7-83)

b. The storage and handling of liquefied petroleum gas fuel shall be in accordance with NFPA Storage and Handling of Liquefied Petroleum Gases (NFPA No. 58-1969). (4-7-83)

08. Changing and Charging Storage Batteries. (4-7-83)

a. Battery charging installations shall be located in areas designated for that purpose. (4-7-83)

b. Facilities shall be provided for flushing and neutralizing spilled electrolyte, for fire protection, for protecting charging apparatus from damage by trucks, and for adequate ventilation for dispersal of fumes from gassing batteries. (4-7-83)

c. When racks are used for support of batteries, they should be made of materials nonconductive to spark generation or be coated or covered to achieve this objective. (4-7-83)

d. A conveyor, overhead hoist, or equivalent material handling equipment shall be provided for handling batteries. (4-7-83)

e. Reinstalled batteries shall be properly positioned and secured in the truck. (4-7-83)

f. A carboy tilter or siphon shall be provided for handling electrolyte. (4-7-83)

g. When charging batteries, acid shall be poured into water; water shall not be poured into acid. (4-7-83)

h. Trucks shall be properly positioned and brake applied before attempting to change or charge batteries. (4-7-83)

i. When charging batteries, the vent caps should be kept in place to avoid electrolyte spray. Care shall be taken to assure that vent caps are functioning. The battery (or compartment) cover(s) shall be open to dissipate heat. (4-7-83)

j. Smoking shall be prohibited in the charging area. (4-7-83)

k. Precautions shall be taken to prevent open flames, sparks, or electric arcs in battery charging areas. (4-7-83)

l. Tools and other metallic objects shall be kept away from the top of uncovered batteries. (4-7-83)

09. Lighting for Operating Areas. (4-7-83)

a. Controlled lighting of adequate intensity should be provided in operating areas. (See American National Standard Practice for Industrial Lighting, A11. 1-1965 R 1970). (4-7-83)

b. Where general lighting is less than 2 lumens per square foot, auxiliary directional lighting shall be provided on the truck. (4-7-83)

10. Control of Noxious Gases and Fumes. (4-7-83)

a. Concentration levels of carbon monoxide gas created by powered industrial truck operations shall not exceed the levels specified in Section 1801 in Chapter R of this Code. (4-7-83)

b. Questions concerning degrees of concentration and methods of sampling to ascertain the conditions should be referred to a qualified industrial hygienist. (4-7-83)

11. Dockboards (Bridge Plates). (4-7-83)

a. Portable and powered dockboards shall be strong enough to carry the load imposed on them. (4-7-83)

b. Portable dockboards shall be secured in position, either by being anchored or equipped with devices which will prevent their slipping. (4-7-83)

c. Powered dockboards shall be designed and constructed in accordance with Commercial Standard CS202-56 (1956) "Industrial Lifts and Hinged Loading Ramps" published by the U. S. Department of Commerce. (4-7-83)

d. Handholds, or other effective means, shall be provided on portable dockboards to permit safe handling. (4-7-83)

e. Positive protection shall be provided to prevent railroad cars from being moved while dockboards or bridge plates are in position. (4-7-83)

12. Trucks and Railroad Cars. (4-7-83)

a. The brakes of highway trucks shall be set and wheel chocks placed under the rear wheels to prevent the trucks from rolling while they are boarded with powered industrial trucks. (4-7-83)

b. Wheel stops or other recognized positive protection shall be provided to prevent railroad cars from moving during loading or unloading operations. (4-7-83)

c. Fixed jacks may be necessary to support a semi-trailer and prevent upending during the loading or unloading when the trailer is not coupled to a tractor. (4-7-83)

d. Positive protection shall be provided to prevent railroad cars from being moved while dockboards or bridge plates are in position. (4-7-83)

13. Operator Training. Only trained and authorized operators shall be permitted to operate a powered industrial truck. Methods shall be devised to train operators in the safe operation of powered industrial trucks. (4-7-83)

14. Truck Operations. (4-7-83)

a. Trucks shall not be driven up to anyone standing in front of a bench or other fixed object. (4-7-83)

b. No person shall be allowed to stand or pass under the elevated portion of any truck, whether loaded or empty. (4-7-83)

c. Unauthorized personnel shall not be permitted to ride on powered industrial trucks. A safe place to ride shall be provided where riding of trucks is authorized. (4-7-83)

d. The employer shall prohibit arms or legs from being placed between the uprights of the mast or outside the running lines of the truck. (4-7-83)

e. When leaving a powered industrial truck unattended, load engaging means shall be shut off, and brakes set. Wheels blocked if the truck is parked on an incline. (4-7-83)

i. A powered industrial truck is unattended when the operator is 25 feet or more away from the vehicle which remains in his view, or whenever the operator leaves the vehicle and it is not in his view. (4-7-83)

ii. When the operator of an industrial truck is dismounted and within 25 feet of the truck still in his view, the load engaging means shall be fully lowered, controls neutralized, and the brakes set to prevent movement. (4-7-83)

f. A safe distance shall be maintained from the edge of ramps or platforms while on any elevated dock, or platform or freight car. Trucks shall not be used for opening or closing freight doors. (4-7-83)

g. Brakes shall be set and wheel blocks shall be in place to prevent movement of trucks, trailers, or railroad cars while loading or unloading. Fixed jacks may be necessary to support a semitrailer during loading or unloading when the trailer is not coupled to a tractor. The flooring of truck trailers, and railroad cars shall be checked for breaks and weakness before they are driven onto. (4-7-83)

h. There shall be sufficient headroom under overhead installations, lights, pipes, sprinkler systems, etc. (4-7-83)

i. An overhead guard shall be used as protection against falling objects. It should be noted that an overhead guard is intended to offer protection from the impact of small packages, boxes, bagged material, etc., representative of the job application, but not to withstand the impact of a falling capacity load. (4-7-83)

j. A load backrest extension shall be used whenever necessary to minimize the possibility of the load or part of it from falling rearward. (4-7-83)

k. Only approved industrial trucks shall be used in hazardous locations. (4-7-83)

l. Whenever a truck is equipped with vertical only, or vertical and horizontal controls elevatable with the lifting carriage or forks for lifting personnel, the following additional precautions shall be taken for the protection of personnel being elevated. (4-7-83)

i. Use of a safety platform firmly secured to the lifting carriage and/or forks. (4-7-83)

ii. Means shall be provided whereby personnel on the platform can shut off power to the truck. (4-7-83)

iii. Such protection from falling objects as indicated necessary to the operating conditions shall be provided. (4-7-83)

m. Using Forklifts as Elevated Work Platforms. A platform or structure built specifically for hoisting persons may be used providing the following requirements are complied with: (4-7-83)

i. The structure must be securely attached to the forks and shall have standard guardrails and toeboards installed on all sides. (4-7-83)

ii. The hydraulic system shall be so designed that the lift mechanism will not drop faster than 125 feet per minute in the event of a failure in any part of the system. Forklifts used for elevating work platforms shall be identified that they are so designed. (4-7-83)

iii. A safety strap shall be installed or the control lever shall be locked to prevent the boom from tilting. (4-7-83)

iv. An operator shall attend the lift equipment while workers are on the platform. (4-7-83)

v. The operator shall be in the normal operating position while raising or lowering the platform. (4-7-83)

vi. The vehicle shall not travel from point to point while workers are on the platform except that inching or maneuvering at very slow speed is permissible. (4-7-83)

vii. The area between workers on the platform and the mast shall be adequately guarded to prevent contact with chains or other shear points. (4-7-83)

n. Fire aisles, access to stairways, and fire equipment shall be kept clear. (4-7-83)

15. Traveling. (4-7-83)

a. All traffic regulations shall be observed, including authorized plant speed limits. A safe distance shall be maintained approximately three truck lengths from the truck ahead, and the truck shall be kept under control at all times. (4-7-83)

b. The right of way shall be yielded to ambulances, fire trucks, or other vehicles in emergency situations. (4-7-83)

c. Other trucks traveling in the same direction at intersections, blind spots, or other dangerous locations shall not be passed. (4-7-83)

d. The driver shall be required to slow down and sound the horn at cross aisles and other locations where vision is obstructed. If the load being carried obstructs forward view, the driver shall be required to travel with the load trailing. (4-7-83)

e. Railroad tracks shall be crossed diagonally wherever possible. Parking closer than 8 feet from the center of railroad tracks is prohibited. (4-7-83)

f. The driver shall be required to look in the direction of, and keep a clear view of the path of travel. (4-7-83)

g. Grades shall be ascended or descended slowly. (4-7-83)

i. When ascending or descending grades in excess of 10 percent, loaded trucks shall be driven with the load upgrade. (4-7-83)

ii. Unloaded trucks should be operated on all grades with the load engaging means downgrade. (4-7-83)

iii. On all grades the load and load engaging means shall be tilted back if applicable, and raised only as far as necessary to clear the road surface. (4-7-83)

h. Under all travel conditions the truck shall be operated at a speed that will permit it to be brought to a stop in a safe manner. (4-7-83)

i. Stunt driving and horseplay shall not be permitted. (4-7-83)

j. The driver shall be required to slow down for wet and slippery floors. (4-7-83)

k. Dockboard or bridgeplates, shall be properly secured before they are driven over. Dockboard or bridgeplates shall be driven over carefully and slowly and their rated capacity never exceeded. (4-7-83)

l. Elevators shall be approached slowly, and then entered squarely after the elevator car is properly leveled. Once on the elevator, the controls shall be neutralized, power shut off, and the brakes set. (4-7-83)

m. Motorized hand trucks must enter elevator or other confined areas with load end forward. (4-7-83)

n. Running over loose objects on the roadway surface shall be avoided. (4-7-83)

o. While negotiating turns, speed shall be reduced to a safe level by means of turning the hand steering wheel in a smooth, sweeping motion. Except when maneuvering at a very low speed, the hand steering wheel shall be turned at a moderate even rate. (4-7-83)

16. Loading. (4-7-83)

a. Only stable or safely arranged loads shall be handled. Caution shall be exercised when handling off-center loads which cannot be centered. (4-7-83)

b. Only loads within the rated capacity of the truck shall be handled. (4-7-83)

c. The long or high (including multiple-tiered) loads which may affect capacity shall be adjusted. (4-7-83)

d. When attachments are used, particular care should be taken in securing, manipulating, positioning, and transporting the load. Trucks equipped with attachments shall be operated as partially loaded trucks when not handling a load. (4-7-83)

e. A load engaging means shall be placed under the load as far as possible; the mast shall be carefully tilted backward to stabilize the load. (4-7-83)

f. Extreme care shall be used when tilting the load forward or backward, particularly when high tiering. Tilting forward with load engaging means elevated shall be prohibited except to pick up a load. An elevated load shall not be tilted forward except when the load is in a deposit position over a rack or stack. When stacking or tiering, only enough backward tilt to stabilize the load shall be used. (4-7-83)

17. Operation of the Truck. (4-7-83)

a. If at any time a powered industrial truck is found to be in need of repair, defective, or in any way unsafe, the truck shall be taken out of service until it has been restored to safe operating condition. (4-7-83)

b. Fuel tanks shall not be filled while the engine is running. Spillage shall be avoided. (4-7-83)

c. Spillage of oil or fuel shall be carefully washed away or completely evaporated and the fuel tank cap replaced before restarting engine. (4-7-83)

d. No truck shall be operated with a leak in the fuel system until the leak has been corrected. (4-7-83)

e. Open flames shall not be used for checking electrolyte level in storage batteries or gasoline level in fuel tanks. (4-7-83)

18. Maintenance of Industrial Trucks. (4-7-83)

a. Any power operated industrial truck not in safe operating condition shall be removed from service. All repairs shall be made by authorized personnel. (4-7-83)

b. No repairs shall be made in Classes I, II, and III locations. (4-7-83)

c. Those repairs to the fuel and ignition systems of industrial trucks which involve fire hazards shall be conducted only in locations designated for such repairs. (4-7-83)

d. Trucks in need of repairs to the electrical system shall have the battery disconnected prior to such repairs. (4-7-83)

e. All parts of any such industrial truck requiring replacement shall be replaced only by parts equivalent as to safety with those used in the original design. (4-7-83)

f. Industrial trucks shall not be altered so that the relative positions of the various parts are different from what they were when originally received from the manufacturer, nor shall they be altered either by the addition of extra parts not provided by the manufacturer or by the elimination of any parts, except as provided in Section 2816 of this Chapter. Additional counter-weighting of fork trucks shall not be done unless approved by the truck manufacturer. (4-7-83)

g. Industrial trucks shall be examined before being placed in service, and shall not be placed in service, and shall not be placed in service if the examination shows any condition adversely affecting the safety of the vehicle. Such examination shall be made at least daily. Where industrial trucks are used on a round-the-clock basis, they shall be examined after each shift. Defects when found shall be immediately reported and corrected. (4-7-83)

h. Water mufflers shall be filled daily or as frequently as is necessary to prevent depletion of the supply of water below 75% of the filled capacity. Vehicles with mufflers having screens or other parts that may become clogged shall not be operated while such screens or parts are clogged. A vehicle that emits hazardous sparks or flames from the exhaust system shall immediately be removed from service, and not returned to service until the cause of the emission of such sparks and flames has been eliminated. (4-7-83)

i. When the temperature of any part of any truck is found to be in excess of its normal operating temperature, thus creating a hazardous condition, the vehicle shall be removed from service and not returned to service until the cause for such overheating has been eliminated. (4-7-83)

j. Industrial trucks shall be kept in a clean condition, free of lint, excess oil and grease. Noncombustible agents should be used for cleaning trucks. Low flash point (below 100 degrees F.) solvents shall not be used. High flash point (at or above 100 degrees F.) solvents may be used. Precautions regarding toxicity, ventilation, and fire hazard shall be consonant with the agent or solvent used. (4-7-83)

k. Where it is necessary to use antifreeze in the engine cooling system, only those products having glycol base shall be used. (4-7-83)

l. Industrial trucks originally approved for the use of gasoline for fuel may be converted to liquefied petroleum gas fuel provided the complete conversion results in a truck which embodies the features specified for LP or LPS designated trucks. Such conversion equipment shall be approved. The description of the component parts of this conversion system and the recommended method of installation on specific trucks are contained in the "Listed by Report". (4-7-83)

19. Motor Vehicle Trucks and Trailers. (4-7-83)

a. Only qualified drivers shall be permitted to operate motor vehicle trucks, and shall possess a current Motor Vehicle Operator's license. (4-7-83)

b. Motor vehicle trucks must be equipped with brakes which will safely hold the maximum load on maximum grades. (4-7-83)

c. Trailers must be equipped with good, workable air brakes, or other type of brake equipment approved by the State Commission of Equipment. Air must be cut into the trailer brake system at the time that the trailer is coupled to the truck. (4-7-83)

d. Brakes on trucks and trailers must be tested before equipment descends a steep grade. (4-7-83)

e. Truck drivers shall at all times operate equipment at a safe speed for roadway conditions. (4-7-83)

f. Safe methods of loading and unloading motor vehicle trucks and trailers shall be observed at all times. (4-7-83)

g. To prevent accidents during the backing of trucks where vision is obstructed, the signalman shall be stationed at a point giving him a clear view of the rear of the truck and the operator of the truck at all times. (4-7-83)

h. Truck drivers shall sound their horn before starting to back, and shall sound the horn intermittently during the entire backing operation. (4-7-83)

i. Dump trucks shall have a device installed on the frame which will be of sufficient strength to hold the bed in the raised position when employees are working in an exposed position underneath. (4-7-83)

j. All parts and accessories of trucks and trailers shall be kept in good repair and safe condition. Tires worn beyond the point of safety shall not be used. (4-7-83)

k. All motor vehicle trucks and trailers shall be equipped with standard lights, horn, flags, flares, etc. to conform to the State of Idaho Motor Vehicle Laws. (4-7-83)

l. All loads transported on trucks and/or trucks and trailers shall be properly secured and distributed, and limited to a safe operating load for the condition of the roadway, and the capacity of the bridges, trestles, and other structures. (4-7-83)

m. Precautions to be taken while inflating tires. Unmounted split-rim wheels shall be placed in a safety cage or other device shall be used which will prevent a split-rim from striking the worker if it should dislodge while the tire is being inflated. (4-7-83)

n. Trucks parked on an incline shall have the steered wheels turned into the curb and shall have at least one "Driver" wheel chocked on each side, independent of the braking system. (4-7-83)

o. Motor vehicles used regularly for transportation of workmen shall be well equipped, covered against the weather and maintained in good mechanical condition at all times. (4-7-83)

i. Seats, which shall be properly secured, shall be provided in each vehicle to accommodate the total number of workers normally transported. Where it becomes necessary under emergency conditions to transport more workers than the seating capacity of the truck will accommodate, all workers not having seats shall ride within the vehicle. Under no circumstances shall workers ride on fenders or running boards of the vehicle. (4-7-83)

ii. No worker shall ride in or on any vehicle with his legs hanging over the end or sides. A safety bar should be placed across the rear opening of all manhaul trucks which are not equipped with tailgates. (4-7-83)

iii. Vehicles shall be equipped with compartments or screen of such strength to retain sharp tools which could present a hazard to employees being transported. (4-7-83)

iv. All dump-trucks used to transport workers shall be equipped with an adequate safety chain or locking device which will eliminate the possibility of the body of the truck being raised while workers are riding in the truck. (4-7-83)

v. Explosives or highly inflammable materials shall not be carried in or on any vehicle while it is used to transport workers. (4-7-83)

vi. Exhaust systems shall be installed and maintained in proper condition, and shall be so designed as to eliminate the exposure of the workers to the exhaust gases and fumes. (4-7-83)

vii. (a)The number of persons allowed in the cab of a single bench seat crew truck shall not exceed two in addition to the driver. Crew trucks designed and constructed with additional seating capacity behind the normal driver's seat may carry additional passengers in the seating area behind the driver's seat. Crew trucks with bucket-type seats may carry only the number of passengers for which the bucket seats are provided. In any seating arrangement, the driver must be able to maintain full freedom of motion. Additionally, the number of passengers or seating arrangement shall not obstruct the driver's normal vision.(b) When trucks are designed and constructed with larger than normal seating capacity in the front seat, the total number of passengers may be increased provided that the operator's vision and control functions, as required in vii. (a) are maintained. (4-7-83)

viii. All enclosed crew trucks shall have an emergency exit in addition to the regular entrance. (4-7-83)

ix. Trucks used for hauling gravel shall not be used as crew trucks unless they are equipped as follows: (a)Steps in proper place or places; (b)wooden floors; (c)seats are securely fastened; (d)truck is properly covered; (e)All other general regulations covering crew trucks are fully conformed with. (4-7-83)

x. Half-ton vehicles shall haul not more than six persons including the driver. Three-quarter-ton vehicles shall haul not more than eight persons including the driver. (4-7-83)

xi. All vehicles carrying crews shall be equipped with stretchers and fire extinguishers. (4-7-83)

xii. No heating units in which there are open fires shall be used in vehicles transporting crews. (4-7-83)

322. OVERHEAD AND GANTRY CRANES.

01. Definitions. (4-7-83)

a. A "Crane" is a machine for lifting and lowering a load and moving it horizontally, with the hoisting mechanism an integral part of the machine. Cranes whether fixed or mobile are driven manually or by power. (4-7-83)

b. An "automatic crane" is a crane which when activated operates through a preset cycle or cycles. (4-7-83)

c. A "cab-operated crane" is a crane controlled by an operator in a cab located on the bridge or trolley. (4-7-83)

d. "Cantilever gantry crane" means a gantry or semigantry crane in which the bridge girders or trusses extend transversely beyond the crane runway on one or both sides. (4-7-83)

e. "Floor-operated crane" means a crane which is pendant or nonconductive rope controlled by an operator on the floor or an independent platform. (4-7-83)

f. "Gantry crane" means a crane similar to an overhead crane except that the bridge for carrying the trolley or trolleys is rigidly supported on two or more legs running on fixed rails or other runway. (4-7-83)

g. "Hot metal handling crane" means an overhead crane used for transporting or pouring molten material. (4-7-83)

h. "Overhead crane" means a crane with a movable bridge carrying a movable or fixed hoisting mechanism and traveling on an overhead fixed runway structure. (4-7-83)

i. "Power-operated crane" means a crane whose mechanism is driven by electric, air, hydraulic, or internal combustion means. (4-7-83)

j. A "pulpit-operated crane" is a crane operated from a fixed operator station not attached to the crane. (4-7-83)

k. A "remote-operated crane" is a crane controlled by an operator not in a pulpit or in the cab attached to the crane, by any method other than pendant or rope control. (4-7-83)

l. A "semigantry crane" is a gantry crane with one end of the bridge rigidly supported on one or more legs that run on a fixed rail or runway, the other end of the bridge being supported by a truck running on an elevated rail or runway. (4-7-83)

m. "Storage bridge crane" means a gantry type crane of long span usually used for bulk storage of material; the bridge girders or trusses are rigidly or nonrigidly supported on one or more legs. It may have one or more fixed or hinged cantilever ends. (4-7-83)

n. "Wall crane" means a crane having a jib with or without trolley and supported from a side wall or line of columns of a building. It is a traveling type and operates on a runway attached to the side wall of columns. (4-7-83)

o. "Appointed" means assigned specific responsibilities by the employer or the employer's representative. (4-7-83)

p. "ANSI" means the American National Standards Institute. (4-7-83)

q. An "Auxiliary hoist" is a supplemental hoisting unit of lighter capacity and usually high speed than provided for the main hoist. (4-7-83)

r. A "brake" is a device used for retarding or stopping motion by friction or power means. (4-7-83)

s. A "drag brake" is a brake which provides retarding force without external control. (4-7-83)

t. A "holding brake" is a brake that automatically prevents motion when power is off. (4-7-83)

u. "Bridge" means that part of a crane consisting of girders, trucks, end ties, footwalks, and drive mechanism which carries the trolley or trollies. (4-7-83)

v. "Bridge travel" means the crane movement in a direction parallel to the crane runway. (4-7-83)

w. A "bumper" (buffer) is an energy absorbing device for reducing impact when a moving crane or trolley reaches the end of its permitted travel; or when two moving cranes or trolleys come in contact. (4-7-83)

x. The "cab" is the operator's compartment on a crane. (4-7-83)

y. "Clearance" means the distance from any part of the crane to a point of the nearest obstruction. (4-7-83)

z. "Collectors" (current) are contacting devices for collecting current from runways or bridge conductors. (4-7-83)

aa. "Conductors, bridge" are the electrical conductors located along the bridge structure of a crane to provide power to the trolley. (4-7-83)

bb. "Conductors, runway" (main) are the electrical conductors located along a crane runway to provide power to the crane. (4-7-83)

cc. The "control braking means" is a method of controlling crane motor speed when in an overhauling condition. (4-7-83)

dd. "Countertorque" means a method of control by which the power to the motor is reversed to develop torque in the opposite direction. (4-7-83)

ee. "Dynamic" means a method of controlling crane motor speeds when in the overhauling condition to provide a retarding force. (4-7-83)

ff. "Regenerative" means a form of dynamic braking in which the electrical energy generated is fed back into the power system. (4-7-83)

gg. "Mechanical" means a method of control by friction. (4-7-83)

hh. "Controller, spring return" means a controller which when released will return automatically to a neutral position. (4-7-83)

ii. "Designated" means selected or assigned by the employer or the employer's representative as being qualified to perform specific duties. (4-7-83)

jj. A "drift point" means a point on a travel motion controller which releases the brake while the motor is not energized. This allows for coasting before the brake is set. (4-7-83)

kk. The "Drum" is the cylindrical member around which the ropes are wound for raising or lowering the load. (4-7-83)

ll. An "equalizer" is a device which compensates for unequal length or stretch of a rope. (4-7-83)

mm. "Exposed" means capable of being contacted inadvertently. Applied to hazardous objects not adequately guarded or isolated. (4-7-83)

nn. "Fail-safe" means a provision designed to automatically stop or safely control any motion in which a malfunction occurs. (4-7-83)

oo. "Footwalk" means the walkway with handrail, attached to the bridge or trolley for access purposes. (4-7-83)

pp. A "hoist" is an apparatus which may be a part of a crane, exerting a force for lifting or lowering. (4-7-83)

qq. "Hoist chain" means the load bearing chain in a hoist. NOTE: Chain properties do not conform to those shown in ANSI B30. 9-1971, Safety Code for Slings. (4-7-83)

rr. "Hoist Motion" means that motion of a crane which raises and lowers a load. (4-7-83)

ss. "Load" means the total superimposed weight on the load block or hook. (4-7-83)

tt. The "load block" is the assembly of hook or shackle, swivel, bearing, sheaves, pins, and frame suspended by the hoisting rope. (4-7-83)

uu. "Magnet" means an electromagnetic device carried on a crane hook to pick up loads magnetically. (4-7-83)

vv. "Main hoist" means the hoist mechanism provided for lifting the maximum rated load. (4-7-83)

ww. A "man trolley" is a trolley having an operator's cab attached thereto. (4-7-83)

xx. "Rated load" means the maximum load for which a crane or individual hoist is designed and built by the manufacturer and shown on the equipment nameplate(s). (4-7-83)

yy. "Rope" refers to wire rope, unless otherwise specified. (4-7-83)

zz. "Running sheave" means a sheave which rotates as the load block is raised or lowered. (4-7-83)

aaa. "Runway" means an assembly of rails, beams, girders, brackets, and framework on which the crane or trolley travels. (4-7-83)

bbb. "Side pull" means that portion of the hoist pull acting horizontally when the hoist lines are not operated vertically. (4-7-83)

ccc. "Span" means the horizontal distance center to center of runway rails. (4-7-83)

ddd. "Standby crane" means a crane which is not in regular service but which is used occasionally or intermittently as required. (4-7-83)

eee. A "stop" is a device to limit travel of a trolley or crane bridge. This device normally is attached to a fixed structure and normally does not have energy absorbing ability. (4-7-83)

fff. A "switch" is a device for making, breaking, or for changing the connections in an electric circuit. (4-7-83)

ggg. An "emergency stop switch" is a manually or automatically operated electric switch to cut off electric power independently of the regular operating controls. (4-7-83)

hhh. A "limit switch" is a switch which is operated by some part or motion of a power-driven machine or equipment to alter the electric circuit associated with the machine or equipment. (4-7-83)

iii. A "master switch" is a switch which dominates the operation of contractors, relays, or other remotely operated devices. (4-7-83)

jjj. A "main switch" is a switch controlling the entire power supply to the crane. (4-7-83)

kkk. The "trolley" is the unit which travels on the bridge rails and carries the hoisting mechanism. (4-7-83)

lll. "Trolley travel" means the trolley movement at right angles to the crane runway. (4-7-83)

mmm. "Truck" means the unit consisting of a frame, wheels, bearings, and axles which supports the bridge girders or trolleys. (4-7-83)

02. General Requirements. (4-7-83)

a. Application. This section applies to overhead and gantry cranes, including semigantry, cantilever gantry, wall cranes, storage bridge cranes, and others having the same fundamental characteristics. These cranes are grouped because they all have trolleys and similar travel characteristics. (4-7-83)

b. New and Existing Equipment. All new overhead and gantry cranes constructed and installed on or after the effective date of these standards shall meet the design specifications of the American National Standard Safety Code for Overhead and Gantry Cranes, ANSI B30.2.0-1967. Overhead and gantry cranes constructed before the effective date of these standards should be modified to conform to those design specifications, unless it can be shown that the crane cannot feasibly or economically be altered and that the crane substantially complies with the requirements of this section. (4-7-83)

c. Modifications. Cranes may be modified and rerated provided such modifications and the supporting structure are checked thoroughly for the new rated load by a qualified engineer or the equipment manufacturer. The crane shall be tested in accordance with Section 2844. New rated load shall be displayed in accordance with E. of this Section. (4-7-83)

d. Wind indicators and rail clamps. Outdoor storage bridges shall be provided with automatic rail clamps. A wind-indicating device shall be provided which will give a visible or audible alarm to the bridge operator at a predetermined wind velocity. If the clamps act on the rail heads, any beads or weld flash on the rail heads shall be ground off. Calculations for wind pressure on outside overhead traveling cranes shall be based on not less than 30 pounds per square foot of exposed surface. (4-7-83)

e. Rated Load Marking. The rated load of the crane shall be plainly marked on each side of the crane, and if the crane has more than one hoisting unit, each hoist shall have its rated load marked on it or its load block and this marking shall be clearly legible from the ground or floor. (4-7-83)

f. Clearance from Obstructions. (4-7-83)

i. Minimum clearance of three inches overhead and two inches laterally shall be provided and maintained between crane and obstructions in conformity with Specification No. 61, Crane Manufacturers Association of America, Inc., Thomas Circle N. W., Washington, D. C.20005. (4-7-83)

ii. Where passageways or walkways are provided obstructions shall not be placed so that safety of personnel will be jeopardized by movements of the crane. (4-7-83)

g. Clearance Between Parallel Cranes. If the runways of two cranes are parallel and there are no intervening walls, of structure, there shall be adequate clearance provided and maintained between the two bridges. (4-7-83)

h. Designated Personnel. Only designated personnel shall be permitted to operate a crane covered by this section. (4-7-83)

03. Cabs. (4-7-83)

a. Cab location. (4-7-83)

i. The general arrangement of the cab and the location of control and protective equipment shall be such that all operating handles are within convenient reach of the operator when facing the area to be served by the load hook, or while facing the direction of travel of the cab. The arrangement shall allow the operator a full view of the load hook in all positions. (4-7-83)

ii. The cab shall be located to afford a minimum of three inches clearance from all fixed structures within its area of possible movement. (4-7-83)

iii. The clearance of the cab above the working floor or passageway should be not less than 7 feet. (4-7-83)

b. Access to Crane. Access to the cab and/or bridge walkway shall be by a conveniently placed fixed ladder, stairs, or platform, requiring no step over any gap exceeding 12 inches. Fixed ladders shall be in conformance with the American National Standard Safety Code for Fixed Ladders, ANSI A14. 3-1956. (4-7-83)

c. Fire Extinguisher. A carbon dioxide dry-chemical, or equivalent hand fire extinguisher should be kept in the cab. Carbon tetrachloride extinguishers shall not be used. (4-7-83)

d. Lighting. Light in the cab shall be sufficient to enable the operator to see clearly enough to perform his work. (4-7-83)

04. Footwalks and Ladders. (4-7-83)

a. Location of Footwalks. (4-7-83)

i. If sufficient headroom is available on cab-operated cranes, a footwalk shall be provided on the drive side along the entire length of the bridge of all cranes having the trolley running on the top of the girders. To give sufficient access to the opposite side of the trolley, there should be provided either a footwalk mounted on the trolley, a suitable footwalk or platform in the building, or a footwalk on the opposite side of the crane at least twice the length of the trolley. (4-7-83)

ii. Footwalks should be located to give a headroom not less than 78 inches. In no case shall less than 48 inches be provided, footwalks should be omitted from the crane and a stationary platform or landing stage built for workmen making repairs. (4-7-83)

b. Construction of Footwalks. (4-7-83)

i. Footwalks shall be of rigid construction and designed to sustain a distributed load of at least 50 pounds per square foot. (4-7-83)

ii. Footwalks shall have a walking surface of anti-slip type. NOTE: Wood will meet this requirement. (4-7-83)

iii. Footwalks shall be continuous and permanently secured. (4-7-83)

iv. Footwalks should have a clear passageway at least 18 inches wide except opposite the bridge motor, where they should be not less than 15 inches. The inner edge shall extend at least to the line of the outside edge of the lower cover plate or flange of the girder. (4-7-83)

c. Toeboards and Handrails for Footwalks. Toeboards and handrails shall be in compliance with Sections 508 through 514 in Chapter E of this Code. (4-7-83)

d. Ladders and Stairways. (4-7-83)

i. Gantry cranes shall be provided with ladders or stairways extending from the ground to the footwalk or cab platform. (4-7-83)

ii. Stairways shall be equipped with rigid and substantial metal handrails. Walking surfaces shall be of an anti-slip type. (4-7-83)

iii. Ladders shall be permanently and securely fastened in place and shall be constructed in compliance with Sections 2510 through 2515 in Chapter Y of this Code. (4-7-83)

05. Stops, Bumpers, Rail Sweeps, and Guards. (4-7-83)

a. Trolley Stops. (4-7-83)

i. Stops shall be provided at the limits of travel of the trolley. (4-7-83)

ii. Stops shall be fastened to resist forces applied when contacted. (4-7-83)

iii. A stop engaging the tread of the wheel shall be of a height at least equal to the radius of the wheel. (4-7-83)

b. Bridge Bumpers. A crane shall be provided with bumpers or other automatic means providing equivalent effect, unless the crane travels at a slow rate of speed and has a faster deceleration rate due to the use of sleeve bearings, or is not operated near the ends of bridge and trolley travel, or is restricted to a limited distance by the nature of the crane operation and there is no hazard of striking any object in this limited distance or is used in similar operating conditions. The bumpers shall be capable of stopping the crane (not including the lifted load) at an

average rate of deceleration not to exceed 3 ft/s/s when traveling in either direction at 20% of the rated load speed.(a)The bumpers shall have sufficient energy absorbing capacity to stop the crane when traveling at a speed of at least 40% of rated load speed.(b) The bumpers shall be so mounted that there is no direct shear on bolts.(c)Bumpers shall be so designed and installed as to minimize parts falling from the crane in case of breakage. (4-7-83)

c. Trolley Bumpers. (4-7-83)

i. A trolley shall be provided with bumpers or other automatic means of equivalent effect, unless the trolley travels at a slow rate of speed, or is not operated near the ends of bridge and trolley travel, or is restricted to a limited distance of the runway and there is no hazard of striking any object in this limited distance, or is used in similar operating conditions. The bumpers shall be capable of stopping the trolley (not including the lifted load) at an average rate of deceleration not to exceed 4.7 ft/s/s when traveling in either direction at 1/3 of the rated load speed. (4-7-83)

ii. When more than one trolley is operated on the same bridge, each shall be equipped with bumpers or equivalent on their adjacent ends. (4-7-83)

iii. Bumpers or equivalent shall be designed and installed to minimize parts falling from the trolley in case of age. (4-7-83)

d. Rail Sweeps. Bridge trucks shall be equipped with sweeps which extend below the top of the rail and project in front of the truck wheels. (4-7-83)

e. Guards for Hoisting Ropes. (4-7-83)

i. If hoisting ropes run near enough to other parts to make fouling or chafing possible, guards shall be installed to prevent this condition. (4-7-83)

ii. A guard shall be provided to prevent contact between bridge conductors and hoisting ropes if they could come into contact. (4-7-83)

f. Guards for Moving Parts. (4-7-83)

i. Exposed moving parts such as gears, set screws, projecting keys, chains, chain sprockets, and reciprocating components which might constitute a hazard under normal conditions shall be guarded. (4-7-83)

ii. Guards shall be securely fastened. (4-7-83)

iii. Each guard shall be capable of supporting without permanent distortion the weight of a 200 pound person unless the guard is located where it is impossible for a person to step on it. (4-7-83)

06. Brakes. (4-7-83)

a. Brakes for Hoists. (4-7-83)

i. Each independent hoisting unit of a crane shall be equipped with at least one self-setting brake, hereafter referred to as a holding brake, applied directly to motor shaft or some part of the gear train. (4-7-83)

ii. Each independent hoisting unit of a crane, except worm-geared hoists, the angle of whose worm is such as to prevent the load from accelerating in the lowering direction shall, in addition to a holding brake, be equipped with control braking means to prevent overspeeding. (4-7-83)

b. Holding Brakes. (4-7-83)

i. Holding brakes for hoist motors shall have not less than the following percentage of the full load hoisting torque at the point where the brake is applied.(a)125% when used with a control braking means other than mechanical.(b)100% when used in conjunction with a mechanical control braking means.(c)100% each if two

holding brakes are provided. (4-7-83)

ii. Holding brakes on hoists shall have ample thermal capacity for the frequency of operation required by the service. (4-7-83)

iii. Holding brakes on hoists shall be applied automatically when power is removed. (4-7-83)

iv. Where necessary, holding brakes shall be provided with adjustment means to compensate for wear. (4-7-83)

v. The wearing surface of all holding-brake drums or discs shall be smooth. (4-7-83)

vi. Each independent hoisting unit of a crane handling hot metal and having power control braking means shall be equipped with at least two holding brakes. (4-7-83)

c. Control Braking Means. (4-7-83)

i. A power control braking means such as regenerative dynamic or countertorque braking, or a mechanically controlled braking means shall be capable of maintaining safe lowering speeds of rated loads. (4-7-83)

ii. The control braking means shall have ample thermal capacity for the frequency of operation required by service. (4-7-83)

d. Brakes for Trolleys and Bridges. (4-7-83)

i. Foot operated brakes shall not require an applied force of more than 70 pounds to develop manufacturer's rated brake torque. (4-7-83)

ii. Brakes may be applied by mechanical, electrical, pneumatic, hydraulic, or gravity means. (4-7-83)

iii. Where necessary, brakes shall be provided with adjustment means to compensate for wear. (4-7-83)

iv. The wearing surface of all brake drums or discs shall be smooth. (4-7-83)

v. All foot-brake pedals shall be constructed so that the operator's foot will not easily slip off the pedal. (4-7-83)

vi. Foot-operated brakes shall be equipped with automatic means for positive release when pressure is released from the pedal. (4-7-83)

vii. Brakes for stopping the motion of the trolley or bridge shall be of sufficient size to stop the trolley or bridge within a distance in feet equal to 10% of full load speed in feet per minute when traveling at full speed with full load. (4-7-83)

viii. If holding brakes are provided on the bridge or trolley(s), they shall not prohibit the use of a drift point in the control circuit. (4-7-83)

ix. Brakes on trolleys and bridges shall have ample thermal capacity for the frequency of operation required by the service to prevent impairment of functions from overheating. (4-7-83)

e. Application of Trolley Brakes. (4-7-83)

i. On cab-operated cranes with cab on trolley, a trolley brake shall be required as specified under D. of this Section. (4-7-83)

ii. A drag brake may be applied to hold the trolley in a desired position on the bridge and to eliminate

creep with the power off. (4-7-83)

f. Application of Bridge Brakes. (4-7-83)

i. On cab-operated cranes with cab on bridge, a bridge brake is required as specified under D. of this Section. (4-7-83)

ii. On cab-operated cranes with cab on trolley, a bridge brake of the holding type shall be required. (4-7-83)

iii. On all floor, remote, and pulpit-operated crane bridge drives, a brake or noncoasting mechanical drive shall be provided. (4-7-83)

07. Electric Equipment. (4-7-83)

a. General. (4-7-83)

i. Wiring and equipment shall comply with Chapter M of this Code and the National Electrical Code. (4-7-83)

ii. The control circuit voltage shall not exceed 600 volts for a.c. or d.c. current. (4-7-83)

iii. The voltage at pendant push buttons shall not exceed 150 volts for a.c. and 300 volts for d.c. (4-7-83)

iv. Where multiple conductor cable is used with a suspended push button station, the station shall be supported in a manner that will protect the electrical conductors against strain. (4-7-83)

v. Pendant control boxes shall be constructed to prevent electrical shock and shall be clearly marked for identification of functions. (4-7-83)

b. Equipment. (4-7-83)

i. Electrical equipment shall be so located or enclosed that live parts will not be exposed to accidental contact under normal operating conditions. (4-7-83)

ii. Electric equipment shall be protected from dirt, grease, oil, and moisture. (4-7-83)

iii. Guards for live parts shall be substantial and so located that they cannot be accidentally deformed so as to make contact with the live parts. (4-7-83)

c. Controllers. (4-7-83)

i. Cranes not equipped with spring-return controllers or momentary contact push buttons shall be provided with a device which will disconnect all motors from the line on failure of power and will not permit any motor to be restarted until the controller handle is brought to the "off" position, or a reset switch or button is operated. (4-7-83)

ii. Lever operated controllers shall be provided with a notch or latch which in the "off" position prevents the handle from being inadvertently moved to the "on" position. An "off" detent or spring return arrangement is acceptable. (4-7-83)

iii. The controller operating handle shall be located within convenient reach of the operator. (4-7-83)

iv. As far as practicable, the movement of each controller handle shall be in the same general directions as the resultant movements of the load. (4-7-83)

v. The control for the bridge and trolley travel shall be so located that the operator can readily face the direction of travel. (4-7-83)

vi. For floor-operated cranes, the controller or controllers if rope operated, shall automatically return to the "off" position when released by the operator. (4-7-83)

vii. Push buttons in pendant stations shall return to the "off" position when pressure is released by the crane operator. (4-7-83)

viii. Automatic cranes shall be so designated that all motions shall fail-safe if any malfunction of operation occurs. (4-7-83)

ix. Remote-operated cranes shall function so that if the control signal for any crane motion becomes ineffective, the crane motion shall stop. (4-7-83)

d. Resistors. (4-7-83)

i. Enclosures for resistors shall have openings to provide adequate ventilation, and shall be installed to prevent the accumulation of combustible matter near hot parts. (4-7-83)

ii. Resistor units shall be supported so as to be free as possible from vibration. (4-7-83)

iii. Provision shall be made to prevent broken parts or molten metal falling upon the operator or from the crane. (4-7-83)

e. Switches. (4-7-83)

i. The power supply to the runway conductors shall be controlled by a switch or circuit breaker located on a fixed structure, accessible from the floor, and arranged to be locked in the open position. (4-7-83)

ii. On cab-operated cranes, a switch or circuit breaker of the enclosed type with provision for locking in the open position shall be provided in the leads from the runway conductors. A means of opening this switch or circuit breaker shall be located within easy reach of the operator. (4-7-83)

iii. On floor-operated cranes, a switch or circuit breaker of the enclosed type, with provision for locking in the open position, shall be provided in the leads from the runway conductors. This disconnect shall be mounted on the bridge or footwalk near the runway collectors. One of the following types of floor operated disconnects shall be provided:(a)Nonconductive rope attached to the main disconnect switch. (b) An undervoltage trip for the main circuit breaker operated by an emergency stop button in the pendant push button station.(c)A main line contactor operated by a switch or push button on the pendant push button station. (4-7-83)

iv. The hoisting motion of all electric traveling cranes shall be provided with an overtravel limit switch in the hoisting direction. (4-7-83)

v. All cranes using a lifting magnet shall have a magnet circuit switch of the enclosed type with provision for locking in the open position. Means for discharging the inductive load of the magnet shall be provided. (4-7-83)

f. Runway Conductors. Conductors of the open type mounted on the crane runway beams or overhead shall be so located or so guarded that persons entering or leaving the cab or crane footwalk normally could not come into contact with them. (4-7-83)

g. Extension Lamps. If a service receptacle is provided in the cab or on the bridge of cab-operated cranes, it shall be a grounded three-prong type permanent receptacle, not exceeding 300 volts. (4-7-83)

h. Floor Operated Cranes. (4-7-83)

i. An unobstructed aisle not less than three feet wide shall be maintained for travel of the operator except in such cases where the control handles are hung from the trolleys of traveling cranes. (4-7-83)

ii. The handles of control ropes shall be distinctly different in contour so that, without looking, the operator will know which is the hoisting and which is the lowering handle. The direction of all movements of the crane shall be clearly indicated in some manner so that the operator can easily become familiar with them. (4-7-83)

iii. When repairing runways, repairmen shall place rail stops and warning signs or signals so as to protect both ends of the section to be repaired. (4-7-83)

iv. Repairmen shall take care to prevent loose parts from falling or being thrown upon the floor beneath. (4-7-83)

08. Hoisting Equipment. (4-7-83)

a. Sheaves. (4-7-83)

i. Sheave grooves shall be smooth and free from surface defects which could cause rope damage. (4-7-83)

ii. Sheaves carrying ropes which can be momentarily unleaded shall be provided with close-fitting guards or other suitable devices to guide the rope back into the groove when the load is applied again. (4-7-83)

iii. The sheaves in the bottom block shall be equipped with close-fitting guards that will prevent ropes from becoming fouled when the block is lying on the ground with ropes loose. (4-7-83)

iv. Pockets and flanges of sheaves used with hoist chains shall be of such dimensions that the chain does not catch or bind during operation. (4-7-83)

v. All running sheaves shall be equipped with means for lubrication. Permanently lubricated, sealed and/or shielded bearings meet this requirement. (4-7-83)

b. Ropes. (4-7-83)

i. In using hoisting ropes, the crane manufacturer's recommendation shall be followed. The rated load divided by the number of parts of rope shall not exceed 20% of the nominal breaking strength of the rope. (4-7-83)

ii. Socketing shall be done in the manner specified by the manufacturer of the assembly. (4-7-83)

iii. Rope shall be secured to the drum as follows: (a) no less than two wraps of rope shall remain on the drum when the hook is in its extreme low position.(b)Rope end shall be anchored by a clamp securely attached to the drum, or by a socket arrangement approved by the crane or rope manufacturer. (4-7-83)

iv. Rope clips attached with U-bolts shall have the U bolts on the dead or short end of the rope. Spacing and number of all types of clips shall be in accordance with B.v. of this section. Clips shall be drop-forged steel in all sizes manufactured commercially. When a newly installed rope has been in operation for an hour, all nuts on the clip bolts shall be retightened. (4-7-83)

v. Table.

Diameter of rope	Number of clips required	Space between clips
1 1/2 inch	8	10 inches
1 3/8 inch	7	9 inches

Diameter of rope	Number of clips required	Space between clips
1 1/4 inch	6	8 inches
1 1/8 inch	5	7 inches
1 inch	5	6 inches
7/8 inch	5	5 1/4 inches
3/4 inch	5	4 1/2 inches
3/8 to 5/8 inch	4	3 inches

vi. Swaged or compressed fittings shall be applied as recommended by the rope or crane manufacturer. (4-7-83)

vii. Wherever exposed to temperatures at which fiber cores would be damaged, rope having an independent wire-rope or wire-strand core or other temperature-damage resistant core shall be used. (4-7-83)

viii. Replacement rope shall be the same size, grade, and construction as the original rope furnished by the crane manufacturer, unless otherwise recommended by a wire rope manufacturer due to actual working condition requirements. (4-7-83)

c. Equalizers. If a load is supported by more than one part of rope, the tension in the parts shall be equalized. (4-7-83)

d. Hooks. Hooks shall meet the manufacturer's recommendations and shall not be overloaded. Safety latch-type hooks shall be used or the hook shall be moused. (4-7-83)

09. Reserved. (4-7-83)

10. Inspection. (4-7-83)

a. Inspection Classification. (4-7-83)

i. Initial inspection. Prior to initial use, all new and altered cranes shall be inspected to insure compliance with the provisions of these standards. (4-7-83)

ii. Inspection procedure for cranes in regular service is divided into two general classifications based upon the intervals at which inspection should be performed. The intervals in turn are dependent upon the nature of the critical components of the crane and the degree of their exposure to wear, deterioration, or malfunction. The two general classifications are herein designated as "frequent" and "periodic" with respective intervals between inspections as defined below: (a) Frequent inspection - Daily to monthly intervals.(b)Periodic inspection - 1 to 12 month intervals. (4-7-83)

b. Frequent inspection. The following items shall be inspected for defects at intervals as defined in A.ii. of this section or as specifically indicated, including observation during operation for any defects which might appear between regular inspections. All deficiencies such as listed shall be carefully examined and determination made as to whether they constitute a safety hazard: (4-7-83)

i. All functional operating mechanisms for maladjustment interfering with proper operation - Daily. (4-7-83)

ii. Deterioration or leakage in lines, tanks, valves, drain pumps, and other parts of air or hydraulic system - Daily. (4-7-83)

iii. Hooks with deformation or cracks - visual inspection daily; monthly inspection with signed reports.

For hooks with cracks or having more than 15% in excess of normal throat opening or more than 10 degrees twist from the plane of the unbent hook refer to Section 2845 of this Chapter. (4-7-83)

iv. Hoist or load attachment chains, including end connections, for excessive wear, twist, distorted links interfering with proper function, or stretch beyond manufacturer's recommendations. Visual inspection daily; monthly inspection with signed reports. (4-7-83)

v. Rope slings, including end connections, for excessive wear, broken wires, stretch, kinking or twisting - visual inspection daily; monthly inspection with signed report. (4-7-83)

vi. All functional operating mechanisms for excessive wear of components. (4-7-83)

vii. Rope reeving for noncompliance with manufacturer's recommendations. (4-7-83)

c. Periodic Inspection. Complete inspections of the crane shall be performed at intervals as generally defined in A.ii.(b) of this section, depending upon its activity severity of service, and environment, or as specifically indicated below. These inspections shall include the requirements of B. of this section and in addition, the following items. Any deficiencies such as listed shall be carefully examined and determination made as to whether they constitute a safety hazard: (4-7-83)

i. Deformed, cracked, or corroded members. (4-7-83)

ii. Loose bolts or rivets. (4-7-83)

iii. Cracked or worn sheaves and drums. (4-7-83)

iv. Worn, cracked or distorted parts such as pins, bearings, shafts, gears, rollers, locking and clamping devices. (4-7-83)

v. Excessive wear on brake system parts, linings, pawls, and ratchets. (4-7-83)

vi. Load, wind, and other indicators over their full range, for any significant inaccuracies. (4-7-83)

vii. Gasoline, diesel, electric, or other powerplants for improper performance or noncompliance with applicable safety requirements. (4-7-83)

viii. Excessive wear of chain drive sprockets and excessive chain stretch. (4-7-83)

ix. Crane hooks. Magnetic particle or other suitable crack detecting inspection should be performed at least once each year. (4-7-83)

x. Electric apparatus, for signs of pitting or any deterioration of controller contactors, limit switches and push button stations. (4-7-83)

d. Cranes Not in Regular Use. (4-7-83)

i. A crane which has been idle for a period of one month or more, but less than six months, shall be given an inspection conforming with requirements of B. of this section and Section 2846 of this chapter before placing in service. (4-7-83)

ii. A crane which has been idle for a period of over six months shall be given a complete inspection conforming with requirements of B. and C. of this section and Section 2846 of this Chapter before placing in service. (4-7-83)

iii. Standby cranes shall be inspected at least semi annually in accordance with requirements of B. of this section and Section 2846 of this Chapter. Standby cranes exposed to adverse environment should be inspected more frequently. (4-7-83)

11. Testing. (4-7-83)

a. Operational Tests. (4-7-83)

i. Prior to initial use, all new and altered cranes shall be tested to insure compliance with this section including the following functions: (a) Hoisting and lowering.(b)Trolley travel.(c)Bridge travel. (d)Limit switches, locking and safety devices. (4-7-83)

ii. The trip setting of hoist limit switches shall be determined by tests with an empty hook traveling in increasing speeds up to the maximum speed. The actuating mechanism of the limit switch shall be located so that it will trip the switch under all conditions, in sufficient time to prevent contact of the hook or hook block with any part of the trolley. (4-7-83)

b. Rated Load Test. Prior to initial use all new, extensively repaired, and altered cranes should be tested by or under the direction of an appointed or authorized person, confirming the load rating of the crane. The load rating should not be more than 80% of the maximum load sustained during the test. Test loads shall not be more than 125% of the rated load unless otherwise recommended by the manufacturer. The test reports shall be placed on file where readily available to appointed personnel. (4-7-83)

12. Maintenance. (4-7-83)

a. Preventive Maintenance. A preventive maintenance program based on the crane manufacturer's recommendations shall be established. (4-7-83)

b. Maintenance Procedure. (4-7-83)

i. Before adjustments and repairs are started on the crane, the following precautions shall be taken: (a) The crane to be repaired shall be run to a location where it will cause the least interference with other cranes and operations in the area. (b)All controllers shall be at the off position.(c)The main or emergency switch shall be open and locked in the open position. (d)Warning or "out of order" signs shall be placed on the crane, also on the floor beneath or on the hook where visible from the floor. (e)Where other cranes are in operation on the same runway, rail stops or other suitable means shall be provided to prevent interference with the idle crane.(f)Where temporary protective rail stops are not available, or practical, a signalman should be placed at a visual vantage point for observing the approach of an active crane and warning its operator when reaching the limit of safe distance from the idle crane. (4-7-83)

ii. After adjustments and repairs have been made, the crane shall not be operated until all guards have been reinstalled, safety devices reactivated, and maintenance equipment removed. (4-7-83)

c. Adjustments and Repairs. (4-7-83)

i. Any unsafe conditions disclosed by the inspection requirements of Section 2843 of this Chapter shall be corrected before operation of the crane is resumed. Adjustments and repairs shall be done only by designated personnel. (4-7-83)

ii. Adjustments shall be maintained to assure correct functioning of components. The following are examples: (a) All functional operating mechanisms.(b)Limit switches.(c) Control systems. (d)Brakes.(e)Power plants. (4-7-83)

iii. Repairs or replacements shall be provided promptly as needed for safe operation. The following are examples: (a) Accessory components, such as hooks, shall be carefully examined periodically and at the time of annual examination and inspection. Cracked or deformed hooks shall be discarded immediately and not reused on any equipment subject to the provisions of this code. (b) Load attachment chains and rope slings showing defects described in Section 2843.B.iv. and v. respectively. (c) All critical parts which are cracked, broken, bent, or excessively worn.(d)Pendant control stations shall be kept clean and function labels kept legible. (4-7-83)

13. Rope Inspection. (4-7-83)

a. Running Ropes. A thorough inspection of all ropes shall be made at least once a month and a full written, dated, and signed report of rope condition kept on file where readily available to appointed personnel. Any deterioration, resulting in appreciable loss of original strength, such as described below, shall be carefully noted and determination made as to whether further use of the rope would constitute a safety hazard: (4-7-83)

i. Reduction of rope diameter below nominal diameter due to loss of core support, internal of external corrosion, or wear of outside wires. (4-7-83)

ii. A number of broken outside wires and the degree of distribution or concentration of such broken wires. (4-7-83)

iii. Worn outside wires. (4-7-83)

iv. Corroded or broken wires at end connections. (4-7-83)

v. Corroded, cracked, bent, worn, or improperly applied end connections. (4-7-83)

vi. Severe kinking, crushing, cutting, or unstranding. (4-7-83)

b. Other Ropes. All rope which has been idle for a period of a month or more due to shutdown or storage or a crane on which it is installed shall be given a thorough inspection before it is placed in service. This inspection shall be for all types of deterioration and shall be performed by an appointed person whose approval shall be required for further use of the rope. A written and dated report of the rope condition shall be available for inspection. (4-7-83)

14. Handling the Load. (4-7-83)

a. Size of Load. The crane shall not be loaded beyond its rated load except for test purposes as provided in Section 2844 of this Chapter. (4-7-83)

b. Attaching the Load. (4-7-83)

i. The hoist chain or hoist rope shall be free from kinks or twists and shall not be wrapped around the load. (4-7-83)

ii. The load shall be attached to the load block hook by means of slings or other approved devices. (4-7-83)

iii. Care shall be taken to make certain that the sling clears all obstacles. (4-7-83)

c. Moving the Load. (4-7-83)

i. The load shall be well secured and properly balanced in the sling or lifting device before it is lifted more than a few inches. (4-7-83)

ii. Before starting to hoist the following conditions shall be noted: (a)Hoist rope shall not be kinked.(b) Multiple part lines shall not be twisted around each other. (c)The hook shall be brought over the load in such a manner as to prevent swinging. (4-7-83)

iii. During hoisting care shall be taken that: (a) There is no sudden acceleration or deceleration of the moving load. (b)The load does not contact any obstructions. (4-7-83)

iv. Cranes shall not be used for side pulls except when specifically authorized by a responsible person who has determined that the stability of the crane is not thereby endangered and that various parts of the crane will not be overstressed. (4-7-83)

v. While any employee is on the load or hook, there shall be no hoisting, lowering or traveling. (4-7-83)

vi. The employer shall require that the operator avoid carrying the loads over people. (4-7-83)

vii. The operator shall test the brakes each time a load approaching the rated load is handled. The brakes shall be tested by raising the load a few inches and applying the brakes. (4-7-83)

viii. The load shall not be lowered below the point where less than two full wraps of rope remain on the hoisting drum. (4-7-83)

ix. When two or more cranes are used to lift a load one qualified responsible person shall be in charge of the operation. He shall analyze the operation and instruct all personnel involved in the proper positioning, rigging of the load, and the movements to be made. (4-7-83)

x. The employer shall assure that the operator does not leave his position at the controls while the load is suspended. (4-7-83)

xi. When starting the bridge and when the load or hook approaches near or over personnel, the warning signal shall be sounded. (4-7-83)

d. Hoist Limit Switch. (4-7-83)

i. At the beginning of each operator's shift, the upper limit switch of each hoist shall be tried out under no load. Extreme care shall be exercised; the block shall be "inched" into the limit or run at slow speed. If the switch does not operate properly, the appointed person shall be immediately notified. (4-7-83)

ii. The hoist limit switch which controls the upper limit of travel of the load block shall never be used as an operating control. (4-7-83)

15. Operators. (4-7-83)

a. Cranes shall be operated only by regular crane operators, authorized substitutes who have had adequate experience and training under the supervision of a competent operator, or by crane repairmen or inspectors. (4-7-83)

b. No person should be permitted to operate a crane who cannot speak and read the English language, or who is under 18 years of age. (4-7-83)

c. No person shall be permitted to operate a crane whose hearing or eyesight is impaired, or who may be suffering from heart disease or similar ailments. (4-7-83)

d. The operator shall familiarize himself fully with all crane rules and with the crane mechanism and its proper care. If adjustments or repairs are necessary, he shall report the same at once to the proper authority. (4-7-83)

e. The operator shall not eat, smoke, or read while actually engaged in the operation of the crane or operate the crane when he is physically unfit. (4-7-83)

f. The operator or someone especially designated shall properly lubricate all working parts of the crane. (4-7-83)

g. Cranes shall be kept clean. (4-7-83)

h. Whenever the operator finds the main or emergency switch open, he shall not close it, even when starting on regular duty, until he has made sure that no one is on or about the crane. He shall not oil or repair the crane

unless the main switch is open. (4-7-83)

i. If the power goes off, the operator shall immediately throw all controllers to "off" position until the power is again available. (4-7-83)

j. Before closing the main switch the operator shall make sure that all controllers are in the "off" position until the power is again available. (4-7-83)

k. The operator shall recognize signals only from the man who is supervising the lift. Operating signals shall follow an established standard. Whistle signals may be used where one crane only is in operation. (4-7-83)

l. Bumping into runway stops or other cranes shall be avoided. When the operator is ordered to engage with or push other cranes, he shall do so with special care for the safety of persons on or below cranes. (4-7-83)

m. When lowering a load, the operator shall proceed carefully and make sure that he has the load under safe control. (4-7-83)

n. When leaving the cage, the operator shall throw all controllers to "off" position and open the main switch. (4-7-83)

o. If the crane is located out-of-doors, the operator shall lock the crane in a secure position to prevent it from being blown along or off the track by a severe wind. (4-7-83)

p. Operators shall not permit anyone to ride on the load or hooks, unless using a lifeline or safety device approved by the Department. (4-7-83)

16. Other Requirements - General. (4-7-83)

a. Ladders. (4-7-83)

i. The employer shall insure that hands are free from encumbrances while personnel are using ladders. (4-7-83)

ii. Articles which are too large to be carried in pockets or belts shall be lifted and lowered by hand line. (4-7-83)

b. Cabs. (4-7-83)

i. Necessary clothing and personal belongings shall be stored in such a manner as not to interfere with access or operation. (4-7-83)

ii. Tools, oil cans, waste, extra fuses, and other necessary articles, shall be stored in such a manner as not to interfere with access or operation. (4-7-83)

iii. Fire Extinguishers. The employer shall insure that operators are familiar with the operation and care of fire extinguishers provided. (4-7-83)

17. Construction, Operation, and Maintenance - Chain and Electric Hoists. (4-7-83)

a. Chain and electric hoists shall be of what is known as "all steel construction". No case iron shall be used in parts subject to tension except drums, bearings, or brake shoes. (4-7-83)

b. The chains shall be made of the best quality steel or iron with welded links. (4-7-83)

c. Chain and electric hoists shall have a factor of safety of at least five (5). (4-7-83)

d. Chain and electric hoists shall be equipped with an approved device which will automatically lock the load when hoisting is stopped. (4-7-83)

e. Electric hoists shall be provided with an approved limit stop to prevent the hoist block from traveling too far in case the operating handle is not released in time. (4-7-83)

18. Air Hoists. (4-7-83)

a. To prevent piston rod lock nuts from becoming loose and allowing rod to drop when supporting a load lock nut shall be secured to piston rod by a castellated nut and cotterpin. (4-7-83)

b. A clevis or other means shall be used to prevent hoists cylinder becoming detached from hanger. (4-7-83)

323. CRAWLER LOCOMOTIVE AND TRUCK CRANES.

01. Definitions. (4-7-83)

a. A "crawler crane" consists of a rotating superstructure with power plant, operating machinery, and boom, mounted on a base, equipped with crawler treads for travel. Its function is to hoist and swing loads at various radii. (4-7-83)

b. A "locomotive crane" consists of a rotating superstructure with power plant, operating machinery and boom, mounted on a base or car equipped for travel on railroad track. It may be self-propelled or propelled by an outside source. Its function is to hoist and swing loads at various radii. (4-7-83)

c. A "truck crane" consists of a rotating superstructure with power plant, operating machinery and boom, mounted on an automotive truck equipped with a power plant for travel. Its function is to hoist and swing loads at various radii. (4-7-83)

d. A "wheel mounted crane" (wagon crane) consists of a rotating superstructure with power plant, operating machinery and boom, mounted on a base or platform equipped with axles and rubber-tired wheels for travel. The base is usually propelled by the engine in the superstructure, but it may be equipped with a separate engine controlled from the superstructure. Its function is to hoist and swing loads at various radii. (4-7-83)

e. An "accessory" is a secondary part or assembly of parts which contributes to the overall function and usefulness of a machine. (4-7-83)

f. "Appointed" means assigned specific responsibilities by the employer or the employer's representative. (4-7-83)

g. "ANSI" means the American National Standards Institute. (4-7-83)

h. An "angle indicator" (boom) is an accessory which measures the angle of the boom to the horizontal. (4-7-83)

i. The "axis of rotation" is the vertical axis around which the crane superstructure rotates. (4-7-83)

j. "Axle" means the shaft or spindle with which or about which a wheel rotates. On truck- and wheel-mounted cranes, it refers to an automotive type of axle assembly including housings, gearing, differential, bearings, and mounting appurtenances. (4-7-83)

k. "Axle" (bogie) means two or more automotive-type axles mounted in tandem in a frame so as to divide the load between the axles and permit vertical oscillation of the wheels. (4-7-83)

l. The "base" (mounting) is the traveling base or carrier on which the rotating superstructure is

mounted such as a car, truck, crawlers, or wheel platform. (4-7-83)

m. The "boom" (crane) is a member hinged to the front of the rotating superstructure with the outer end supported by ropes leading to a gantry of "A" frame and used for supporting the hoisting tackle. (4-7-83)

n. The "boom angle" is the angle between the longitudinal centerline of the boom and the horizontal. The boom longitudinal centerline is a straight line between the boom foot pin (heel pin) centerline and boom point sheave pin centerline. (4-7-83)

o. The "boom hoist" is a hoist drum and rope reeving system used to raise and lower the boom. The rope system may be all live reeving or a combination of live reeving and pendants. (4-7-83)

p. The "boom stop" is a device used to limit the angle of the boom at the highest position. (4-7-83)

q. A "brake" is a device used for retarding or stopping motion by friction or power means. (4-7-83)

r. The "cab" is housing which covers the rotating superstructure machinery and/or operator's station. On truck crane trucks, a separate cab covers the driver's station. (4-7-83)

s. The "clutch" is a fraction, electromagnetic, hydraulic, pneumatic, or positive mechanical device for engagement or disengagement of power. (4-7-83)

t. The "counterweight" is a weight used to supplement the weight of the machine in providing stability for lifting working loads. (4-7-83)

u. "Designated" means selected or assigned by the employer or the employer's representative as being qualified to perform specific duties. (4-7-83)

v. The "drum" is the cylindrical members around which ropes are wound for raising and lowering the load or boom. (4-7-83)

w. "Dynamic" (loading) means loads introduced into the machine or its components by forces in motion. (4-7-83)

x. The "gantry" (A-frame) is a structure frame, extending above the superstructure, to which the boom support ropes are reeved. (4-7-83)

y. A "jib" is an extension attached to the boom point to provide added boom length for lifting specified loads. The jib may be in line with the boom or offset to various angles. (4-7-83)

z. "Load" (working) means the external load, in pounds, applied to the crane, including the weight of load attaching equipment such as load blocks, shackles, and slings. (4-7-83)

aa. "Load block" (upper) means the assembly of hook or shackle, swivel, sheaves, pins, and crane suspended from the boom point. (4-7-83)

bb. "Load block" (lower) means the assembly of hook or shackle, swivel, sheaves, pins, and frame suspended by the hoisting ropes. (4-7-83)

cc. A "load hoist" is a hoist drum and rope reeving system used for hoisting and lowering loads. (4-7-83)

dd. "Load ratings" are crane ratings in pounds established by the manufacturer in accordance with Section 2854 of this Chapter. (4-7-83)

ee. "Outriggers" are extendable or fixed metal arms, attached to the mounting base, which rests on supports at the outer ends. (4-7-83)

ff. "Rail clamp" means a tong-like metal device, mounted on a locomotive crane car, which can be connected to the track. (4-7-83)

gg. "Reeving" means a rope system in which the rope travels around drums and sheaves. (4-7-83)

hh. "Rope" refers to a wire rope unless otherwise specified. (4-7-83)

ii. "Side loading" means a load applied at an angle to the vertical plane of the boom. (4-7-83)

jj. A "standby crane" is a crane which is not in regular service but which is used occasionally or intermittently as required. (4-7-83)

kk. A "standing (guy) rope" is a supporting rope which maintains a constant distance between the points of attachment to the two components connected by the rope. (4-7-83)

ll. "Structural competence" means the ability of the machine and its components to withstand the stresses imposed by applied loads. (4-7-83)

mm. "Superstructure" means the rotating upper frame structure of the machine and the operating machinery mounted thereon. (4-7-83)

nn. "Swing" means the rotation of the superstructure for movement of loads in a horizontal direction about the axis of rotation. (4-7-83)

oo. "Swing mechanism" means the machinery involved in providing rotation of the superstructure. (4-7-83)

pp. "Tackle" is an assembly of ropes and sheaves arranged for hoisting and pulling. (4-7-83)

qq. "Transit" means the moving or transporting of a crane from one jobsite to another. (4-7-83)

rr. "Travel" means the functions of the machine moving from one location to another, on a jobsite. (4-7-83)

ss. The "travel mechanism" is the machinery involved in providing travel. (4-7-83)

tt. "Wheelbase" means the distance between centers of front and rear axles. For a multiple axle assembly the axle center for wheelbase measurement is taken as the mid-point of the assembly. (4-7-83)

uu. The "whipline" (auxiliary hoist) is a separate hoist rope system of lighter load capacity and higher speed than provided by the main hoist. (4-7-83)

vv. A "winch head" is a power driven spool for handling of loads by means of friction between fiber or wire rope and spool. (4-7-83)

02. General Requirements. (4-7-83)

a. Application. This section applies to crawler cranes, locomotive cranes, wheel mounted cranes of both truck and self-propelled wheel type, and any variations thereof which retain the same fundamental characteristics. This section includes only cranes of the above types, which are basically powered by internal combustion engines or electric motors and which utilize drums and ropes. Cranes designed for railway and automobile wreck clearances are excepted. The requirements of these standards are applicable only to machines when used as lifting cranes. (4-7-83)

b. New and Existing Equipment. All new crawler, locomotive and truck cranes constructed and utilized on or after the effective date of these standards shall meet the design specifications of the American National

Standard Safety Code for Crawler, Locomotive and Truck Cranes, ANSI B30. 5-1968. Crawler, locomotive, and truck cranes constructed prior to the effective date of these standards should be modified to conform to those design specifications by December 31, 1973, unless it can be shown that the crane can not feasibly or economically be altered and that the crane substantially complies with the requirements of this section. Replacement parts shall be of equal or better quality than the original equipment and suitable for the purpose. Repairs or modifications shall be such as to render the equipment equal to or better than the original construction or design. (4-7-83)

c. Designated Personnel. Only designated personnel shall be permitted to operate a crane covered by this section. (4-7-83)

03. Load Ratings. (4-7-83)

a. Load ratings - Where stability governs lifting performance. (4-7-83)

i. The margin of stability for determination of load ratings, with booms of stipulated lengths at stipulated working radii for the various types of crane mountings is established by taking a percentage of the loads which will produce a condition of tipping or balance with the boom in the least stable direction, relative to the mounting. The load ratings shall not exceed the following percentages for cranes, with the indicated types of mounting under conditions stipulated in ii. and iii. of this section. (4-7-83)

Maximum load ratings (percent of tipping loads)

)

Type of crane mounting:	Percent
Locomotive, without outriggers; Booms 60 ft. or less	85
Booms over 60 ft.	85
Locomotive, using outriggers fully extended	80
Crawler, without outriggers	75
Crawler, using outriggers fully extended	85
Truck and wheel mounted without outriggers or using outriggers fully extended	85

ii. The following stipulation shall govern the application of the values in i. of this section for locomotive cranes: (a) Tipping with or without the use of outriggers occurs when half of the wheels farthest from the load leave the rail. (b)The crane shall be standing on track which is level within 1% grade. (c)Radius of the load is the horizontal distance from a projection of the axis of rotation to the rail support surface, before loading, to the center of vertical hoist line or tackle with load applied.(d)Tipping loads from which ratings are determined shall be applied under static conditions only, i.e., without dynamic effect of hoisting, lowering, or swinging.(e)The weight of all auxiliary handling devices such as hoist blocks, hooks, and slings shall be considered a part of the load rating. (4-7-83)

iii. Stipulations governing the application of the values in i. of this section for crawler, truck, and wheel-mounted cranes shall be in accordance with Crane Load-Stability Test Code. Society of Automotive Engineers (SAE) J765. (4-7-83)

iv. NOTE: Effectiveness of these preceding stability factors will be influenced by such additional factors as freely suspended loads, track, wind, or ground conditions, condition and inflation of rubber tires, boom lengths, proper operating speeds for existing conditions, and, in general, careful and competent operation. All of these shall be taken into account by the user. (4-7-83)

b. Rated Capacity Chart. A chart indicating the manufacturer's rated capacity at all operating radii for

all permissible boom lengths and jib lengths with alternate ratings for optional equipment affecting such ratings shall be posted in all mobile type cranes and shall be readily visible to the operator in his normal operating position. (4-7-83)

c. Inspection Classification. Initial inspection. Prior to initial use all new and altered cranes shall be inspected to insure compliance with provisions of these standards. (4-7-83)

d. All hooks shall be of the safety latch-type or the hook shall be moused. (4-7-83)

04. Inspection Classification. (4-7-83)

a. Regular Inspection. Inspection procedure for cranes in regular service is divided into two general classifications based upon the intervals at which inspection should be performed. The intervals in turn are dependent upon the nature of the critical components of the crane and the degree of their exposure to wear, deterioration, or malfunction. The two general classifications are herein designated as "frequent" and "periodic" with respective intervals between inspections as defined below: (4-7-83)

i. Frequent inspection - Daily to monthly intervals. (4-7-83)

ii. Periodic inspection: One to 12-month intervals, or as specifically recommended by the manufacturer. (4-7-83)

b. Frequent Inspection. Items such as the following shall be inspected for defects at intervals as defined in B. i. of this section or as specifically indicated including observation during operation for any defects which might appear between regular inspection. Any deficiencies such as listed shall be carefully examined and determination made as to whether they constitute a safety hazard: (4-7-83)

i. All control mechanisms for maladjustment interfering with proper operation - Daily. (4-7-83)

ii. All control mechanism for excessive wear of components and contamination by lubricants or other foreign manner. (4-7-83)

iii. All safety devices for malfunction. (4-7-83)

iv. Deterioration or leakage in air or hydraulic systems -Daily. (4-7-83)

v. Crane hooks with deformations or cracks. For hooks with cracks or having more than 15% in excess of normal throat opening or more than 10 degrees twist from the plant of the unbent hook. (4-7-83)

vi. Rope reeving for non-compliance with manufacturer's recommendations. (4-7-83)

vii. Electrical apparatus for malfunctioning, signs of excessive deterioration, dirt, and moisture accumulation. (4-7-83)

c. Periodic Inspection. Complete inspections of the crane shall be performed at intervals as generally defined in B. ii. of this section, depending upon its activity, severity of service, and environment, or as specifically indicated below. These inspections shall include the requirements of B. of this section and in addition, items such as the following. Any deficiencies such as listed shall be carefully examined and determination made as to whether they constitute a safety hazard: (4-7-83)

i. Deformed, cracked, or corroded members, in the crane structure and boom. (4-7-83)

ii. Loose bolts or rivets. (4-7-83)

iii. Cracked or worn sheaves and drums. (4-7-83)

iv. Worn, cracked, or distorted parts such as pins, bearings, shafts, gears, rollers and locking devices.

(4-7-83)

v. Excessive wear on brake and clutch system parts, linings, pawls, and ratchets. (4-7-83)

vi. Load, boom angle, and other indicators over their full range, for any significant inaccuracies. (4-7-83)

vii. Gasoline, diesel, electric, or other power plants for improper performance or noncompliance with safety requirements. (4-7-83)

viii. Excessive wear of chain-drive sprockets and excessive chain stretch. (4-7-83)

ix. Travel steering, braking, and locking devices, for malfunction. (4-7-83)

x. Excessively worn or damaged tires. (4-7-83)

d. Cranes not in Regular Use. (4-7-83)

i. A crane which has been idle for a period of one month or more, but less than six months, shall be given an inspection conforming with requirements of C. of this section and Section 2858 before placing in service. (4-7-83)

ii. A crane which has been idle for a period of six months shall be given a complete inspection conforming with requirements of C. and D. of this section and of Section 2858 of this Chapter before placing in service. (4-7-83)

iii. Standby cranes shall be inspected at least semi- annually in accordance with requirements of C. of this section and Section 2858 of this Chapter. Such cranes which are exposed to adverse environment should be inspected more frequently. (4-7-83)

e. Inspection Records. Written, dated, and signed inspection reports and records shall be made monthly on critical items in use such as brakes, crane hooks, and ropes. Records shall be kept readily available. (4-7-83)

05. Testing. (4-7-83)

a. Operational Tests. (4-7-83)

i. In addition to prototype tests and quality-control measure, the user of each new production crane shall require that it be tested and related data supplied by the manufacturer to the extent necessary to assure compliance with the operational requirements of this paragraph including functions such as the following: (a)Load hoisting and lowering mechanism.(b)Boom hoisting and lowering mechanism.(c)Swinging mechanism. (d) Travel mechanism.(e)Safety devices. (4-7-83)

ii. Where the complete production crane is not supplied by one manufacturer, such tests shall be conducted at final assembly. (4-7-83)

iii. Certified production crane test results shall be made available. (4-7-83)

b. Rated Load Test. (4-7-83)

i. Written reports shall be available showing test procedures and confirming the adequacy of repairs or alterations. (4-7-83)

ii. Test loads shall not exceed 100% of the rated load at any selected working radius. (4-7-83)

iii. Where rerating is necessary: (a) Crawler, truck, and wheel-mounted cranes shall be tested in

accordance with SAE Recommended Practice, Crane Load Stability Test Code J765 (April, 1961).(b)Locomotive cranes shall be tested in accordance with Section 2854 of this Chapter.(c)Rerating test report shall be readily available. (4-7-83)

iv. No cranes shall be rerated in excess of the original load ratings unless such rating changes are approved by the crane manufacturer or final assembler. (4-7-83)

06. Maintenance Procedure. (4-7-83)

a. Any unsafe conditions disclosed by the inspection requirements of this Chapter shall be corrected before operation of the crane is resumed. Adjustments and repairs shall be done only by designated personnel. (4-7-83)

b. After adjustments and repairs have been made, the crane shall not be operated until all guards have been reinstalled, safety devices reactivated, and maintenance equipment removed. (4-7-83)

07. Rope Inspection. (4-7-83)

a. Running Ropes. A thorough inspection of all ropes in use shall be made at least once a month and a full written, dated, and signed report of rope condition kept on file where readily available. All inspections shall be performed by an appointed or authorized person. Any deterioration, resulting in appreciable loss of original strength, such as described below, shall be carefully noted and determination made as to whether further use of the rope would constitute a safety hazard: (4-7-83)

i. Reduction of rope diameter below nominal diameter due to loss of core support, internal, or exterior corrosion or wear of outside wires. (4-7-83)

ii. A number of broken outside wires and the degree of distribution of concentration of such broken wires. (4-7-83)

iii. Worn outside wires. (4-7-83)

iv. Corroded or broken wires at end connections. (4-7-83)

v. Corroded, cracked, bent, worn, or improperly applied end connections. (4-7-83)

vi. Severe kinking, crushing, cutting or unstranding. (4-7-83)

b. Other Ropes. (4-7-83)

i. Heavy wear and/or broken wires may occur in sections in contact with equalizer sheaves or other sheaves where rope travel is limited or with saddles. Particular care shall be taken to inspect ropes at these locations. (4-7-83)

ii. All rope which has been idle for a period of a month or more due to shutdown or storage of a crane on which it is installed shall be given a thorough inspection before it is placed in service. This inspection shall be for all types of deterioration and shall be performed by an appointed or authorized person whose approval shall be required for further use of the rope. A written and dated report of the rope condition shall be available. (4-7-83)

iii. Particular care shall be taken in the inspection of non rotating rope. (4-7-83)

08. Handling the Load. (4-7-83)

a. Size of the Load. (4-7-83)

i. No crane shall be loaded beyond the rated load, except for test purposes as provided in Section 2856 of this Chapter. (4-7-83)

ii. When loads which are limited by structural competence rather than by stability are to be handled, it shall be ascertained that the weight of the load has been determined within plus or minus 10% before it is lifted. (4-7-83)

b. Attaching the Load. (4-7-83)

i. The hoist rope shall not be wrapped around the load. (4-7-83)

ii. The load shall be attached to the hook by means of slings or other approved devices. (4-7-83)

c. Moving the Load. (4-7-83)

i. The employer shall assure that: (a)The crane is level and where necessary, blocked properly.(b)The load is well secured and properly balanced in the sling or lifting device before it is lifted more than a few inches.(c)The hook shall be brought over the load in such a manner as to prevent swinging. (d)If there is a slack rope condition, it should be determined that the rope is properly seated on the drum and in the sheaves. (4-7-83)

ii. During hoisting care shall be taken that: (a) There is no sudden acceleration or deceleration of the moving load. (b)The load does not contact any obstructions. (4-7-83)

iii. Side loading of booms shall be limited to freely suspended loads. Cranes shall not be used for dragging loads sideways. (4-7-83)

iv. No hoisting, lowering, swinging, or traveling shall be done while anyone is on the load or hook. (4-7-83)

v. The operator should avoid carrying loads over people. (4-7-83)

vi. On truck mounted cranes, no loads shall be lifted over the front area except as approved by the crane manufacturer. (4-7-83)

vii. The operator shall test the brakes each time a load approaching the rated load is handled by raising it a few inches and applying the brakes. (4-7-83)

viii. Outriggers shall be used when the load to be handled at that particular radius exceeds the rated load without outriggers as given by the manufacturer for that crane. Where floats are used, they shall be securely attached to the outriggers. Wood blocks used to support outriggers shall: (a) Be strong enough to prevent crushing.(b)Be free from defects.(c)Be of sufficient width and length to prevent shifting or toppling under load. (4-7-83)

ix. Neither the load nor the boom shall be lowered below the point where less than two full wraps of rope remain on their respective drums. (4-7-83)

x. Before lifting loads with locomotive cranes without using outriggers, means shall be applied to prevent the load from being carried by the truck springs. (4-7-83)

xi. When two or more cranes are used to lift one load, one designated person shall be responsible for the operation. He shall be required to analyze the operation and instruct all personnel involved in the proper positioning, rigging of the load, and the movements to be made. (4-7-83)

xii. In transit, the following additional precautions shall be exercised: (a) The boom shall be carried in line with the direction of motion.(b)The superstructure shall be secured against rotation, except when negotiating turns when there is an operator in the cab or the boom is supported on a dolly.(c)The empty hook shall be lashed or otherwise restrained so that it cannot swing freely. (4-7-83)

xiii. Before traveling a crane with load, a designated person shall be responsible for determining and controlling safety. Decisions such as position of load, boom location, ground support, travel route, and speed of

movement shall be in accord with his determinations. (4-7-83)

xiv. A crane with or without load shall not be traveled with the boom so high that it may bounce back over the cab. (4-7-83)

xv. When rotating the crane, sudden starts and stops shall be avoided. Rotational speed shall be such that the load does not swing out beyond the radii at which it can be controlled. A tag or restraint line shall be used when rotation of the load is hazardous. (4-7-83)

xvi. When a crane is to be operated at a fixed radius, the boom-hoist pawl or other positive locking device shall be engaged. (4-7-83)

xvii. Ropes shall not be handled on a winch head without the knowledge of the operator. (4-7-83)

xviii. While a winch head is being used, the operator shall be within convenient reach of the power unit control lever. (4-7-83)

d. Holding the Load. (4-7-83)

i. The operator shall not be permitted to leave his position at the controls while the load is suspended. (4-7-83)

ii. No person should be permitted to stand or pass under a load on the hook. (4-7-83)

iii. If the load must remain suspended for any considerable length of time, the operator shall hold the drum from rotating in the lower direction by activating the positive controllable means of the operator's station. (4-7-83)

09. Other Requirements. (4-7-83)

a. Rail clamps. Rail clamps shall not be used as a means of restraining tipping of a locomotive crane. (4-7-83)

b. Ballast or Counterweight. Cranes shall not be operated without the full amount of any ballast or counterweight in place as specified by the maker, but truck cranes that have dropped the ballast or counterweight may be operated temporarily with special care and only for light loads without full ballast or counterweight in place. The ballast or counterweight in place specified by the manufacturer shall not be exceeded. (4-7-83)

c. Cabs. (4-7-83)

i. Necessary clothing and personal belongings shall be stored in such a manner as to not interfere with access or operation. (4-7-83)

ii. Tools, oil cans, waste, extra fuses, and other necessary articles shall be stored in the tool box, and shall not be permitted to lie loose in or about the cab. (4-7-83)

d. Refueling. (4-7-83)

i. Refueling with small portable containers shall be done with Underwriter's Laboratories or Factory Mutual Laboratories approved, or equivalent, safety type can equipped with an automatic closing cap and flame arrester. (4-7-83)

ii. Machines shall not be refueled with the engine running. (4-7-83)

e. Fire Extinguishers. (4-7-83)

i. A carbon dioxide, dry chemical, or equivalent fire extinguisher shall be kept in the cab or vicinity

of the crane. (4-7-83)

ii. Operating and maintenance personnel shall be made familiar with the use and care of the fire extinguishers provided. (4-7-83)

f. Swinging Locomotive Cranes. A locomotive crane shall not be swung into a position where railway cars on an adjacent track might strike it, until it has been ascertained that cars are not being moved on the adjacent track and proper flag protection has been established. (4-7-83)

10. Operating Near Electric Power Lines. (4-7-83)

a. Clearances. Except where the electrical distribution and transmission lines have been deenergized and visibly grounded at point of work or where insulating barriers not a part of or an attachment to the crane have been erected to prevent physical contact with the lines, cranes shall be operated proximate to, under, over, by, or near powerlines only in accordance with the following: (4-7-83)

i. For lines rated 50 kv. or below, minimum clearance between the lines and any part of the crane or load shall be 20 feet. (4-7-83)

ii. For lines rated over 50 kv., minimum clearance between the lines and any part of the crane or load shall be 10 feet plus 0.4 inch for each 1 kv. over 50 kv., or twice the length of the line insulator but never less than 10 feet. (4-7-83)

iii. In transit with no load and boom lowered, the clearance shall be a minimum of 4 feet. (4-7-83)

b. Boom Guards. Cage-type boom guards, insulating links, or proximity warning devices may be used on cranes, but the use of such devices shall not operate to alter the requirements of this section. (4-7-83)

c. Notification. Before the commencement of operations near electrical lines, the owners of the lines or their authorized representative shall be notified and provided with all pertinent information. The cooperation of the owner shall be requested. (4-7-83)

d. Overhead Wires. Any overhead wire shall be considered to be an energized line unless and until the person owning such line or the electrical utility authorities indicate that it is not an energized line. (4-7-83)

324. DERRICKS.

01. Definitions. (4-7-83)

a. A "derrick" is an apparatus consisting of a mast or equivalent member held at the head by guys or braces, with or without a boom, for use with a hoisting mechanism and operating ropes. (4-7-83)

b. A "frame-derrick" means a derrick in which the boom is hinged from a cross member between the bottom ends of two upright members spread apart at the lower ends and joined at the top; the boom point secured to the junction of the side members, and the side members are braced or guyed from this junction point. (4-7-83)

DIAGRAM available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

c. A "basket derrick" is a derrick without a boom, similar to a gin pole with its base supported by ropes attached to corner posts or other parts of the structure. The base is at a lower elevation than its supports. The location of the base of a basket derrick can be changed by varying the length of the rope supports. The top of the pole is secured with multiple reeved guys to position the top of the pole to the desired location by varying the length of the upper guy lines. The load is raised and lowered by ropes through a sheave or block secured to the top of the pole. (4-7-83)

DIAGRAM available from Industrial Commission, 317 Main Street Boise, Idaho 83720, telephone (208)

334-6000.

d. "Breast derrick" means a derrick without boom. The mast consists of two side members spread farther apart at the base than at the top and tied together at top and bottom by rigid members. The mast is prevented from tipping forward by guys connected to its top. The load is raised and lowered by ropes through a sheave or block secured to the top crosspiece. (4-7-83)

DIAGRAM available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

e. "Chicago boom derrick" means a boom which is attached to a structure, and outside upright member of the structure serving as the mast, and the boom being stepped in a fixed socket clamped to the upright. The derrick is complete with load, boom, and boom point swing line falls. (4-7-83)

DIAGRAM available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

f. A "gin pole derrick" is a derrick without a boom. Its guys are so arranged from its top as to permit leaning the mast in any direction. The load is raised and lowered by ropes reeved through sheaves or blocks at the top of the mast. (4-7-83)

DIAGRAM available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

g. "Guy derrick" means a fixed derrick consisting of a mast capable of being rotated, supported in a vertical position by guys, and a boom whose bottom end is hinged or pivoted to move in a vertical plane with a reeved rope between the head of the mast and the boom point for raising and lowering the boom, and a reeved rope from the boom point for raising and lowering the load. (4-7-83)

DIAGRAM available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

h. "Shearing derrick" means a derrick without a boom and similar to a breast derrick. The mast, wide at the bottom and narrow at the top, is hinged at the bottom and has its top secured by a multiple reeved guy to permit handling loads at various radii by means of load tackle suspended from the mast top. (4-7-83)

i. A "stiff leg derrick" is a derrick similar to a guy derrick except that the mast is supported or held in place by two or more stiff members, called stifflegs, which are capable of resisting either tensile or compressive forces. Sills are generally provided to connect the lower ends of the stifflegs to the foot of the mast. (4-7-83)

DIAGRAM available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

j. "Appointed" means assigned specific responsibilities by the employer or the employer's representative. (4-7-83)

k. "ANSI" means the American National Standards Institute. (4-7-83)

l. A boom is a timber or metal section or strut, pivoted or hinged at the heel (lower end) at a location fixed in height on a frame or mast or vertical member, and with its point (upper end) supported by chains, ropes, or rods to the upper end of the frame mast, or vertical member. A rope for raising and lowering the load is reeved through sheaves or a block at the boom point. The length of the boom shall be taken as the straight line distance between the axis of the foot pin and the axis of the boom point sheave pin, or where used, the axis of the upper load block attachment pin. (4-7-83)

m. "Boom harness" means the block and sheave arrangement on the boom point to which the topping lift cable is reeved for lowering and raising the boom. (4-7-83)

n. The "boom point" is the outward end of the top section of the boom. (4-7-83)

o. "Derrick bullwheel" means a horizontal ring or wheel, fastened to the foot of a derrick, for the purpose of turning the derrick by means of ropes leading from this wheel to a powered drum. (4-7-83)

p. "Designated" means selected or assigned by the employer or employer's representative as being qualified to perform specific duties. (4-7-83)

q. "Eye" means a loop formed at the end of a rope by securing the dead end to the live end at the base of the loop. (4-7-83)

r. A "fiddle block" is a block consisting of two sheaves in the same plane held in place by the same cheek plates. (4-7-83)

s. The "foot bearing" or "foot block" (sill block) is the lower support on which the mast rotates. (4-7-83)

t. A "gudgeon pin" is a pin connecting the mast cap to the mast allowing rotation of the mast. (4-7-83)

u. A "guy" is a rope used to steady or secure the mast or other member in the desired position. (4-7-83)

v. "Load, working" means the external load, in pounds, applied to the derrick, including the weight of load attaching equipment such as load blocks, shackles, and slings. (4-7-83)

w. "Load block, lower" means the assembly of sheaves, pins, and frame suspended by the hoisting rope. (4-7-83)

x. "Load block, upper" means the assembly of sheaves, pins, and frame suspended from the boom. (4-7-83)

y. "Mast" means the upright member of the derrick. (4-7-83)

z. "Mast cap (spider)" means the fitting at the top of the mast to which the guys are connected. (4-7-83)

aa. "Reeving" means a rope system in which the rope travels around drums and sheaves. (4-7-83)

bb. "Rope" refers to wire rope unless otherwise specified. (4-7-83)

cc. "Safety Hook" means a hook with a latch to prevent slings or load from accidentally slipping off the hook. (4-7-83)

dd. "Side loading" is a load applied at an angle to the vertical plant of the boom. (4-7-83)

ee. The "sill" is a member connecting the foot block and stiffleg or a member connecting the lower ends of a double member mast. (4-7-83)

ff. A "standby derrick" is a derrick not in regular service which is used occasionally or intermittently as required. (4-7-83)

gg. "Still leg" means a rigid member supporting the mast at the head. (4-7-83)

hh. "Swing" means rotation of the mast and/or boom for movements of loads of a horizontal direction about the axis of rotation. (4-7-83)

02. General Requirements. (4-7-83)

a. Application. This section applies to guy, still-leg, bucket, breast, gin, pole, Chicago Boom and A-frame derricks of the stationary type, capable of handling loads at variable reaches and powered by hoists through systems or rope reeving, used to perform lifting hook work, single or multiple line bucket work, grab, grapple, and magnet work. Derricks may be permanently installed for temporary use as in construction work. The requirements of this section also apply to any modification of these types which retain their fundamental features, except for floating derricks. (4-7-83)

b. New and existing equipment. All new derricks constructed and installed on or after the effective date of these standards shall meet the design specifications of the "American National Standard Safety Code for Derricks, ANSI B30. 6-1969". Derricks constructed prior to the effective date of these standards should be modified to conform to these design specifications by December 31, 1973 unless it can be shown that the derrick cannot feasibly or economically be altered and that the derrick substantially complies with the requirements of this section. (4-7-83)

i. Operating controls shall be marked or an explanation of the controls shall be posted in full view of the operator. (4-7-83)

ii. Cranes or derricks having a movable working boom shall have a radius or boom angle indicator installed. This shall be located where the operator can readily read it while in his normal operating position. (4-7-83)

iii. Top of boom painted. The top six feet of the boom or jib shall be painted bright yellow. (4-7-83)

c. Designated Personnel. Only designated personnel shall be permitted to operate a derrick covered by this section. (4-7-83)

03. Load Ratings. (4-7-83)

a. Rated Load Marking. For permanently installed derricks with fixed lengths of boom, guy, and mast, a substantial, durable, and clearly legible rating chart shall be provided with each derrick and securely affixed where it is visible to personnel responsible for the safe operation of the equipment. The chart shall include the following data: (4-7-83)

i. Manufacturer's approved load ratings at corresponding ranges of boom angle or operating radii. (4-7-83)

ii. Specific lengths of components on which the load ratings are based. (4-7-83)

iii. Required parts for hoist reeving. Size and construction of rope may be shown either on the rating chart or in the operating manual. (4-7-83)

b. Nonpermanent Installations. For nonpermanent installations, the employer shall provide sufficient information from which capacity charts can be prepared for the particular installation. The capacity charts shall be located at the derricks or the job site office. (4-7-83)

04. Inspection. (4-7-83)

a. Inspection Classification. (4-7-83)

i. Prior to initial use, all new and altered derricks shall be inspected to insure compliance with the provisions of these standards. (4-7-83)

ii. Inspection procedure for derricks in regular service is divided into two general classifications based upon the intervals at which inspection should be performed. The intervals in turn are dependent upon the nature of the critical components of the derrick and the degree of their exposure to wear, deterioration, or malfunction. The two

general classifications are herein designated as frequent and period with respective intervals between inspections as defined below (a) Frequent inspection - Daily to monthly intervals.(b)Periodic Inspection:1 to 12 month intervals, or as specified by the manufacturer. (4-7-83)

b. Frequent Inspection. Items such as the following shall be inspected for defects at intervals as defined in A.ii.(a) of this section or as specifically indicated, including observation during operation for any defects which might appear between regular inspections. Deficiencies shall be carefully examined for any safety hazard. (4-7-83)

i. All control mechanisms: inspect daily for adjustment, wear, and lubrication. (4-7-83)

ii. All chords and lacing: Inspect daily visually. (4-7-83)

iii. Tension in guys: Daily. (4-7-83)

iv. Plumb of the mast. (4-7-83)

v. Deterioration or leakage in air or hydraulic systems: Daily. (4-7-83)

vi. Derrick hooks for deformations or cracks: for hooks with cracks or having more than 15% in excess of normal throat opening or more than 10 degree twist from the plane of the unbent hook, refer to Section 2868 of this Chapter. (4-7-83)

vii. Rope reeving: visual inspection for noncompliance with derrick manufacturer's recommendations. (4-7-83)

viii. Hoist brakes, clutches, and operating levers: check daily for proper functioning before beginning operations. (4-7-83)

ix. Electrical apparatus for malfunctioning, signs of excessive deterioration, dirt and moisture accumulation. (4-7-83)

c. Periodic Inspection. (4-7-83)

i. Complete inspections of the derrick shall be performed at intervals as generally defined in A.ii.(b) of this section depending upon its activity, severity of service, and environment, or as specifically indicated below. These inspections shall include the requirements of B. of this section and in addition, items such as the following. Deficiencies shall be carefully examined and a determination made as to whether they constitute a safety hazard: (a) Bolts or rivets for tightness. (b)Parts such as pins, bearings, shafts, gears, sheaves, drums, rollers, locking and clamping devices, for wear, cracks, and distortion.(c)Structural members for deformations, cracks, and corrosion.(d)Gudgeon pin for cracks, wear and distortion each time the derrick is to be erected.(e)Power plants for proper performance and compliance with applicable safety requirements. (f) Hooks: magnetic particle or other suitable crack detecting inspection should be performed at least once each year. (4-7-83)

ii. Foundation or supports shall be inspected for continued ability to sustain the imposed loads. (4-7-83)

d. Derricks not in Regular Use. (4-7-83)

i. A derrick which has been idle for a period of 1 month or more, but less than 6 months shall be given an inspection conforming with requirements of B. of this section and Section 2868 of this Chapter before placing in service. (4-7-83)

ii. A derrick which has been idle for a period of over 6 months shall be given a complete inspection conforming with requirements of B. and C. of this section and Section 2868 of this chapter before placing in service. (4-7-83)

iii. Standby derricks shall be inspected at least semi- annually in accordance with requirements of B. of this section and Section 2868 of this Chapter. Those exposed to adverse environment should be inspected more frequently. (4-7-83)

05. Testing. (4-7-83)

a. Operational Tests. Prior to initial use all new and latered derricks shall be tested to ensure compliance with this section, including the following functions: (4-7-83)

i. Load hoisting and lowering. (4-7-83)

ii. Boom up and down. (4-7-83)

iii. Swing. (4-7-83)

iv. Operation of clutches and brakes of hoist. (4-7-83)

b. Anchorages. All anchorages shall be approved by the appointed person. Rock and hairpin anchorages may require special testing. (4-7-83)

06. Maintenance. (4-7-83)

a. Preventative Maintenance. A preventive maintenance program based on the derrick manufacturer's recommendations shall be established. (4-7-83)

b. Maintenance Procedure. (4-7-83)

i. Before adjustments and repairs are started on a derrick, the following precautions shall be taken: (a) The derrick to be repaired shall be arranged so it will cause the least interference with other equipment and operations in the area. (b) All hoist drum dogs shall be engaged. (c)The main or emergency switch shall be locked in the open position, if an electric hoist is used.(d)Warning or out of order signs shall be placed on the derrick and hoist.(e)The repairs of booms or derricks shall either be made when the booms are lowered and adequately supported or safely tied off.(f)A good communication system shall be set up between the hoist operator and the appointed individual in charge of the derrick operations before any work on the equipment is started.(g)Welding repairs shall be approved by an appointed person. (4-7-83)

ii. After adjustments and repairs have been made, the derrick shall not be operated until all guards have been reinstalled, safety devices reactivated, and maintenance equipment removed. (4-7-83)

c. Adjustments and Repairs. (4-7-83)

i. Any unsafe conditions disclosed by inspection shall be corrected before operation of the derrick is resumed. (4-7-83)

ii. Adjustments shall be maintained to assure correct functioning of components. (4-7-83)

iii. Repairs or replacements shall be provided promptly as needed for safe operation. The following are examples of conditions requiring prompt repair or replacement: (a) Hooks showing defects described in Section 2865 of this Chapter shall be discarded.(b)All critical parts which are cracked, broken, bent, or excessively worn.(c)Pitted or burned electrical contacts should be corrected only by the replacement and in sets. Controller parts should be lubricated as recommended by the manufacturer.(d)All replacement and repaired parts shall have at least the original safety factor. (4-7-83)

07. Rope Inspection. (4-7-83)

a. Running Ropes. A thorough inspection of all ropes in use shall be made at least once a month and a full written, dated, and signed report of rope condition kept on file where readily available. Any deterioration,

resulting in appreciable loss of original strength, such as described below, shall be carefully noted and determination made as to whether further use of the rope would constitute a safety hazard: (4-7-83)

i. Reduction of rope diameter below nominal diameter due to loss of core support, internal or external corrosion, or wear of outside wires. (4-7-83)

ii. A number of broken outside wires and the degree of distribution or concentration of such broken wires. (4-7-83)

iii. Worn outside wires. (4-7-83)

iv. Corroded or broken wires at end connections. (4-7-83)

v. Corroded, cracked, bent, worn, or improperly applied end connections. (4-7-83)

vi. Severe kinking, crushing, cutting, or unstranding. (4-7-83)

b. Idle Ropes. All rope which has been idle for a period of a month or more due to shutdown or storage of derrick on which it is installed shall be given a thorough inspection before it is placed in service. This inspection shall be for all types of deterioration. A written and dated report of the rope condition shall be available. (4-7-83)

c. Nonrotating Ropes. Particular care shall be taken in the inspection of nonrotating rope. NOTE: Limited Travel Ropes. Heavy wear and/or broken wires may occur in sections in contact with equalized sheaves or other sheaves where rope travel is limited, or with saddles. Particular care shall be taken to inspect ropes at these locations. (4-7-83)

08. Operations of Derricks. Derrick operation shall be directed only by the individual specifically designated for that purpose. (4-7-83)

09. Handling the Load. (4-7-83)

a. Size of Load. (4-7-83)

i. No derrick shall be loaded beyond the rated load. (4-7-83)

ii. When loads approach the maximum rating of the derrick, it shall be ascertained that the weight of the load has been determined within plus or minus 10% before it is lifted. (4-7-83)

b. Attaching the Load. (4-7-83)

i. The hoist rope shall not be wrapped around the load. (4-7-83)

ii. The load shall be attached to the hook by means of slings or other suitable devices. (4-7-83)

c. Moving the Load. (4-7-83)

i. The load shall be well secured and properly balanced in the sling or lifting device before it is lifted more than a few inches. (4-7-83)

ii. Before starting to hoist, the following conditions shall be noted: (a) Hoist rope shall not be kinked.(b) Multiple part lines shall not be twisted around each other. (c) The hook shall be brought over the load in such a manner as to prevent swinging.(d)If there is a slack rope condition, it should be determined that the rope is properly seated on the drum and in the sheaves. (4-7-83)

iii. During hoisting, care shall be taken that: (a) There is no sudden acceleration or deceleration of the moving load. (b)Load does not contact any obstructions. (4-7-83)

iv. A derrick shall not be used for side loading except when specifically authorized by a responsible person who has determined that the various structural components will not be overstressed. (4-7-83)

v. No hoisting, lowering, or swinging shall be done while anyone is on the load or hook. (4-7-83)

vi. The operator shall avoid carrying loads over people. (4-7-83)

vii. The operator shall test the brakes each time a load approaching the rated load is handled by raising it a few inches and applying the brakes. (4-7-83)

viii. Neither the load nor boom shall be lowered below the point where less than two full wraps of rope remain on their respective drums. (4-7-83)

ix. When rotating a derrick, sudden starts and stops shall be avoided. Rotational speed shall be such that the load does not swing out beyond the radius at which it can be controlled. (4-7-83)

x. Boom and hoisting rope systems shall not be twisted. (4-7-83)

d. Holding the Load. (4-7-83)

i. The operator shall not be allowed to leave his position at the controls while the load is suspended. (4-7-83)

ii. People should not be permitted to stand or pass under a load on the hook. (4-7-83)

iii. If the load must remain suspended for any considerable length of time, a dog, or pawl and ratchet, or other equivalent means, rather than the brake alone, shall be used to hold the load. (4-7-83)

e. Use of Winch Heads. (4-7-83)

i. Ropes shall not be handled on a winch head without the knowledge of the operator. (4-7-83)

ii. While a winch head is being used, the operator shall be within convenient reach of the power unit control lever. (4-7-83)

f. Securing Boom. Dogs, pawls, or other positive holding mechanism on the hoist shall be engaged. When not in use, the derrick boom shall: (4-7-83)

i. Be laid down; (4-7-83)

ii. Be secured to a stationary member, as nearly under the head as possible, by attachment of a sling to the load block; or (4-7-83)

iii. Be hoisted to a vertical position and secured to the mast. (4-7-83)

10. Other Requirements. (4-7-83)

a. Guards. (4-7-83)

i. Exposed moving parts, such as gears, ropes, setscrews, projecting keys, chains, chain sprockets and reciprocating components which constitute a hazard under normal operating conditions shall be guarded. (4-7-83)

ii. Guards shall be securely fastened. (4-7-83)

iii. Each guard shall be capable of supporting without permanent distortion, the weight of a 200-pound

person unless the guard is located where it is impossible for a person to step on it. (4-7-83)

b. Hooks. (4-7-83)

i. Hooks shall meet the manufacturer's recommendations and shall not be overloaded. (4-7-83)

ii. Safety latch type hooks shall be used or the hooks shall be moused. (4-7-83)

c. Fire Extinguishers. (4-7-83)

i. A carbon dioxide, dry chemical, or equivalent fire extinguisher shall be kept in the immediate vicinity of the derrick. (4-7-83)

ii. Operating and maintenance personnel shall be familiar with the use and care of the fire extinguishers provided. (4-7-83)

d. Refueling. (4-7-83)

i. Refueling with portable containers shall be done with Underwriters' Laboratory, Inc., (UL) or Factory Mutual Laboratories approved or equivalent, safety type containers equipped with automatic closing spout and flame arrester. (4-7-83)

ii. Machines shall not be refueled with the engine running. (4-7-83)

e. Operating Near Electric Powerlines. (4-7-83)

i. Except where the electrical distribution and transmission lines have been deenergized and visibility grounded at point of work or where insulating barriers not a part of or an attachment to the derrick have been erected to prevent physical contact with the lines, derricks shall be operated proximate to, under, over, by, or near powerlines only in accordance with the following: (a) For lines rated 50 kv or below, minimum clearance between the lines and any part of the derrick or load shall be 10 feet. (b)For lines rated over 50 kv., minimum clearance between lines and part of the derrick or load shall be 10 feet plus 0.4 inch for each l kv. over 50 kv., or use twice the length of the line insulator, but never less than 10 feet. (4-7-83)

ii. Cage-type boom guards, insulating links, or proximity warning devices may be used on derricks, but the use of such devices shall not operate to alter the requirements of E.i. of this section. (4-7-83)

iii. Before the commencement of operations near electrical lines, the owners of the lines or their authorized representatives shall be notified and provided with pertinent information. The owner's cooperation shall be requested. (4-7-83)

iv. Any overhead wire shall be considered to be an energized line until the owner of the line or their authorized representatives state that it is deenergized. (4-7-83)

f. Cab or Operating Enclosure. (4-7-83)

i. Necessary clothing and personal belongings shall be stored in such a manner as to not interfere with access or operation. (4-7-83)

ii. Tools, oil cans, waste, extra fuses, and other necessary articles shall be stored in the tool box, and shall not be permitted to lie loose in or about the cab or operating enclosure. (4-7-83)

11. Helicopters. (4-7-83)

a. Helicopter Regulations. Helicopter cranes shall be expected to comply with any applicable regulations of the Federal Aviation Administration. (4-7-83)

b. Briefing. Prior to each day's operation, a briefing shall be conducted. This briefing shall set forth the plan of operation for the pilot and ground personnel. (4-7-83)

c. Slings and Tag Lines. Load shall be properly slung. Tag lines shall be of a length that will not permit their being drawn up into rotors. Pressed sleeve, swedged eyes, or equivalent means shall be used for all freely suspended loads to prevent hand splices from spinning open or cable clamps from loosening. (4-7-83)

d. Cargo Hooks. All electrically operated cargo hooks shall have the electrical activating device so designed and installed as to prevent inadvertent operation. In addition, these cargo hooks shall be equipped with an emergency mechanical control for releasing the load. The hooks shall be tested prior to each day's operation to determine that the release functions properly, both electrically and mechanically. (4-7-83)

e. Personal Protective Equipment. (4-7-83)

i. Personal protective equipment for employees receiving the load shall consist of complete eye protection and hard hats secured by chin straps. (4-7-83)

ii. Loose-fitting clothing likely to flap in the downwash and thus be snagged on hoist line shall not be worn. (4-7-83)

f. Loose Gear and Objects. Every practical precaution shall be taken to provide for the protection of the employees from flying objects in the rotor downwash. All loose gear within 100 feet of the place of lifting the load, depositing the load, and all other areas susceptible to rotor downwash shall be secured or removed. (4-7-83)

g. Housekeeping. Good housekeeping shall be maintained in all helicopter loading and unloading areas. (4-7-83)

h. Operator Responsibility. The helicopter operator shall be responsible for size, weight, and manner in which loads are connected to the helicopter. If, for any reason, the helicopter operator believes the lift can not be made safely, the lift shall not be made. (4-7-83)

i. Hooking and Unhooking Loads. Employees shall not perform work under hovering craft except for that limited period of time necessary to guide, secure and unhook loads, or to hook loads. Regardless of whether the hooking or unhooking of a load takes place on the ground or a flat roof, or other location in an elevated work position in structural members, a safe means of access and egress, to include an unprogrammed emergency escape route or routes, shall be provided for the employees who are hooking or unhooking loads. (4-7-83)

j. Static Charge. Static charge on the suspended load shall be dissipated with a grounding device before ground personnel touch the suspended load, or protective rubber gloves shall be worn by all ground personnel touching the suspended load. (4-7-83)

k. Weight Limitation. The weight of an external load shall not exceed the manufacturer's rating. (4-7-83)

l. Ground Lines. Hoist wires or other gear, except for pulling lines or conductors that are allowed to "pay out" from a container or roll off a reel, shall not be attached to any fixed ground structure, or allowed to foul on any fixed structure. (4-7-83)

m. Visibility. When visibility is reduced by dust or other conditions, ground personnel shall exercise special caution to keep clear of main and stabilizing rotors. Precautions shall also be taken by the employer to eliminate as far as practical reduced visibility. (4-7-83)

n. Signal Systems. Signal systems between aircrew and ground personnel shall be understood and checked in advance of hoisting the load. This applies to either radio or hand signal systems. Hand signals shall be as shown in Figure 2880-A. (4-7-83)

o. Approach Distance. No unauthorized person shall be allowed to approach within 50 feet of the

helicopter when the rotor blades are turning. (4-7-83)

p. Approaching Helicopter. Whenever approaching or leaving a helicopter with blades rotating, all employees shall remain in full view of the pilot and keep in a crouched position. Employees shall avoid the area from the cockpit or cabin rearward unless authorized by the helicopter operator to work there. (4-7-83)

q. Personnel. Sufficient ground personnel shall be provided when required for safe helicopter loading and unloading operations. (4-7-83)

r. Communications. There shall be constant reliable communication between the pilot, and a designated employee of the ground crew who acts as a signalman during the period of loading and unloading. This signalman shall be distinctly recognizable from other ground personnel. (4-7-83)

s. Fires. Open fires shall not be permitted in an area that could result in such fires being spread by the rotor downwash. (4-7-83)

12. A-Frames. (4-7-83)

a. All timbers for A-frames shall be of correct size, length, and condition to sustain the maximum contemplated loads. (4-7-83)

b. A-frame timbers shall be braced with two spreaders spaced 1/4 the length of the A-frame from each end. Cross bracing shall cross between the two spreaders. Bracing material shall be not less than 2/3 of the rated strength of the A-frame timbers. (4-7-83)

c. Tie rods (staybolts) of not less than 1/12 the diameter of the main A-frame timbers shall be used. Tie rods shall be placed directly above the upper spreader and directly below the lower spreader. Ends of bolts shall be secured at each end with malleable washers and nuts. (4-7-83)

d. The base of the A-frame shall be securely anchored. Elevating type A-frames shall be set in pinion-type sockets. Pinion bases shall be securely anchored. (4-7-83)

e. Guy lines shall be of sufficient strength to carry the load imposed upon them and shall be securely fastened in place. (4-7-83)

325. RIGGING.

01. Wire Rope. (4-7-83)

a. Safe loads. Whenever used in connection with work, employment, occupations or uses to which these standards are applicable, wire rope shall not be subjected to loads in excess of 1/5 the breaking load as given in the schedule of the cable manufacturer. Except as required in Standard for Material Hoists. (4-7-83)

b. Condemned. When cables deteriorate through rust, wear, broken wires, undue strain or other conditions to the extent of 15% of their original strength, use of cables shall be discontinued. (4-7-83)

c. Straps and Ribbons. The strap or steel ribbon type of cable shall not be used in the suspension of scaffolding. (4-7-83)

d. Inspections. There shall be not less than monthly inspection of all wire rope in use, and all wire rope must be inspected before put into use. (4-7-83)

e. Fastening. The following methods of fastening and attaching wire rope shall be adhered to: (4-7-83)

i. Sockets. The end of wire rope to be set into socket fittings held securely with molten babbitt or zinc (not lead). The wires of the cable shall be frayed out and each wire bent toward the outside of socket, so that the end

of each wire projects well into the depth of the socket. This method of fastening cables should be left in the hands of an experienced workman in this kind of work. (4-7-83)

ii. Wrapping. Thimbles spliced into rope and the splice securely wrapped. (4-7-83)

iii. Bolted. Thimbles inserted and held in place by at least a three bolt clamp or three U-bolt clips. Clamps shall be of standard size for the sizes of the cable in use. (4-7-83)

iv. Lashing. For temporary work, by passing rope at least twice around large objects such as a post, avoiding sharp points and carrying the end back several feet and securing it by clamps, clips or lashing to the cable. (4-7-83)

02. Hemp Rope. (4-7-83)

a. Quality. Whenever hemp rope is used, it shall be first grade along fiber Manila hemp rope. (4-7-83)

b. Strength. Rope shall not be used to support loads in excess of those given in table for hemp and Manila Rope. (4-7-83)

c. Lashed. Supporting ropes shall be double lashed at each point of suspension. (4-7-83)

d. Pads. Where supporting ropes are brought over sharp corners of steel, stone, or other material liable to cut the rope, or are in any other way subject to abrasion, they shall be protected at such points by the use of bagging, wooden blocks, or other protective padding. (4-7-83)

e. Knot Ends. Rope knots shall have their loose and free ends lashed to the standing part in order to prevent their becoming untied. (4-7-83)

f. Inspection. All ropes shall be inspected before use. (4-7-83)

g. Defective Rope. Rope badly frayed, rotted, exposed to the action of acid or caustic, or otherwise defective and unsafe, shall be condemned and destroyed to avoid all possibility of future use by mistake. (4-7-83)

03. Hemp and Wire Rope Slings. (4-7-83)

a. Inspection. All rope slings shall be inspected thoroughly and regularly at intervals of not more than one month, and when not in use, shall be stored in a dry place. (4-7-83)

b. Pads. Rope slings shall be protected with pads or blocks when wrapped around sharp edges of structural shapes casting, etc. (4-7-83)

c. Slip-Noose. Slings shall not be used in single strand slip-noose form. (4-7-83)

d. Acids. Hemp rope shall not be used as slings for handling objects contaminated with acid. (4-7-83)

e. How Attached. Hand ropes (guide ropes) shall not be attached to slings but to hoisting tackle, or (only when necessary) attached to the object handled. (4-7-83)

f. Strength. All slings shall be of sufficient strength for handling the imposed loads. See tables given for hemp and wire ropes. (4-7-83)

g. Double Slings. Double slings shall be used on all horizontal loads over 12 feet in length, and the distance between the points where slings are attached shall be sufficient to prevent the load from tipping up endwise. (4-7-83)

h. Spreaders. Spreaders shall be used where there is a danger of sling ends or "hitches" slipping together. (4-7-83)

i. Defective - Destroyed. Defective and unsafe slings shall be destroyed in order to avoid the possibility of their being used by mistake. (4-7-83)

04. Guys. Guy wires and rope shall be of sufficient strength to carry the load imposed upon them and shall be securely fastened in place. (4-7-83)

05. Thimbles. Wherever rope is permanently fastened by a single wrap to a metal object less in diameter or shortest measurement than three times the diameter of the rope, a galvanized thimble (of size intended for the rope) shall be inserted between the object and the loop of the rope. (4-7-83)

06. Blocks and Falls. Blocks and falls shall be carefully inspected before being used. Blocks shall be of substantial construction and maintained in good condition while in use. Blocks shall fit the sizes of ropes they carry and shall not chafe or abrade the ropes running through them. (4-7-83)

07. Chains and Cables. (4-7-83)

a. If at any time, any 3 foot length of chain is found to have stretched 1/3 the length of a link, it shall be discarded. (4-7-83)

b. The practice of placing bolts or nails between two links to shorten chains is prohibited. (4-7-83)

c. Splicing broken chains by inserting a bolt between two links with the heads of the bolt and the nut sustaining the load, or passing one link through another and inserting a bolt or nail to hold it, is prohibited. (4-7-83)

d. Wherever annealing of chains is attempted, it shall be done in properly equipped annealing furnaces and under the direct supervision of a competent person thoroughly versed in heat treating. (4-7-83)

e. Cables shall be periodically inspected. A copy of the report of the inspections of each running cable shall be filed in a place readily accessible to the Department, or authorized representative. (4-7-83)

FIGURE 2880-A available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000.

f. Do not remove the load or the crane unless you understand the floor signal clearly. (4-7-83)

g. Be careful that the load does not swing to injure your hookon man or other floormen - make certain they are in the clear. (4-7-83)

h. When raising or lowering the load, see that it will safely clear adjacent stockpiles or machinery. (4-7-83)

i. Never pick up a load greater than the capacity of your crane. In case of doubt, call your foreman. (4-7-83)

j. Never do ANYTHING that is not safe. (4-7-83)

k. Cooperate with your hookon or floormen. You and he are a team handling a valuable piece of equipment - Never let it become a hazard. (7-4-83)

08. Slings. This section applies to slings used in conjunction with other material handling equipment for the movement of material by hoisting, in employments covered by this Chapter. The types of slings covered are those made from alloy steel chain, wire rope, metal mesh, natural or synthetic fiber rope (conventional three strand construction), and synthetic web (nylon, polyester, and polypropylene). (4-7-83)

09. Definitions. (4-7-83)

a. Angle of Loading means the inclination of a leg or branch of a sling measured from the horizontal or vertical plane as shown in Figure 2889-B, provided that an angle of loading of five degrees or less from the vertical may be considered a vertical angle of loading. (4-7-83)

b. Basket Hitch means a sling configuration whereby the sling is passed under the load and has both ends, end attachments, eyes or hanles on the hook or a single master link. (4-7-83)

c. Braided Wire Rope means a wire rope formed by plaiting component wire ropes. (4-7-83)

d. Bridle Wire Rope Sling means a sling composed of multiple wire rope legs with the top ends gathered in a fitting that goes over the lifting hook. (4-7-83)

e. Cable Laid Endless Sling Mechanical Joint means a wire rope sling made end-less by joining the ends of a single length of cable laid rope with one or more metallic fittings. (4-7-83)

f. Cable Laid Grommet-Hand Tucked means an endless wire rope sling made from one length of rope wrapped six times around a core formed by hand tucking the ends of the rope inside the six wraps. (4-7-83)

g. Cable Laid Rope means a wire rope composed of six wire ropes wrapped around a fiber or wire rope core. (4-7-83)

h. Cable Laid Rope Sling-Mechanical Joint means a wire rope sling made from a cable laid rope with eyes fabricated by pressing or swagging one or more metal sleeves over the rope junction. (4-7-83)

i. Choker Hitch means a sling configuration with one end of the sling passing under the load and through an end attachment, handle or eye on the other end of the sling. (4-7-83)

j. Coating means an elastomer or other suitable material applied to a sling or to a sling component to impart desirable properties. (4-7-83)

k. Cross Rod means a wire used to join spirals of metal mesh to form a complete fabric. (See figure 2889-B). (4-7-83)

l. Designated means selected or assigned by the employer or the employer's representative as being qualified to perform specific duties. (4-7-83)

m. Equivalent Entity means a person or organization (including an employer) which, by possession of equipment, technical knowledge and skills, can perform with equal competence the same repairs and tests as the person or organization with which it is equated. (4-7-83)

n. Fabric (Metal mesh) means the flexible portion of a metal mesh sling consisting of a series of transverse coils and cross rods. (4-7-83)

o. Female Handle (choker) means a handle with a handle eye and slot of such dimension as to permit passage of a male handle thereby allowing the use of a metal mesh sling in a choker hitch. (See figure 2889-A). (4-7-83)

p. Handle means a terminal fitting to which metal mesh fabric is attached. (See Figure 2889-A). (4-7-83)

q. Handle Eye means an opening in a handle of a metal mesh sling shaped to accept a hook, shackle or other lifting device. (See Figure 2889-A). (4-7-83)

r. Hitch means a sling configuration whereby the sling is fastened to an object or load, either directly to it or around it. (4-7-83)

s. Link means a single ring of a chain. (4-7-83)

t. Male Handle (Triangle) means a handle with a handle eye. (4-7-83)

u. Master Coupling Link means an alloy steel welded coupling link used as an intermediate link to join alloy steel chain to master links. (See Figure 2889-C). (4-7-83)

v. Master Link or Gathering Ring means a forged or welded steel link used to support all members (legs) of an alloy steel chain sling or wire rope sling (See Figure 2889-C). (4-7-83)

w. Mechanical Coupling Link means a nonwelded, mechanically closed steel link used to attach master links, hooks, etc., to alloy steel chain. (4-7-83)

x. Proof Load means the load applied in performance of a proof test. (4-7-83)

y. Proof Test means a nondestructive tension test performed by the sling manufacturer or an equivalent entity to verify construction and workmanship of a sling. (4-7-83)

z. Rated Capacity or Working Load Limit means the maximum working load permitted by the provisions of this section. (4-7-83)

aa. Reach means the effective length of an alloy steel chain sling measured from the top bearing surface of the upper terminal component to the bottom bearing surface of the lower terminal component. (4-7-83)

bb. Selvage Edge means the finished edge of synthetic webbing designed to prevent unraveling. (4-7-83)

cc. Sling means an assembly which connects the load to the material handling equipment. (4-7-83)

dd. Sling Manufacturer means a person or organization that assembles sling components into their final form for sale to users. (4-7-83)

ee. Spiral means a single transverse coil that is the basic element from which metal mesh is fabricated. (See Figure 2889-B). (4-7-83)

ff. Strand Laid Endless Sling mechanical Joint means a wire rope sling made endless from one length or rope with the ends joined by one or more metallic fittings. (4-7-83)

gg. Strand Laid Grommet-hand Tucked means an endless wire rope sling made from one length of strand wrapped six times around a core formed by hand tucking the ends of the strand inside the six wraps. (4-7-83)

hh. Strand Laid Rope means a wire sope made with strands (usually six or eight) wrapped around a fiber core, wire strand core, or independent wire rope core (IWRC). (4-7-83)

ii. Vertical Hitch means a method of supporting a load by a single, vertical part or leg of the sling. (4-7-83)

10. Safe Operating Practices. Whenever any sling is used, the following practices shall be observed: (4-7-83)

a. Slings that are damaged or defective shall not be used. (4-7-83)

b. Slings shall not be shortened with knots or bolts or other makeshift devices. (4-7-83)

c. Sling legs shall not be kinked. (4-7-83)

d. Slings shall not be loaded in excess of their rated capacities. (4-7-83)

e. Slings used in a basket hitch shall have the loads balanced to prevent slippage. (4-7-83)

f. Slings shall be securely attached to their loads. (4-7-83)

g. Slings shall be padded or protected from the sharp edges of their loads. (4-7-83)

h. Suspended loads shall be kept clear of all obstructions. (4-7-83)

i. All employees shall be kept clear of loads about to be lifted and of suspended loads. (4-7-83)

j. Hands or fingers shall not be placed between the sling and its load while the sling is being tightened around the load. (4-7-83)

k. Shock loading is prohibited. (4-7-83)

l. A sling shall not be pulled from under a load when the load is resting on the sling. (4-7-83)

11. Inspections. Each day before being used, the sling and all fastenings and attachments shall be inspected for damage or defects by a competent person designated by the employer. Additional inspections shall be performed during sling use, where service conditions warrant. Damaged or defective slings shall be immediately removed from service. (4-7-83)

12. Alloy Steel Chain Slings. (4-7-83)

a. Sling identification. Alloy steel chain slings shall have permanently affixed durable identification stating size, grade, rated capacity and reach. (4-7-83)

b. Attachments. (4-7-83)

i. Hooks, rings, oblong links, pear-shaped links, welded or mechanical coupling links or other attachments shall have a rated capacity at least equal to that of the alloy steel chain with which they are used or the sling shall not be used in excess of the rated capacity of the weakest component. (4-7-83)

ii. Makeshift links or fasteners formed from bolts or rods, or other such attachments, shall not be used. (4-7-83)

c. Inspections. (4-7-83)

i. In addition to the inspection required by Section 2885 of this Chapter, a thorough periodic inspection of alloy steel chain slings in use shall be made on a regular basis, to be determined on the basis of: (a) Frequency of sling use; (b) Severity of service conditions; (c) Nature of lifts being made; and (d) Experience gained on the service life of slings used in similar circumstances. Such inspections shall in no event be at intervals greater than once every 12 months. (4-7-83)

ii. The employer shall make and maintain a record of the most recent month in which each alloy steel chain sling was thoroughly inspected, and shall make such record available for examination. (4-7-83)

iii. The thorough inspection of alloy steel chain slings shall be performed by a competent person designated by the employer, and shall include a thorough inspection for wear, defective welds, deformation and increase in length. Where such defects or deterioration are present, the sling shall be immediately removed from service. (4-7-83)

d. Proof Testing. The employer shall ensure that before use, each new, repaired, or reconditioned alloy steel chain sling, including all welded components in the sling assembly, shall be proof tested by the sling manufacturer or equivalent entity, in accordance with Paragraph 5.2 of the American Society of Testing and Materials Specification A391-65 (ANSI G61.1-1968). The employer shall retain a certificate of proof test and shall make it available for examination. (4-7-83)

e. Sling Use. Alloy steel chain slings shall not be used with loads in excess of the rated capacities prescribed in Table 2889-A. Slings not included in this table shall be used only in accordance with the manufacturer's recommendations. (4-7-83)

f. Safe Operating Temperatures. Alloy steel chain slings shall be permanently removed from service if they are heated above 1000 degrees F. When exposed to service temperatures in excess of 600 degrees F. maximum working load limits permitted in Table 2889-A shall be reduced in accordance with the chain or sling manufacturer's recommendations. (4-7-83)

g. Repairing and Reconditioning Alloy Steel Chain Slings. (4-7-83)

i. Worn or damaged alloy steel chain slings or attachments shall not be used until repaired. When welding or heat testing is performed, slings shall not be used unless repaired, reconditioned and proof tested by the sling manufacturer or an equivalent entity. (4-7-83)

ii. Mechanical coupling links or low carbon steel repair links shall not be used to repair broken lengths of chain. (4-7-83)

h. Effect of Wear. If the chain size at any point of any links is less than that stated in Table 2889-A, the sling shall be removed from service. (4-7-83)

i. Deformed Attachments. (4-7-83)

i. Alloy steel chain sling with cracked or deformed master links, coupling links or other components shall be removed from service. (4-7-83)

ii. Slings shall be removed from service if hooks are cracked, have been opened more than 15% of the normal throat opening measured at the narrowest point or twisted more than 10 degrees from the plane of the unbent hook. (4-7-83)

13. Wire Rope Slings. (4-7-83)

a. Sling Use. Wire rope slings shall not be used with loads in excess of the rated capacities shown in Table 2889-C through 2889-N. Slings not included in these tables shall be used only in accordance with the manufacturer's recommendations. (4-7-83)

b. Minimum Sling Lengths. (4-7-83)

i. Cable laid and 6 x 19 and 6 x 37 slings shall have a minimum clear length of wire rope 10 times the component rope diameter between splices sleeves, or end fittings. (4-7-83)

ii. Braided slings shall have a minimum clear length of wire rope 40 times the component rope diameter between the loops or end fittings. (4-7-83)

iii. Cable laid grommets, strand laid grommets and endless slings shall have a minimum circumferential length of 96 times their body diameter. (4-7-83)

c. Safe operating temperatures. Fiber core wire rope slings of all grades shall be permanently removed from service if they are exposed to temperatures in excess of 200 degrees F. When nonfiber core wire rope slings of any grade are used at temperatures above 400 degrees F. or below -60 degrees F. recommendations of the sling manufacturer regarding use at that temperature shall be followed. (4-7-83)

d. End Attachments. (4-7-83)

i. Welding of end attachments, except covers to thimbles, shall be performed prior to the assembly of the sling. (4-7-83)

ii. All welded end attachments shall not be used unless proof tested by the manufacturer or equivalent entity at twice their rated capacity prior to initial use. The employer shall retain a certificate of the proof test, and make it available for examination. (4-7-83)

e. Removal from service. Wire rope slings shall be immediately removed from service if any of the following conditions are present: (4-7-83)

i. Ten randomly distributed broken wires in one rope lay, or five broken wires in one strand in one rope lay. (4-7-83)

ii. Wear or scraping of 1/3 the original diameter of outside individual wires. (4-7-83)

iii. Kinking, crushing, bird caging or any other damage resulting in distortion of the wire rope structure. (4-7-83)

iv. Evidence of heat damage. (4-7-83)

v. End attachments that are cracked, deformed or worn. (4-7-83)

vi. Hooks that have been opened more than 15% of the normal throat opening measured at the narrowest point or twisted more than 10 degrees from the plane of the unbent hook. (4-7-83)

vii. Corrosion of the rope or end attachments. (4-7-83)

14. Metal Mesh Slings. (4-7-83)

a. Sling Marking. Each metal mesh sling shall have permanently affixed to it a durable marking that states the rated capacity for vertical basket hitch and choker hitch loadings. (4-7-83)

b. Handles. Handles shall have a rated capacity at least equal to the metal fabric and exhibit no deformation after proof testing. (4-7-83)

c. Attachments of Handles to Fabric. The fabric and handles shall be joined so that: (4-7-83)

i. The rated capacity of the sling is not reduced. (4-7-83)

ii. The load is evenly distributed across the width of the fabric. (4-7-83)

iii. Sharp edges will not damage the fabric. (4-7-83)

d. Sling Coatings. Coatings which diminish the rated capacity of a sling shall not be applied. (4-7-83)

e. Sling Testing. All new and repaired metal mesh slings, including handles, shall not be used unless proof tested by the manufacturer or equivalent entity at a minimum of 1 1/2 times their rated capacity. Elastomer impregnated slings shall be proof tested before coating. (4-7-83)

f. Proper Use of Metal Mesh Slings. Metal mesh slings shall not be used to lift loads in excess of their rated capacities as prescribed in Table 2889-O. Slings not included in this table shall be used only in accordance with the manufacturer's recommendations. (4-7-83)

g. Safe Operating Temperatures. Metal mesh slings which are not impregnated with elastomers may be used in a temperature range from-20 degrees F. to +550 degrees F. without decreasing the working load limit. Metal mesh sings impregnated with polyvinyl chloride or neoprene may be used only in a temperature range from 0 degrees to +200 degrees F. For operations outside these temperature ranges or for metal mesh slings impregnated with other materials, the sling manufacturer's recommendations shall be followed. (4-7-83)

h. Repairs. (4-7-83)

i. Metal mesh slings which are repaired shall not be used unless repaired by a metal mesh sling manufacturer or an equivalent entity. (4-7-83)

ii. Once repaired, each sling shall be permanently marked or tagged, or a written record maintained, to indicate the date and nature of the repairs and the person or organization that performed the repairs. Records of repairs shall be made available for examination. (4-7-83)

i. Removal from Service. Metal mesh slings shall be immediately removed from service if any of the following conditions are present: (4-7-83)

i. A broken weld or broken brazed joint along the sling edge. (4-7-83)

ii. Reduction in wire diameter of 25% due to abrasion or 15% due to corrosion. (4-7-83)

iii. Lack of flexibility due to distortion of the fabric. (4-7-83)

iv. Distortion of the female handle so that the depth of the slot is increased more than 10%. (4-7-83)

v. Distortion of either handle so that the width of the eye is decreased more than 10%. (4-7-83)

vi. A 15% reduction of the original cross sectional area of metal at any point around the handle eye. (4-7-83)

vii. Distortion of either handle out of its plane. (4-7-83)

15. National and Synthetic Fiber Rope Slings. (4-7-83)

a. Sling Use. (4-7-83)

i. Fiber rope slings made from conventional three strand construction fiber rope shall not be used with loads in excess of the rated capacities prescribed in Tables 2889-P through 2889-S of this Chapter. (4-7-83)

ii. Fiber rope slings shall have a diameter of curvature meeting at least the minimums specified in Figures 2889-D and 2889-E. (4-7-83)

iii. Slings not included in these tables shall be used only in accordance with the manufacturer's recommendations. (4-7-83)

b. Safe Operating Temperatures. Natural and synthetic fiber rope slings, except for wet frozen slings, may be used in a temperature range from-20 degrees F. to +180 degrees F. without decreasing the working load limit. For operations outside this temperature range and for wet frozen slings, the sling manufacturer's recommendations shall be followed. (4-7-83)

c. Splicing. Spliced fiber rope slings shall not be used unless they have been spliced in accordance with the following minimum requirements and in accordance with any additional recommendations of the manufacturer: (4-7-83)

i. In manila rope, eye splices shall consist of at least three full tucks, and short splices shall consist of at least six full tucks, three on each side of the splice center lines. (4-7-83)

ii. In synthetic fiber rope, eye splices shall consist of at least four full tucks, and short splices shall consist of at least eight full tucks, four on each side of the center line. (4-7-83)

iii. Strand end tails shall not be trimmed flush with the surface of the rope immediately adjacent to the full tucks. This applies to all types of fiber rope and both eye and short splices. For fiber rope under one inch in

diameter, the tail shall project at least six rope diameters beyond the last full tuck. For fiber rope one inch in diameter and larger, the tail shall project at least six inches beyond the last full tuck. Where a projecting tail interferes with the use of the sling, the tail shall be tapered and spliced into the body of the rope using at least two additional tucks (which will require a tail length of approximately six rope diameters beyond the last full tuck). (4-7-83)

iv. Fiber rope slings shall have a minimum clear length of rope between eye splices equal to 10 times the rope diameter. (4-7-83)

v. Knots shall not be used in lieu of splices. (4-7-83)

vi. Clamps not designed specifically for fiber ropes shall not be used for splicing. (4-7-83)

vii. For all eye splices, the eye shall be of such size to provide an included angle of not greater than 60 degrees at the splice when the eye is placed over the load or support. (4-7-83)

d. End Attachments. Fiber rope slings shall not be used if end attachments in contact with the rope have sharp edges or projections. (4-7-83)

e. Removal from Service. Natural and synthetic fiber rope slings shall be immediately removed from service if any of the following conditions are present: (4-7-83)

i. Abnormal wear; (4-7-83)

ii. Powdered fiber between strands; (4-7-83)

iii. Broken or cut fibers; (4-7-83)

iv. Variations in the size or roundness of strands; (4-7-83)

v. Discoloration or rotting; and (4-7-83)

vi. Distortion of hardware in the sling. (4-7-83)

f. Repairs. Only fiber rope slings made from new rope shall be used. Use of repaired or reconditioned fiber rope slings is prohibited. (4-7-83)

16. Synthetic Web Slings. (4-7-83)

a. Sling Identification. Each sling shall be marked or coded to show the rated capacities for each type of hitch and type of synthetic web material. (4-7-83)

b. Webbing. Synthetic webbing shall be of uniform thickness and width and selvage edges shall not be split from the webbing width. (4-7-83)

c. Fittings. Fittings shall be: (4-7-83)

i. Of a minimum breaking strength equal to that of the sling; and (4-7-83)

ii. Free of all sharp edges that could in any way damage the webbing. (4-7-83)

d. Attachment of End Fittings to Webbing and Formation of Eyes. Stitching shall be the only method used to attach end fittings to webbing and to form eyes. The thread shall be in an even pattern and contain a sufficient number of stitches to develop the full breaking strength of the sling. (4-7-83)

e. Sling Use. Synthetic web slings illustrated in Figure 2889-F shall not be used with loads in excess of the rated capacities specified in Tables 2889-T through 2889-V. Slings not included in these tables shall be used only in accordance with the manufacturer's recommendations. (4-7-83)

f. Environmental Conditions. When synthetic web slings are used, the following precautions shall be taken: (4-7-83)

i. Nylon web slings shall not be used where fumes, vapors, sprays, mists, or liquids of acids or phenolics are present. (4-7-83)

ii. Polyester and polypropylene web slings shall not be used where fumes, vapors, sprays, mists or liquids of caustics are present. (4-7-83)

iii. Web slings with aluminum fittings shall not be used where fumes, vapors, sprays, mists, or liquids of caustics are present. (4-7-83)

g. Safe Operating Temperatures. Synthetic web slings of polyester and nylon shall not be used at temperatures in excess of 180 degrees F. Polypropylene web slings shall not be used at temperatures in excess of 200 degrees F. (4-7-83)

h. Repairs. (4-7-83)

i. Synthetic web slings which are repaired shall not be used unless repaired by a sling manufacturer or an equivalent entity. (4-7-83)

ii. Each repaired sling shall be proof tested by the manufacturer or equivalent entity to twice the rated capacity prior to its return to service. The employer shall retain a certificate of proof test and make it available for examination. (4-7-83)

iii. Slings, including webbing and fittings, which have been repaired in a temporary manner shall not be used. (4-7-83)

i. Removal from service. Synthetic web slings shall be immediately removed from service if any of the following conditions are present: (4-7-83)

i. Acid or caustic burns; (4-7-83)

ii. Melting or charring of any part of the sling surface; (4-7-83)

iii. Snags, punctures, tears, or cuts; (4-7-83)

iv. Broken or worn stitches; or (4-7-83)

v. Distortion of fittings. (4-7-83)

vi. Remainder of Tables and Figures are available from Industrial Commission, 317 Main Street, Boise, Idaho 83720, telephone (208) 334-6000. (7-1-93)

326. -- 329. (RESERVED).

330. LAUNDRY MACHINERY AND OPERATIONS.

01. General Requirements. This section applies to moving parts of equipment used in laundries and to conditions peculiar to this industry, with special reference to the point of operation of laundry machines. This section does not apply to dry-cleaning operations. (4-7-83)

02. Point-of-Operation Guards. (4-7-83)

a. Washroom machines. Each washing machine shall be provided with means for holding open the doors or covers of inner and outer cylinders or shells while being loaded or unloaded. (4-7-83)

b. Starching and Drying Machines. (4-7-83)

i. Drying Tumbler. Each drying tumbler shall be provided with means for holding open the doors or covers of inner and outer cylinders or shells while being loaded or unloaded. (4-7-83)

ii. Shaker (clothes tumbler). Each shaker or clothes tumbler of the double-cylinder type shall be provided with means for holding open the doors or covers of inner and outer cylinders or shells while being loaded or unloaded. (4-7-83)

iii. Exception: Provisions of i. and ii. of this section shall not apply to shakeout or conditioning tumblers where the clothes are loaded into the open end of the revolving cylinder and are automatically discharged out of the opposite end. (4-7-83)

c. Miscellaneous Machines and Equipment - Steam Pipes. (4-7-83)

i. All steam pipes that are within 7 feet of the floor or working platform, and with which the worker may come into contact, shall be insulated or covered with a heat resistive material or shall be otherwise properly guarded. (4-7-83)

ii. Where pressure reducing valves are used, one or more relief or safety valves shall be provided on the low-pressure side of the reducing valve, in case the piping or equipment on the low-pressure side does not meet the requirements for full initial pressure. The relief or safety valve shall be located adjacent to, or as close as possible to, the reducing valve. Proper protection shall be provided to prevent injury or damage caused by fluid escaping from relief or safety valves if vented to the atmosphere. The vents shall be of ample size and as short and direct as possible. The combined discharge capacity of the relief valves shall be such that the pressure piping and equipment will not be exceeded if the reducing valve stocks fail to open. (4-7-83)

03. Operating Rules. (4-7-83)

a. General. (4-7-83)

i. Markers. Markers and others handling soiled clothes shall be warned against touching the eyes, mouth, or any part of the body on which the skin has been broken by a scratch or abrasion; and they shall be cautioned not to touch or eat food until their hands have been thoroughly washed. (4-7-83)

ii. Instruction of employees. Employees shall be properly instructed as to the hazards of their work and be instructed in safe practices, by bulletins, printed rules, and verbal instructions. (4-7-83)

b. Mechanical. Safety Guards. No safeguard, safety appliance, or device attached to, or forming an integral part of any machinery shall be removed or made ineffective except for the purpose of making immediate repairs or adjustments. Any such safeguard, safety appliance, or device removed or made ineffective during the repair or adjustment of such machinery shall be replaced immediately upon the completion of such repairs or adjustments. (4-7-83)

331. -- 339. (RESERVED).

340. MAKING BUILDINGS AND FACILITIES ACCESSIBLE TO, AND USABLE BY, THE PHYSICALLY HANDICAPPED.

01. Scope. (4-7-83)

a. The design and construction of new buildings and facilities, including both rooms and spaces; site improvements; and public walks. (4-7-83)

b. Remodeling, alteration, and rehabilitation of existing construction. (4-7-83)

c. Permanent, temporary, and emergency conditions. (4-7-83)

02. Purpose. The specifications in this standard are intended to make buildings and facilities accessible to and usable by people with such physical disabilities as the inability to walk, difficulty in walking, reliance on walking aids, sight and hearing disabilities, incoordination, reaching and manipulation disabilities, lack of stamina, difficulty interpreting and reacting to sensory information, and extremes of physical size. Accessibility and usability allow a disabled person to get to, enter, and use a building or facility. (4-7-83)

341. RECOMMENDATIONS TO ADOPTING AUTHORITIES.

01. Intent. This standard is intended for adoption by governmental building regulatory agencies at the federal, state, county, or community level. It is intended to achieve uniformity in the technical design criteria in building codes and other regulations enforced by these authorities. This standard may also be used by non-governmental parties as technical design guidelines or requirements to make buildings and facilities accessible to and usable by physically disabled people. (4-7-83)

02. Coverage. (4-7-83)

a. This standard provides minimum specifications for accessibility and usability of buildings and facilities, but it does not establish which occupancy or building types are covered or the extent to which each type is covered. This standard applies to the construction of all new buildings and facilities and to changes to existing ones, unless the administrative authority adopting this standard specifies otherwise. The administrative authority adopting this standard should consider the items in B. through G. of this section in establishing its coverage and in developing regulations for accessible buildings and facilities under its jurisdiction. (4-7-83)

b. Building Types. The administrative authority when adopting this standard should specify those classes of buildings and facilities that are not to be covered by the standard in its jurisdiction. (4-7-83)

c. Functional Spaces and Accessible Elements. Functional spaces within buildings are those that house the major activities for which the building or facility is intended. Classrooms, hotel rooms, lobbies, dormitory rooms, and offices are examples of functional spaces. This standard describes minimum specifications for elements that make functional space accessible. For example, it specifies minimum requirements for accessible doors, accessible routes, seating space, and other elements that can be used to design accessible classrooms. Therefore, the adopting body should specify which and how many functional spaces are to be made accessible within each building type under its jurisdiction. (4-7-83)

d. Reasonable Number. This standard contains specifications that call for the installation of at least one accessible element of a particular type. This kind of specification ensures a minimal degree of accessibility, but the provision of only a single accessible element is insufficient to satisfy the need at many buildings and facilities. For example, to provide only one accessible parking space at an apartment complex having twenty accessible dwelling units under supplies the need. Hence, every specification for "at least one" is combined with a recommendation to provide a "reasonable number" of the type of accessible element at issue. (4-7-83)

e. The administrative authority adopting this standard should specify reasonable numbers or should establish procedures for determining them. The actual number to be provided must be based upon many factors, including: (4-7-83)

i. Population to be served. (4-7-83)

ii. Availability to occupants, employees, customers, and visitors. (4-7-83)

iii. Distances and time required to use the accessible elements. (4-7-83)

iv. Provisions of equal opportunity and treatment under law. (4-7-83)

f. Remodeling. The specifications in this standard are based upon the functional requirements of disabled people. These specifications remain the same whether they are applied to new construction, remodeling,

alteration, or rehabilitation. The administrative authority adopting this standard must specify the extent to which it is to cover remodeling, alteration, or rehabilitation within its jurisdiction. (4-7-83)

g. Review Procedures. To promote effective compliance with the requirements of this standard, the administrative authority adopting it should establish a review and approval procedure for construction projects that come under its jurisdiction. (4-7-83)

h. Provisions for Adults and Children. The specifications in this standard are based upon adult dimensions and anthropometrics. If buildings, facilities, or portions thereof serve children primarily, the administrative authority should adjust dimensions and other provisions to make them suitable for children. (4-7-83)

03. Problem Sites. It is not the intent of this standard to discourage development of sites with extreme conditions, for example, where housing would be built on steep slopes or recreation facilities provided in natural terrain, and where full accessibility might be impractical. (4-7-83)

04. Refer to ANSI A117.1-1980 and also refer to Section 504 (When applicable), of the Vocational Rehabilitation Act for specifications for making buildings and facilities accessible to and usable by, the physically handicapped. (4-7-83)

342. -- 349. (RESERVED).

350. ASBESTOS.

01. Scope. This rule establishes the requirements which must be followed during asbestos abatement projects by employers of State of Idaho and Local government employees not covered by the Asbestos Standard of the Occupational Safety and Health Administration (OSHA), 29 CFR 1926.58. The rule also covers every person in the service of a public entity who may be exposed to airborne asbestos. (4-7-83)

02. Definitions. For the purpose of this Section. (4-7-83)

a. "Action Level" means an airborne concentration of asbestos of 0.1 fiber per cubic centimeter (f/cc) of air calculated as an 8-hour time weighted average. (4-7-83)

b. "Administrator" means the State of Idaho Industrial Commission or their appointed representative. (4-7-83)

c. "Asbestos" means the asbestiform varieties of chrysotile (serpentine); crocidolite (riebeckite); amosite (cummingtonitgrunerite); tremolite; anthophyllite; and actinolite. (4-7-83)

d. "Asbestos abatement project" means any activity involving the removal, enclosure, or encapsulation of friable asbestos material. (4-7-83)

e. "Authorized person" means any person authorized by the employer and required by work duties to be present in regulated areas. (4-7-83)

f. "Clean room" means an uncontaminated room having facilities for the storage of employees' street clothing and uncontaminated materials and equipment. (4-7-83)

g. "Competent person" means one who is capable of identifying existing asbestos hazards in the work place and who has the authority to take prompt corrective measures to eliminate them. The duties of the competent person include at least the following: establishing the negative pressure enclosure, ensuring its integrity, and controlling entry to and exit from the enclosure; supervising any employee exposure monitoring required by this rule; ensuring that all employees working within such an enclosure wear the appropriate personal protective equipment, are trained in the use of appropriate methods of exposure control, and use the hygiene facilities and decontamination procedures specified in this rule; and ensuring that engineering controls in use are in proper operating condition and are functioning properly. (4-7-83)

h. "Decontamination area" means an enclosed area adjacent and connected to the regulated area and consisting of an equipment room, shower area, and clean room, which is used for the decontamination of workers, materials, and equipment contaminated with asbestos. (4-7-83)

i. "Demolition" means the wrecking or taking out of any load-supporting structural member and any related razing, removing, or stripping of asbestos products. (4-7-83)

j. "Emergency project" means a project involving the removal, enclosure, or encapsulation of friable asbestos-containing material that was not planned but resulted from a sudden unexpected event. (4-7-83)

k. "Employee exposure" means that exposure to airborne asbestos would occur if the employee were not using respiratory protective equipment. (4-7-83)

l. "Employer" means the public department, agency, or entity which hires an employee. The term includes, but is not limited to, any departments or agencies of the State, Counties, Cities, School Districts or other political subdivisions of the state which operate or administer a fire department, police department, a library or similar public service agencies. (4-7-83)

m. "Equipment room (change room)" means a contaminated room located within the decontamination area that is supplied with impermeable bags of containers for the disposal of contaminated protective clothing and equipment. (4-7-83)

n. "Fiber" means a particulate form of asbestos, 5 micrometers or longer, with a length-to-diameter ratio of at least 3 to 1. (4-7-83)

o. "Friable asbestos material" means any material containing more than 1% asbestos by weight which, when dry, may be crumbled, pulverized or reduced to powder by hand pressure. (4-7-83)

p. "High-efficiency particulate air (HEPA) filter" means a filter capable of trapping and retaining at least 99.97% of all monodispersed particles of 0.3 micrometer in diameter or larger. (4-7-83)

q. "Regulated area" means an area established by the employer to demarcate areas where airborne concentrations of asbestos exceed or can reasonably be expected to exceed the permissible exposure limit. The regulated area may be a temporary enclosure as required by section 3104(f) or an area demarcated in any manner that minimizes the number of employees exposed to asbestos. (4-7-83)

r. "Removal" means the taking out or stripping of asbestos or materials containing asbestos. (4-7-83)

s. "Renovation" means the modification of any existing structure, or portion thereof, where exposure to airborne asbestos may result. (4-7-83)

t. "Repair" means overhauling, rebuilding, reconstructing, or reconditioning of structures or substrates where asbestos is present. (4-7-83)

03. Permissible Exposure Limit (PEL). (4-7-83)

a. Airborne Concentration. The employer shall ensure that no employee is exposed to an airborne concentration of asbestos in excess of 0.2 fiber per cubic centimeter of air as an 8-hour time-weighted average (TWA), as approved by the Environmental Protection Agency and prescribed in 40 CFR Part 763, Appendix A. or by an equivalent method. (4-7-83)

b. Ceiling Concentration. No employee shall be exposed at any time to airborne concentrations of asbestos in excess of 1.0 fiber per cubic centimeter (1.0 F/cc) of air during any fifteen minute period, as determined by the methods prescribed in 40 CFR Part 763, Appendix A, or by an equivalent method. (4-7-83)

04. Communication Among Employers. On multi-employer work sites, an employer performing asbestos work requiring the establishment of a regulated area shall inform other employers (as defined in 3101(1)) on

the site of the nature of the employer's work with asbestos and of the existence of and requirements pertaining to regulated areas. (4-7-83)

05. Regulated Areas. (4-7-83)

a. General. The employer shall establish a regulated area in work areas where airborne concentrations of asbestos exceed or can reasonably be expected to exceed the permissible exposure limit as described in 3102. (4-7-83)

b. Demarcation. The regulated area shall be demarcated in any manner that minimizes the number of persons within the area and protects persons outside the area from exposure to airborne concentrations of asbestos in excess of the permissible exposure limit and/or ceiling concentration. (4-7-83)

c. Access. Access to regulated areas shall be limited to authorized persons. (4-7-83)

d. Respirators. All persons entering a regulated area shall be supplied with a respirator, selected in accordance with section 3108(b). (4-7-83)

e. Prohibited Activities. The employer shall ensure that employees do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in the regulated area. (4-7-83)

f. Requirements for asbestos removal, demolition, and renovation operations. (4-7-83)

i. Whenever feasible, the employer shall establish negative-pressure enclosures before commencing removal, demolition, and renovation operations. (4-7-83)

ii. The employer shall designate a competent person to perform or supervise the following duties: (a) Set up the enclosure.(b)Ensure the integrity of the enclosure.(c) Control entry to and from the enclosure.(d)Supervise all employee exposure monitoring required by this section.(e) Ensure that employees working within the enclosure wear respirators and protective clothing as required by Sections 3108 and 3109. (f) Ensure that employees are trained in the use of engineering controls, work practices and personal protective equipment. (g) Ensure that employees use the hygiene facilities and observe the decontamination procedures specified in Section 3110.(h) Ensure that engineering controls are functioning properly. (4-7-83)

iii. The competent person also shall be trained in all aspects of asbestos abatement, the identification of asbestos and its removal procedures, and other practices for reducing the hazard. Such training shall be obtained in a comprehensive course, such as a course conducted by a U. S. Environmental Protection Agency (EPA) Asbestos Training Center or an equivalent course. (4-7-83)

iv. For small scale, short-duration operations, such as pipe repair, valve replacement, installing electrical conduits, installing or removing drywall, roofing, and other general building maintenance or renovation, the employer is not required to comply with 3104(f). (4-7-83)

06. Identification. Prior to commencing construction work, the employer shall make reasonable efforts to determine if materials to be worked on or removed contain asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals. Reasonable efforts would include, but not be limited to, obtaining manufacturer's information, laboratory analysis of bulk samples, or records indicating the age and composition of building materials. A determination shall not be required when an employer assumes that the suspect material contains asbestos, tremolite, anthophyllite, actinolite or a combination of these minerals and performs the construction work involving these materials in accordance with the provisions of all applicable regulations. (4-7-83)

07. Exposure Monitoring. (4-7-83)

a. General. (4-7-83)

i. Each employer who has a work place or work operation covered by this rule shall perform monitoring to determine accurately the airborne concentrations of asbestos to which employees may be exposed.

(4-7-83)

ii. Determinations of employee exposure shall be made from breathing zone air samples that are representative of the 8-hour TWA of each employee. (4-7-83)

iii. Representative 8-hour TWA employee exposure shall be determined on the basis of one or more samples representing full shift exposure for employees in each work area. (4-7-83)

iv. Representative employee ceiling exposure shall be determined on the basis of one or more samples representing exposure for employees in each work area. Sampling periods for ceiling concentration evaluations shall not exceed fifteen minutes. (4-7-83)

b. Initial Monitoring. (4-7-83)

i. Each employer who has a work place or work operation covered by this rule, except as provided for in 3106(b)(iii)(iv) of this rule, shall perform initial monitoring at the initiation of each asbestos job to determine accurately the airborne concentrations of asbestos to which employees may be exposed. (4-7-83)

ii. Monitoring shall be performed by persons having a thorough understanding of monitoring principles and procedures and who can demonstrate proficiency in sampling techniques. (4-7-83)

iii. The employer may demonstrate that employee exposures are below the action level and/or ceiling concentration by means of objective data demonstrating that the product or material containing asbestos cannot release airborne fibers in concentrations exceeding the action level and/or ceiling concentration under those work conditions having the greatest potential for releasing asbestos. (4-7-83)

iv. Where the employer has monitored each asbestos job, and the data were obtained during work operations conducted under work place conditions closely resembling the processes, type of material, control methods, work practices, and environmental conditions used and prevailing in the employer's current operations, the employer may rely on such earlier monitoring results to satisfy the requirements of section 3106(b)(i). (4-7-83)

c. Periodic Monitoring Within Regulated Areas. The employer shall conduct daily monitoring that is representative of the exposure of each employee who is assigned to work within a regulated area. Exception: When all employees within a regulated area are equipped with supplied-air respirators operated in the positive pressure mode, the employer may dispense with the daily monitoring required by this paragraph. (4-7-83)

d. Termination of Monitoring. If the periodic monitoring required by section 3106(c) reveals that employee exposures, as indicated by statistically reliable measurement, are below the action level and/or ceiling concentration, the employer may discontinue monitoring for those employees whose exposures are represented by such monitoring. (4-7-83)

e. Method of Monitoring. (4-7-83)

i. All samples taken to satisfy the monitoring requirements of section 3106 shall be personal samples collected following the procedures specified in 40 CFR Part 763, Appendix A. (4-7-83)

ii. All samples taken to satisfy the monitoring requirements of section 3106 shall be evaluated using the EPA/OSHA Reference Method (ORM) specified in 40 CFR Part 763, Appendix A, or an equivalent counting method. (4-7-83)

iii. If an equivalent method to the ORM is used, the employer shall ensure that the method meets the following criteria: (a)Replicate exposure data used to establish equivalency are collected in side-by-side field and laboratory comparisons. (b) The comparison indicates that 90% of the samples collected in the range 0.5 to 2.0 times the permissible limit have an accuracy range of plus or minus 25% of the ORM results with a 95% confidence level as demonstrated by a statistically valid protocol.(c) The equivalent method is documented and the results of the comparison testing are maintained. (4-7-83)

iv. To satisfy the monitoring requirements of Section 3106, employers shall rely on the results of monitoring analysis performed by laboratories that have instituted quality assurance programs that include the elements prescribed in 40 CFR Part 763, Appendix A. (4-7-83)

f. Employee Notification of Monitoring Results. (4-7-83)

i. The employer shall notify affected employees of the monitoring results that represent the employees' exposure as soon as possible following receipt of monitoring results. (4-7-83)

ii. The employer shall notify affected employees of the results of monitoring representing the employees' exposure in writing either individually or by posting at a centrally located place that is accessible to affected employees. (4-7-83)

g. Observation of Monitoring. (4-7-83)

i. The employer shall provide affected employees or their designated representatives an opportunity to observe any monitoring of employee exposure to asbestos conducted in accordance with Section 3106. (4-7-83)

ii. When observation of the monitoring of employee exposure to asbestos requires entry into an area where the use of protective clothing or equipment is required, the observer shall be provided with and be required to use such clothing and equipment and shall comply with all other applicable safety and health procedures. (4-7-83)

08. Methods of Compliance. (4-7-83)

a. Engineering Controls and Work Practices. (4-7-83)

i. The employer shall use one or any combination of the following control methods to achieve compliance with the permissible exposure limit and/or ceiling concentration prescribed by Section 3102: (a) Local exhaust ventilation equipped with HEPA filter dust collection systems. (b) General ventilation systems. (c) Vacuum cleaners equipped with HEPA filters.(d) Enclosure or isolation of processes producing asbestos dust.(e) Use of wet methods, wetting agents, or removal encapsulants to control employee exposures during asbestos handling, mixing, removal, cutting, application, and cleanup. (f) Prompt disposal of wastes contaminated with asbestos in leak-tight containers. (g)Use of work practices or other engineering controls that the Administrator can show to be feasible. (4-7-83)

ii. Whenever the feasible engineering and work practice controls described in this paragraph are not sufficient to reduce employee exposure to or below the limit prescribed in Section 3102, the employer shall use them to reduce employee exposure to the lowest levels attainable by these controls and shall supplement them by the use of respiratory protection that complies with the requirements of Section 3108. (4-7-83)

b. Prohibitions. (4-7-83)

i. High-speed abrasive disc saws that are not equipped with appropriate engineering controls shall not be used for work related to asbestos. (4-7-83)

ii. Compressed air shall not be used to remove asbestos materials containing asbestos unless the compressed air is used in conjunction with an enclosed ventilation system designed to capture the dust cloud created by the compressed air. (4-7-83)

iii. Materials containing asbestos shall not be applied by spray methods. (4-7-83)

c. Employee Rotation. The employer shall not use employee rotation as a means of compliance with the exposure limit prescribed in Section 3102. (4-7-83)

d. Clean Up. (4-7-83)

i. After completion of an asbestos abatement project, all surfaces in and around the work area shall be

cleared of any asbestos containing debris. (4-7-83)

ii. Lock Down. Where asbestos has been removed, EPA accepted encapsulant shall be applied to ensure encapsulation of remaining fibers. (4-7-83)

iii. The employer shall demonstrate by monitoring that the airborne fiber concentration is below the action level; or, at or below the airborne fiber level existing prior to the start of the asbestos abatement project.(a) Monitoring shall be performed by persons having a thorough understanding of monitoring principles and procedures and who can demonstrate proficiency in sampling techniques. (4-7-83)

e. Final Clearance Monitoring. (4-7-83)

i. At the conclusion of any action to remove, encapsulate, or enclose asbestos containing building material (ACBM) or material assumed to be ACBM, a competent person shall visually inspect each functional space where such action was conducted to determine whether the action has been properly completed. (4-7-83)

ii. A competent person shall collect air samples using aggressive sampling as described in 40 CFR Part 763, Appendix A to monitor air for clearance after each removal, encapsulation, and enclosure project involving ACBM, except for projects that are of small scale, short duration as described in Section 3104(F)(iv). (4-7-83)

iii. Air samples collected under this section will be analyzed for asbestos by laboratories accredited by the National Bureau of Standards. (4-7-83)

iv. An action to remove, encapsulate, or enclose ACBM shall be considered complete when the average concentration of asbestos of five air samples collected within the affected functional space is analyzed using the EPA/OSHA Reference Method (ORM) specified in 40 CFR Part 763, Appendix A and found to be at or below the permissible exposure limit as defined in Section 3102. (4-7-83)

09. Respiratory Protection. (4-7-83)

a. General. The employer shall provide respirators, and ensure that they are used, where required by this rule. Respirators shall be used in the following circumstances: (4-7-83)

i. During the interval necessary to install or implement feasible engineering and work practice controls. (4-7-83)

ii. In work operations such as maintenance and repair activities, or other activities for which engineering and work practice controls are not feasible. (4-7-83)

iii. In work situations where feasible engineering and work practice controls are not yet sufficient to reduce exposure to or below the exposure limit. (4-7-83)

iv. In emergencies. (4-7-83)

b. Respirator Selection. (4-7-83)

i. Where respirators are used, the employer shall select and provide, at no cost to the employee, the appropriate respirator as specified in 3108 (b) (iv) and shall ensure that the employee uses the respirator provided. (4-7-83)

ii. The employer shall select respirators from among those jointly approved as being acceptable for protection by the Mine Safety and Health Administration (MSHA) and the National Institute for Occupational Safety and Health (NIOSH) under the provisions of 30 CFR Part 11. (4-7-83)

iii. The employer shall provide a powered, air purifying respirator in lieu of any negative-pressure respirator specified in 3108 (b) (iv) whenever: (a)An employee chooses to use this type of respirator; and (b)This respirator will provide adequate protection to the employee. (4-7-83)

iv. Respiratory Protection for Asbestos Fibers (a) When airborne concentrations of asbestos are not in excess of 2 f/cc (10 x PEL), either a half mask air purifying respirator equipped with high efficiency filters or a full facepiece air-purifying respirator equipped with high efficiency filters is required. (b)When airborne concentrations of asbestos are not in excess of 20 f/cc (100 x PEL), any powered air purifying respirator equipped with high efficiency filters or any supplied air respirator operated in continuous flow mode is required. (c) When airborne concentrations of asbestos are not in excess of 200 f/cc (1,000 x PEL), full facepiece supplied air respirator operated in pressure demand mode is required. (d)When airborne concentrations of asbestos are greater than 200 f/cc (>1,000 x PEL) or unknown concentration, full facepiece supplied air respirator operated in pressure demand mode equipped with an auxiliary positive pressure self contained breathing apparatus are required. NOTE: Respirators assigned for higher environmental concentrations may be used at lower concentrations; a high efficiency filter means a filter that is at least 99.97% efficient against monodispersed particles of 0.3 micrometers in diameter or larger. (4-7-83)

c. Respirator Program. (4-7-83)

i. Where respiratory protection is used, the employee shall institute a respirator program. This should include all information and guidance necessary for their proper selection, use, and care. Possible emergency uses of respirators should be anticipated and planned for. (4-7-83)

ii. The employer shall permit each employee who uses a filter respirator to change the filter elements whenever an increase in breathing resistance is detected and shall maintain an adequate supply of filter elements for this purpose. (4-7-83)

iii. Employees who wear respirators shall be permitted to leave work areas to wash their faces and respirator facepieces whenever necessary to prevent skin irritation associated with respirator use. (4-7-83)

iv. No employee shall be assigned to tasks requiring the use of respirators if, based on his or her most recent examination, an examining physician determines that the employee will be unable to function normally wearing a respirator, or that the safety or health of the employee or of other employees will be impaired by the use of a respirator. Such employee shall be assigned to another job or given the opportunity to transfer to a different position, the duties of which he or she is able to perform, with the same employer, in the same geographical are, and with the same seniority, status, and rate of pay he or she had just prior to such transfer, if such a different position is available. (4-7-83)

d. Respirator Fit Testing. (4-7-83)

i. The employer shall ensure that the respirator issued to the employee exhibits the least possible facepiece leakage and that the respirator is fitted properly. (4-7-83)

ii. Employers shall perform either quantitative or qualitative face fit tests at the time of initial fitting and at least every 6 months thereafter for each employee wearing a negative-pressure respirator. The qualitative fit tests may be used only for testing the fit of half-mask respirators where they are permitted to be worn, and shall be conducted in accordance with 40 CFR Part 653, Appendix C. The tests shall be used to select facepieces that provide the required protection as prescribed in 3108 (b) (iv). (4-7-83)

10. Protective Clothing. (4-7-83)

a. General. The employer shall provide and require the use of protective clothing, such as coveralls or similar whole-body clothing, head coverings, gloves, and foot coverings for any employee exposed to airborne concentrations of asbestos that exceed the permissible exposure limit and/or ceiling concentration prescribed in Section 3102. (4-7-83)

b. Laundering. (4-7-83)

i. The employer shall ensure that laundering of contaminated clothing is done so as to prevent the release of airborne asbestos in excess of the exposure limit prescribed in Section 3102. (4-7-83)

ii. Any employer who gives contaminated clothing to another person for laundering shall inform such person of the requirement in section 3109 (b) (i) effectively to prevent the release of airborne asbestos in excess of the exposure limit prescribed in Section 3102. (4-7-83)

c. Contaminated Clothing. Contaminated clothing shall be transported in sealed impermeable bags, or other closed, impermeable containers, and be labeled in accordance with section 3111 (ii). (4-7-83)

d. Protective Clothing for Removal, Demolition, and Renovation Operations. (4-7-83)

i. The competent person shall periodically examine work suits worn by employees for rips or tears that may occur during performance of work. (4-7-83)

ii. When rips or tears are detected while an employee is working within a negative-pressure enclosure, rips and tears shall be immediately mended, or the work suit shall be immediately replaced. (4-7-83)

11. Hygiene Facilities and Practice. (4-7-83)

a. General. (4-7-83)

i. The employer shall provide clean change areas for employees required to work in regulated areas or required by section 3109 (a) to wear protective clothing. (4-7-83)

ii. In lieu of the change area requirement specified in section 3110 (a) (i), the employer may permit employees engaged in small-scale, short-duration operations, as described in section 3104 (f) (iv), to clean their protective clothing with a portable HEPA-equipped vacuum before such employees leave the area where maintenance was performed. (4-7-83)

iii. The employer shall ensure that change areas are equipped with separate storage facilities for protective clothing and street clothing. (4-7-83)

iv. Whenever food or beverages are consumed at the work site and employees are exposed to airborne concentrations of asbestos in excess of the permissible exposure limit and/or ceiling concentration, the employer shall provide lunch areas in which the airborne concentrations of asbestos are below the action level. (4-7-83)

b. Requirements for Removal, Demolition, and Renovation Operations. (4-7-83)

i. Decontamination Area. Except for small-scale, short-duration operations, as described in section 3104 (f) (iv), the employer shall establish a decontamination area that is adjacent and connected to the regulated area for the decontamination of employees contaminated with asbestos. The decontamination area shall consist of an equipment room, shower area, and clean room in series. The employer shall ensure that employees enter and exit the regulated area through the decontamination area. (4-7-83)

ii. Clean Room. The clean room shall be equipped with a locker or appropriated storage container for each employee's use. (4-7-83)

iii. Shower Area. Where feasible, shower facilities shall be provided. The showers shall be contiguous both to the equipment room and the clean change room, unless the employer can demonstrate that this location is not feasible. Where the employer can demonstrate that it is not feasible to locate the shower between the equipment room and the clean change room, the employer shall ensure that employees: (a)Remove asbestos contamination from their work suits using a HEPA vacuum before proceeding to a shower that is not contiguous to the work area; or (b)Remove their contaminated work suits, don clean work suits, and proceed to a shower that is not contiguous to the work area. (4-7-83)

iv. Equipment Room. The equipment room shall be supplied with impermeable, labeled bags and containers for the containment and disposal of contaminated protective clothing and equipment. (4-7-83)

v. Decontamination Area Entry Procedures (a)The employer shall ensure that employees: (1) Enter

the decontamination area through the clean room. (2) Remove and deposit street clothing within a locker provided for their use. (3) Put on protective clothing and respiratory protection before leaving the clean room. (b)The employer shall ensure that employees pass through the equipment room before entering the enclosure. (4-7-83)

(4) Decontamination Area Exit Procedures (a) The employer shall ensure that employees remove all gross contamination and debris from their protective clothing before leaving the regulated area. (b) The employer shall ensure that employees remove their protective clothing in the equipment room and deposit the clothing in labeled impermeable bags or containers. (c) The employer shall ensure that employees do not remove their respirators in the equipment room. (d) The employer shall ensure that employees shower prior to entering the clean room. (e)The employer shall ensure that, after showering, employees enter the clean room before changing into street clothes. (4-7-83)

12. Communication of Hazards to Employees. (4-7-83)

a. Signs. (4-7-83)

i. Warning signs that demarcate the regulated area shall be provided and displayed at each location where airborne concentrations of asbestos may be in excess of the exposure limit prescribed in section 3102. Signs shall be posted at such a distance from such a location that an employee may read the signs and take necessary protective steps before entering the area marked by the signs. (4-7-83)

ii. The warning signs required by 3111 (a) (i) of this section shall bear the following information: DANGER, ASBESTOS, CANCER AND LUNG DISEASE HAZARD. AUTHORIZED PERSONNEL ONLY RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED IN THIS AREA. (4-7-83)

b. Labels. (4-7-83)

i. Labels shall be affixed to all products containing asbestos and to all containers containing such products, including waste containers. Where feasible, installed asbestos products shall contain a visible label. (4-7-83)

ii. Labels shall be printed in large, bold letters on a contrasting background. (4-7-83)

iii. Labels shall be used and shall contain the following information: DANGER, CONTAINS ASBESTOS FIBERS. AVOID CREATING DUST. CANCER AND LUNG DISEASE HAZARD. (4-7-83)

iv. Labels shall contain a warning statement against breathing airborne asbestos fibers. (4-7-83)

v. The provisions for labels required by section 3111 (a) (ii) ((a)) do not apply where: (a)Asbestos fibers have been modified by a bonding agent, coating, binder, or other material, provided that the manufacturer can demonstrate that, during any reasonable foreseeable use, handling, storage, disposal, processing, or transportation, no airborne concentrations of asbestos fibers in excess of the action level will be released; or (b)Asbestos is present in a product in concentrations less than 0.1% by weight. (4-7-83)

c. Employee Information and Training. (4-7-83)

i. The employer shall institute a training program for all employees exposed to airborne concentrations of asbestos in excess of the action level and/or ceiling concentration and shall ensure their participation in the program. (4-7-83)

ii. Training shall be provided prior to or at the time of initial assignment, unless the employee has received equivalent training within the previous 12 months, and at least annually thereafter. (4-7-83)

iii. The training program shall be conducted in a manner that the employee is able to understand. The employer shall ensure that each employee is informed of the following: (a)Methods of recognizing asbestos. (b)The health effects associated with asbestos exposure. (c)The relationship between smoking and asbestos in producing lung cancer. (d)The nature of operations that could result in exposure to asbestos, the importance of necessary

protective controls to minimize exposure including, as applicable, engineering controls, work practices, respirators, housekeeping procedures, hygiene facilities, protective clothing, decontamination procedures, emergency procedures, and waste disposal procedures, and any necessary instruction in the use of these controls and procedures. (e)The purpose, proper use, fitting instructions, and limitations of respirators. (f)The appropriate work practices for performing the asbestos job. (g) Medical surveillance program requirements. (h)A review of this rule, including those appendices included by reference. (4-7-83)

d. Access to Training Materials. (4-7-83)

i. The employer shall make readily available to all affected employees without cost all written materials relating to the employee training program, including a copy of this rule. (4-7-83)

ii. The employer shall provide to the Industrial Commission, upon request, all information and training materials relating to the employee information and training program. (4-7-83)

e. Housekeeping. (4-7-83)

i. Vacuuming. Where vacuuming methods are selected. HEPA filtered vacuuming equipment must be used. The equipment shall be used and emptied in a manner that minimizes the reentry of asbestos into the workplace. (4-7-83)

ii. Waste Disposal. Asbestos waste, scrap, debris, bags, containers, equipment, and contaminated clothing consigned for disposal shall be collected and disposed of in sealed, labeled, impermeable bags or other closed, labeled, impermeable containers. (4-7-83)

13. Medical Surveillance. (4-7-83)

a. General. (4-7-83)

i. Employees Covered. The employer shall institute a medical surveillance program for all employees engaged in work involving levels of asbestos at or above the action level and/or ceiling concentration for 30 or more days per year, or who are required by this section to wear negative pressure respirators. (4-7-83)

ii. Examination by a Physician (a)The employer shall ensure that all medical examinations and procedures are performed by or under the supervision of a licensed physician, and are provided at no cost to the employee and at a reasonable time and place. (b)Persons other than such licensed physicians who administer the pulmonary function testing required by this section shall complete a training course in spirometry sponsored by an appropriate academic or professional institution. (4-7-83)

b. Medical Examinations and Consultation. (4-7-83)

i. Frequency. The employer shall make available medical examinations and consultations to each employee covered under section 3112 (a) (i) on the following schedules: (a)Prior to assignment of the employee to an area where negative pressure respirators are worn. (b)When the employee is assigned to an area where exposure to asbestos may be at or above the action level and/or ceiling concentration for 30 or more days per year, a medical examination must be given within 10 working days following the thirtieth day of exposure. (c)No medical examination is required of any employee if adequate records show that the employee has been examined in accordance with this section with the past 1 year period. (d)At least annually thereafter. (e)If the examining physician determines that any of the examinations should be provided more frequently than specified, the employer shall provide such examinations to affected employees at the frequencies specified by the physician. (4-7-83)

ii. Content. Medical examinations made available pursuant to section 3112 (B) (i) ((a)) ((b)) shall include: (a) A medical and work history with special emphasis directed to the pulmonary, cardiovascular, and gastrointestinal systems. (b)On initial examination, the standardized questionnaire contained in 40 CFR Part 763, Appendix D, Part 1 and, on annual examination the abbreviated standardized questionnaire contained in Appendix D, Part 2. (c)A physical examination directed to the pulmonary and gastrointestinal systems, including a chest roentgenogram to be administered at the discretion of the physician, and pulmonary function tests of forced vital

capacity (FVC) and forced expiratory volume at one second (FEV). Interpretation and classification of chest roentgenograms shall be conducted in accordance with 40 CFR Part 763, Appendix E. (d)Any other examinations or tests deemed necessary by the examining physician. (4-7-83)

iii. Information Provided to the Physician. The employer shall provide the following information to the examining physician: (a)A copy of this rule and 40 CFR Part 763, Appendices D and E. (b)A description of the affected employee's duties as they relate to the employee's exposure. (c)The employee's representative exposure level or anticipated exposure level. (d)A description of any personal protective and respiratory equipment used or to be used. (e)Information from previous medical examinations of the affected employee that is not otherwise available to the examining physician. (4-7-83)

iv. Physician's Written Opinion (a)The employer shall obtain a written opinion from the examining physician. This written opinion shall contain the results of the medical examination and shall include: (i)The physician's opinion as to whether the employee has any detected medical conditions that would place the employee at an increased risk of material health impairment from exposure to asbestos. (ii)Any recommended limitations on the employee or on the use of personal protective equipment such as respirators. (iii)A statement that the employee has been informed by the physician of the results of the medical examinations and of any medical conditions that may result from asbestos exposure. (b)The employer shall instruct the physician not to reveal in the written opinion given to the employer specific findings or diagnoses unrelated to occupational exposure to asbestos. (c)The employer shall provide a copy of the physician's written opinion to the affected employee within 30 days from its receipt. (4-7-83)

14. Recordkeeping. (4-7-83)

a. Objective Data for Exempted Operations. (4-7-83)

i. Where the employer has relied on objective data that demonstrate that products made from or containing asbestos are not capable of releasing fibers of asbestos in concentrations at or above the action level and/or ceiling concentration under the expected conditions of processing, use, or handling to exempt such operations from the initial monitoring requirements under section 3106(b), the employer shall establish and maintain an accurate record of objective data reasonably relied upon in support of the exemption. (a)The product qualifying for exemption. (b)The source of the objective data. (c)The testing protocol, results of testing, and/or analysis of the material for the release of asbestos. (d)A description of the operation exempted and how the data support the exemption. (e)Other data relevant to the operations, materials, processing, or employee exposures covered by the exemption. (4-7-83)

ii. The employer shall maintain this record for the duration of the employer's reliance upon such objective data. (4-7-83)

b. Exposure Measurements. (4-7-83)

i. The employer shall keep an accurate record of all measurements taken to monitor employee exposure to asbestos as prescribed in section 3106. (4-7-83)

ii. The employer may utilize the services of competent organizations such as employee associations to maintain the records required by this section. (4-7-83)

iii. This record shall include at least the following information: (a)The date of measurement. (b)The operation involving exposure to asbestos that is being monitored. (c) Sampling and analytical methods used and evidence of their accuracy. (d)Number, duration, and results of samples taken. (e)Type of protective devices worn, if any. (f)Name, social security number, and exposure of the employees whose exposures are represented. (4-7-83)

c. Medical Surveillance (4-7-83)

i. The employer shall establish and maintain an accurate record for each employee subject to medical surveillance by section 3112. (4-7-83)

ii. The record shall include at least the following information: (a)The name and social security number of the employee. (b)A copy of the employee's medical examination results, including the medical history,

questionnaire responses, results of any tests, and physician's recommendations. (c)Physician's written opinions. (d)Any employee medical complaints related to exposure to asbestos (e)A copy of the information provided to the physician as required by section 3112. (4-7-83)

iii. The employer shall ensure that this record is maintained for the duration of employment plus 30 years. (4-7-83)

d. Training Records. The employer shall maintain all employee training records for one year beyond the last date of employment by that employer. (4-7-83)

e. Availability (4-7-83)

i. The employer upon request, shall make all records required to be maintained by this section available to the Administrator for examination and copying. (4-7-83)

ii. The employer, upon request, shall make any exposure records required by sections 3106 and 3113 available for examination and copying to affected employees, former employees, designated representatives, and the Administrator. (4-7-83)

iii. The employer, upon request, shall make employee medical records required by for examination and copying to the subject employee, anyone having the specific written consent of the subject employee, and the Administrator. (4-7-83)

f. Transfer of Records. Whenever the employer ceases to operate and there is no successor employer to receive and retain the records for the prescribed period, the employer shall notify the Administrator at least 90 days prior to disposal and, upon request, transmit them to the Administrator. (4-7-83)

15. Effective Date. This rule shall become effective January 1, 1990. (4-7-83)

16. Reporting. (4-7-83)

a. Employers subject to this rule must report to the Idaho Department of Labor and Industrial Services at least 10 days before they begin any asbestos abatement project, except one that involves less than either 3 linear feet or 3 square feet of friable asbestos material, and an emergency project. Employers must report any emergency project covered by this rule as soon as possible but in no case more than 48 hours after the project begins. (4-7-83)

b. The report must include: (4-7-83)

i. The employer's name and address. (4-7-83)

ii. The location, including street address, of the asbestos abatement project. (4-7-83)

iii. The scheduled starting and completion dates for the asbestos abatement project. (4-7-83)

c. If a report is mailed to the Department of Labor and Industrial Services, the report must be postmarked at least 10 days before the asbestos abatement project begins unless the report is for an emergency project. In such a case, the report must be postmarked as soon as possible but in no case more than 48 hours after the project begins. (4-7-83)

17. Enforcement. Failure to comply with any provision of this rule will result in the issuance of a Safety Order pursuant to 72-720, et. seq., Idaho Code. Failure or refusal to comply with such order may result in the imposition of civil fines or misdemeanor penalties pursuant to 72-723, Idaho Code. (4-7-83)

18. Inspections. The Department of Labor and Industrial Services will conduct inspections pursuant to 44-104, Idaho Code. (4-7-83)

19. Appendices. Appendices A, C, D, and E of 40 CFR Part 763; Environmental Protection Agency;

Asbestos Abatement Projects Worker Protection; Final Rule are incorporated by reference into this regulation and are mandatory. Appendix B of 40 CFR Part 763 is informational and is not intended to create any additional obligations not otherwise imposed or to detract from any existing obligations. (4-7-83)

351. -- 999. (RESERVED).