

Minnesota Attorney General: Administrative Rules Proceedings

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- FireMar 60, 61, 62, 63 - Chapter Five: Flame Resistance Standards for Tents and Sleeping Bags

Adopted Rules

MINNESOTA DEPARTMENT OF PUBLIC SAFETY

STATE FIRE MARSHAL DIVISION

CHAPTER FIVE: FLAME RESISTANCE STANDARDS FOR TENTS AND SLEEPING BAGS.

FireMar 60 PURPOSE AND SCOPE

A. The purpose of these rules is to adopt minimum flame resistance standards and to establish certification and labeling requirements for camping tents, sleeping bags, and public assembly tents.

B. It is the intent of these rules to provide tests to determine whether all component fabric or fabrics are comparatively difficult to ignite and whether it is comparatively difficult to propagate flame beyond the area exposed to the source of ignition.

C. These rules are enacted pursuant to Laws 1975, ch. 341 (Minn. Stat. 325.331 - 325.335 (1975)).

FireMar 61 CAMPING TENTS

The standard for flame resistance of camping tents shall be the Camping Products Association International Standard C.P.A.I. - 84, 1975 edition, and is hereby incorporated by reference and made part of Minnesota rules.

FireMar 62 SLEEPING BAGS

The standard for flame resistance of sleeping bags shall be the Camping Products Association International Standard C.P.A.I. - 75, 1976 edition, and is hereby incorporated by reference and made part of Minnesota rules.

FireMar 63 PUBLIC ASSEMBLY TENTS

The standard for flame resistance of public assembly tents shall be the small scale test requirements of National Fire Protection Association Standard N.F.P.A. No. 701, Flame Resistant Textiles, Films, 1975, adopted by N.F.P.A. at its annual meeting on May 15, 1975. The following sections of N.F.P.A. No. 701 apply to small scale test requirements and are hereby incorporated by reference and made part of Minnesota rules:

Test Apparatus and Materials

2-1 Pre-Conditioning Oven

2-2 Small Scale Test Apparatus

2-4 Test Specimens

Flame Test Procedures

3-1 Small Scale Test

Cleaning and Weathering Procedures

4-1 General Considerations

4-2 Application

4-3 Accelerated Dry Cleaning

4-4 Accelerated Laundering

4-5 Scrubbing

4-6 Accelerated Water Leaching

4-7 Accelerated Weathering

Flame Resistance Requirements

5-1 Small Scale Test

FireMar 64-66 Reserved for future use.

CPAI - 75

A RATE-OF-BURN STANDARD FOR SLEEPING BAGS

1975

1. Scope

1.1 Scope. This standard provides a test method and performance requirements for measuring the flammability, i.e. burn rate, of multi-component sleeping bags, and provides labeling requirements to facilitate the identification of products conforming to this specification.

1.2 Application. This standard is applicable to all sleeping bags.

2. Performance Requirements

2.1 Performance Requirements. When subjected to the test described in Section 8 the average burn rate for a sample unit shall not exceed 6.0 inches per minute. No individual specimen shall have a burn rate of more than 8.0 inches per minute.

3. Labeling

3.1 Labeling. Bags shall be labeled as conforming to CPAI -75 Rate-of-Burn Standard for Sleeping Bags.

4. Specimens and Sampling

4.1 Specimen. The specimen shall be taken from the bag as shown in Figure I and shall have a finished size of 12" x 14". In the event that it is impossible to cut an actual sample from a bag due to its construction, a 12" x 28" facsimile may be constructed and folded. All components shall be used in their correct positions and amounts.

4.2 Sample Unit. A sample unit shall consist of ten specimens, five to be subjected to three cycles of washing following the procedures recommended by the manufacturer. (Samples should be dried between washings and thoroughly dry before testing).

5. Conditions for Testing

5.1 Ambient Conditions. Tests shall be conducted under ambient conditions. In the

case of a dispute, tests shall be conducted under conditions of 55 percent maximum relative humidity and a temperature of 70° ± 2° F, and specimens shall be in moisture equilibrium under the above conditions.

5.2 Draft. Tests shall be conducted in a draft-free environment.

6. Apparatus

6.1 Test Cabinet. A test cabinet similar to that shown in Figure IV shall be used.

6.2 Support Frame. A support frame conforming to Figure II shall be used. It shall be constructed of 1/8" steel.

6.3 Hold-Down Plate. A hold-down plate conforming to Figure III shall be used. It shall be constructed of 1/8" steel.

6.4 Spacers and Clamps. A spacer and clamping arrangement shall be used which is capable of positioning the hold-down plate with its bottom surface one inch above the top surface of the support frame, so that it holds the test specimen at a one-inch thickness on the two sides and the back.

6.5 Thread. #50 white mercerized cotton thread.

6.6 Tape. Tape for fastening the thread to the frame. (Alternate methods of accomplishing this, such as small clips, may also be used.)

6.7 Weights. Weights for attachment to the timing threads. (See Note 9.1)

6.8 Burner. A Bunsen burner with a tube of 3/8" inside diameter shall be used. The gas adjusting valve is set to provide a flame, with the tube vertical, 1 1/2" in height. The air inlet to the burner is closed.

6.9 Gas. The gas used shall be Matheson Manufactured Gas Type B or the equivalent.

6.10 Stop Watch. A stop watch or other timing device shall be used capable of measuring the burning time to 0.2 second.

7. Sample Preparation

7.1 Compression. Samples shall be compressed to 1/2 their original loft for 24 hours prior to testing. (See Note 9.2)

7.2 Re-Lofting. Following the 24 hour compression period, specimens shall be allowed

a minimum of one hour to regain their loft before tests are conducted.

8. Procedure

8.1 Mount the specimen horizontally on the support frame with the sewn sides and end held at a one-inch thickness by the U-shaped hold-down frame, spacers and clamps.

8.2 Attach two #50 White Mercerized Cotton Threads to one edge of the frame at points 1 1/2" and 11 1/2 inches back from the open end, i.e. with 10" in between, and stretch across the sample, attaching small weights to the overhanging ends of the threads. Timing will begin and end as the respective threads burn through and their weights drop.

8.3 With the flame adjusted as in Section 6.8 and the frame with mounted specimen in the test cabinet, position the burner so that the center of the burner tip is 3/4" below the center of the edge of the exposed end of the specimen.

8.4 Lower the door of the test cabinet.

8.5 Expose the sample to the flame for 30 seconds to force ignition. (See Note 9.3)

8.6 Begin timing when the first weight drops and continue until the second weight drops or until the flaming stops.

8.7 Calculate the burn rate using the following formula:

$$B = 60 \times \frac{D}{T}$$

Where:

B = Burn rate in inches per minute

D = Distance the flame travels in inches, and

T = Time in seconds for the flame to travel D inches.

9. Notes

9.1 Small clamp-type paper clips work well as weights.

9.2 An easy method of accomplishing this is to stack a number of specimens in a box and compress them all to half their original height under a board or plate held down by pins through the side of the box, etc.

9.3 The most reproducible results are produced when the fan in the hood is turned off, or down if a variable speed fan is used, during the 30-second ignition period. During this time it is desirable that the burner flame not flicker. Following the ignition period the fan should be turned back up to exhaust fumes, yet not cause a draft in the test cabinet.

Figure I - Test Specimen

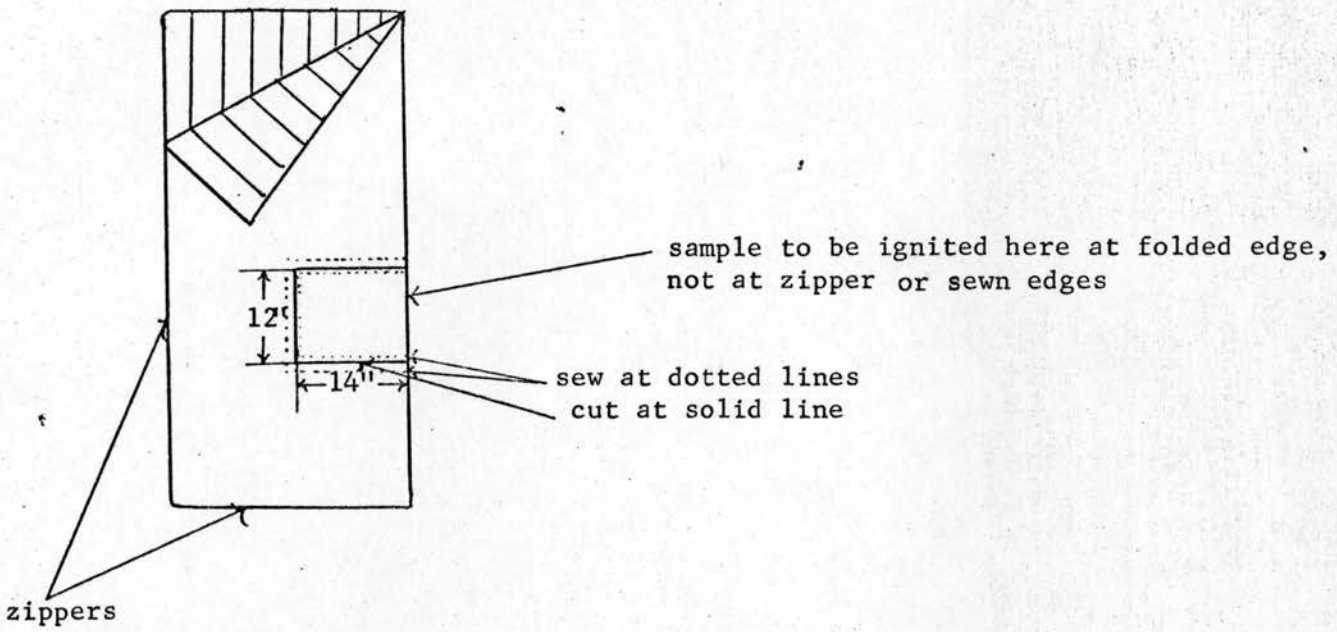


Figure II - Support Frame

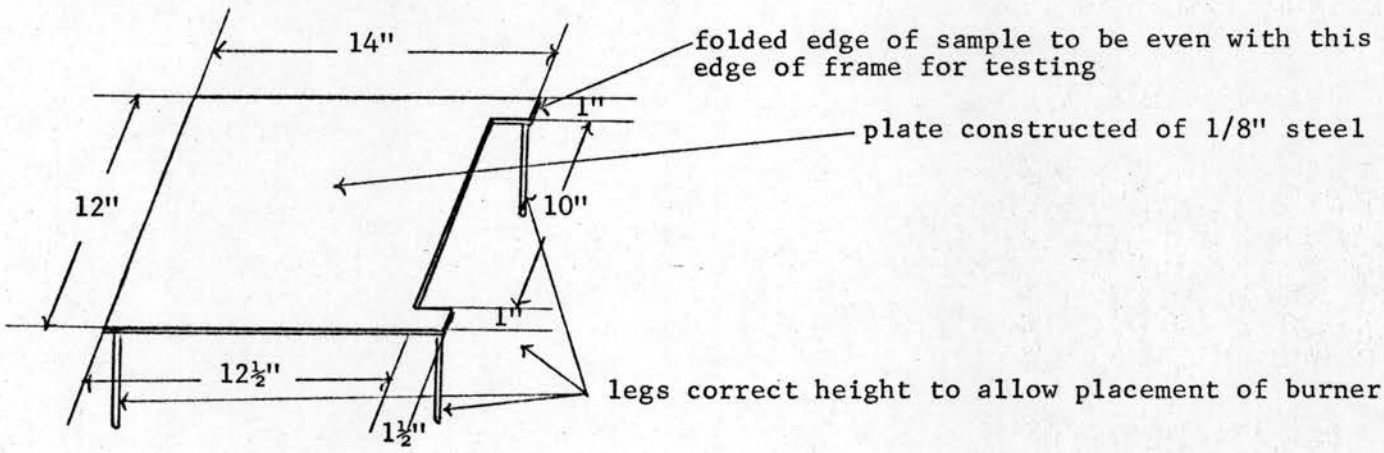


Figure III - Hold-Down Plate

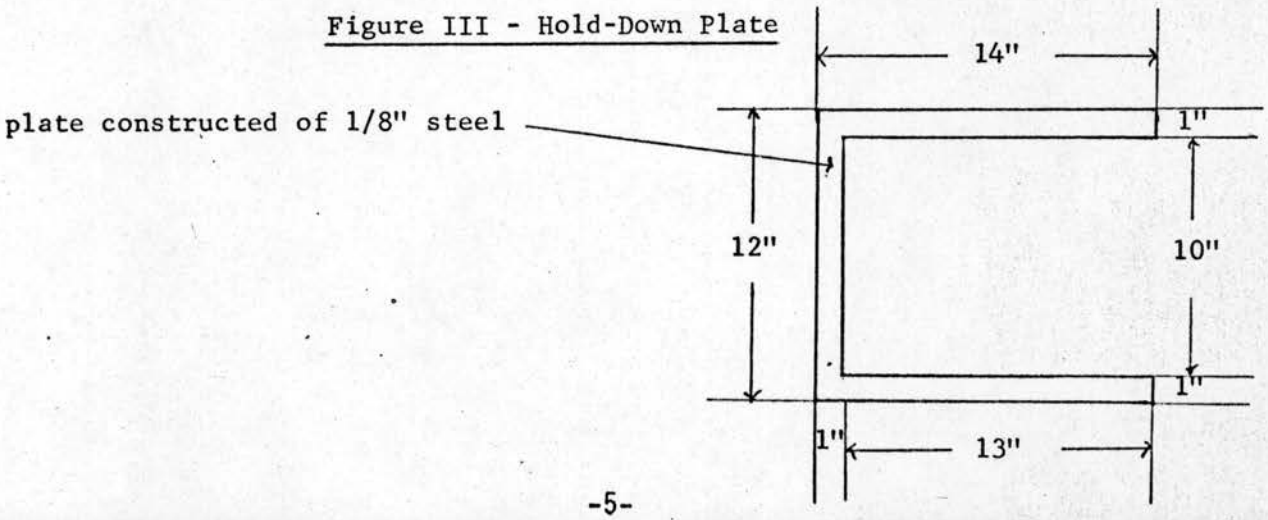
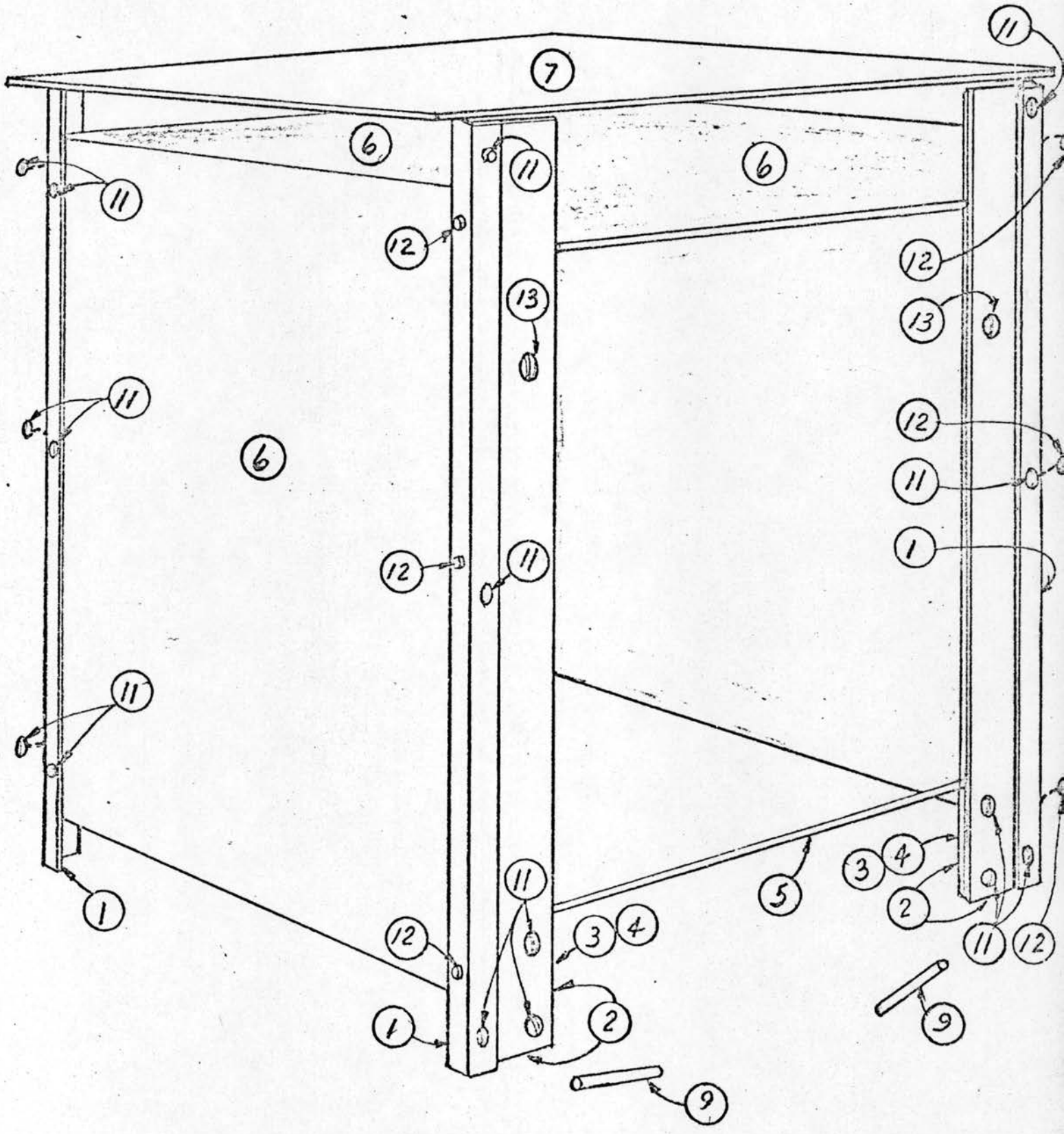


Figure IV - Test Cabinet



CPAI-75 Test Cabinet

Materials List

All Items 1/8" Stainless

Except as Noted

Item	No. Required	Description
1.	4	Corner Angle, 1x28"
2.	4	Window Frame, 3x28"
3.	4	Frame Spacer, 1-3/4x4"
4.	4	Window Seat, 1-1/4x4"
5.	1	Window, Heat Resistant Glass, 3/16x20x20"
6.	3	Panel, 24x24"
7.	1	Top Plate, 24-1/2x26"
8.	2	Chain, 24"
9.	2	Window Stop Rods, 1/4 dia. x 4"
10.	4	S-Hooks
11.	22	Bolt w/nut, 1/4-20x3/4"
12.	6	Bolt w/nut, 10-24x1/2"
13.	2	Hole, 1/4 dia.

Notes: The window glass slides up and down; its edges are taped to avoid cuts; rubber tubing on top of seat acts as cushion.

CPAI - 84

A SPECIFICATION FOR FLAME RESISTANT MATERIALS USED IN CAMPING TENTAGE

1975

1. Scope

1.1 Scope. This standard provides performance requirements and test methods for evaluating the flame resistance of fabric and other pliable materials used in camping tentage. It also provides for certification of materials by suppliers and for labeling programs to caution the user against actions detrimental to flame retardant finishes, as well as to facilitate the identification of tentage as being constructed of flame resistant materials and to identify the manufacturer.

2. Definitions

2.1 Camping Tentage: Any portable temporary shelter or structure designed to protect persons from the elements, all or a portion of the covering of which is made of fabric or other pliable materials. This includes, though not exclusively, the following: camping tents; play tents; recreational vehicle awnings; dining flies and canopies; fabric screen houses; add-a-room; ice fishing tents.

2.2 Material Classifications. All materials covered in this standard fall under one of the following definitions:

2.2.1 Flooring Material: Any pliable material used for flooring in camping tentage but excluding such things as rugs or carpets placed in the tent which are not an integral part of the item.

2.2.2 Wall and Top Material: Any pliable material used in camping tentage for other than flooring including walls, roofs, tops, doors, windows, screens, awnings, flies, and canopies.

2.3 Sample Unit. A sample unit shall consist of the following:

2.3.1 Flooring Material: Four individual specimens, no two specimens containing the same warp or fill yarns or filaments.

2.3.2 Wall and Top Material: Eight individual specimens, four taken from the warp and four from the fill direction of the test material. No two warp specimens shall contain the same warp years or filaments and no two fill specimens shall contain the same fill yarns or filaments.

3. Performance Requirements

3.1 Flooring Material. When subjected to the test described in Section 6, no specimen from a sample unit of flooring material shall be damaged within 1.0 inch of the edge of the hole in the flattening frame.

3.2 Wall and Top Material. When subjected to the test described in Section 7, no specimen from a sample unit of wall and top material shall have an afterflame time (length of time a specimen continues to flame after removal of the test flame source) of more than 4.0 seconds; the average afterflame time for all specimens in a sample unit shall not exceed 2.0 seconds. The damaged length (distance from the bottom of the specimen to a point above which all material is sound) for the sample unit and individual specimens shall not exceed the values shown in Section 3.2.1. Portions or residues which break or drip from the test specimens shall not continue to flame after they reach the floor of the test cabinet.

3.2.1 Damaged Length. The maximum permissible damaged lengths for wall and top material shall be as follows:

Untreated Weight of Materials Being Tested - Ounces Per Square Yard	Maximum Average Damaged Length for Sample Unit - Inches	Maximum Damaged Length for an Individual Specimen - Inches
Over 10	4.5	10.0
Over 8 but not over 10	5.5	10.0
Over 6 but not over 8	6.5	10.0

Over 4 but not over 6	7.5	10.0
Over 1.5 but not over 4	8.5	10.0
Not over 1.5	9.0	10.0

4. Certification and Labeling

4.1 Material Certification. Each lot of flame resistant material supplied to a manufacturer of camping tentage shall be accompanied by a written certification from the supplier stating that it meets the flame retardance requirements of CPAI-84 and giving the lot number and yardage therein.

4.2 Labeling of Camping Tentage. A label or labels shall be permanently affixed to each item of camping tentage containing the following information:

4.2.1 Certification: A statement that the materials used in the manufacture of the item meet the flame resistance requirements of CPAI-84.

4.2.2 Manufacturer Identification: An identification of the manufacturer of the item, unless the item bears a private label, in which case, it shall identify the private labeler and shall also contain a code mark which will permit the seller of the item to identify the manufacturer thereof to the purchaser upon his request.

4.2.3 Code Number: A number enabling the manufacturer to identify from his records the suppliers and suppliers' lot numbers of the certified materials used in the item. The manufacturer shall also maintain records identifying the parties to whom he sold camping tentage. Further, he shall maintain records identifying items manufactured from lots of certified material. Records shall be maintained for 4 years.

4.2.4 Warning Label:

24 pt. type

16 pt. type

12 pt. type

WARNING

KEEP ALL FLAME AND
HEAT SOURCES AWAY
FROM THIS TENT FABRIC

This tent is made with flame resistant fabric which meets CPAI-84 specifications. It is not fire proof. The fabric will burn if left in continuous contact with any flame source.

The application of any foreign substance to the tent fabric may render the flame resistant properties ineffective.

This warning label or its equivalent must be permanently affixed to the tent at one conspicuous location, and must contain block letters on a white background. The first paragraph of the body of the label must be placed in a conspicuous location on each carton containing the tent.

5. Conditioning

5.1 Standard Conditions for Testing. Flame tests shall be performed under or upon immediate removal from Standard Atmospheric Conditions and on specimens in moisture equilibrium under Standard Atmospheric Conditions.

5.1.1 Standard Atmospheric Conditions. Standard Atmospheric Conditions for testing are 65 percent $\pm$ 2 percent relative humidity at a temperature of 70°F. $\pm$ 2°F. (21.1°C. $\pm$ 1.1°C.)

5.1.2 Moisture Equilibrium. Moisture equilibrium is considered to have been reached when, after free exposure of the material to air in motion controlled at Standard Atmospheric Conditions as defined above, the change in weight of successive weighings made at intervals of 1 hour is no greater than 0.25 percent.

5.1.3 Preconditioning. In the event of dispute concerning the results of tests that may be affected by the moisture content, the material shall be preconditioned by being brought to moisture equilibrium with an atmosphere having a relative humidity of not over 10 percent and a temperature not over 125°F. (52°C.). The material shall than be brought to moisture equilibrium under Standard Atmospheric Conditions as defined above and then tested.

5.2 Leaching. Tests in Sections 6 and 7 shall be performed both before and after leaching.

5.2.1 Test Specimen. Test specimens to be leached shall be of the following dimensions:

5.2.1.1 Flooring Material. Each test specimen shall be a 9 inch by 9 inch (±1/16 inch) section of the flooring material to be tested.

5.2.1.2 Wall and Top Material. Test specimens shall be rectangles of cloth 2 3/4 inches by 12 inches (±1/16 inch) with the long dimensions parallel to either the warp or filling directions of the material.

5.2.2 Apparatus

5.2.2.1 Water container or tank of such shape and size that the specimen can be submerged therein with all surfaces of the specimen having full access to the water. For cloth specimens the container shall allow not less than 1/2 gallon of water for each square foot of specimen. The water shall be changed by a continuous flow or by emptying and refilling so that there shall be at least six complete changes of water in a 72-hour period.

5.2.2.2 Means of maintaining water at a temperature of 60°F. to 70°F. (15.5°C. to 21.1°C.) and a pH of 6.0 to 8.0 during the test.

5.2.2.3 Means for holding the specimen submerged throughout the leaching period.

5.2.3 Procedure. The specimens shall be immersed in water at a temperature of 60°F. to 70°F. (15.5°C. to 21.1°C.) and a pH of 6.0 to 8.0 for 72 hours. The

specimen shall then be removed, air-dried, and brought to Standard Atmospheric Conditions prior to further testing.

5.3 Accelerated Weathering. Tests in Sections 6 and 7 shall be performed both before and after accelerated weathering.

5.3.1 Test Specimen. Test specimens to be weathered shall be of the following dimensions:

5.3.1.1. Flooring Material. Each test specimen shall be a 9 inch by 9 inch (±1/16 inch) section of the flooring material to be tested.

5.3.1.2 Wall and Top Material. Test specimens shall be rectangles of cloth 2 3/4 inches by 12 inches (±1/16 inch) with the long dimensions parallel to either the warp or filling directions of the material.

5.3.2 Apparatus

5.3.2.1 Vertical carbon arc mounted at the center of a vertical cylinder. The arc shall be designed to accommodate either two or three pairs of carbons but shall burn only one pair at a time, automatically transferring from one pair to another as the carbons are consumed. The carbons shall be Sunshine-cored and copper-coated, No. 22 for the upper pair and No. 13 for the lower pair. The arc shall be operated on 60 amperes and 50 volts across the arc for alternating current and on 50 amperes and 60 volts across the arc for direct current.

5.3.2.2 A rotating rack with holder in which the specimens are suspended vertically and normally to radiation from the arc with the center of the face of the specimen at a radial distance of approximately 18 inches from the arc.

5.3.2.3 Water-spray nozzles shall be mounted horizontally (the water-spray assembly vertically) in the test chamber inside the specimen rack and so placed that the water shall strike the specimens evenly over their entire length in the form of a fine spray in sufficient volume to cover specimens immediately on impact. The apparatus shall be so operated that the specimens are exposed to successive cycles of 102 minutes of light without spray and 18 minutes of light with spray.

5.3.2.4 Means for maintaining the required temperature of water in the spray.

5.3.2.5 Means for maintaining the required pressure of water entering the spray.

5.3.2.6 Means for delivering the required quantity of water per spray nozzle to the specimen.

5.3.2.7 Exhaust fan to ventilate the arc effectively.

5.3.2.8 Black panel thermometer unit for measuring the temperature within the machine. This unit shall consist of a metal panel to the base of which is attached the sensitive portion of a bimetallic dial-type thermometer. The entire base is then coated twice with long lasting baked enamel paint.

5.3.3 Procedure

5.3.3.1 The rack shall rotate about the arc at a uniform speed of one revolution per minute.

5.3.3.2 The temperature of water in the spray shall be $80^{o} \pm 10^{o}$F. ($26.7^{o} \pm 5.6^{o}$C.)

5.3.3.3 The pressure of the water entering the spray shall be 1 - 18 psi inclusive.

5.3.3.4 The quantity of water delivered to the specimen shall be .12 to .25 gallons, inclusive, per hour per spray nozzle.

5.3.3.5 The black panel temperature at the exposure plane of the specimen rack shall be $155^{o} \pm 10^{o}$F. ($68^{o} \pm 5.7^{o}$C.) when measured in the following manner:

Before reading the temperature the machine shall be full of specimens and shall be in operation long enough for thermal equilibrium to be established. The black panel shall be mounted in the test-panel rack and readings taken at the point where water spray is not striking the panel.

5.3.3.6 The specimen shall be suspended on the rotating rack without tension and in such a way that the ends or corners cannot curl. The long dimension of the specimen shall be in the vertical position and shall be indicated on the reverse side of the cloth. No test portion of the specimen shall be over 7 inches about or below the horizontal plane of the arc.

5.3.3.7 The specimen shall be exposed to normal radiation from the arc for 100 hours.

5.3.3.8 At the end of the exposure period, the specimen shall be removed from the machine, allowed to dry, and brought to Standard Atmospheric Conditions prior to further testing.

6. Test Method, Flooring Material

6.1 Test Specimen. Each test specimen shall be a 9 inch by 9 inch (±1/16 inch) section of the flooring material to be tested.

6.2 Apparatus

6.2.1 Test Chamber. The test chamber shall consist of an open top hollow cube made of noncombustible material with inside dimensions 12 x 12 x 12 inches and a minimum of 1/4 inch wall thickness. The flat bottom of the box shall be made of the same material as the sides and shall be easily removable. The sides shall be fastened together with screws or brackets and taped to prevent air leakage into the box during use.

6.2.2 Supporting Frame. A steel plate, 9 inches by 9 inches, 1/4 inch thick with an 8 inch diameter hole in its center and a 1 inch be 1 inch by 1/16 inch thick shim affixed to the underside of each corner is required to support the material above the floor of the chamber during the course of the test.

6.2.3 Flattening Frame. A steel plate 9 inches by 9 inches, 1/4 inch thick with an 8 inch diameter hole in its center is required to hold the flooring material flat during the course of the test.

6.2.4 Punch: A punch capable of making a 1/4 inch diameter hole in the

center of the specimen of flooring material to be tested.

6.2.5 Standard Igniting Source: No. 1588 methenamine timed burning tablet or an equal tablet. These tablets shall be stored in a desiccator over a desiccant for 24 hours prior to use. (Small quantities of sorbed water may cause the tablets to fracture when first ignited. If a major fracture occurs, any results from that test shall be ignored, and it shall be repeated.)

6.2.6 Hood: A hood capable of being closed and having its draft turned off during each test and capable of rapidly removing the products of combustion following each test. The front or sides of the hood should be transparent to permit observation of the tests in progress.

6.2.7 Mirror: A small mirror mounted above the test chamber at an angle to permit observation of the specimen from outside of the hood.

6.3 Procedure

6.3.1 Place the test chamber in the draft-protected environment (hood with draft off) with its bottom in place and the supporting frame centered in the bottom of the chamber, shimmed side down.

6.3.2 Punch a 1/4 inch diameter hole in the center of the specimen of flooring material to be tested.

6.3.3 Place the specimen on the supporting frame in the position in which it will be used, exercising care that the specimen is horizontal and flat. Place the flattening frame on the specimen and position a methenamine tablet on one of its flat sides with its edge within 1/8 inch of the edge of the hole in the center of the specimen.

6.3.4 Ignite the tablet by touching a lighted match or an equivalent igniting source carefully to its top.

6.3.5 Continue each test until the last vestige of flame or glow disappears (this is frequently accompanied by a final puff of smoke) or the flaming or smoldering has approached within 1.0 inch of the edge of the hole in the flattening frame at any

point. (Any test in which the tablet is extinguished by physical action of the specimen of flooring material shall be disregarded and the test repeated.)

6.3.6 When all combustion has ceased, ventilate the hood and measure the shortest distance between the edge of the hole in the flattening frame and the damaged area. Record the distance measured for each specimen.

6.3.7 Remove the specimen from the chamber and remove any burn residue from the floor of the chamber. Before proceeding to the next text, the floor must be cooled to normal room temperature or replaced with one that is at normal room temperature.

6.4 Report. The number of specimens of the four tested in which the damaged area does not extend to within 1.0 inch of the edge of the hole in the flattening frame shall be reported.

6.5 Notes

6.5.1 The No. 1588 methenamine tablet may be procured from a local pharmacy or from Eli Lilly & Co., 740 S. Alabama, Indianapolis, Indiana 46206.

7. Test Method, Wall and Top Material

7.1 Test Specimen. The test specimens shall be rectangles of cloth 2 3/4 inches by 12 inches (±1/16 inch) with the long dimensions parallel to either the warp or filling directions of the material.

7.2 Apparatus

7.2.1 Cabinet: A cabinet and accessories, fabricated in accordance with the requirements specified in Figures A, B, and C. Galvanized sheet metal or other suitable metal shall be used. The entire inside back wall of the cabinet shall be painted black to facilitate the viewing of the test specimen and pilot flame.

7.2.2 Burner. The burner shall be equipped with a variable orifice to adjust the flame height, a barrel having a 3/8 inch inside diameter, and a pilot light.

7.2.2.1 The burner may be constructed by combining a 3/8 inch inside diameter barrel 3 ± 1/4 inches long from a fixed orifice burner with a base from a

variable orifice burner.

7.2.2.2 The pilot light tube shall have a diameter of approximately 1/16 inch and shall be spaced 1/8 inch away from the burner edge with a pilot flame 1/8 inch long.

7.2.2.3 The necessary gas connections and the applicable plumbing shall be as specified in Figure D except that a solenoid valve may be used in lieu of the stopcock valve to which the burner is attached. The stopcock valve or solenoid valve, whichever is used, shall be capable of being fully opened or fully closed in 0.1 second.

7.2.2.4 On the side of the barrel of the burner, opposite the pilot light there shall be a metal rod of approximately 1/8 inch diameter spaced 1/2 inch from the barrel and extending above the burner. The rod shall have two 5/16 inch prongs marking the distances of 3/4 inch and 1 1/2 inches above the top of the burner.

7.2.2.5 The burner shall be fixed in a position so that the center of the barrel of the burner is directly below the center of the specimen.

7.2.3 A control valve system with a delivery rate designed to furnish gas to the burner under a pressure of 2 1/2 $\pm$ 1/4 lbs. per square inch at the burner inlet (see 7.5.1). The manufacturer's recommended delivery rate for the valve system shall include the required pressure.

7.2.4 The gas used shall be Matheson Manufactured Gas Type B or the equivalent.

7.2.5 Metal hooks and weights to produce a series of total loads to determine damaged length. The metal hooks shall consist of No. 19 gauge steel wire or equivalent and shall be made from 3 inch lengths of the wire and bent 1/2 inch from one end to a 45 degree hook. One end of the hook shall be fastened around the neck of the weight to be used.

7.2.6 Stop watch or other device to measure the burning time to 0.2 second.

7.2.7 Scale, graduated in 0.1 inch to measure the damaged length.

7.3 Procedure

7.3.1 The specimen in its holder shall be suspended vertically in the cabinet in such a manner that the entire length of the specimen is exposed and the lower end is 3/4 inch above the top of the gas burner. The apparatus shall be set up in a draft free area.

7.3.2 Prior to inserting the specimen, the pilot flame shall be adjusted to approximately 1/8 inch in height measured from its lowest point to the tip. The burner flame shall be adjusted by means of the needle valve in the base of the burner to give a flame height of 1 1/2 inches (± 1/16 inch) with the stopcock fully open and the air supply to the burner shut off and taped. The 1 1/2 inch flame height is obtained by adjusting the valve so that the uppermost portion (tip) of the flame is level with the tip of the metal prong (see Figure B) specified for adjustment of flame height. It is an important aspect of the evaluation that the flame height be adjusted with the tip of the flame level with the tip of the metal prong. After inserting the specimen, the stopcock shall be fully opened, and the burner flame applied vertically at the middle of the lower edge of the specimen for 12 seconds (± .2 second) and the burner turned off. The cabinet door shall remain shut during testing.

7.3.3 The after-flame time for each specimen shall be recorded to the nearest 0.2 seconds. After flaming and glowing have ceased, the specimen shall be removed from the cabinet.

7.3.4 After each specimen is removed, the test cabinet shall be cleared of fumes and smoke prior to testing the next specimen.

7.3.5 After both flaming and glowing have ceased, the damaged length shall be measured. The damaged length shall be the distance from the end of the specimen, which was exposed to the flame, to the end of a tear (made lengthwise) of the specimen through the center of the damaged area as follows: The specimen shall be folded lengthwise and creased by hand along a line through the highest peak of the damaged

area. The hook shall be inserted in the specimen (or a hole, 1/4 inch diameter or less, punched out for the hook) at one side of the damaged area 1/4 inch from the adjacent outside edge and 1/4 inch in from the lower end. A weight of sufficient size such that the weight and hook together shall equal the total tearing load required in 7.3.6.1 shall be attached to the specimen.

7.3.6 A tearing force shall be applied gently to the specimen by grasping the corner of the cloth at the opposite edge of the char from the load and raising the specimen and weight clear of the supporting surface. The end of the tear shall be marked off on the edge and the damaged length measurement made along the undamaged edge.

7.3.6.1 Loads for Determining Damaged Length. The specific load applicable to the weight of the test material shall be as follows:

Untreated Weight of Material Being Tested - Ounces per Square Yard	Total Tear Weight for Determining the Damaged Length - Pounds
Not exceeding 6.0	0.25
Over 6.0 and not exceeding 15.0	0.50
Over 15.0 and not exceeding 23.0	0.75
Over 23.0	1.00

7.3.7 The damaged length for each specimen shall be recorded to the nearest 0.1 inch.

7.4 Report

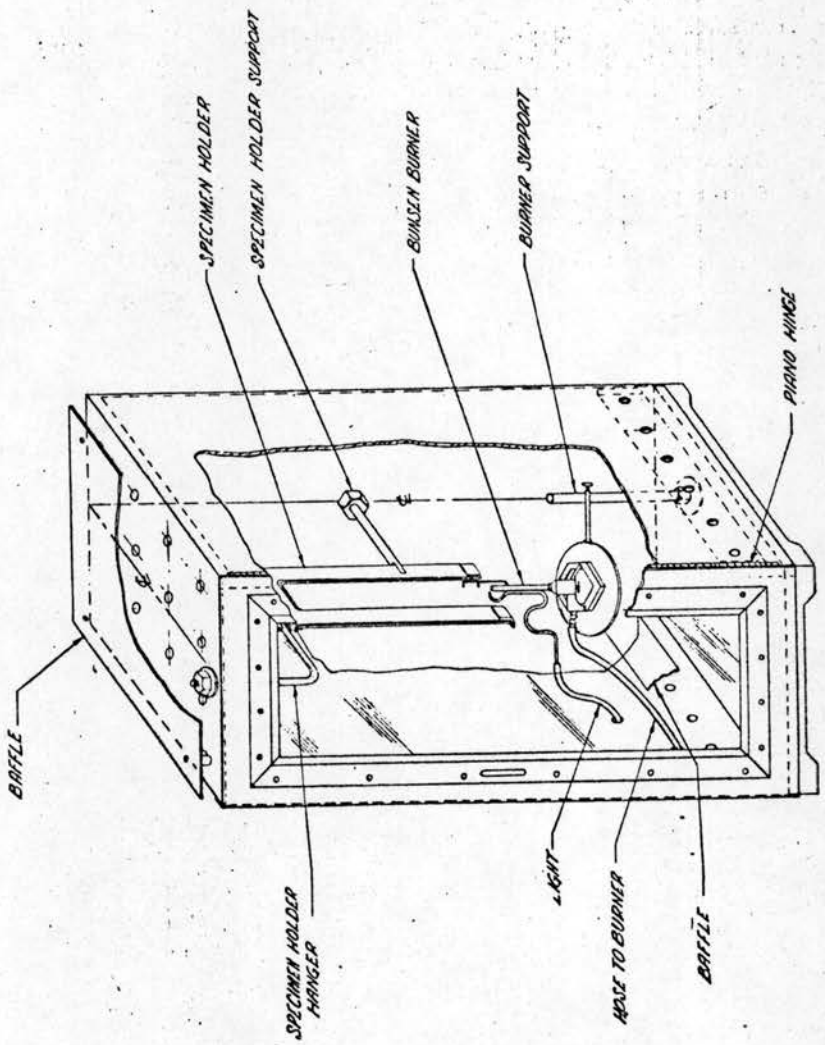
7.4.1 The after-flame time and damaged length of the sample unit shall be the average of the results obtained from the individual specimens tested. All values obtained from the individual specimens shall be recorded.

7.4.2 The after-flame time shall be reported to the nearest 0.2 second and the damaged length to the nearest 0.1 inch.

7.5 Notes

7.5.1 The gas and the regulator valve system, Models IL-350 and 70 with hose and fittings connected in series may be obtained from Matheson Gas Products, P. O. Box 85, East Rutherford, New Jersey 07073.

7.5.2 The test cabinet of the type described in this test method may be obtained from U. S. Testing Company, 1941 Park Avenue, Hoboken, New Jersey 07030 or from the Govmark Organization, Inc. P. O. Box 807, Bellmore, New York 11710.



ILLUSTRATION

FIGURE A - Verticle flame resistance textile apparatus.

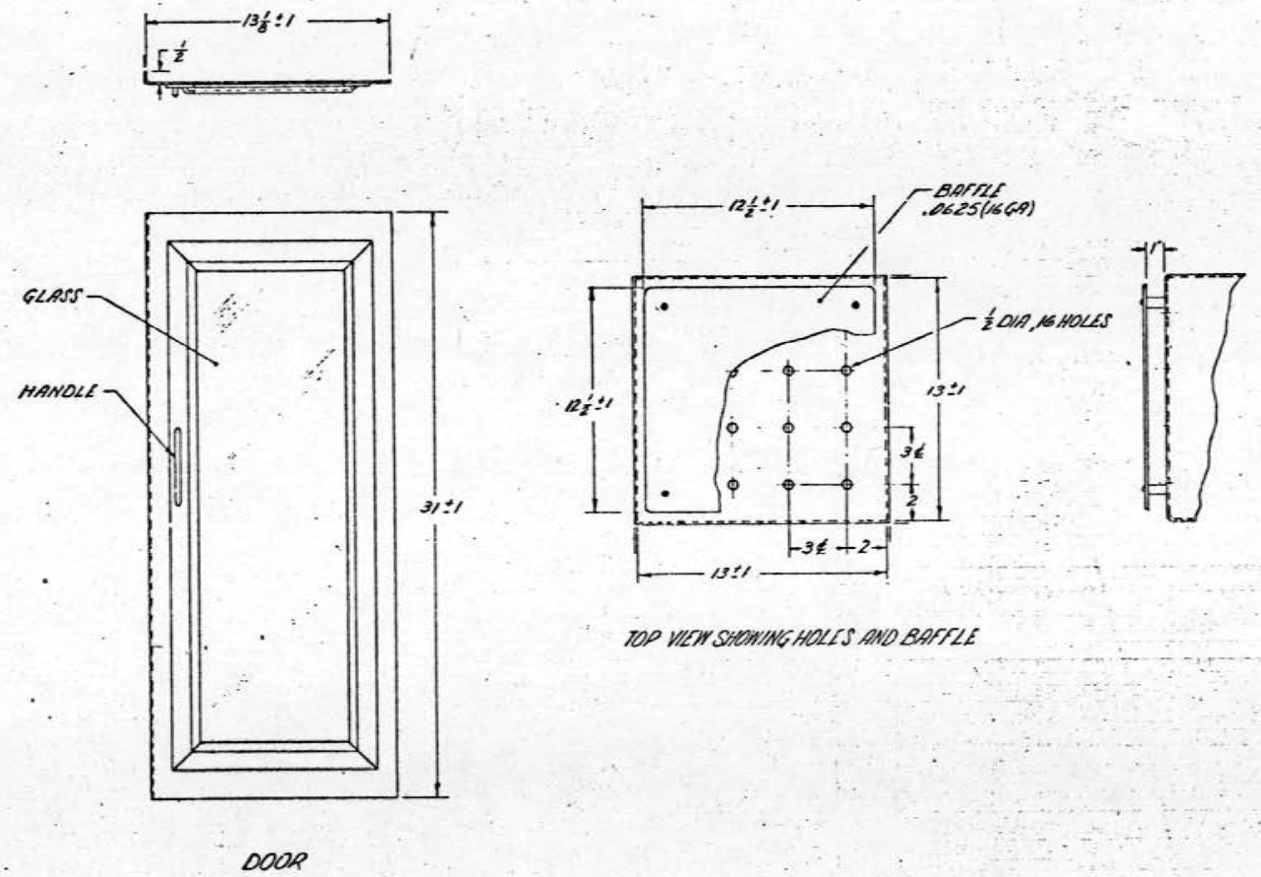


FIGURE B - Vertical flame resistance textile apparatus, door and top view w/baffle.

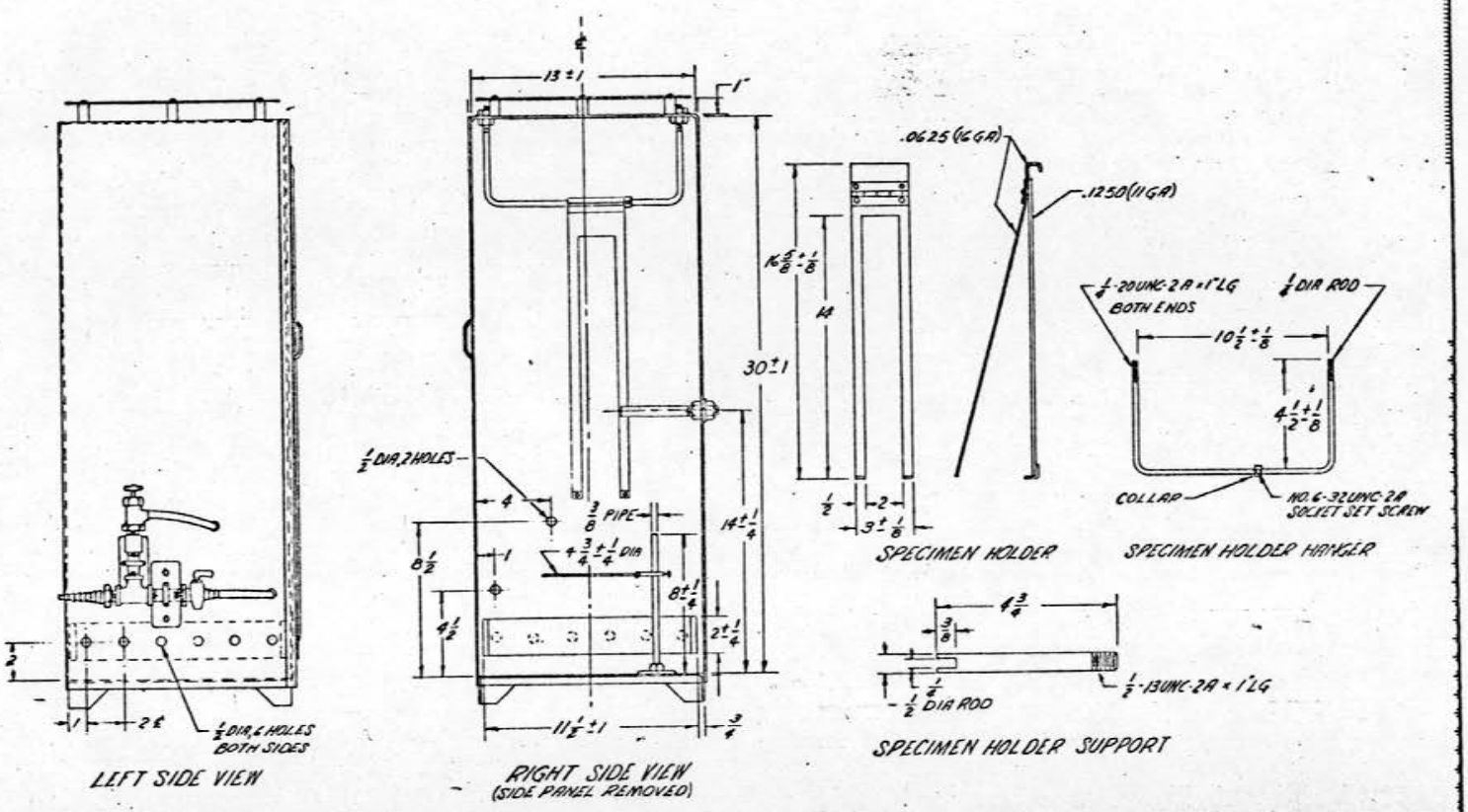


FIGURE C - Verticle flame resistance textile apparatus, views and details.

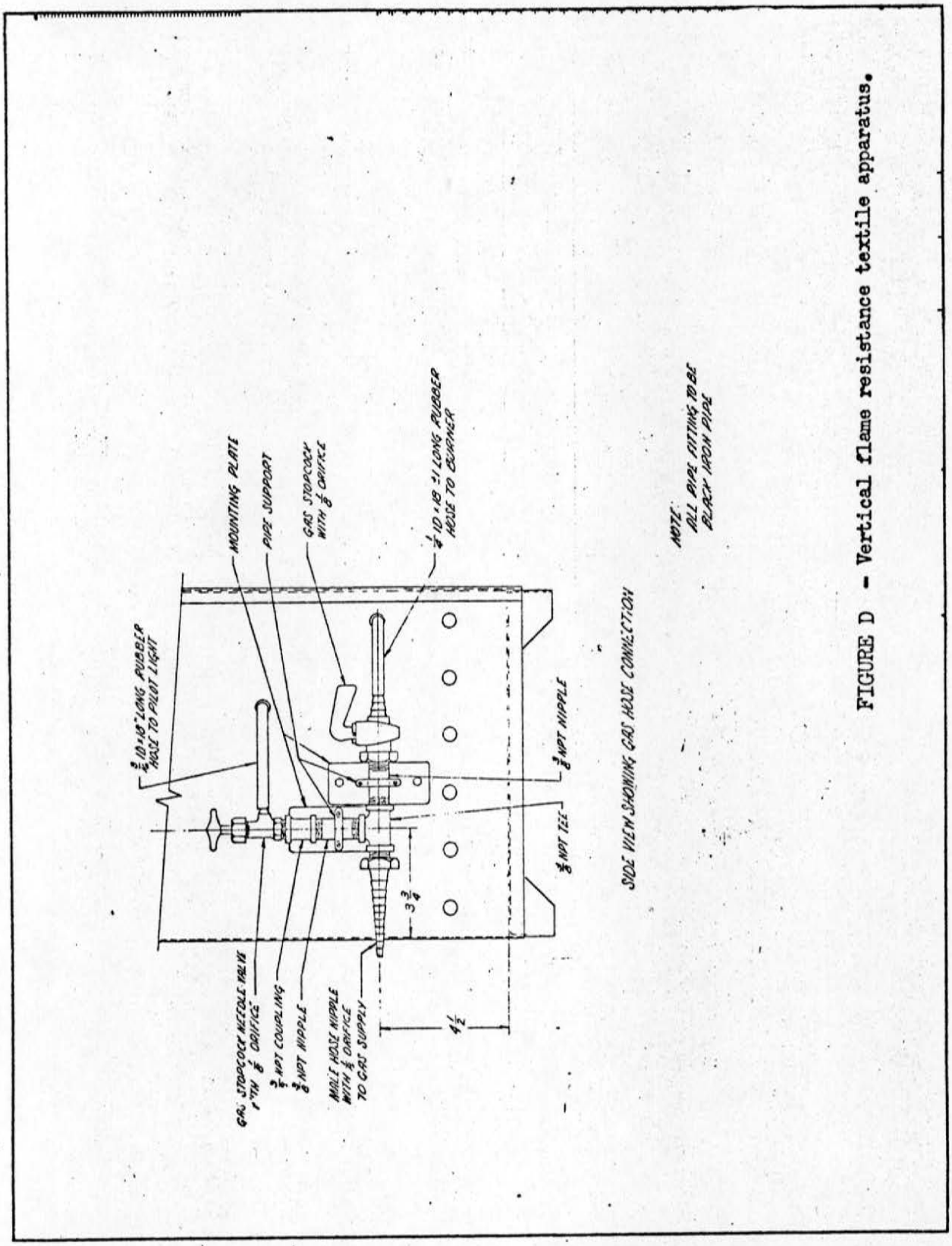


FIGURE D - Vertical flame resistance textile apparatus.

CPAI-84

2-1 Pre-Conditioning Oven.

2-1.1 A forced draft oven shall be used to properly condition test specimens prior to testing in either the small scale test or the large scale test.

2-1.1.1 The interior of the oven shall be large enough to provide free air flow around each specimen contained.

2-1.1.2 The oven shall have variable temperature control.

2-2 Small Scale Test Apparatus.

2-2.1 Specimen Holder.

2-2.1.1 A metal holder, having clamps arranged to grip the specimen along its edges only, shall be used to support the specimen. The ends of the specimen shall remain free.

2-2.2 Test Shield.

2-2.2.1 The specimen and its holder shall be supported in the vertical position within a metal shield having a depth of 12 inches, a width of 12 inches and a height of 30 inches.

(a) The shield shall be open at the top and shall be provided with baffled vent openings along the bottom of at least two sides, totaling 6 square inches of free vent area.

(b) The shield shall also have a sliding glass door or panel.

2-2.3 Gas Burner.

2-2.3.1 A Bunsen or Tirrell gas burner, approximately 6 inches high and 3/8 inch tube diameter, shall be used as an ignition source.

(a) The burner shall be supported so that its barrel will be at a 25 degree angle with vertical.

(b) The burner shall have means for being moved into test position after the shield has been closed. (A rod attached to the base of the burner and extending through a slot at the bottom of the shield will serve the purpose.)

(c) The gas supply to the burner shall be natural gas or a mixture of natural and manufactured gases having a heat value of approximately 800-1000 BTU per cubic foot.

2-2.4 Hook and Weight.

2-2.4.1 A hook and weight assembly shall be used to determine the length of char or destruction of the specimen.

(a) The weight shall be detachable from the hook.

(b) The combined weight of the assembly shall follow Table 2-2.4.

Table 2-2.4

Tearing Weights - Small Scale Test

Weight of Treated Fabric Being Tested	Total Tearing Weight for Determination of Length of Char
Ounces per Square Yard	Pounds
2 to 6 inclusive	0.25
Over 6 and not exceeding 15	0.5
Over 15 and not exceeding 23	0.75
Over 23	1.00

2-4 Test Specimens.

2-4.1 Small Scale Test.

2-4.1.1 Five specimens of the material, 2 3/4 by 10 inches, shall be cut

with their long dimension in the direction of the warp and five in the direction of the filling.

2-4.1.2 Each lot of five shall be cut from at least four places in the sample separated sufficiently to give indication as to the uniformity of the flame-resistant treatment.

3-1 Small Scale Test.

3-1.1 Preconditioning of Test Specimens.

3-1.1.1 The test specimens shall be conditioned in an oven at temperatures of 140-145 degrees Fahrenheit, for duration of one to one and one-half hours prior to testing.

3-1.1.2 Materials which distort or melt at the above indicated oven exposure are to be conditioned at 60 - 80 degrees Fahrenheit and 25 - 50 percent relative humidity for not less than 24 hours.

3-1.1.3 Specimens shall be removed from the oven one at a time and immediately subjected to the procedures described in Sections 3-1.2 and 3-1.3.

3-1.2 Mounting of Test Specimens.

3-1.2.1 The specimen shall be placed on the specimen holder and clamped so that a strip 2 inches wide and 10 inches long is left exposed.

3-1.2.2 The specimen and its holder shall be supported within the test shield so that its lower end will be 3/4 inch above the top of the gas burner.

3-1.3 Conducting the Flame Test.

3-1.3.1 The gas burner shall be ignited and, with the air supply completely shut off, shall be adjusted to give a luminous flame about 1 1/2 inches long.

3-1.3.2 The burner shall be moved under the specimen so that the flame is applied vertically to the lower end of the specimen, near the middle of its width. The flame shall be applied for 12 seconds, then withdrawn.

3-1.3.3 The duration of flaming of the specimen shall be noted after withdrawal of the burner.

3-1.4 Measurement of Length of Char or Material Destruction.

3-1.4.1 After all flaming and afterglow on the specimen has ceased, the length of char or material destruction shall be determined immediately. The length of char in this test is defined as the distance from the end of the specimen which was exposed to the flame to the end of a tear made lengthwise of the specimen through the center of the charred area in the following manner:

(a) The hook (of the hook/weight assembly) is inserted in the specimen, on one side of the charred area, 1/4 inch in from the adjacent outside edge and 1/4 inch up from the bottom.

(b) The weight is then attached to the hook.

(c) The specimen is then grasped on the opposite side of the charred area with the fingers, and raised gently until it supports the weight. The specimen will tear through the charred area until fabric strong enough to carry the load is reached.

3-1.4.2 When it is not feasible to measure char, the material destruction can normally be judged as the measurement from the bottom of the sample to a horizontal line above which all material is sound and in original condition.

4-1 General Considerations.

4-1.1 The probable durability of a treatment relative to the life of the fabric is difficult to assess but, in general, flame-retardant treatments tend to be either very tenacious or quite easily removed.

4-2 Application

4-2.1 These procedures shall be applied to fabrics which are expected to retain their flame-resistant qualities through dry cleaning, laundering, weathering, or other exposures to water.

4-2.2 Each fabric shall be subjected to only those exposure procedures which are applicable to its intended use. It shall meet the flame resistance requirements of

Chapter 5 after passing through the appropriate exposure cycles.

4-2.2.1 It is believed that such accelerated exposure tests as those described in this section provide sufficient testing to permit a reasonable appraisal of the durability of the treatment (under the conditions for which it was designed) for the useful life of the fabric.

4-3 Accelerated Dry Cleaning.

4-3.1 The specimens of the treated fabric shall be agitated for approximately 15 minutes in a suitable commercial type dry cleaning apparatus.

4-3.1.1 A dry cleaning solution of 10 to 15 parts dry cleaning soap or detergent and 1000 parts perchlorethylene shall be used. The volume of solution employed shall be in excess of that required to saturate the sample.

4-3.2 The specimens shall be rinsed for at least five minutes in pure perchlorethylene shall be used. The volume of solution employed shall be in excess of that required to saturate the sample.

4-3.3 The above procedure shall be repeated until ten complete cycles of cleaning and drying have been realized.

4-4 Accelerated Laundering.

4-4.1 A sample of the treated fabric shall be washed in an automatic commercial washing machine using a solution containing 0.15 percent solution of tallow soap and 0.20 to 0.25 percent alkali.

4-4.2 The operating cycle outlined in Table 4-4 shall be followed.

Table 4-4

Operating Cycle for Accelerated Laundering[1]

Operation	Time, Min.	Temp. - Deg. F.
1. Sudsing	6	130
2. Sudsing	6	160
3. Sudsing	6	160
4. Bleaching	8	150
5. Rinsing	2	160
6. Rinsing	2	160
7. Rinsing	2	160
8. Rinsing	2	130
9. Bluing	3	100
10. Scouring	3	100

[1]This cycle is intended for white fabrics. For colored fabrics, the bleaching and bluing operations are omitted and the temperature of the "Sudsing" and "Rinsing" operations is reduced 30 degrees F.

4-4.3 The sample shall then be dried in a drying tumbler at 250 degrees F.

4-4.4 The above procedure shall be repeated until ten complete cycles of washing and drying have been accomplished.

4-4.4.1 If the material is to be subjected to a special use, more laundering may be required.

4-4.5 Where instruction for laundering a fabric are supplied by the manufacturer or finisher, those instructions should be followed in preference to the above procedure

which simulates a typical commercial laundering practice.

4-5 Scrubbing.

4-5.1 Certain articles of flame-resistant fabric not ordinarily washed by home or commercial laundering methods are sometimes scrubbed vigorously on one or both sides, applying laundry soap (or other detergent) and water with a stiff bristle brush. The fabric is then thoroughly rinsed with water and dried.

4-5.2 Where treated fabrics are likely to be cleaned in this manner during their use, test specimens shall be subjected to flame tests after repeated cycles of scrubbing as outlined.

4-6 Accelerated Water Leaching.

4-6.1 A sample of the treated fabric shall be totally submerged in a vessel containing tap water at room temperature for a period of 72 hours. The vessel shall have a capacity of at least four gallons of water.

4-6.2 The water shall be drained from the tank and replenished at 24-hour intervals during the immersion period.

4-6.3 At the conclusion of the immersion period, the sample shall be removed from the test vessel and dried at room temperature.

4-7 Accelerated Weathering.

4-7.1 Either of the following alternative Accelerated Weathering Conditioning procedures shall be used.

4-7.2 Alternative Procedure No. 1.

4-7.2.1 Apparatus.

(a) The apparatus shall consist of a vertical metal cylinder fitted with a vertical carbon arc at its center and having a specimen holder mounted within.

(b) The diameter of the cylinder shall be such that the distance to the face of the specimen holder from the center of the carbon arc is 14 3/4 inches.

(c) The cylinder shall be arranged to rotate about the arc at a rate of

approximately three revolutions per minute.

(d) A water spray shall be provided within the cylinder and fitted with means to regulate the amount of water discharged.

(e) The vertical carbon arc shall be either 0.5 inches diameter solid electrode type, if operating on direct current, or a single-cored electrode, if operating on alternating current. The electrodes shall be of uniform composition.

(f) The arc shall be surrounded by a clear globe of No. 9200 PX Pyres glass, 0.0625 inches thick, or other enclosure having equivalent absorbing and transmitting properties.

4-7.2.2 Operation of the Test Equipment.

(a) The specimens for test shall be mounted on the inside of the cylinder facing the arc.

(b) The cylinder shall rotate at approximately three revolutions per minute for the duration of the test.

(c) The water spray shall discharge about 0.7 gallons per minute onto the specimens for about one minute during each revolution.

(d) The arc shall operate on 13 amperes direct current or 17 amperes, 60 hertz alternating current, with voltage at the arc of 140 volts.

(e) The electrodes shall be renewed at intervals sufficiently frequent to insure full operative conditions of the lamp.

(f) The globe shall be cleaned when the electrodes are removed or at least once in each 36 hours of operation.

4-7.2.3 Test Cycle.

(a) Specimens shall be subjected to this exposure for 360 hours.

(b) Specimens shall then be allowed to dry thoroughly at a temperature between 70 and 100 degrees Fahrenheit.

(c) After drying, the specimens shall proceed through the Flame Test.

4-7.3.2. Operation of Test Equipment.

(a) The specimens for test shall be mounted on the rotating rack, facing the arc.

(b) The rack shall rotate about the arc at a uniform speed of about one revolution in two hours.

(c) The arc shall operate on 60 amperes and 50 volts across the arc for alternating current or 50 amperes and 60 volts across the arc for direct current.

4-7.3.3 Test Cycle.

(a) Specimens shall be subjected to this exposure for 100 hours.

(b) They shall then be allowed to dry thoroughly at a temperature between 70 and 100 degrees Fahrenheit.

(c) After drying, the specimens shall proceed through the Flame Test.

5-1 Small Scale Test.

5-1.1 When subjected to the small scale test dexcribed in Section 3-1 no specimen shall continue flaming for more than two seconds after the test flame is removed from contact with the specimen.

5-1.2 The vertical spread of flame and afterglow (smoldering combustion) on the material, as indicated by the length of char or the measurement from the bottom of the sample above which all material is sound and in original condition, shall not exceed the values shown in Table 5-1.

5-1.3 At no time during or after the application of the test flame shall portions or residues of textiles or films which break or drip from any test specimen continue to flame after they reach the floor of the tester.

Table 5-1

Permissible Length of Char or Destroyed Material -

Small Scale Test

Weight of Treated Fabric Being Tested	Maximum Average Length of Char or Destroyed Material for Ten Specimens	Maximum Length of Char or Destroyed Material for Any Specimen
Ounces per Square Yard	Inches	Inches
Over 10	3½	4½
Over 6 and not exceeding 10	4½	5½
Not exceeding 6	5½	6½

APPROVED AS TO FORM AND LEGALITY
OCT 22 1976 19
WARREN SPANNAUS, ATTORNEY GENERAL
BY /s/ Michael B. Miller
SPECIAL ASSISTANT ATTORNEY GENERAL

STATE OF MINNESOTA
DEPARTMENT OF STATE
FILED
OCT 22 1976 - 2:45 pm
Joan Anderson Growe
Secretary of State

STATEMENT OF COMPLIANCE WITH
MANUAL OF RULE-MAKING PROCEDURES

I, Richard G. Evans, Special Assistant Attorney General, do declare that I have examined the adopted versions of Minn. Rules FireMar 60-63 which incorporate by express reference CPA1 Standards 75 and 84 and NFPA Standard 701. I have also examined all the accompanying documents relating to the official filing of the aforementioned rules and that, based upon them and my personal familiarity with applicable procedures, the Manual of Rule Making Procedures has been followed. The only exception is noted hereinafter.*

Dated: September 29, 1976

Richard G. Evans

RICHARD G. EVANS
Special Assistant
Attorney General

* Attached to the Statement of Need is a copy of the "Statement of Justification" which was read into the record during the public hearing on May 13, 1976. See, transcript at pp. 9-12. Accordingly, that document is intended and officially filed as an attachment or supplement to the Statement of Need dated April 19, 1976.

STATE OF MINNESOTA
OFFICE OF HEARINGS EXAMINERS

FOR THE DEPARTMENT OF PUBLIC SAFETY

In the Matter of the Proposed Adoption of Rules of the State Department of Public Safety Governing Flame Resistance Standards for Tents and Sleeping Bags.

REPORT OF HEARING EXAMINER

The above-entitled matter came on for hearing before Hearing Examiner Peter C. Erickson of the Minnesota Office of Hearings Examiners at 9:00 a.m. on May 13th and 14th, 1976 in Room 81 of the State Office Building.

Gary Hanson, Special Assistant Attorney General, 207 Veterans Service Building, appeared as counsel for the Department of Public Safety, Fire Marshal's Division. Wes Werner, State Fire Marshal, 1246 University Avenue, St.Paul, Minnesota - 55104, and Robert F. Johnson, professor of textiles and clothing, University of Minnesota, St. Paul, Minnesota - 55108, appeared as witnesses on behalf of the petitioning Department. Michael McGuire, attorney at law, appeared on behalf of the Minnesota Retail Federation, 38th Floor, IDS Tower, Minneapolis, Minnesota - 55402, and Thomas Ryan appeared on behalf of the Recreation Vehicle Industry Assn., 54809 County Road 17 South, Elkhart, Indiana - 46514. The hearing continued until all interested groups or persons had an opportunity to be heard concerning the adoption of the proposed rules.

Pursuant to Minn. Stat. § 15.052, subd. 3 (1975 Supp.), this report will include Findings of Fact, Conclusions and Recommendations. The Department of Public Safety, Fire Marshal's Division, and the Office of Hearing Examiners will make a copy of this report available for review to any interested person upon request. Copies of the report will be furnished at a nominal cost.

The Department shall, if it proposes to adopt the rules as originally proposed or amended, submit the complete hearing record to the Chief Hearing Examiner, pursuant to HE 108, no earlier than ten days subsequent to the receipt of this report. It shall include the rules as originally proposed, and the rules as

proposed for adoption in final form. The submission to the Chief Hearing Examiner shall precede review by the Attorney General. The Chief Hearing Examiner shall complete his review and submit his report to the Department on the issue of substantial changes in the rule within ten calendar days. The Department will be responsible for filing the rules with the Attorney General.

Based upon the proceedings herein, the Examiner makes the following:

FINDINGS OF FACT

1. On April 5, 1976, the Department filed the following documents with the Chief Hearing Examiner:

(a) A proposed Order for Hearing;

(b) A proposed Notice of Hearing with the proposed rules attached; and

(c) A statement of the number of persons expected to attend and estimated length of hearing.

2. On April 8, 1976, the Department mailed the Notice of Hearing to all persons and associations who had registered their names with the Secretary of State for the purpose of receiving such notice, to all persons and associations on a list maintained by the Department of Public Safety, and to all members of the Legislature.

3. On April 9, 1976, the Department filed with the Office of Hearings Examiners the following documents:

(a) The Order for Hearing;

(b) The Notice of Hearing as mailed;

(c) The affidavit of receipt of the Secretary of State's list;

(d) The Affidavit of Mailing;

(e) The Statement of Need;

(f) The affidavit of mailing of a notice pursuant to Minn. Stat. § 15.0412, subd. 6, a copy of the Notice and material received pursuant to the Notice.

(g) The names of Department personnel who will represent the agency.

(h) A summary of evidence.

The documents were available for inspection at the office of Hearings Examiners from the date of filng to the date of the hearing.

4. The record was closed after allowing 20 days for submission of written comments at the end of the day on June 3, 1976.

5. Statutory authority to promulgate the proposed rules is found in Minn. Stat.§§ 325.331--325.335 (1975 Supp.). Section 325.333 which, in effect, mandates that the Commissioner of Public Safety "shall" promulgate rules. The statutes read as follows:

> "§325.331 No person, firm or corporation shall establish, maintain or operate any circus, side show, carnival, tent show, theater, skating rink, dance hall, or a similar exhibition, production, engagement or offering or other place of assemblage in or under which ten or more persons may gather for any lawful purpose in any tent, awning or other fabric enclosure unless such tent, awning or other fabric enclosure, and all auxiliary tents, curtains, drops, awnings and all decorative materials are made from a nonflammable material or are treated and maintained in a flame resistant condition. This section shall not apply to tents used to conduct committal services on the grounds of a cemetery, nor to tents, awnings or other fabric enclosures erected and used within a sound stage, or other similar structural enclosure which is equipped with an overhead automatic sprinkler system.
>
> "§ 325.332 No person, firm or corporation may sell or offer for sale or manufacture for sale in this state any tent unless all fabrics or pliable materials in the tent are durably flame resistant. No person, firm or corporation may sell or offer for sale or manufacture for sale in this state any sleeping bag unless it meets the standards of the commissioner of public safety for flame resistancy. Tents and sleeping bags shall be conspicuously labeled as being durably flame resistant.
>
> "§ 325.333 The Commissioner of public safety shall act so as to have effective rules and regulations concerning standards for nonflammable, flame resistant and durably resistant materials and for labeling requirements by January 1, 1976. In order to comply with sections 325.331 and 325.332 all materials and labels must comply with the rules and regulations adopted by the commissioner. The commissioner has general rule making power to otherwise implement sections 325.331 to 325.335.
>
> "§ 325.334 Any firm or corporation who violates sections 325.331 to 325.333 shall be strictly liable for any damage which occurs to any person as a result of such violation. In addition, any seller shall refund the full purchase price of any item sold in violation of section 325.332 upon return of the item by the buyer.
>
> "§ 325.335 Any person, firm or corporation which violates sections 325.331 to 325.333 is guilty of a misdemeanor."

6. Since the Spring of 1973, Dr. Robert F. Johnson, professor of textiles and clothing in the College of Economics at the

University of Minnesota, has documented approximately 120 camping tent fires. Seventy-five of these fires are analyzed in a paper authored by Dr. Johnson. He found that 55 of the fires in his study involved bodily injury; there were 119 injured persons, of whom 27 were fatally burned, 72 severly injured and 20 with minor injuries. Twenty-two of the 75 studied fires occurred in Minnesota.

On the basis of linear extrapolation of the 22 Minnesota tent fires on a population basis, it would yield 1,200 fires over the country. This is a sixteen-fold increase over the total of 75 and likely presents a truer picture. A corresponding sixteen-fold increase in injured persons would give 1900 injuries for the country in the period studied. This appears to agree with a Consumer Product Safety Commission press release in May of 1974 which estimated that 2600 persons are treated in hospital emergency rooms each year for injuries involving tents, sleeping bags, cots and mattresses.

The large majority of tent fires occurs at night when the occupants of the tent are sleeping. Adolescents and children constitute the group which is most often injured by tent fires. Many of these accidents occur in and around homes as well as in the woods, camping. Reflecting the growth of camping in the past few years, the proportion of tent fire incidents is greatest in the last years studied.

7. In 1938, the National Fire Protection Association developed a standard for flame resistancy of textiles, NFPA 701. This standard has been amended in 1939, '40, '41, '51, '66, '69 and '75. It has been adopted by 33 states as the standard for flame resistancy of the material used in public assembly tents. NFPA 701 employs both a small-scale test procedure and a large-scale test method. The states which use 701 for public assembly tents mandate compliance with the small-scale test because the fabrics manufactured are not large enough to provide samples for the large-scale test. The Department of Public Safety is proposing that Minnesota adopt this old, proven standard and that it apply to all tents, including small camping tents and

camper trailer tents, and the covering and liner fabric of sleeping bags. No other states use the 701 standard for anything else other than large, public assembly tents.

In 1972, in response to the tent fire "epidemic", Canvas Products Association International, CPAI, drafted a standard for tent flammability, CPAI 84. This standard was designed to cover only the smaller camping tents. Approximately 90 percent of the recreational tent manufacturing industry is now in voluntary compliance with the 84 standard. Four states have adopted CPAI 84 as the standard which all camping tent manufacturers must comply with. A similar standard, CPAI 75, was drafted to apply only to sleeping bags.

8. At the hearing, representatives of CPAI, tent and sleeping bag manufacturers and retail associations constituted a pro-CPAI 84 and 75 standards group. The Department, almost solely through Dr. Johnson, was the proponent of the NFPA 701 standard. Each of these standards is a package in itself, and they were discussed in that manner rather than by suggesting amendments to the proposed rules. CPAI representatives offered assistance in helping to draft the proposed rules; however, the State Fire Marshal's Division rejected their offered input.

Representatives of the camper-trailer industry appeared and argued that the Department does not have statutory authority to regulate their business. They stated that there are standards which cover the camper-trailer industry exclusively. These standards are NFPA 501C, ANSI A119.2 and FVMSS 302. That 19 states have adopted the 302 standard to cover camping trailer textiles.

One individual argued that backpackers should have the option of being able to purchase nylon tents and sleeping bags which arenot treated for flame resistancy at all; that any treatment adds weight, which is very detrimental to backpackers, and that they should have the option of assuming the risks of fire.

9. NFPA 701 employs a small-scale test for camping tents and sleeping bags, and a large-scale test for public assembly tents. (This standard is essentially the proposed rule.) The small-scale test invovles: (1) accelerated dry cleaning or

laundering for sleeping bag fabrics or accelerated water leaching for tent fabrics; (2) preconditioning fabric specimens in an oven prior to testing; (3) applying a flame from a gas burner to the specimen, which is mounted in a vertical position, for a period of twelve seconds; (4) measuring the amount of time that the specimen continues to burn after the flame is withdrawn; and (5) measuring the length of char or destroyed fabric. The large-scale test uses the same methods as the small-scale test for tents; however, much larger specimens are used, and the type of flame and duration of application is different. This procedure, direct application of a flame to a vertically mounted fabric specimen, is the same for all of the fabrics which make up tents and sleeping bags.

10. CPAI 84 uses the same kind of direct flame application for camping tent fabrics. However, for the material used in tent floors, 84 employs a horizontal test procedure using an ignited methenamine tablet as the heat source. After-flame time and char length are measured for the wall and top fabric specimens. The floor fabric must comply with an "amount of material damaged" standard. All specimens are tested in a standard atmospheric conditions state after water leaching and accelerated weathering.

The after-flame requirement is relatively the same for CPAI 84 and NFPA 701, but 84 allows substantially greater char lengths than does 701.

11. CPAI 75 tests sleeping bags very differently than 701. 75 subjects a composite specimen (a 12" x 14" cut-out section, including cover, flller and liner) to a direct flame while mounted in a horizontal position. There is no dry cleaning or laundering requirement before testing. The standard used is the burn rate of the specimen in inches per minute.

12. Films were shown at the hearing which showed the experimental burning of a tent which met 701 standards and one that met 84 standards. There was no appreciable difference in how the tents burned (or rather did not burn) after being exposed to a direct flame. No hard evidence was offered to show that "84 tents" have been involved in accidental tent fires or that they present more of danger than "701 tents."

13. CPAI spokesmen argued that 84 and 75 testing methods more closely resembled real-life conditions, and, as such, were a better indicator of inflammability. 84 tests tent floor fabric in a horizontal position, as it would be in a real situation. 75 tests a composite specimen of a sleeping bag for fire retardancy, rather than just the cover or liner fabric. It was conceded that just because the components of a unit are flame-retardant, the unit as a whole may not have the same fire retardancy.

Dr. Johnson testified that he had field tested twelve sleeping bags and that none of these would have passed the 701 standard. There was no evidence given that there is presently a sleeping bag in existence which would pass 701. CPAI 75 was drafted after two years of testing sleeping bags for flammability. Dr. Johnson stated he had no knowledge of the 75 standard.

14. Every camping tent or sleeping bag manufacturer who appeared or submitted written testimony stated that it could not make lightweight tents or bags that could meet 701. That the strict char length requirement in 701 prohibits the use of cloth and nylon fabrics unless they are very heavily coated with flame-retardant chemicals. That even if the coating were used, the nylon tent or bag would be far too heavy for the purpose for which it is now being made. The manufacturers stated that they could comply with CPAI 84 and 75 and still make a relatively lightweight tent and sleeping bag. Several manufacturers stated that they would have to stop supplying those items to Minnesota if 701 were adopted.

The difference in weight between fabrics which comply with 701 and 84 was discussed at great length. One retailer testified that he is currently selling tents made out of 1.9-2.2 ounce per square yard nylon which will meet 84 standards. He stated that his manufacturer informed him that he would have to use 10-ounce per square yard fabric in order to comply with 701. A 10.9 ounce Coleman tent that Dr. Johnson initially found to have passed 701, was shown to have actually failed the 701 char length requirement.

It was never clearly established how much "treatment weight" would have to be added to nylon fabric to make it meet 701. The Examiner finds that nylon fabric would have to have a "treat increased" weight of at least 4.5 to 5 ounces per square yard to comply with the 701 char length standard. This much treatment would take away the breathability of the fabric. Cloth fabrics would likewise have to be heavily treated to comply with 701.

Dr. Johnson testified that a firm called Pyrotex stated it could make a lightweight nylon which would comply with 701. That company, however, went out of business a short time ago.

15. Retailers and retail organizations testified that adoption of NFPA 701 would put Minnesota stores out of the tent and sleeping bag retail business. They stated that Minnesota consumers would go to neighboring states, none of which have any kind of regulation, to buy lightweight tents and sleeping bags. That then campers would have no required protection, and millions of dollars in business would go out-of-state. Many testified that they currently sell tents and bags which comply with CPAI 84 and 75.

16. The proposed rules state that "nonmetallic closing devices (e.g., zippers, snaps, etc.) on tents and sleeping bags are prohibited." This would also seem to foreclose the use of drawstring closing devices, cord or fabric ties and Velcro fasteners. It was argued that in cold weather, metal zippers freeze up and stick whereas the nonmetallic devices operate smoothly. The question was raised as to whether there is statutory authority to regulate the type of closing devices used in tents and sleeping bags.

Dr. Johnson testified that nonmetallic zippers may melt and fuse in a fire, thus making escape from a sleeping bag very difficult. Testimony was unclear as to the temperature at which nonmetallic zippers melt, whether a person could survive the "melt" temperature, and at what point the melting, or fusing, actually inhibits escape.

17. The proposed rules, CPAI 84 and 75 each have labeling requirements. The label required in the proposed rules and in 84

for tents is just about identical. However, the proposed label requirements mandate manufacturer code numbers, record-keeping procedures and more of the prescribed labels on each item. CPAI 75 only requires that, "Bags shall be labeled as conforming to CPAI-75 Rate-of-Burn Standard for Sleeping Bags."

18. Minnesota Statutes § 325.333 states that the commissioner of public safety shall have adopted rules by January 1, 1976. These rules are to go into effect on January 1, 1977. The problem of compliance by January 1, 1977, if rules are not adopted until late summer or fall, was raised by one small manufacturer of tents. He stated that he may wind up with a large inventory of tent fabric at the end of 1976 which will not comply with the rules that are adopted.

CONCLUSIONS

1. Due, timely and adequate legal notice of the hearing was properly served and filed by the Department of Public Safety. All other substantive and procedural requirements of statute or rule have been complied with.

2. The legislature has mandated that rules be promulgated by the commissioner of public safety concerning standards for flame resistant fabrics in tents and sleeping bags. Concomitant with this mandate, Dr. Johnson's testimony and exhibits with regard to the tent and sleeping bag fire problem have shown the need for regulations in respect to those items.

3. Minnesota Statutes §§ 325.331-325.335 do not speak to the regulation of camper pop-up tent trailers. Section 325.331 speaks of public assembly fabric enclosures. Section 325.332 speaks of fabrics in tents and sleeping bags. Camper-trailers have many kinds of optional built-in fixtures and conveniences which make them much different from a common tent. The fact that camper-trailers are covered by a different NFPA standard and federal regulation more clearly points this out.

Minnesota Statutes § 15.052, subd. 3 (1975 Supp.) states that:

> "It shall be the duty of the Hearing Examiner to . . . (4) make a report on each proposed agency action . . . taking notice of the degree to which the agency has

(i) documented its statutory authority to take the proposed action. . . . (iii) demonstrated the need for and reasonableness of its proposed action. . . ."

The Department of Public Safety has not demonstrated that it has the authority to regulate camper-trailers. The Examiner concludes that if the legislature had wanted to regulate the manufacture of camper-trailers, they would have included those kinds of descriptive terms in the authorizing statutes.

4. The scope of the "nonmetallic closing devices" language in the proposed rules is very broad. Certain kinds of nonmetallic devices serve important functions in tents and sleeping bags (e.g., drawstrings, plastic zippers, Velcro, etc.), and are much easier to use in cold weather. The evidence submitted does not support a conclusion that all types of metal closing devices are less dangerous than all types of plastic zippers or other kinds of nonmetallic closing devices. It is concluded that it would be unreasonable to prohibit drawstrings, Velcro fasteners and fabric ties. The Examiner concludes that the Department has not demonstrated the reasonableness of prohibiting "nonmetallic closing devices"; however, statutory authority to regulate those devices has been shown in § 325.332.

5. The Examiner concludes that the Department has not demonstrated the reasonableness of applying NFPA 701 to camping tents, but rather, that CPAI 84 was shown to be the more reasonable standard for camping tents.

6. The Examiner concludes that the Department has not demonstrated the reasonableness of applying NFPA 701 to sleeping bags, but rather, that CPAI 75 was shown to be the more reasonable standard for sleeping bags.

7. The Examiner concludes that the Department has not demonstrated the reasonableness of applying the large-scale test in NFPA 701 to public assembly tents, but rather, that the small-scale test in NFPA 701 was shown to be the more reasonable standard for public assembly tents as defined in Minn. Stat. § 325.331.

8. Minnesota Statutes § 325.332 states that, "Tents and sleeping bags shall be conspicuously labeled as being durably flame resistant." Both CPAI 84 and 75 have labeling requirements

which appear to meet the statutory mandate. Because many other states have adopted the small-scale test in NFPA 701 for public assembly tents, the Examiner feels that Minnesota should try to comply with the labeling requirements of those other states.

9. Any rules adopted by the Department of Public Safety regarding the flammability of tents and sleeping bags are to go into effect on January 1, 1977 (see Laws 1975, Chapter 341, § 6.). Depending on what the Department does adopt, compliance may be difficult for manufacturers who do not supply states other than Minnesota. This problem, however, is one which would require legislation to correct. If difficulties do arise, private lobbying and that by the Department itself may bring about quick legislative action.

10. If the option of buying untreated tents and bags were available, anyone, including small children, could be exposed to the dangers involved in that option. The Examiner concludes that in the interest of general public safety, all tents and bags sold in Minnesota must meet a flammability standard.

11. CPAI 84 and 75 are different than NFPA 701 in several respects. However, if 84 and 75 are adopted by the Department, the Examiner concludes that 84 and 75 are not substantially different from the rule as originally proposed. This conclusion is based on the factors enumerated in HE 108 which reads in part as follows:

> ". . . In determining whether the proposed final rule is substantially different, the Chief Hearing Examiner shall consider the degree to which it:
>
> (1) Affects classes of persons not represented at the previous hearing; or
>
> (2) Goes to a new subject matter of significant substantive effect; or
>
> (3) Makes a major substantive change which was not raised by the original Notice of Hearing in such a way as to invite reaction at the hearing; or
>
> (4) Results in a rule fundamentally different from that contained in the Notice of Hearing.

Representatives of most of the largest tent and sleeping bag manufacturers in the United States were present at the hearing. Representatives of CPAI, retail organizations and many private individuals gave testimony and submitted written comments in the 20-

day period. No new subject matter was raised, and no major substantive changes were made which interested persons did not have notice of. CPAI 84 and 75 are not fundamentally different from the rule contained in the Notice of Hearing. They all aim at the same goal through the use of slightly different methods.

RECOMMENDATIONS

The Hearing Examiner recommends that:

(1) CPAI 75 be adopted for sleeping bags (Exhibit No. 20 in the file);

(2) CPAI 84 be adopted for camping tents (Exhibit No. 21 in the file);

(3) The small-scale test of NFPA 701 (as in the proposed rules, Exhibit No. 9), be adopted for public assembly tents with label requirements that conform to what other states have already adopted in regard to that standard.

Dated this 9th day of July, 1976.

Peter C. Erickson

PETER C. ERICKSON
Hearing Examiner

DPS-76-001-PE

STATE OF MINNESOTA
OFFICE OF HEARING EXAMINERS

FOR THE DEPARTMENT OF PUBLIC SAFETY

IN THE MATTER OF THE PROPOSED ADOPTION OF RULES OF THE STATE DEPARTMENT OF PUBLIC SAFETY GOVERNING FLAME RESISTANCE STANDARDS FOR TENTS AND SLEEPING BAGS.

REPORT OF THE ACTING CHIEF HEARING EXAMINER

WHEREAS, hearings were held on May 13 and 14, 1976, before Peter C. Erickson, a Hearing Examiner of the State Office of Hearing Examiners, on the above-entitled matter in compliance with Minn. Stat. §15.0412, Subd. 4; and

WHEREAS, the Report of Hearing Examiner made pursuant to Minn. Stat. §15.052, Subd. 3, was issued to the Department of Public Safety on July 9, 1976; and

WHEREAS, the Department of Public Safety has now determined to adopt rules pursuant to Minn. Stat. §15.0412, Subd. 4; and

WHEREAS, the Department of Public Safety has submitted said rules to the Acting Chief Hearing Examiner for review pursuant to Minn. Stat. §15.052, Subd. 4, and Rule HE 107; and

WHEREAS, the Acting Chief Hearing Examiner finds that there are no substantial changes in said rules as originally proposed.

NOW, THEREFORE, upon receipt of this Report, the Department of Public Safety has the responsibility of submitting the complete hearing record and the rules as adopted by the Department to the Attorney General and to publish in the State Register, all pursuant to Minn. Stat. §15.0412, Subd. 4.

Dated this 27th day of August, 1976.

DUANE R. HARVES
Acting Chief Hearing Examiner

STATE OF MINNESOTA

COUNTY OF RAMSEY

BEFORE EDWARD G. NOVAK

COMMISSIONER OF PUBLIC SAFETY

In the matter of the Proposed Adoption of Rules of the State Department of Public Safety Governing Flame Resistance Standards for Tents and Sleeping Bags.

ORDER ADOPTING RULES

The above-entitled matter came on for hearing before the Commissioner of Public Safety of the State of Minnesota on the 13th and 14th days of May, 1976, at 9:00 a.m. in Room 81, State Office Building, after proper notice required by Minn. Stat. 15.0412 (1975) was served upon all persons, associations and other interested groups registered with the Secretary of State for that purpose.

After affording interested persons an opportunity to present written and oral data, statements and arguments, having considered all of the evidence adduced and upon the records, files and proceedings herein, and applicable statutory standards or criteria, and having confirmed the need for the above captioned rules;

NOW, THEREFORE, IT IS ORDERED that these rules identified as Department of Public Safety Fire Marshal Division Chapter Five: Flame Resistance Standards for Tents and Sleeping Bags, FireMar 60-66 are adopted this 26th day of August, 1976, pursuant to authority vested in me by Minn. Stat. 299A.01, subd. 6 (1974).

STATE OF MINNEOSTA
DEPARTMENT OF PUBLIC SAFETY

Edward G. Novak
COMMISSIONER OF PUBLIC SAFETY

STATE OF MINNESOTA

COUNTY OF RAMSEY

BEFORE EDWARD G. NOVAK

COMMISSIONER OF PUBLIC SAFETY

In the matter of the Proposed Adoption of Rules of the State Department of Public Safety Governing Flame Resistance Standards for Tents and Sleeping Bags.

FINDINGS OF FACT

The above-entitled matter came on for hearing before Peter C. Erickson, Office of Hearing Examiners of the State of Minnesota on the 13th and 14th days of May, 1976, at 9:00 a.m. in Room 81 State Office Building, after proper notice required by Minn. Stat. 15.0412 (1975) was served upon all persons, associations and other interested groups registered with the Secretary of State for that purpose.

After affording interested persons an opportunity to present written and oral data, statements and arguments, having heard all of the testimony, having considered all of the evidence adduced and upon the records, files and proceedings herein, the Hearing Examiner has made his findings, attached. Upon review of the Hearing Examiner's findings and evidence and statements submitted by interested parties, I find the following:

The report of the Hearing Examiner is hereby adopted as the findings of the Commissioner of Public Safety.

STATE OF MINNESOTA
DEPARTMENT OF PUBLIC SAFETY

Edward G. Novak
COMMISSIONER OF PUBLIC SAFETY

August 26, 1976
DATE

EXHIBIT B

STATE OF MINNESOTA

COUNTY OF RAMSEY

BEFORE EDWARD G. NOVAK

COMMISSIONER OF PUBLIC SAFETY

In the matter of the Proposed Adoption of Rules of the State Department of Public Safety Relating to Flame Resistance Standards for Tents and Sleeping Bags.

STATEMENT OF NEED

The above captioned rules are not amendments to existing rules of the Department of Public Safety, Fire Marshal Division.

The need to adopt these rules arises because of legislation mandating regulation of the flammability hazards of tents and sleeping bags. The authority to adopt the proposed rules lies in Law 1975, Chapter 341 which requires that tents and sleeping bags be flame resistant and requires the Commissioner of Public Safety to set standards for such flame resistancy.

Tent fires and resulting injuries is a growing public concern. As a result of mass media documentation it is no longer a "silent epidemic". However, media saturation spurred many states into passing hastily drafted legislation and regulations, inadequately attempting to solve the problem. A great many tents on the market today will collapse within 1-1½ minutes after ignition. This is a particularly tragic hazard when it is considered that the majority of camping tent fires occur at night when campers are sleeping.

With today's technology no tent or sleeping bag can be made completely fire proof. However fabrics can be treated to greatly slow down the spread of flame across the surface and to self extinguish when the source of heat or flame is removed.

The proposed rules constitute two laboratory test methods to determine the adequacy of flame resistance of any fabric which is purported to be flame resistant, either by treatment or inherent characteristics. The rules require that tent fabric, to be considered flame resistant, self extinguish when the flame or heat source is removed, and it is strict with respect to the amount of fabric allowed to burn. It requires that fabric will not be easily ignited, and that once ignited flame spread across the fabric will be quite slow. Although these requirements of flame resistancy are quite subjective, the rules provide objective specific testings and pass-fail criteria proven in subsequent field tests to be valid predictors of actual camping hazards.

The proposed rules are patterned after N.F.P.A. 701 (National Fire Protection Association standard test method of flame resistance of fabrics). N.F.P.A. 701 has been used for many years to test fabrics used for public assembly tents. It is widely accepted as a standard for such tents. Adoption of the proposed rules would essentially extend the strict requirements of that standard to fabrics used in the manufacture of camping tents and sleeping bags. Campers, who are usually asleep when tent fires occur, deserve the same high quality standard of protection heretofor affored patrons of public assembly tent operations.

STATE OF MINNESOTA
DEPARTMENT OF PUBLIC SAFETY

Edward G Novak
COMMISSIONER OF PUBLIC SAFETY

4-19-76
DATE

EXHIBIT C-1

STATE OF MINNESOTA

COUNTY OF RAMSEY

BEFORE EDWARD G. NOVAK

COMMISSIONER OF PUBLIC SAFETY

#7

In the matter of the Proposed Adoption of Rules of the State Department of Public Safety Governing Flame Resistance Standards for Tents and Sleeping Bags.

STATEMENT OF JUSTIFICATION

The justification establishing the reasonableness of the specific substantive provisions of the proposed rules is as follows:

FireMar 60. This section establishes non regulatory background and introductory information as to the reason and statutory authority for promulgating the proposed rules in order to provide a general idea of purpose, scope and intent.

FireMar 61 and 62(a). The definitions section is intended to provide specific meanings to either technical words or to words which could have more than one meaning, so that such words or terms will be uniformly understood in context.

FireMar 62(b). It is an established fact that metallic closing devices, such as zippers and snaps, will not melt and fuse together when exposed to heat or flame. In order to keep means of egress open and assure a measure of fire safety for the occupant of a tent or sleeping bag, closing devices which would melt and fuse shut must be prohibited.

FireMar 63(a), (b), and (c). This section dicatates the specific tests to be used, depending upon the size of the tent. The designation of test method is appropriate because each simulates actual field conditions of fabric use. Fabrics expected to maintain their flame resistance throughout dry cleaning, laundering, water leaching or weathering exposures must be subjected to such tests prior to obtaining a flame resistant rating from either the small scale or large scale test. This requirement is necessary to assure continued flame resistancy of tents and sleeping bags after normal use, which usually includes such exposures.

FireMar 64(a) and (b), specifies the number of samples to be taken per lot size of fabric. This is required in order to ensure quality control over the entire mill run.

FireMar 65(a) and (b). This section dictates the specific apparatus and testing equipment to be used for the small scale test in order to provide a meaningful and uniform testing procedure.

FireMar 65(c), dictates the apparatus and procedure to be used for the large scale test in order to provide a uniform and meaningful testing procedure.

FireMar 65(d)(1) and (d)(2), specify the selection of the test specimens from throughout the lot of fabric. This requirement is necessary in order to ensure that test specimens will be representative of the entire fabric lot.

FireMar 66. This section specifies the exact test procedure for the small scale test. This section is necessary in order to ensure quality control and uniformity of performing the test.

FireMar 67. This section specifies the exact test procedure for the large scale test. This section is also necessary in order to ensure quality control and uniformity of performing the test.

FireMar 68. This section specifies procedures which are intended to simulate various cleaning procedures commonly used and available for sleeping bags. Following these cleaning procedures the flame resistance requirements of the sleeping bag must be maintained in the laboratory test. This requirement is necessary to assure continued flame resistancy after actual laundering or dry cleaning.

FireMar 69(a), (b), and (c). This section specifies procedures intended to simulate outdoor weather conditions over a period of time. Following these procedures flame resistancy must be maintained in the laboratory tests. This requirement is necessary to assure continued flame resistancy after normal use in various outdoor weather conditions over extended periods of time.

FireMar 70(a) and (b), specifies the exact amount of flame spread and afterglow that is an acceptable level permitted within these rules in order to be certified as meeting the requirements of these rules. This flame resistance rating is a minimal requirement to provide fire and life safety to users of tents and sleeping bags.

FireMar 71(a), (b), and (c). This section dictates the certification and labeling requirements for fabric and tents and sleeping bags which meet the requirements of flame resistancy of these rules. This is necessary in order to inform consumers that such products are in compliance with state specifications.

A sample label requirement appears on the last page of the rules showing the size, color and type of print required. This will ensure uniformity of labeling in all tents and sleeping bags sold in the State of Minnesota thus making flame resistant tents and sleeping bags readily and universally identifiable to consumers.

The sections which I have just outlined are, in fact, one general rule. Further testimony will be given by Dr. Robert Johnson, Textiles Specialist at the University of Minnesota, who will detail the technical facts relating to the need for and reasonableness of the proposed rules.

READ INTO HEARING RECORD
May 13, 1976

WES WERNER
STATE FIRE MARSHAL

EXHIBIT F

STATE OF MINNESOTA

COUNTY OF RAMSEY

In the matter of the Proposed Adoption of Rules of the State Department of Public Safety Governing Flame Resistance Standards for Tents and Sleeping Bags.

AFFIDAVIT OF MAILING

Diane Hamilton, being first duly sworn, deposes and says:

That on the 8th day of April, 1976, at the City of St. Paul, County of Ramsey, State of Minnesota, she served the attached Notice of Hearing by depositing in the United States mail at said City of St. Paul, a true and correct copy thereof, properly enveloped, with postage prepaid, to all persons and associations at the addresses listed on the attached Certificate of the Secretary of State as well as to all persons presently being members of the Minnesota Legislature.

Diane K Hamilton

Subscribed and sworn to before me

this 9th day of April, 1976.

Cheryl E. Waller

CHERYL E. WALLER
NOTARY PUBLIC - MINNESOTA
HENNEPIN COUNTY
My Comm. Expires Jan. 21, 1980

EXHIBIT D

STATE OF MINNESOTA

COUNTY OF RAMSEY

In the matter of the Proposed Adoption of Rules of the State Department of Public Safety Governing Flame Resistance Standards for Tents and Sleeping Bags.

CERTIFICATE

I hereby certify that the enclosed 471 general labels and Public Safety list constitute the complete list of persons, associations, and other interested groups who as of 10:00 o'clock A.M., this 8th day of April, 1976, have requested pursuant to M.S. 19__, Section 15,0412, Subdivision 4, that their names be placed on file with the Secretary of State for the purpose of receiving notice of public hearing on proposed rules on the subject captioned above.

SECRETARY OF STATE

JOAN ANDERSON GROWE

Joan Anderson Growe

BY Neil Dion

EXHIBIT E

STATE OF MINNESOTA

COUNTY OF RAMSEY

In the matter of the Proposed Adoption of rules of the State Department of Public Safety Governing Flame Resistance Standards for Tents and Sleeping Bags.

AFFIDAVIT OF RECEIPT OF SECRETARY OF STATE'S LIST

Diane Hamilton, being duly sworn on oath deposes and says:

1) That she is an employee of the Department of Public Safety of the State of Minnesota.

2) That on the 8th day of April 1976, she went to the Secretary of State's office of the State of Minnesota and requested a current list of all representatives of associations or other interested groups or persons who had registered their names with the Secretary of State for the purpose of obtaining notices of public hearings relating to the promulgation of rules pursuant to M.S. 15.0412.

3) That on the 8th day of April 1976, in response to the above request, the Secretary of State provided her with such a list, a copy of which is attached hereto and incorporated by reference.

Diane K Hamilton

Subscribed and sworn to before me

this 9th day of April 1976.

Cheryl E Waller

CHERYL E. WALLER
NOTARY PUBLIC - MINNESOTA
HENNEPIN COUNTY
My Comm. Expires Jan. 21, 1980

EXHIBIT C

STATE OF MINNESOTA

COUNTY OF RAMSEY

BEFORE EDWARD G. NOVAK

COMMISSIONER OF PUBLIC SAFETY

In the matter of the Proposed Adoption of Rules of the State Department of Public Safety Governing Flame Resistance Standards for Tents and Sleeping Bags.

NOTICE OF HEARING

Notice is hereby given that a public hearing pursuant to M.S. 1974, Section 15.0412, Subd. 4 in the above-entitled manner will be held in the Veterans Service Building, 5th floor, Conference Room D, 20 W. 12th Street and Columbus Ave., St. Paul, Minnesota, on May 13, 1976, commencing at 9:00 A.M., and continuing until all persons have had an opportunity to be heard concerning adoption of the proposed rules captioned above.

All interested or affected persons or representatives of such groups or organizations will have an opportunity to be heard, by submitting either oral or written data, statements, or arguments. Statements or briefs may be submitted by mail to the Commissioner of Public Safety, 211 Highway Building, St. Paul, MN 55155, either before the hearing or within 20 days after the close of the hearing.

The Commissioner proposes to adopt rules relating to the following matters: The proposed rules establish tests and minimum performance requirements to determine whether component fabrics of tents and sleeping bags are flame resistant, and establish certification and labeling requirements for tents and sleeping bags. The department's authority to promulgate the proposed rules is contained in Laws 1975, Chapter 341 (M.S. 1975 Supplement, Section 325.331-325.335). One free copy of the proposed rules may be obtained by writing to Diane Hamilton, Department of Public Safety, 210 Highway Building, St. Paul, Minnesota 55155. Additional copies will be available at the door on the date of the hearing.

Pursuant to Minnesota Statutes 1974, Section 10A.01, Subd. 11, any individual engaged for pay or other consideration for the purpose of representing persons or associations attempting to influence administrative action, such as the promulgation of these rules, must register with the State Ethics Commission as a lobbyist within five days of the commencement of such activity.

STATE OF MINNESOTA
DEPARTMENT OF PUBLIC SAFETY

Edward G. Novak
COMMISSIONER OF PUBLIC SAFETY

3-31-76
DATE

EXHIBIT A

STATE OF MINNESOTA

COUNTY OF RAMSEY

BEFORE EDWARD G. NOVAK

COMMISSIONER OF PUBLIC SAFETY

In the matter of the Proposed Adoption of Rules of the State Department of Public Safety Governing Flame Resistance Standards for Tents and Sleeping Bags.

ORDER FOR HEARING

To effectively implement Laws 1975, Chapter 341 (M.S. 1975 Supplement, Section 325.331-325.335), the Minnesota Commissioner of Public Safety deems it necessary to consider adoption of the proposed rules captioned above pursuant to the authority vested in me by M.S. 1974, Section 299A.01, Subdivision 6.

NOW, THEREFORE, IT IS ORDERED this 25th day of March, 1976, that a public hearing on the proposed rules captioned above be held in the Veterans Service Building, 5th floor, Conference Room D, St. Paul, Minnesota, on May 13, 1976, commencing at 9:00 a.m., and continuing until all representatives of associations or other interested groups or persons have had an opportunity to be heard.

IT IS FURTHER ORDERED, that notice of said hearing be given to all representatives of associations or other interested groups or persons who have registered their names with the Secretary of State for that purpose and all persons who are presently members of the Minnesota Legislature.

STATE OF MINNESOTA
DEPARTMENT OF PUBLIC SAFETY

Edward G. Novak
COMMISSIONER OF PUBLIC SAFETY

PROPOSED RULES #9

MINNESOTA DEPARTMENT OF PUBLIC SAFETY

STATE FIRE MARSHAL DIVISION

CHAPTER FIVE: FLAME RESISTANCE STANDARDS FOR TENTS AND SLEEPING BAGS.

FireMar 60 PURPOSE AND SCOPE

(a) The purpose of these rules is to adopt minimum flame resistance standards and to establish certification and labeling requirements for all tents and sleeping bags.

(b) It is the intent of these rules to provide tests to determine whether all component fabric or fabrics are comparatively difficult to ignite and whether it is comparatively difficult to propagate flame beyond the area exposed to the source of ignition.

(c) The performance tests in these rules do not necessarily indicate whether the material tested will resist the propagation of flame under severe fire exposure or when used in a manner which differs substantially from the test requirements.

(d) These rules are enacted pursuant to Laws 1975, Chapter 341 (Minnesota Statutes, 1975 Supplement, Section 325.331 - 325.335).

FireMar 61 DEFINITIONS

As used in these rules, the following terms shall have the meanings as ascribed below:

(a) Afterglow. A glow or smoldering combustion continuing after the disappearance of flame.

(b) Camping tent. Any portable or mobile temporary shelter

or structure with a capacity of less than 10 persons, all or part of the structure being made from fabric or fabrics, including, but not limited to pup tents, lightweight backpacker tents, hiker tents, umbrella tents, cabin tents, ice fishing tents, children's play tents, screen houses, canopies, recreational vehicle awnings, and fold-out or pop-up camper trailer tents.

(c) Char. A blackened carbonized effect remaining on fabric burned partly on the outside.

(d) Distort. To twist out of a natural normal or orginal shape or condition.

(e) Fabric. All woven fabric, non-woven fabric, coated fabric, plastic film and like textiles, but not loose fiber filler or batting.

(f) Filling. The yarn interlacing the warp at right angles in the weaving.

(g) Public assembly tent. Any portable or mobile temporary shelter or structure in which 10 or more persons may gather for public assemblage, as defined in Laws 1975, Chapter 341, Section 1, all or part of the structure including auxiliary tents, curtains, drops, awnings and decorative material being made from fabric or fabrics.

(h) Sleeping bag. All component fabric or fabrics of sleeping bags, slumber bags, stadium bags and other forms of bedding which can be zippered, snapped or buttoned into a bag-like shape, but not including the loose fiber filler or batting.

(i) Warp. A series of yarns extended lengthwise thereby

forming the lengthwise threads of a woven fabric.

FireMar 62 GENERAL RULES

(a) Except as otherwise specified as to type, wherever in these rules the term "tent" is used, it shall mean both public assembly and camping tents.

(b) Prohibited components of tents and sleeping bags. Non-metallic closing devices (e.g. zippers, snaps, etc.) on tents and sleeping bags are prohibited.

FireMar 63 TEST METHODS AND TEST SELECTION

(a) All fabrics shall be capable of complying with the performance requirements of the small scale test or the large scale tests. The large scale test shall be used for public assembly tents and other related items as defined in FireMar 61 (g). The small scale test shall be used for camping tents and sleeping bags as defined in FireMar 61 (b) and (h).

(b) For those materials which show excessive melting or shrinkage on burning by the small scale test, then the large scale test shall be considered applicable.

(c) Textiles which are expected to retain their flame resistance through dry cleaning, laundering, water leaching, or weathering exposures must be subjected to the applicable procedures of FireMar 68 and 69 before being tested by either the small scale or the large scale flame test.

FireMar 64 TEST FREQUENCY

(a) A number of random sample units shall be taken from each fabric lot as indicated below. Each sample unit shall contain enough fabric to provide all of the

specimens necessary to conduct the tests required within these rules.

Sample Units Per Lot

Lot Size in Lineal Yards	Number of Sample Units
0 - 800	2
801 - 22,000	3
22,001 - and over	5

(b) If any sample unit from a lot of fabric fails to meet the flame resistance requirements, that lot of fabric may be resampled and tested one additional time. If, again, any sample fails the test that lot of fabric shall not be certified as passing.

FireMar 65 TEST APPARATUS AND MATERIALS

(a) Pre-Conditioning Oven

A forced draft oven shall be used to properly condition test specimens prior to testing in either the small scale or the large scale test. The interior of the oven shall be large enough to provide free air flow around each specimen contained. The oven shall have variable temperature control.

(b) Small Scale Test Apparatus

(1) Specimen Holder. A metal holder, having clamps arranged to grip the specimen along its edges only, shall be used to support the specimen. The ends of the specimen shall remain free.

(2) Test Shield. The specimen and its holder shall be supported in the vertical position within a metal shield having a depth of 12 inches, a width of 12 inches and a height of 30 inches. The shield

shall be open at the top and shall be provided with baffled vent openings along the bottom of at least two sides, totaling 6 square inches of free vent area. The shield shall also have a sliding glass door or panel.

(3) Gas Burner. A Bunsen or Tirrell gas burner, 6 inches high and 3/8-inch tube diameter, shall be used as an ignition source. The burner shall be supported so that its barrel will be at a 25 degree angle with vertical. The burner shall have means for being moved into test position after the shield has been closed. (A rod attached to the base of the burner and extending through a slot at the bottom of the shield will serve the purpose). The gas supply to the burner shall be natural gas or a mixture of natural and manufactured gases having a heat value of 800 - 1000 BTU per cubic foot.

(4) Hook and Weight. A hook and weight assembly shall be used to determine the length of char or destruction of the specimen. The weight shall be detachable from the hook. The combined weight of the assembly shall follow the table below:

Tearing Weights - Small Scale Test

Weight of Treated Fabric Being Tested	Total Tearing Weight for Determination of Length of Char
Ounces per Square Yard	Pounds
2 to 6 inclusive	0.25
Over 6 and not exceeding 15	0.5
Over 15 and not exceeding 23	0.75
Over 23	1.00

(c) Large Scale Test Apparatus

(1) Test Enclosure. The test shall be carried out in a sheet-iron stack 12 inches square and 7 feet high. The stack shall be supported 1 foot above the floor by legs and shall be open at the top and bottom. The stack shall also be fitted with a wired glass observation window extending the full length of the front. The stack shall have means for hanging the specimen.

(2) Restraining Clamps. Test specimens shall be lightly restrained laterally in the stack by suitable clamps and guide wires attached to the outer edges of the specimen. Clamps are not required for folded specimens.

(3) Gas Burner. A Bunsen burner having 3/8-inch tube diameter and means for measuring the gas pressure shall be used for the ignition source. The burner shall be fixed in a position so that the barrel is at a 25 degree angle with the vertical. The gas supply to the burner shall

be natural gas or a mixture of natural and manufactured gases having a heat value of 800 to 1000 BTU per cubic foot. The burner tube shall be fully adjustable so as to vary flame height and pattern.

(d) Test Specimens

(1) Small Scale Test. Five specimens of the fabric, 2 3/4 by 10 inches, shall be cut with their long dimension in the direction of the warp (lengthwise threads) and five specimens, 2 3/4 by 10 inches, shall be cut with their long dimension in the direction of the filling (horizontal threads). Each lot of five shall be cut from at least four places in the sample separated sufficiently to give indication as to the uniformity of any flame-resistant treatment.

(2) Large Scale Test. The test specimens shall be taken from as widely separated and symmetrically located sections as possible over the entire area of the sample of each fabric. One-half of the specimens of each kind shall be cut with the long dimension in the direction of the warp, and the balance of the specimens shall be cut with the long dimension in the direction of the filling. For conducting flame tests of fabrics in single sheets, at least 10 specimens, 5 inches by 7 feet, shall be used. For conducting flame tests of fabrics hung in folds, at least 4 specimens, 25 inches by 7 feet, shall be cut. Each specimen

shall be folded longitudinally to form four folds, each 5 inches wide, uniformly over the length (spacing about 1/2 inch).

FireMar 66 SMALL SCALE FLAME TEST PROCEDURES

(a) Preconditioning of Test Specimens

(1) The test specimens shall be conditioned in an oven at temperatures of 140-145 degrees Fahrenheit, for duration of one to one and one-half hours prior to testing.

(2) Fabrics which distort or melt at the above indicated oven exposure are to be conditioned at 60-80 degrees Fahrenheit and 25-50 percent relative humidity for not less than 24 hours.

(3) Specimens shall be removed from the oven one at a time and immediately subjected to the procedures described in FireMar 66(b) and (c).

(b) Mounting of Test Specimens

(1) The specimens shall be placed on the specimen holder and clamped so that a strip 2 inches wide and 10 inches long is left exposed.

(2) The specimen and its holder shall be supported within the test shield so that its lower end will be 3/4 inch above the top of the gas burner.

(c) Conducting the Flame Test

(1) The gas burner shall be ignited and, with the air supply completely shut off, shall be adjusted to give a luminous flame about 1 1/2 inches long.

(2) The burner shall be moved under the specimen so that the flame is applied vertically to the lower

end of the specimen, near the middle of its width. The flame shall be applied for 12 seconds, then withdrawn.

(3) The duration in seconds of flaming of the specimen after withdrawal of the burner shall be measured with a stopwatch and recorded.

(d) Measurement of Length of Char or Fabric Destruction After all flaming and afterglow on the specimen has ceased, the length of char or fabric destruction shall be determined immediately. (When it is not feasible to measure char, the material destruction can normally be judged as the measurement from the bottom of the sample to a horizontal line above which all material is sound and in original condition). The length of char in this test is defined as the distance from the end of the specimen which was exposed to the flame to the end of a tear made lengthwise of the specimen through the center of the charred area in the following manner:

(1) The hook (of the hook/weight assembly) is inserted in the specimen, on one side of the charred area, 1/4 inch in from the adjacent outside edge and 1/4 inch up from the bottom.

(2) The weight is then attached to the hook.

(3) The specimen is then grasped on the opposite side of the charred area with the fingers, and raised gently until it supports the weight. The specimen will tear through the charred area until fabric strong enough to carry the load is reached.

FireMar 67 LARGE SCALE FLAME TEST PROCEDURES

(a) Preconditioning of Test Specimens

(1) The test specimens shall be conditioned in an oven, at temperatures of 140-145 degrees Fahrenheit for duration of not less than one hour nor more than one and one-half hours before testing.

(2) Fabrics which distort or melt at the above indicated oven exposure shall be conditioned at 60-80 degrees Fahrenheit and 25-50 percent relative humidity for not less than 24 hours.

(3) Specimens shall be removed from the oven one at a time and immediately subjected to the procedures described in FireMar 67 (b) and (c).

(b) Mounting of Test Specimens

(1) The single-sheet specimen shall be suspended vertically in the stack with its full width facing the observer so that the bottom of the specimen will be 4 inches above the top of the Bunsen burner.

(2) For the folded specimen the conditions of test shall be the same as above except that it shall be suspended vertically with the edges of the folds facing the observer. The folds shall be spread apart 1/2 inch by means of guide rods inserted at the top and bottom ends.

(c) Conducting the Flame Test

(1) The gas burner shall be ignited and the gas pressure regulated at 4 1/4 inches (108mm) of water.

(2) The burner shall be adjusted to produce an 11

inch oxidizing flame having an indistinct inner cone.

(3) The flame shall be applied vertically near the middle of the width of the lower end of the specimen in a single sheet, or to the middle of the width of the lower end of the middle fold of the specimen in folds. The position of the specimen relative to the test flame shall be maintained by guide wires attached to the outer edges of the specimen. The test flame shall be applied to the specimen for two minutes, then withdrawn.

(4) The duration in seconds of flaming of the specimen after withdrawal of the burner shall be measured with a stopwatch and recorded.

(d) Measurement of Length of Char

After all flaming and afterglow on the specimen has ceased, the length of char shall be determined. For purposes of this test, the length of char is defined as the vertical distance on the specimen from the top of the test flame to the top of the charred area resulting from spread of flame and afterglow. For synthetic fabrics the length of char is defined as the vertical distance from the tip of the test flame to a horizontal line, above which all fabric is sound and in essentially original condition.

FireMar 68 CLEANING PROCEDURES FOR SLEEPING BAGS

(a) Application

(1) These procedures shall be applied separately to all

fabrics which are used to fabricate a sleeping bag.

(2) Each fabric shall meet the flame resistance requirements of FireMar 70 after passing through the appropriate exposure cycles.

(b) Accelerated Dry Cleaning

(1) The specimens of the treated fabric shall be agitated for 15 minutes in a suitable type dry cleaning apparatus. A dry cleaning solution of 10 to 15 parts dry cleaning soap or detergent and 1000 parts perchlorethylene shall be used. The volume of solution employed shall be in excess of that required to saturate the sample.

(2) The specimens shall be rinsed for at least five minutes in pure perchlorethylene and dried in a dryer at 135-150 degrees F.

(3) The above procedure shall be repeated until ten complete cycles of cleaning and drying have been realized.

(4) If a label on the bag, which is permanently attached and durable for the life of the bag, prohibits dry cleaning, this test is not applicable.

(c) Accelerated Laundering

(1) A sample of the treated fabric shall be washed in an automatic washing machine using a solution containing 0.15 percent solution of tallow soap and 0.20 to 0.25 percent alkali.

(2) The operating cycle outlined in the table below shall be followed.

Operating Cycle for Accelerated Laundering

Operation	*Time, Min.*	*Temp. - Deg.F*
1. Sudsing	6	130
2. Sudsing	6	160
3. Sudsing	6	160
4. Rinsing	2	160
5. Rinsing	2	160
6. Rinsing	2	160
7. Rinsing	2	130

(3) The sample shall then be dried in a drying tumbler at 250 degrees F.

(4) The above procedure shall be repeated until seven (7) complete cycles of washing and drying have been accomplished.

(5) Where instructions for laundering a sleeping bag are supplied on a label permanently attached to the bag and durable for the life of the bag, by the manufacturer or finisher, those instructions may be followed in preference to the procedure outlined in FireMar 68(c)(1) and (c)(2).

FireMar 69 WEATHERING PROCEDURES FOR TENTS

Accelerated Water Leaching

(a) A sample of all the fabrics used to fabricate a tent shall be totally submerged in a vessel containing tap water at room temperature for a period of 72 hours.

The vessel shall have a capacity of at least four gallons of water.

(b) The water shall be drained from the tank and replenished at 24 hour intervals during the immersion period.

(c) At the conclusion of the immersion period, the sample shall be removed from the test vessel and dried at room temperature.

FireMar 70 FLAME RESISTANCE REQUIREMENTS

(a) Small Scale Test

(1) When subjected to the small scale test described in FireMar 66, no specimen shall continue flaming for more than two seconds after the test flame is removed from contact with the specimen.

(2) The vertical spread of flame and afterglow (smoldering combustion) on the fabric, as indicated by the length of char or the measurement from the bottom of the sample above which all fabric is sound and in original condition, shall not exceed the values shown in the table below.

Permissible Length of Char or Destroyed Fabric
Small Scale Test

Weight of Fabric being Tested	Maximum Average Length of Char or Destroyed Fabric for Ten Specimens	Maximum Length of Char or Destroyed Fabric for Any Specimen
Ounces per Square Yard	Inches	Inches
Over 10.....	3½	4½
Over 6 and not exceeding 10	4½	5½
Not exceeding 6.....	5½	6½

(3) At no time during or after the application of the the test flame shall portions or residues of fabric which break or drip from any test specimen continue to flame after they reach the floor of the tester.

(b) Large Scale Test

(1) When subjected to the large scale test described in FireMar 67, no specimen, in single sheets or in folds, shall continue flaming for more than two seconds after the test flame is removed from contact with the specimen.

(2) The vertical spread of burning on the fabric in single sheets shall not exceed 10 inches above the tip of the test flame. This vertical spread shall be measured as the distance from the tip of the test flame to a horizontal line above which all fabric is sound and in original condition, except for possible smoke deposits.

(3) The vertical spread of burning on the folded specimens shall not exceed 35 inches above the tip of the test flame, but the afterglow may spread in the folds.

(4) At no time during or after the application of the test flame shall any portions or residues of fabric which break or drip from the test specimen continue to flame after they reach the floor of the tester.

FireMar 71 CERTIFICATION AND LABELING

(a) Fabric Certification

Each lot of flame resistant fabric supplied to a manufacturer shall be accompanied by written certification

from the supplier stating that the fabric has been tested according to and meets the flame resistance requirements of Minnesota State Fire Marshal Rules, FireMar 60-79.

(b) Labeling of Tents and Sleeping Bags

A label as shown in Exhibit 1, attached to and made part of these rules, shall be the required warning and certification label for use on tents and sleeping bags. The label must contain block type letters, on a white background, in the size and color indicated. In addition, the label must contain the following information:

(1) An identification of the manufacturer of the item, unless the item bears a private label, in which case, it shall contain an identification of the private labeler. It shall also contain a code mark which will permit the seller of the item to identify the manufacturer thereof to the purchaser upon his request.

(2) A number enabling the manufacturer to identify from his records the suppliers and suppliers' lot numbers of the certified materials used in the item. The manufacturer shall maintain records identifying the parties to whom he sold materials. Further, he shall maintain records identifying items manufactured from lots of certified material. Records shall be maintained for four (4) years.

(c) Number and Location of Labels

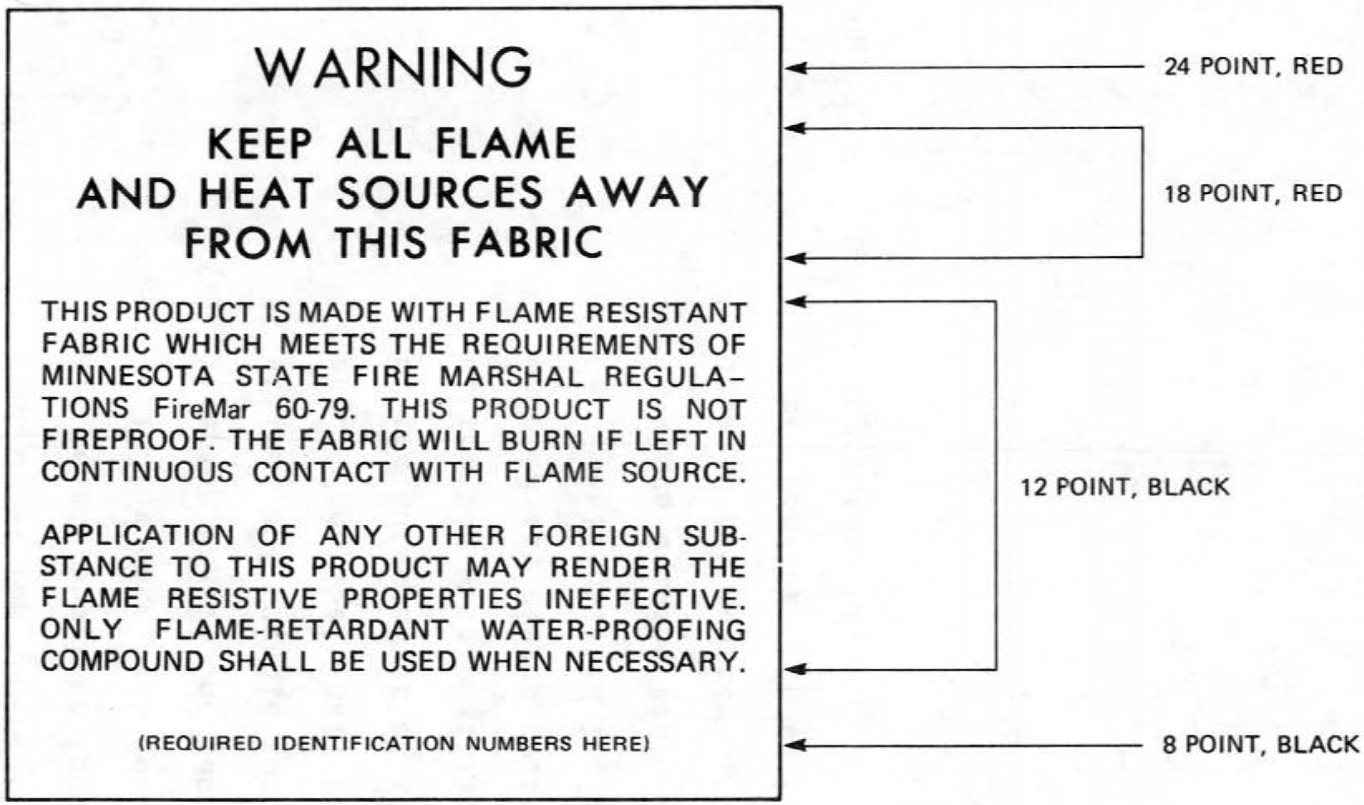
(1) Tents. Two labels shall be permanently affixed

and durable for the life of the tent at each tent door location. One label shall be located on the outside of the tent to the right of the door, the second label shall be located on the inside of the tent to the left of the door, each located vertically five feet up from the bottom of the tent, or at the top of the tent, whichever is lower. All labels shall be located so as not to be concealed by open tent door flaps.

(2) Sleeping Bags. One label shall be permanently affixed and durable for the life of the sleeping bag. The label shall be located on the outside of the outer cover of the bag, on the top section of the bag within six inches of the zipper tab when in its closed position.

(3) One label shall be located on the box or container in which camping tents and sleeping bags are sold, located prominently near the major portion of other consumer product information.

FireMar 72-79 Reserve for future use.



REQUIRED LABEL FOR TENTS AND SLEEPING BAGS