

ASSE 6040

MEDICAL GAS SYSTEMS MAINTENANCE PERSONNEL CERTIFICATION PROGRAM

**NFPA 99: *HEALTH CARE FACILITIES CODE*
2012, 2015, 2018, & 2021 EDITIONS**

CANDIDATE HANDBOOK AND PROGRAM OUTLINE

TRAINING PROVIDER:



Table of Contents

SECTION 1: CERTIFICATION PROGRAM OVERVIEW.....	3
1.01 MEDICAL GAS TRAINING INSTITUTE	3
1.02 CERTIFICATION INFORMATION	3
1.03 CERTIFICATION / ELIGIBILITY REQUIREMENTS.....	3
1.04 PROGRAM FEES.....	3
1.05 ABOUT THE PROGRAM	4
SECTION 2: APPLICATION PROCEDURES.....	4
2.01 GENERAL.....	4
2.02 ADHERENCE TO THE PROFESSIONAL STANDARDS OF CONDUCT	5
SECTION 3: CERTIFICATION EXAMINATION PROCEDURES	5
3.01 GENERAL.....	5
3.02 CERTIFICATION EXAMINATION	5
3.03 REQUIRED AND HELPFUL RESOURCES	5
3.04 EXAM SCORING AND SCORE REPORTS	6
3.05 PASSING THE EXAM	6
3.06 RETAKING THE EXAM	6
3.07 REQUEST FOR REVIEW OF QUESTIONS.....	6
3.08 EXAMINATION APPEALS.....	6
3.09 SPECIAL ACCOMMODATIONS FOR TAKING THE EXAM.....	6
3.10 EXAM CONTENT OUTLINE	6
SECTION 4: CERTIFICATION RENEWAL.....	9
4.01 RE-CERTIFICATION PROCEDURE.....	9
4.02 FAILURE TO RENEW CERTIFICATION.....	9

CANDIDATE HANDBOOK

ASSE 6040 MEDICAL GAS SYSTEMS MAINTENANCE PERSONNEL CERTIFICATION PROGRAM

SECTION 1: CERTIFICATION PROGRAM OVERVIEW

1.01 The Medical Gas Training Institute (MGTI)

The Medical Gas Training Institute (MGTI) is a third-party certification agency for the medical gas industry. MGTI offers testing and certification services for personnel involved in all areas of the industry. MGTI strives to improve the medical gas field by offering high quality testing and high standards while making the content and process as practical as possible. As a personnel certifying agency MGTI is guided by the ISO standard 17024 (Personnel Certification), and maintains high standards for integrity as an organization and for the exam development process. Our mission is to provide comprehensive certification services efficiently and effectively for the medical gas industry.

1.02 Certification Information

The ASSE 6040 Medical Gas Systems Maintenance Personnel Certification Program was developed to provide qualified individuals, who are responsible for the proper inspection, testing, and maintenance of medical gas and vacuum systems, with the certification necessary to ensure that the individual has met the requirements of the ASSE Series 6000 Professional Qualifications Standard and are technically competent and experienced in the field of medical gas systems inspection, testing, and maintenance. The program is based on the code requirements identified in the NFPA 99: *Health Care Facilities Code*. Candidates are also tested for a basic understanding of medical gas systems including general knowledge, applications, component overview, basic operating principles and performance characteristics, critical safety precautions, troubleshooting, routine maintenance and testing, and common repairs.

The program is comprised of a verification of work experience prerequisites, a 24-hour training course, and a written examination.

1.03 Certification / Eligibility Requirements

The Medical Gas Systems Maintenance Personnel Certification is administered in accordance with the American Society of Sanitary Engineers (ASSE) Series 6000 Standard, Section 6040. Candidates must meet the following requirements in order to become ASSE 6040 Certified.

- A. All candidates must be employed or contracted by a healthcare facility or actively engaged in working with medical gas systems.
- B. All candidates must have a minimum of one (1) year of documented experience in the inspection, testing, or maintenance of medical gas systems.
- C. All candidates must successfully complete an approved twenty-four (24) hour training course covering all aspects of the ASSE Standard 6040, taught by an approved 6050 certified instructor.
- D. All candidates must successfully pass the written certification examination.

1.04 Program Fees

The certification exam price schedule can be found on the MGTI website. The exam fee must be received prior to starting the exam. This price is separate from the cost of the required training. The exam fee covers the following:

- A. Certification Examination
- B. Completion Wall Certificate, Certification Number & Certification Card
- C. Entry into the database, with notifications about expirations, upcoming trainings, etc.

1.05 About the Program

The certification programs were developed by two of the leading authorities on medical gas and vacuum systems in the industry. With combined experience in excess of 50 years, Mr. Jonathan C. Willard and Mr. Douglas Ostraat have designed and developed these programs to focus on those individuals involved in the design, operation, installation, service, and repair of medical gas and vacuum systems. The certification exams were constructed by educational and industry experts with in depth knowledge of the skill and competencies required to perform the field work in these certification areas.

Jonathan C. Willard

Mr. Willard has worked in the medical gas and health care construction industry for 20 years. In addition to being one of a handful of individuals to attain all of the ASSE 6000 Certifications, Mr. Willard is a principal member of the Technical Committee on Medical Gas and Vacuum Piping Systems (NFPA 99: *Health Care Facilities Code*) and a principal member of the Technical Committee on Industrial and Medical Gases (NFPA 55: *Compressed Gases and Cryogenic Fluids Code*). He is Certified in Plumbing Design (CPD®), and is also a LEED AP® (Accredited Professional), a certified Project Management Professional (PMP®), and a Certified Healthcare Constructor (CHC®) with a Master of Science degree in Business Education (MBE).

Medical Gas Credentials:

ASSE 6010 Medical Gas Systems Installer Certified
 ASSE 6015 Bulk Medical Gas Systems Installer Certified
 ASSE 6020 Medical Gas Systems Inspector Certified
 ASSE 6030 Medical Gas Systems Verifier Certified
 ASSE 6035 Bulk Medical Gas Systems Verifier Certified
 ASSE 6040 Medical Gas Systems Maintenance Personnel Certified
 ASSE 6050 Medical Gas Systems Instructor Certified
 ASSE 6055 Bulk Medical Gas Systems Instructor Certified
 MGPHO Credentialed Medical Gas Verifier (V-0135)

Copyrighted Program Materials

All program materials are the copyrighted property of the Medical Gas Training Institute. It is forbidden under federal copyright law to copy, reproduce, record, distribute, or display these materials by any means, in whole or in part. Doing so may result in severe civil and criminal penalties.

SECTION 2: APPLICATION PROCEDURES

2.01 General

Candidates must complete the Program Application and submit it to the training provider for review and submission prior to entering into the ASSE 6040 Certification Program. When the application is approved the candidate is allowed to participate in the training course. Once the training course is completed candidates will be able to sit for the certification exam.

In addition to information that verifies eligibility, the application contains a Professional Standard of Conduct. These standards must be adhered to in order to remain a certificate holder.

2.02 Adherence to the Professional Standards of Conduct

The Medical Gas Training Institute is responsible to its candidates, certificate holders, employers, the profession, regulatory agencies, and the public for ensuring integrity of all its processes and products of its Certification Programs. As such, MGTI requires adherence to these *Professional Standards of Conduct* by all who have achieved acceptance into the ASSE 6040 Certification Program and/or attained the ASSE 6040 Certification. A candidate must agree on the application to accept and adhere to the *Professional Standards of Conduct*. The standards of conduct are outlined below:

A candidate, who has been accepted into the program and/or an ASSE Certificate Holder by the Medical Gas Training Institute agrees to conduct himself/herself in an ethical and professional manner. This includes demonstrating practice-related behavior that is indicative of professional integrity. By acceptance into the program and/or issuance of certificate, the candidate or certified person agrees to do the following:

- A. Maintain professional competence
- B. Demonstrate work behavior that exemplifies ability to perform safely, competently, and with good judgment
- C. Conduct activities with honesty and integrity
- D. Avoid discriminating against any individual based on age, gender, race, color, religion, national origin, disability, or marital status
- E. Avoid conflicts of interest
- F. Abide by laws, rules, and regulations of duly authorized agencies regulating the industry
- G. Abide by rules and regulations governing programs conducted by MGTI

For more information about standards of conduct, infractions, and reporting infractions see MGTI's Policies and Procedures document.

SECTION 3: CERTIFICATION EXAMINATION AND PROCEDURES

3.01 General

Upon completion of an approved (24) hour training program, the candidate will be allowed to take the certification exam. These exams are administered in accordance with the Medical Gas Training Institute standards. If the candidate is successful in passing the examination, a wall certificate and certification card will be sent via U.S. Mail to the newly certified individual.

3.02 Certification Examination

The examination is based on the content from NFPA 99: *Health Care Facilities Code*, NFPA 55: *Compressed Gases and Cryogenic Fluids Code*, ASSE Series 6000 Professional Qualification Standard, and other generally accepted industry documents. An outline of the examination can be found below. The written examination is made up of one hundred (100) multiple choice and true/false questions. The candidate is allowed four (4) hours to complete the exam. Candidates are permitted to use the *NFPA 99: Health Care Facilities Code* book during the exam.

3.03 Required Training Resources and Recommended Documents

Candidates eligible for the ASSE 6040 program should attain a copy of NFPA 99: *Health Care Facilities Code*, current edition. This text will be referred to during training and will be required for completing the program. In addition to this text, it is recommended that the following documents be attained as well, but not required.

- A. ASSE Standard Series 6000: *Professional Qualifications Standard for Medical Gas Systems Personnel*
- B. NFPA 55, *Compressed Gases and Cryogenic Fluids Code*, current edition

3.04 Examination Scoring and Score Reports

Candidates will receive his/her score once the final examination has been reviewed. Candidates must answer (70%) or more of the questions correctly in order to achieve a passing grade. If a candidate does not pass the exam, the score report will indicate which categories they should review further before retaking the exams.

3.05 Passing the Examination

A candidate who passes the final examinations is awarded the ASSE 6040 Medical Gas Systems Maintenance Personnel Certification credential. In recognition of this accomplishment, the candidate will receive a certification package in the mail within (30) business days. The certification package will include a wall Certificate of Accomplishment and wallet Certification Card.

3.06 Retaking the Certification Exam

If a candidate does not achieve a passing score on the examination, they will need to go through the re-examination process. Candidates can retake the exam after ten (10) business days. They will need to contact MGTI or their training provider to schedule a time to retake the exam. See MGTI's Policies and Procedures Manual for more details about re-examination.

3.07 Request for Review of Questions

A candidate may challenge, at the conclusion of the examination, any question(s) by completing the question challenge form that is provided in the exam package. Candidates must request a review of any question(s) at the time the examination is taken. See MGTI's Policies and Procedures for more information about question challenges.

3.08 Examination Appeals

Candidates may appeal the score of a final examination. Appeals shall be filed in writing to the Medical Gas Training Institute office via U.S. Mail, facsimile, or electronic mail no more than thirty (30) business days from the date that the candidate receives their final score. Appellants will be notified in writing of the decision by the organization. The complete appeals procedure is outlined in the Policies and Procedures Manual.

3.09 Special Accommodations for Taking the Exam

Please contact MGTI for information about testing accommodations, including language/translation accommodation. See the Policies and Procedures Manual for MGTI's guidelines on testing for people with disabilities.

3.10 Exam Content Outline

- A. Code and Standard Review
 - 1.) Applicable Codes & Standards
 - a.) NFPA 99, current edition
 - b.) ASSE Series 6000, current edition
 - c.) NFPA 55, current edition
 - d.) Joint Commission
 - e.) Centers for Medicare and Medicaid
 - f.) Federal Regulations
 - g.) Compressed Gas Association
 - 2.) Healthcare System Category Requirements
- B. Patient, Personal, and Public Safety
 - 1.) Nature of Hazards
 - 2.) Personal Protective Equipment

- a.) Eye Protection
 - b.) Ear Protection
 - c.) Hand Protection
 - d.) Protective Footwear
 - e.) Lockout/Tag-out
- C. Basic Concepts, Terminology, & Definitions
- 1.) NFPA 99 Terms and Definitions
 - 2.) Source Equipment Basics
- D. Medical Gas System Qualifications
- 1.) ASSE 6000 Series Qualifications
 - 2.) MGPHO Credentialed Medical Gas Verifier
- E. The Purposes and Uses of Medical Gases
- 1.) Properties, Uses, and Basic Information
- F. Medical Gas Cylinder and Container Best Practices
- 1.) Storage & Ventilation Requirements
 - 2.) General Safety Practices
 - 3.) Container Security
- G. Medical Gas Headers & Manifold Systems
- 1.) Application & Components
 - 2.) Basic Operating Principles & Performance Characteristics
 - 3.) NFPA 99 Requirements
 - 4.) Critical Safety Precautions
- H. Bulk Oxygen Systems
- 1.) Application & Components
 - 2.) Basic Operating Principles & Performance Characteristics
 - 3.) NFPA 99 Requirements
 - 4.) Critical Safety Precautions
- I. Medical Air Systems
- 1.) Application & Components
 - 2.) Basic Operating Principles & Performance Characteristics
 - 3.) NFPA 99 Requirements
 - 4.) Critical Safety Precautions
- J. Medical – Surgical Vacuum Systems
- 1.) Application & Components
 - 2.) Basic Operating Principles & Performance Characteristics
 - 3.) NFPA 99 Requirements
 - 4.) Critical Safety Precautions
- K. Waste Anesthesia Gas Disposal (WAGD) System
- 1.) Application & Components
 - 2.) Basic Operating Principles & Performance Characteristics
 - 3.) NFPA 99 Requirements
 - 4.) Critical Safety Precautions
- L. Instrument Air Systems
- 1.) Application & Components

- 2.) Basic Operating Principles & Performance Characteristics
- 3.) NFPA 99 Requirements
- 4.) Critical Safety Precautions

M. Valves

- 1.) Application & Components
 - a.) Source Valves
 - b.) Mainline Valves
 - c.) Emergency Oxygen Supply Connection (EOSC) Valves
 - d.) Riser Valves
 - e.) Zone Valves
 - f.) Service Valves
 - g.) In-Line Valves
 - h.) Future Use Valves
 - i.) Other Valve Types
- 2.) Basic Operating Principles
- 3.) Design Characteristics
- 4.) NFPA 99 Requirements

N. Station Outlets and Inlets

- 1.) Application & Components
 - a.) D.I.S.S. (Diameter Index)
 - b.) Chemetron Style (Latch Type)
 - c.) Diamond Style (Pin Index)
 - d.) Puritan Bennett Style (Geometric)
 - e.) Schrader (Quick Disconnect)
- 2.) Basic Operating Principles
- 3.) Design Characteristics
- 4.) NFPA 99 Requirements
- 5.) Critical Safety Precautions

O. Alarm Warning Systems

- 1.) Application & Components
 - a.) Master Alarms
 - b.) Area Alarms
 - c.) Local Alarms
- 2.) Basic Operating Principles
- 3.) Design Characteristics
- 4.) NFPA 99 Requirements
- 5.) Critical Safety Precautions

P. Category 1 Medical Gas Pipeline Distribution System

- 1.) Piping Material Requirements
- 2.) Joining Methods
- 3.) System Installation

Q. System Performance Criteria & Testing

- 1.) NFPA 99 Requirements for Testing, Inspections, and System Verifications

R. Category 2 and Category 3 Medical Gas and Vacuum Systems

- 1.) NFPA 99 Requirements

S. Operation and Management Programs

T. Policies and Procedures

- 1.) Responsible Facility Authority (RFA)
- 2.) Permit-To-Work Policy
- 3.) Planned System Shutdown and Back-Feed Procedures
- 4.) Emergency Operations & Contingency Planning

U. Maintenance, Troubleshooting, & Repairs

- 1.) Routine Maintenance Guidelines
- 2.) Troubleshooting Techniques
- 3.) Minor Repairs

V. Testing Procedures

- 1.) Standardized Inspection, Testing, and Performance Verification Requirements and Procedures

Copyrighted Final Examination Questions

All examination questions are the copyrighted property of the Medical Gas Training Institute. It is forbidden under federal copyright law to copy, reproduce, record, distribute, or display these examination questions by any means, in whole or in part. Doing so may result in severe civil and criminal penalties.

SECTION 4: CERTIFICATION RENEWAL

4.01 Re-Certification Procedure

Attaining certification is an indication of mastery of a well-defined body of knowledge at a point in time. Periodic renewal of the certification is required to maintain certified status. Initial ASSE 6040 certification or renewal of certification is valid for three (3) years.

Candidates who successfully complete the examination are provided information about certification renewal requirements in the certification package sent by the Medical Gas Training Institute. The renewal application must be submitted 30 days prior to expiration date as listed on the wall certificate and certification card.

Certificate holders may receive emails notices of pending expiration from MGTI. However, certificate holders are solely responsible for keeping their certifications current and up to date. To ensure receipt of communications, it is suggested that certificate holders keep their contact information current. MGTI is not responsible for ensuring any of these communications are received.

Certificate holders may renew their certification by meeting the following requirements:

- A. Completion of current ASSE 6040 Certification Renewal Application
- B. Completion of an a four (4) hour recertification training course offered by a Medical Gas Training Institute approved instructor
- C. Taking and passing the re-certification exam

For current ASSE 6040 Certification Renewal Application and fees, please visit the Medical Gas Training Institute website.

4.02 Failure to Renew Certification

A certified person who fails to renew his/her certification is no longer considered certified and may not use the credential in professional communications, such as letterhead, signatures, business cards, directory listings or signage. To regain certification, the individual must retake and pass the corresponding examination (subject to the usual fees and provisions for testing).