

*American Society of Sanitary Engineering*

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Professional Qualifications Standard for  
**Medical Gas Systems  
Personnel**

- **Medical Gas Systems Specialists**
- **Medical Gas Systems Installers**
- **Bulk Medical Gas Systems Installers**
- **Medical Gas Systems Inspectors**
- **Medical Gas Systems Verifiers**
- **Medical Gas Systems Maintenance Personnel**
- **Medical Gas Systems Instructors**
- **Bulk Medical Gas Systems Instructors**

*An American National Standard*



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# GENERAL INFORMATION

## *Professional Qualifications Standards for Medical Gas Systems Personnel*

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ASSE Professional Qualifications Standards incorporate requirements for education, training and general knowledge. No person may be certified to an ASSE Professional Standard unless they have met all of the requirements contained within the applicable standard, and is certified by a recognized third party certification agency.

Organizations wishing to adopt or list any ASSE Professional Qualifications Standard should print the ASSE standard number on the cover page first and in equal or larger type to that of the adopting or listing organization.

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Westlake, Ohio  
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# FOREWORD

## *Professional Qualifications Standards for Medical Gas Systems Personnel*

This foreword shall not be considered a part of the standard; however, it is offered to provide background information.

The American Society of Sanitary Engineering for Plumbing and Sanitary Research is dedicated to the preservation of public health and safety through "Prevention Rather Than Cure."

The ASSE Standards Program systematically evaluates new technologies through formal requests and addresses the development and promulgation of performance and qualification standards designed to safeguard public health and safety.

It is now a fundamental truth that the plumbing industry must know and understand medical gas and vacuum system requirements since the referencing of NFPA 99 and specific requirements for installation have been added to the model plumbing codes.

In reviewing those requirements it became apparent that there was a need to develop the Series 6000 Standards to address minimum requirements for medical gas and vacuum system installers, inspectors, verifiers, maintenance personnel and instructors. During the 2005 revision of the series, requirements for three new specialties were added – medical gas specialists, bulk system installers and bulk system instructors. While NFPA 99-2005 covers the general field of medical gas and vacuum systems, it does not specifically address requirements in these seven areas that would allow an individual to be certified as a qualified Medical Gas Systems Specialist, Medical Gas Systems Installer, Medical Gas Systems Inspector, Medical Gas Systems Verifier, Medical Gas Systems Maintenance Personnel, Medical Gas Systems Instructor, Bulk System Installer or Bulk System Instructor.

The ASSE Series 6000 Qualification Standards for Medical Gas and Vacuum System Specialists, Installers, Inspectors, Verifiers, Maintenance Personnel, and Instructors, and for Bulk System Installers and Instructors, are based on the requirements of NFPA Standard 99 - *Health*

*Care Facilities*, 2005 Edition, for Level 1 systems. Level 1 Medical Gas and Vacuum Systems have the highest level of requirements for health care and fire safety, and are typically found in hospitals, ambulatory care centers, and clinics. However, depending on the type of health care provided, they may also be required in medical and dental offices, nursing homes, and limited care facilities.

NFPA 99-2005 also has requirements for Level 2, and Level 3, which have less stringent requirements than those for Level 1 systems. Under certain conditions, these lower level systems are permitted in medical and dental offices, nursing homes, and limited care facilities. Users must refer to NFPA 99-2005 for these requirements. It is important, however, that individuals qualified under the ASSE Series 6000 Standards are qualified for all levels of piped medical gas and vacuum systems covered in NFPA 99-2005.

These ASSE Series 6000 Standards allow regulatory officials and states to have uniform minimum requirements for qualified Medical Gas Systems Installers, Medical Gas Systems Inspectors, Medical Gas Systems Verifiers, Medical Gas Systems Maintenance Personnel, Medical Gas Systems Instructors, Bulk System Installers and Medical Gas Systems Instructors. In addition, these standards give uniform requirements for third-party certifiers so that individuals can be qualified to install, inspect, verify, maintain or teach classes on medical gas and vacuum systems, and can be qualified to install bulk systems or be instructors on the installation of bulk systems.

The ASSE Series 6000 Standards will continue to change through revision, not only because the NFPA 99 Standards change every three years, but because the industry will respond to the experience gained in the field through the use of these standards.

This standard series was promulgated in accordance with procedures developed by the American National Standards Institute (ANSI).

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## *Listed Standards and Terminology in ASSE Series 6000 Professional Qualification Standards*

### **1-1.1 Reference and Industry Standards**

The following list of reference and industry standards is part of the requirements of ASSE Standard 6005, ASSE Standard 6010, ASSE Standard 6015, ASSE Standard 6020, ASSE Standard 6030, ASSE Standard 6040, ASSE Standard 6050, and ASSE Standard 6055. Refer to Annex K for information to contact the various standards organizations.

- |          |   |  |  |
|----------|---|--|--|
| 1-1.1.1  | ASME Boiler and Pressure Vessel Code, Section IX - Welding and Brazing Qualification, current edition.                              |  |  |
| 1-1.1.2  | ASSE 6005 Medical Gas Systems General Knowledge, current edition.   |  |  |
| 1-1.1.3  | ASSE 6010 Medical Gas Systems Installer Professional Qualifications Standard, current edition.                                      |  |  |
| 1-1.1.4  | ASSE 6015 Bulk System Installer Professional Qualifications Standard, current edition.  |  |  |
| 1-1.1.5  | ASSE 6020 Medical Gas Systems Inspector Professional Qualifications Standard, current edition.                                      |  |  |
| 1-1.1.6  | ASSE 6030 Medical Gas Systems Verifier Professional Qualifications Standard, current edition.                                       |  |  |
| 1-1.1.7  | ASSE 6040 Medical Gas Systems Maintenance Personnel Professional Qualifications Standard, current edition.                          |  |  |
| 1-1.1.8  | ASSE 6050 Medical Gas Systems Instructor Professional Qualifications Standard, current edition.                                     |  |  |
| 1-1.1.9  | ASSE 6055 Bulk System Instructor Professional Qualifications Standard, current edition.   |  |  |
| 1-1.1.10 | ASTM B32 Standard Specification for Solder Metal, current edition.  |  |  |
| 1-1.1.11 | ASTM B819 Standard Specification for Seamless Copper Tube for Medical Gas Systems, current edition.                                 |  |  |
| 1-1.1.12 | ASTM B828 Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings, current edition. |  |  |
| 1-1.1.13 | AWS B2.2 Standard for Brazing Procedure and Performance Qualification, current edition.   |  |  |
| 1-1.1.14 | CGA C-9 Standard Color Marking of Compressed Gas Containers Intended for Medical Use, current edition.                              |  |  |
| 1-1.1.15 | CGA E-10 Maintenance of Medical Gas and Vacuum Systems in Health Care Facilities, current edition.                                  |  |  |
| 1-1.1.16 | CGA G-4.1 Cleaning Equipment for Oxygen Service, current edition.   |  |  |
| 1-1.1.17 | CGA G-10.1 Commodity Specification for Nitrogen, current edition.   |  |  |
| 1-1.1.18 | CGA M-1, Guide For Medical Gas Supply Systems At Consumer Sites, current edition.   |  |  |
| 1-1.1.19 | CGA P-2 Characteristics and Safe Handling of Medical Gases, current edition.  |  |  |
| 1-1.1.20 | CGA V-1 Compressed Gas Cylinder Valve Outlet and Inlet Connections, current edition.  |  |  |
| 1-1.1.21 | CSA Z305.1 Nonflammable Medical Gas Piping Systems, current edition.  |  |  |
| 1-1.1.22 | CSA Z305.2 Low Pressure Connecting Assemblies for Medical Gas Systems, current edition.   |  |  |
| 1-1.1.23 | CSA Z305.3 Pressure Regulators, Gauges, and Flow Metering Devices for Medical Gas Systems, current edition.                         |  |  |
| 1-1.1.24 | CSA Z305.4 Qualification Requirements for Agencies Testing Non-Flammable Medical Gas Piping Systems, current edition.               |  |  |
| 1-1.1.25 | CSA Z305.5 Medical Gas Terminal Units, current edition.   |  |  |
| 1-1.1.26 | Copper Development Association Copper Tube  |  |  |

	Handbook, current edition.	1-1.2.17	Gas-specific demand check fittings
1-1.1.27	NFPA 50 Standard for Bulk Oxygen Systems at Consumer Sites, current edition.	1-1.2.18	Gas tungsten arc welding (GTAW) autogenous orbital welded joints
1-1.1.28	NFPA 55 Storage, Use, and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders, and Tanks, current edition.	1-1.2.19	Health care facility requirements
1-1.1.29	NFPA 70 National Electrical Code, current edition.	1-1.2.20	Helium, USP
1-1.1.30	NFPA 99 Standard for Health Care Facilities, 2005 edition.	1-1.2.21	In-Building Emergency Reserve
1-1.1.31	NFPA 99B Standard for Hypobaric Facilities, current edition.	1-1.2.22	Instrument air
1-1.1.32	NFPA 101 Life Safety Code, current edition.	1-1.2.23	Labeled
1-1.1.33	US Food & Drug Administration Current Good Manufacturing Practices, Title 21 of the CFR Parts 210 and 211.	1-1.2.24	Level 1 medical gas and Level 1 medical/surgical vacuum system
<b>NOTE:</b>	All questions related to applicability shall be directed to the Authority Having Jurisdiction (AHJ).	1-1.2.25	Level 2 medical gas and Level 2 medical/surgical vacuum system
		1-1.2.26	Level 3 medical gas and Level 3 vacuum system
		1-1.2.27	Level 3 gas powered devices supply system
		1-1.2.28	Limited care facility requirements
		1-1.2.29	Listed
		1-1.2.30	Local jurisdiction
		1-1.2.31	Manifold
		1-1.2.32	Manufactured assemblies
		1-1.2.33	Medical air, USP (cylinders)
		1-1.2.34	Medical air, USP (compressed)
		1-1.2.35	Medical gas and vacuum systems
		1-1.2.36	Medical Gas Systems Installer
		1-1.2.37	Medical Gas Bulk System Installer
		1-1.2.38	Medical Gas Systems Inspector
		1-1.2.39	Medical Gas Systems Verifier
		1-1.2.40	Medical Gas Systems Maintenance Personnel
		1-1.2.41	Medical Gas Systems Instructor
		1-1.2.42	Medical Gas Bulk System Instructor
		1-1.2.43	Medical support gases
		1-1.2.44	Nitrogen, (NF)
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## 1-1.2 Terminology

The following list of terms is part of the requirements of ASSE Standard 6005, ASSE Standard 6010, ASSE Standard 6015, ASSE Standard 6020, ASSE Standard 6030, ASSE Standard 6040, ASSE Standard 6050, and ASSE Standard 6055.

1-1.2.1	Acceptable joints
1-1.2.2	Alarms - area, local, master
1-1.2.3	Anesthetizing location
1-1.2.4	Authority Having Jurisdiction
1-1.2.5	Brazed joints
1-1.2.6	Bulk systems
1-1.2.7	Carbon dioxide, USP
1-1.2.8	Blowdown
1-1.2.9	Code
1-1.2.10	Critical care and life support area
1-1.2.11	Cross-connection
1-1.2.12	Dew point
1-1.2.13	Emergency oxygen supply connection
1-1.2.14	Fire stopping
1-1.2.15	Flowmeter
1-1.2.16	Gas contamination

- 1-1.2.51 Particulate contaminants
- 1-1.2.52 Patient medical gases
- 1-1.2.53 Prohibited joints
- 1-1.2.54 Purge
- 1-1.2.55 SCFM, ACFM, CFM, CFH, LPM
- 1-1.2.56 Special fittings
- 1-1.2.57 Standard
- 1-1.2.58 Surface mounted medical gas rails
- 1-1.2.59 Third-party certification agency (See Annex N)



## *Medical Gas Systems General Information*

1-1.2.60 Use point

1-1.2.61 Waste Anesthetic Gas Disposal (WAGD) Systems

### **5-1.1 Scope**

This standard provides general knowledge of medical gas and vacuum systems for the purpose of providing continuing education. Eligible individuals include any person with an interest in medical gas and vacuum systems and equipment.

This standard does not apply to those who work with medical gas systems as a Medical Gas Systems Installer per ASSE Standard 6010, Bulk System Installer per ASSE Standard 6015, Inspector per ASSE Standard 6020, Verifier per ASSE Standard 6030, Maintenance Personnel per ASSE Standard 6040, Medical Gas Systems Instructor per ASSE Standard 6050, or Bulk Systems Instructor per ASSE Standard 6055.

Medical gas systems and equipment covered in this standard include health care facilities within the scope of NFPA 99 Standard for Health Care Facilities. Medical gas systems include vacuum piping.

### **5-1.2 Purpose**

The purpose of this standard is to provide minimum criteria, identified by an industry consensus, for Medical Gas Systems, to assure compliance with the referenced standards in Section 5-1.4.

### **5-1.3 Limitations**

Compliance with this standard in itself shall not constitute compliance with the requirements for a Medical Gas Installer per ASSE Standard 6010, a Bulk System Installer per ASSE 6015, a Medical Gas Sys-

tems Inspector per ASSE Standard 6020, a Medical Gas Verifier per ASSE Standard 6030, a Medical Gas Maintenance Person per ASSE Standard 6040, a Medical Gas Instructor per ASSE Standard 6050, or a Bulk System Instructor per ASSE Standard 6055.

### **5-1.4 Reference and Industry Standards**

The Reference and Industry Standards listed in ASSE Standard 6001 are a part of this standard.

### **5-2.1 General Knowledge**

5-2.1.1 The individual shall be able to identify and show knowledge of the applicable laws, codes, rules, listing agencies and regulations from the federal, state, and local levels pertaining to medical gas and vacuum systems.

5-2.1.2 The individual shall be able to identify and describe the basic concepts pertaining to:

- a. Absolute pressure;
- b. Alarm panel locations;
- c. Alarm settings;
- d. Atmospheric pressure;
- e. Gage pressure;
- f. Manual valves, including source valves, main valves, riser valves, service valves, in-line shut-off valves, zone valves and valves for future connections;
- g. Medical support gases;
- h. Medical-surgical vacuum;
- i. Oxygen deficient atmosphere;
- j. Oxygen enriched atmosphere;
- k. Patient medical gases;
- l. Pressure and vacuum sensors;
- m. Vacuum measurement; and
- n. Zone valve location.

### **5-2.2 Product Performance Knowledge**