

*American Society of Sanitary Engineering*

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**Professional Qualifications Standard for**

# **Medical Gas Systems Personnel**

- **Medical Gas Systems Generalists**
- **Medical Gas Systems Installers**
- **Bulk Medical Gas Systems Installers**
- **Medical Gas Systems Inspectors**
- **Medical Gas Systems Verifiers**
- **Bulk 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*

Neither this standard, nor any portion thereof, may be reproduced without the written consent of the American Society of Sanitary Engineering.

ASSE Professional Qualifications Standards incorporate requirements for education, training and general knowledge. No person may be certified to an ASSE Professional Qualifications 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 is dedicated to the preservation of public health and safety through “Prevention Rather Than Cure.”

In 1987, the American Society of Sanitary Engineering’s Board of Directors recognized the need to develop Professional Qualifications Standards for the plumbing and mechanical industry. Since that time ASSE has developed a number of Professional Qualifications Standards, including the Series 5000, Cross-Connection Control Professional Qualifications Standard, and the Series 6000, Professional Qualifications Standard for Medical Gas Systems Personnel. Both of these important documents, now each considered the industry standard, were necessary to allow the Authority Having Jurisdiction (AHJ) to have nationally recognized standards, developed in an open consensus process, to use in ensuring that individuals working on these critically important systems possess the knowledge and experience required to successfully perform the installation, testing, maintenance, inspection and verification needed within the industry.

It was clear that there was a need to develop a standard to address minimum requirements for medical gas and vacuum systems installers, inspectors, verifiers, maintenance personnel and instructors. In subsequent revisions, requirements for medical gas generalists, bulk medical gas systems installers and bulk medical gas systems instructors were added. The 2012 revision adds one more standard, which includes the minimum requirements for bulk medical gas systems verifiers.

The ASSE/IAPMO/ANSI Series 6000, Professional Qualification Standard for Medical Gas Systems Personnel, is based on the requirements of NFPA 99-2012, Health Care Facilities Code.

These ASSE/IAPMO/ANSI Series 6000 Standards allow regulatory officials 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 Medical Gas Systems Installers, Bulk Medical Gas Systems Verifiers and Bulk Medical Gas Systems Instructors. In addition, these standards give uniform requirements for third-party certifiers so that individuals can be certified to these standards.

The ASSE/IAPMO/ANSI Series 6000 Standards will continue to change through revision, not only because the NFPA 99 Code changes on a regular basis, but because the industry responds to the experience gained in the field through the use of these standards.

Recognition is made of the time volunteered by members of the Series 6000 working groups who participated in the initial development of this standard and the subsequent revisions.

This series of standards 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 Qualifications Standard*

### **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 6035, ASSE Standard 6040, ASSE Standard 6050 and ASSE Standard 6055. Refer to Annex K for information to contact the various standards organizations.

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| <p>1-1.1.1 ASME Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators, 2010 edition, 2011 addenda.</p> <p>1-1.1.2 ASSE 6005 Medical Gas Systems Generalists Professional Qualifications Standard, revised 2012.</p> <p>1-1.1.3 ASSE 6010 Medical Gas Systems Installers Professional Qualifications Standard, revised 2012.</p> <p>1-1.1.4 ASSE 6015 Bulk Medical Gas Systems Installers Professional Qualifications Standard, revised 2012.</p> <p>1-1.1.5 ASSE 6020 Medical Gas Systems Inspectors Professional Qualifications Standard, revised 2012.</p> <p>1-1.1.6 ASSE 6030 Medical Gas Systems Verifiers Professional Qualifications Standard, revised 2012.</p> <p>1-1.1.7 ASSE 6035 Bulk Medical Gas Systems Verifiers Professional Qualifications Standard, 2012.</p> <p>1-1.1.8 ASSE 6040 Medical Gas Systems Maintenance Personnel Professional Qualifications Standard, revised 2012.</p> <p>1-1.1.9 ASSE 6050 Medical Gas Systems Instructors Professional Qualifications Standard, revised 2012.</p> <p>1-1.1.10 ASSE 6055 Bulk Medical Gas Systems Instructors Professional Qualifications Standard, revised 2012.</p> <p>1-1.1.11 ASTM B32 Standard Specification for Solder Metal, 2008 edition.</p> | <p>1-1.1.12 ASTM B819 Standard Specification for Seamless Copper Tube for Medical Gas Systems, 2000 edition (R2006).</p> <p>1-1.1.13 ASTM B828 Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings, 2002 edition (R2010).</p> <p>1-1.1.14 AWS B2.2 Specification for Brazing Procedure and Performance Qualification, 2010 edition.</p> <p>1-1.1.15 CGA C-9 Standard Color Marking of Compressed Gas Containers for Medical Use, 4th edition, 2004 (R2008).</p> <p>1-1.1.16 CGA E-10 Maintenance of Medical Gas and Vacuum Systems in Health Care Facilities, 3rd edition, 2007.</p> <p>1-1.1.17 CGA G-4.1 Cleaning Equipment for Oxygen Service, 6th edition, 2009.</p> <p>1-1.1.18 CGA G-10.1 Commodity Specification for Nitrogen, 7th edition, 2008.</p> <p>1-1.1.19 CGA M-1 Guide for Medical Gas Supply Systems at Consumer Sites, 2nd edition, 2007.</p> <p>1-1.1.20 CGA M-7- Guideline for Qualifying Suppliers used by Medical Gas Manufacturers and Distributors, 3rd edition 2009.</p> <p>1-1.1.21 CGA P-2 Characteristics and Safe Handling of Medical Gases, 9th edition, 2006.</p> <p>1-1.1.22 CGA P-18 Standard for Bulk Inert Gas Systems at Consumer Sites, 3rd edition, 2006.</p> <p>1-1.1.23 CGA P-41 Locating Bulk Storage Systems in Courts, 1st edition, 2010.</p> <p>1-1.1.24 CGA SB-45 Proper Handling of Insulated Tanks that are in Obvious Signs of Loss of Vacuum, 1st edition, 2011.</p> <p>1-1.1.25 CGA V-1 Standard for Compressed Gas Cylinder Valve Outlet and Inlet Connections, 12th edition, 2005.</p> |
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| 1-1.1.26     | CSA Z7369.1 Medical Gas Pipeline Systems - Part 1: Pipelines for Medical Gases and Vacuum, 2009 edition.                                                                                                                                          | 1-1.2.17 | Critical care and life support area                              |
| 1-1.1.27     | Copper Development Association Copper Tube Handbook, published 2010.                                                                                                                                                                              | 1-1.2.18 | Cross-connection                                                 |
| 1-1.1.28     | NFPA 55 Compressed Gases and Cryogenic Fluids Code, 2010 edition.                                                                                                                                                                                 | 1-1.2.19 | Dew point                                                        |
| 1-1.1.29     | NFPA 70 National Electrical Code, 2011 edition.                                                                                                                                                                                                   | 1-1.2.20 | Emergency oxygen supply connection (EOSC)                        |
| 1-1.1.30     | NFPA 99 Health Care Facilities Code, 2012 edition.                                                                                                                                                                                                | 1-1.2.21 | Fire stopping                                                    |
| 1-1.1.31     | NFPA 101 Life Safety Code, 2012 edition.                                                                                                                                                                                                          | 1-1.2.22 | Flowmeter                                                        |
| 1-1.1.32     | US Food & Drug Administration Current Good Manufacturing Practices, Title 21 of the CFR Parts 210 and 211, revised 2011.                                                                                                                          | 1-1.2.23 | Gas contamination                                                |
| NOTE:        | All questions related to applicability shall be directed to the Authority Having Jurisdiction (AHJ).                                                                                                                                              | 1-1.2.24 | Gas-specific demand check fittings                               |
|              |                                                                                                                                                                                                                                                   | 1-1.2.25 | Gas tungsten arc welding (GTAW) autogenous orbital welded joints |
|              |                                                                                                                                                                                                                                                   | 1-1.2.26 | General anesthesia and levels of sedation/analgesia              |
|              |                                                                                                                                                                                                                                                   | 1-1.2.27 | Health care facility requirements                                |
|              |                                                                                                                                                                                                                                                   | 1-1.2.28 | Helium, USP                                                      |
|              |                                                                                                                                                                                                                                                   | 1-1.2.29 | Hyperbaric                                                       |
| <b>1-1.2</b> | <b>Terminology</b>                                                                                                                                                                                                                                | 1-1.2.30 | Hyperbaric medical gas piping systems and accessories            |
|              | 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 6035, ASSE Standard 6040, ASSE Standard 6050 and ASSE Standard 6055. | 1-1.2.31 | In-building emergency reserve                                    |
| 1-1.2.1      | Acceptable joints                                                                                                                                                                                                                                 | 1-1.2.32 | Instrument air                                                   |
| 1-1.2.2      | Alarms - area, local, master                                                                                                                                                                                                                      | 1-1.2.33 | Labeled                                                          |
| 1-1.2.3      | Anesthetizing location                                                                                                                                                                                                                            | 1-1.2.34 | Limited care facility requirements                               |
| 1-1.2.4      | Authority Having Jurisdiction (AHJ)                                                                                                                                                                                                               | 1-1.2.35 | Listed                                                           |
| 1-1.2.5      | Blowdown                                                                                                                                                                                                                                          | 1-1.2.36 | Local jurisdiction                                               |
| 1-1.2.6      | Brazed joints                                                                                                                                                                                                                                     | 1-1.2.37 | Local signal                                                     |
| 1-1.2.7      | Bulk medical gas systems                                                                                                                                                                                                                          | 1-1.2.38 | Manifold                                                         |
| 1-1.2.8      | Bulk Medical Gas Systems Installer                                                                                                                                                                                                                | 1-1.2.39 | Manufactured assemblies                                          |
| 1-1.2.9      | Bulk Medical Gas Systems Instructor                                                                                                                                                                                                               | 1-1.2.40 | Medical air, USP                                                 |
| 1-1.2.10     | Bulk Medical Gas Systems Verifier                                                                                                                                                                                                                 | 1-1.2.41 | Medical gas and vacuum systems                                   |
| 1-1.2.11     | Carbon dioxide, USP                                                                                                                                                                                                                               | 1-1.2.42 | Medical gas rails (MGR)                                          |
| 1-1.2.12     | Category 1 medical gas and Category 1 medical/surgical vacuum system                                                                                                                                                                              | 1-1.2.43 | Medical Gas Systems Inspector                                    |
| 1-1.2.13     | Category 2 medical gas and Category 2 medical/surgical vacuum system                                                                                                                                                                              | 1-1.2.44 | Medical Gas Systems Installer                                    |
| 1-1.2.14     | Category 3 medical gas and Category 3 vacuum system                                                                                                                                                                                               | 1-1.2.45 | Medical Gas Systems Instructor                                   |
| 1-1.2.15     | Category 3 gas powered devices supply system                                                                                                                                                                                                      | 1-1.2.46 | Medical Gas Systems Maintenance Personnel                        |
| 1-1.2.16     | Code                                                                                                                                                                                                                                              | 1-1.2.47 | Medical Gas Systems Verifier                                     |
|              |                                                                                                                                                                                                                                                   | 1-1.2.48 | Medical support gases                                            |
|              |                                                                                                                                                                                                                                                   | 1-1.2.49 | Metal inert gas (MIG) welded joints                              |
|              |                                                                                                                                                                                                                                                   | 1-1.2.50 | Nitrogen, NF                                                     |
|              |                                                                                                                                                                                                                                                   | 1-1.2.51 | Nitrogen purge gas source alarm                                  |

- 1-1.2.52 Nitrous oxide, USP
- 1-1.2.53 Nonflammable
- 1-1.2.54 Nursing home requirements
- 1-1.2.55 Oxygen, USP
- 1-1.2.56 Particulate contaminants
- 1-1.2.57 Patient care room
- 1-1.2.58 Patient medical gases
- 1-1.2.59 Piped distribution system
- 1-1.2.60 Prohibited piping joints
- 1-1.2.61 Purge
- 1-1.2.62 SCFM, ACFM, CFM, CFH, LPM
- 1-1.2.63 Special fittings
- 1-1.2.64 Standard
- 1-1.2.65 Surface-mounted medical gas rails (MGR)
- 1-1.2.66 Third-party certification agency (See 1.3)
- 1-1.2.67 Tungsten inert gas (TIG) welded joints
- 1-1.2.68 Use point
- 1-1.2.69 Waste anesthetic gas disposal (WAGD) systems

- d) A procedure for employers and customers to verify the certified person's validity.
- e) Demonstrate that their procedures and policy are not in conflict with generally accepted business ethics and adhere to all applicable laws, both federal and state.
- f) That certification documents are issued to the applicant, including name, ID number, expiration date and including the title of the standard that the certification test is based on so certified persons are assured they were tested to a standard that is applicable to the reason for becoming certified.
- g) A provision for discontinued use of the certificate if the certificate is used in a misleading manner.

### **1-1.3 Third Party Certification Agencies**

A recognized third party certification agency shall at a minimum be able to demonstrate to interested parties the following components:

- 1-1.3.1 Management Systems
  - a) Have a management system that includes management review, document controls and internal audits.
- 1-1.3.2 Applications and Security
  - a) Accepts applications and issues certifications in a non-discriminatory manner.
  - b) Have a management system that includes management review, document controls and internal audits.
  - c) The pass/fail scores are determined through an accepted validation process, and if multiple tests are used for the same certification, they are consistent in degree of difficulty.
  - d) Examinations and related items are protected and kept in a secure environment.
- 1-1.3.3 Procedures and Certificates
  - a) An appeal process.
  - b) Have a re-certification process.
  - c) A suspension and/or revocation process.

