



Medical Gas and Vacuum Systems 2021



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Our Presenter

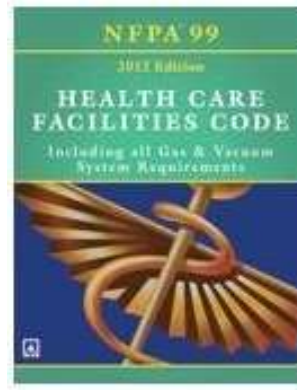


- Owner & founder of Purely Med Gas, Inc.
- Involved in the Medical Gas and Vacuum field for over 40 years
- Instructor NFPA 99 & ASSE 6000 credentialing courses since 1994
- Credentialed ASSE 6010 Installer, ASSE 6020 Inspector, ASSE 6030 Verifier, ASSE 6040 Service Tech, ASSE 6050 Instructor
- Licensed Master Plumber
- Member of ASSE 6000 & CGA M-1 Technical Committees
- Member of WHEA, ASHE, NFPA, ASSE, ASPE and UA
- Educator to facilities, engineers, architectural firms, regulatory agencies and contractors



NFPA 99 Health Care Facilities Code

- National Fire Protection Association
- Revised every three years
- NFPA 99 code book and handbook



Medical Gas Systems

Oxygen	50-55 psi	Respiratory
Medical Air	50-55 psi	Respiratory
Nitrous Oxide	50-55 psi	Anesthesia
Carbon Dioxide	50-55 psi	Surgical
Helium	50-55 psi	Respiratory
Vacuum	15-30" Hg	Suction
WAGD	As required	Waste Anesthetic Gas Disposal

- *Medical Gas: Used in the application of human respiration and the calibration of medical devices used for human respiration.*



Support Gas Systems

Nitrogen	160-185 psi	Support / Tools
Instrument Air	160-185 psi	Support

- *Support Gas: Nitrogen or Instrument Air used to support medical procedures by operating medical-surgical (tools, booms, devices, etc.) and not respired as part of any treatment.*



Risk Categories

The Sudden Failure of Equipment or System is Likely to Cause:

- Category 1: **Major injury** or **death** of patients, staff or visitors
- Category 2: **Minor injury** of patients, staff or visitors
- Category 3: **Not likely to cause injury** to patients, staff or visitors, **may cause discomfort**
- Category 4: **No impact** on patient care

*Risk Assessment by Healthcare Facility



Central Supply System Types

- Bulk Cryogenic Fluid Systems
- Manifolds for Gas Cylinders
- Manifolds for Cryogenic liquid containers
- Medical Air Compressor systems
- Medical Air Proportioning Systems
- Instrument Air Systems
- Vacuum Producers
- WAGD Producers
- Oxygen Concentrators “newest”



Permitted Locations for Medical Gases

Under the direction of licensed medical professionals for:

- Direct respiration by patients
- Clinical application of Gas to a patient
- Power for Medical devices for patients
- Calibration of medical devices
- Simulation centers for Education and Training



Electrical Power

- Electrical power for all medical gas source equipment and alarms shall be from the Emergency electrical service
- **Alarms** - Life Safety Branch
- **Source Equipment** - Essential Equipment Branch
- NFPA 99 2005 Chapter 4
- NFPA 70 (National Electric Code)



Cylinder Room Door Signage

Positive Pressure Gases

No Smoking or Open Flame

Room May Have Insufficient Oxygen

Open Door and Allow Room to Ventilate Before Entering



Cylinder Handling Qualification

11.5.2.1.1: Personnel who handle Medical Gas cylinders shall be trained.



Warning Systems 5.1.9

- Master Alarms
- Area Alarms
- Local Alarms



WAGD Inlets

- **5.1.5.16:** Required where Nitrous Oxide or Anesthetic Gas is intended to be administered
- Not interchangeable with Vacuum
- Flow as required by system use



Pipe Labeling

- Name or chemical symbol
- Designated color code
- Every 20 feet
- Once in each room minimum
- Each side of every wall penetration
- Each floor level



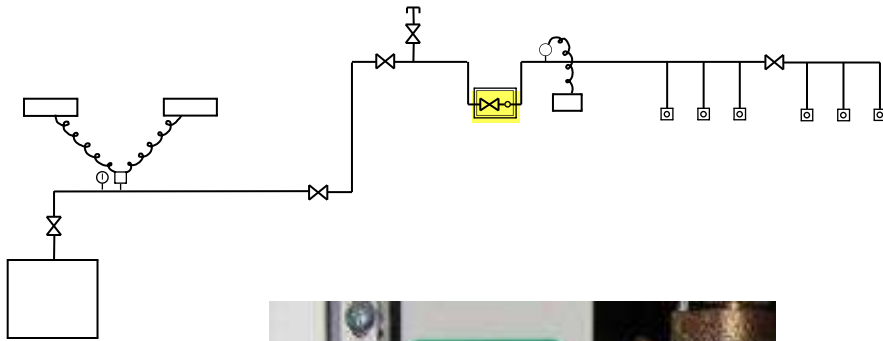
Valve Identification

- Name or chemical symbol system
- Designated color code “new”
- Room or Areas served
- A caution to not close or open the valve except in an emergency



Zone Valves

- Located within Corridor
- Always visible / readily accessible
- Labeled to identify Area served



Zone Valve Locations



Acceptable Joints

- Brazing
- Welding
- Memory Metal Fittings
- Axially Swaged Fittings
- Threaded

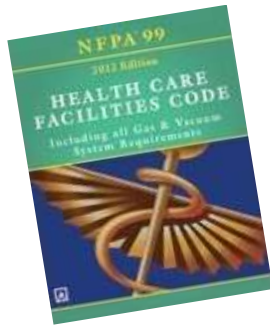


Axially Swaged



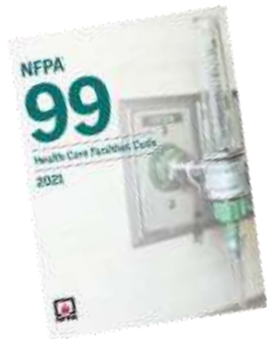
Swivel head allows 360° rotation for easy installations.

Code Approved



NFPA 99 2012 EDITION: 5.1.10.7.1

Axially swaged, elastic strain preload fittings providing metal-to-metal seals, having a temperature rating not less than 538°C (1000°F) and a pressure rating not less than 2070 kPa (300 psi), and that, when complete, are permanent and nonseparable shall be permitted to be used to join copper or stainless steel tube.



NFPA 99 2021 EDITION: 5.1.10.7.1

Axially swaged fittings providing metal-to-metal seals, suitable for service at (300 psig) and able to withstand a temperature of (1000°F) and that, when complete, are permanent and nonseparable, shall be permitted to be used to join copper or stainless steel tube.



Benefits

- No Brazing - No Open Flame
- No Flammable Gas in Patient Area
- No Burn Permits / Fire Watch
- Smoke & Fire Alarms Remain On
- Reduce Damage to Surroundings
- No Cool Down
- No Nitrogen Purge
- No Particulate
- Reduce Verification Time
- Return to System Use Sooner
- Cost Savings



Active Regulatory Compliance Issues

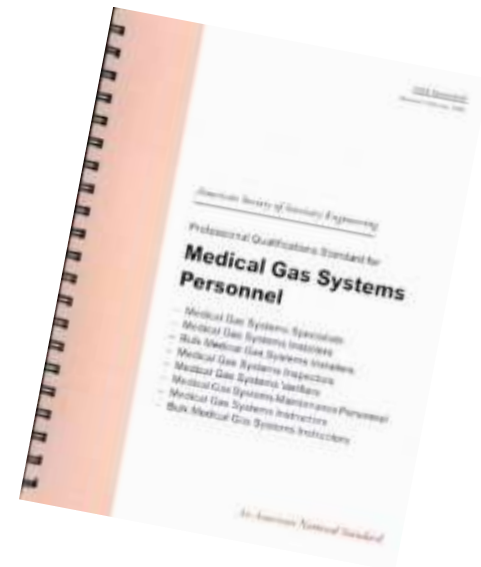
- Inventory
- Maintenance Program
- Inspections
- Qualifications
- Emergency Prep
- Repair Tracking
- Verification Records
- Accurate Valve Tagging



ASSE 6000

Medical Gas Personnel Credentials

	2012	2021
ASSE 6010 Installer	X	X
ASSE 6015 Bulk Installer	-	X
ASSE 6020 Inspector	-	X
ASSE 6030 Verifier	X	X
ASSE 6035 Bulk Verifier	-	X
ASSE 6040 Maintenance Tech	X	X



NFPA 99 2021 Edition

5.1.14.1: Responsible Facility authority “new”

- System Implementation
- Risk Assessment
- Personal Qualifications
- Rule Interpretations
- Emergency Planning
- System Interruptions & Procedures
- Correctly Tested
- Acceptance of Test Reports
- Facility Records
- Maintenance Programs
- Safety Procedures



Thank You!

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For Additional Training / System Services / Medlok Products:



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