

Medical Gas and Vacuum Systems 2023



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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
- Subject Matter Expert for ASSE 6000 Technical Committee
- Member of WHEA, ASHE, NFPA, ASSE, ASPE and UA
- Educator to healthcare facilities, engineers, architectural firms, regulatory agencies and mechanical 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



Support Gas: Nitrogen or Instrument Air used to support medical procedures by operating medical-surgical (tools, booms, devices, etc.) and <u>not</u> 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 2021 Chapter 6 electrical systems
- 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 Alarm







Warning Systems 5.1.9

Area Alarm







Warning Systems 5.1.9

Local Alarm







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
- Non-standard pressures







Valve Identification

- Name or chemical symbol system
- Designated color code "new"
- Room or Areas served
- Do not close except in an emergency
- Non-standard pressures
- Dual systems Zone Valve (V & W)











Zone Valves

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









Zone Valve Locations















Acceptable Joints

- Brazing (copper tubing)
- Welding (stainless steel pipe)
- Axially Swaged Fittings
- •Threaded (specific uses)





ASSE 6000

Medical Gas Personnel Credentials

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







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

~ ASSE Credentialed





Active Regulatory Compliance Issues

- Inventory
- Maintenance Program
- Inspections
- Qualified Technicians
- Record Drawings
- Carbon Monoxide Monitors

- Emergency Prep
- Documenting Repairs
- Verification Records
- Current Valve Tagging
- Cylinder Lead Life-span
- Dew Point Monitors
- Non-Stationary Booms







Need Training? Let us help with your next class. *Providing Education for 30 years!*



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