



# Medical Gas and Vacuum Systems 2021



Tom Spremo

President / Founder

Purely Med Gas, Inc.

[www.purelymedgas.com](http://www.purelymedgas.com)

# 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, Subject Matter Expert
- Member of WHEA, ASHE, NFPA, ASSE, ASPE and the UA
- Educator to facilities, universities, engineers, architects, regulatory agencies and contractors

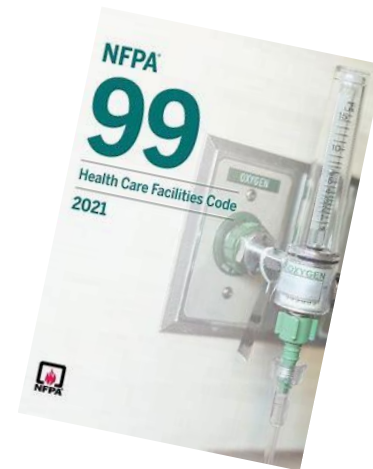
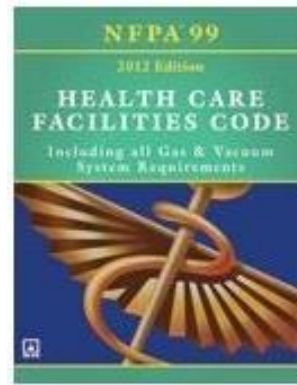


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# NFPA 99 Health Care Facilities Code

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



# Medical Gas Systems

<b>Oxygen</b>	50-55 psi	Respiratory
<b>Medical Air</b>	50-55 psi	Respiratory
<b>Nitrous Oxide</b>	50-55 psi	Anesthesia
<b>Carbon Dioxide</b>	50-55 psi	Surgical
<b>Helium</b>	50-55 psi	Respiratory
<b>Vacuum</b>	15-30" Hg	Suction
<b>WAGD</b>	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

<b>Nitrogen</b>	160-185 psi	Support / Tools
<b>Instrument Air</b>	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 2021 Chapter 6
- NFPA 70 (National Electric Code)

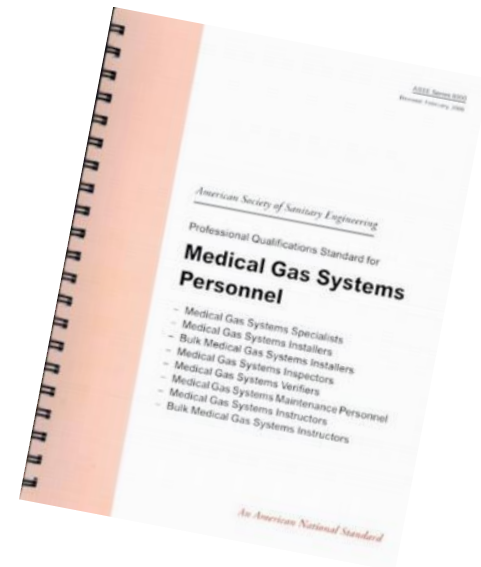


# ASSE 6000

## 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

- ~ASSE 6050, Instructor
- ~ASSE 6060, Designer



# NFPA 99 2021 Key Changes

## 5.1.11: Labeling



## 5.1.14.1: Responsible Facility Authority



## 5.1.12.3: System Inspection



## 5.1.3.3.2: Storage Room Design



## **5.1.3.5.13.2: EOSC**





## 5.1.3.5.6: Relief Valves

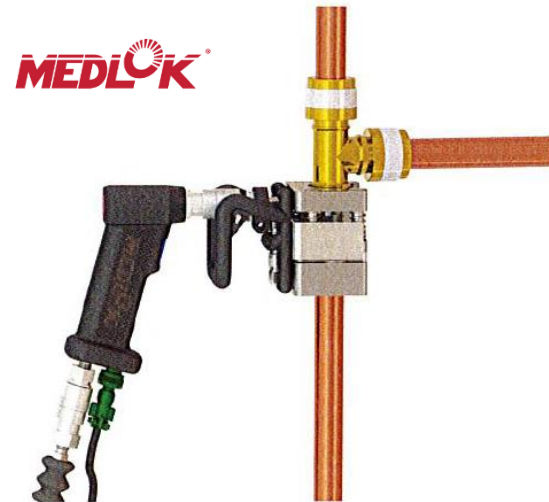


# Latest Technologies

# Axially Swaged

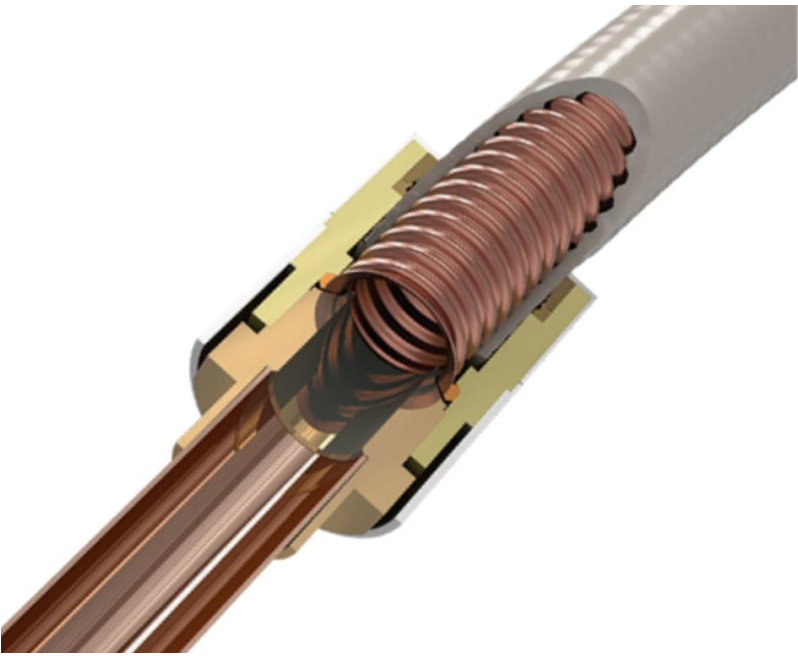
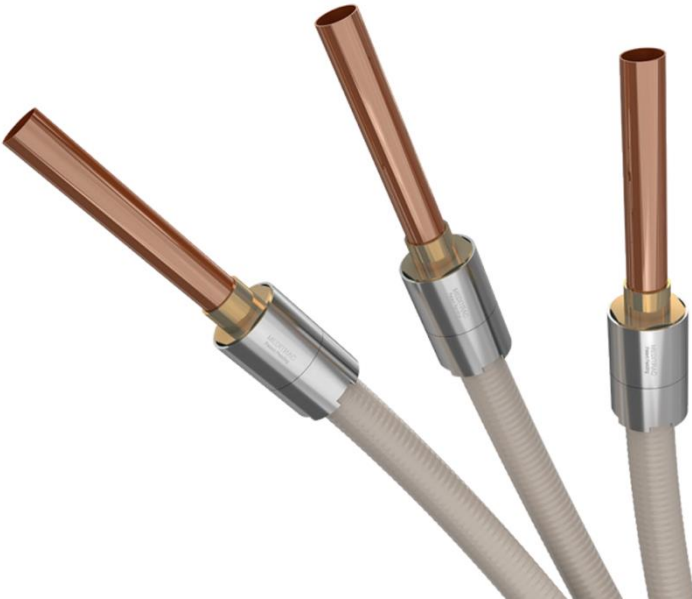


**1/2" – 2" Sizes**



**Swivel head allows 360°  
rotation for easy installations.**

# Corrugated Metal Tubing (CMT)



# System Capacity Calculations

# Bulk Oxygen Systems



# Med Air Compressors / Vacuum Producers



# Storage / Handling of Med Gas Cylinders



# Greater Than 3,000 CF of Gas

- 1 hour rated room for Oxygen, Nitrous Oxide and Oxidizing gases
- Lockable doors or gates
- Well drained outdoor locations
- Limited cylinder contact with soil
- Noncombustible interior finishes
- No fuel fired equipment



# Greater Than 3,000 CF of Gas

- In room heating element, 266 Degrees F max
- Secured cylinders
- Non-combustible racks, shelves and supports
- Explosion proof not required
- Proper ventilation
- Protected electrical devices



# 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



# Regulatory Compliance Issues

- Inventory
- Emergency Preparedness
- Verification Records
- Inspections
- Maintenance Program
- Repair Tracking



- Training
- Qualifications
- Cylinder Storage Rooms
- Accurate Valve Tagging
- 30 PSI Handheld Hose
- ZV / AA Obstructions



# WAGD Inlets





# 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



# *Thank You!*

***A Single Source for:***

***Med Gas Classes / System Services / Medlok Fittings***



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