Medical Gas Changes in the 2012 edition of NFPA 99

Annual Winter Lecture Series for Respiratory Care at The Westwood

Corky Bishop, P.E.
Mike Fink
Airgas Medical Services, Inc.

This is now the Health Care Facilities Code. As a code, it may be incorporated into law by itself.
Levels have changed to Categories.

Chapter 4 Fundamentals

Category 1  Facility systems in which failure of such equipment or system is likely to cause major injury or death of patients or caregivers…

Category 2  Facility systems in which failure of such equipment is likely to cause minor injury to patients or caregivers…

Category 3  Facility systems in which failure of such equipment is not likely to cause injury to patients or caregivers, but can cause patient discomfort…

Category 4  Facility systems in which failure of such equipment would have no impact on patient care…

System Categories are based on risks to patients and caregivers in the facilities.

Risk Assessment. Categories shall be determined by following and documenting a defined risk assessment procedure.

The category definitions apply to equipment operations and are not intended to consider intervention by caregivers or others.
Category 1  Systems are expected to work or be available at all times to support patient needs.

Examples: Hospitals, Ambulatory Surgical Center with full OR services, or a Reconstructive surgeon’s office with general anesthesia.

Category 2  Systems are expected to provide a high level of reliability; however, limited short durations of equipment downtime can be tolerated without significant impact on patient care. Category 2 systems support patient needs but are not critical for life support.

Example: Procedural sedation site for outpatient services.

Use of a sedative to impair short term memory.
**Category 3** Normal building system reliabilities are expected. Such systems support patient needs, but failure of such equipment would not immediately affect patient care. Such equipment is not critical for life support.

Example: Dental office.

**Category 4** Such systems have no impact on patient care and would not be noticeable to patients in the event of failure.

No piped medical gas systems in the facility.
Patient Care Rooms.

1.3.4.1 The governing body of the facility or its designee shall establish the following areas in accordance with the type of patient care anticipated and with the following definitions of the classification:
   (1) Critical care rooms
   (2) General care rooms
   (3) Basic care rooms
   (4) Support rooms

1.3.4.2 Anesthesia. It shall be the responsibility of the governing body of the health care organization to designate anesthetizing locations.

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Patient Care Room. Any room of a health care facility wherein patients are intended to be examined or treated.

Critical Care Room. Room in which failure of equipment or a system is likely to cause major injury or death of patients or caregivers (Category 1).

General Care Room. Room in which failure of equipment or a system is likely to cause minor injury to patients or caregivers (Category 2).

Basic Care Room. Room in which the failure of equipment or a system is not likely to cause injury to the patients or caregivers but can cause patient discomfort (Category 3).

Support Room. Room in which failure of equipment or a system is not likely to have a physical impact on patients or caregivers (Category 4).
General Anesthesia and Levels of Sedation/Analgesia

- **General Anesthesia**
- **Deep Sedation/Analgesia**
- **Moderate Sedation/Analgesia (Conscious Sedation)**
- **Minimal Sedation (Anxiolysis)**

Anesthetizing Locations will affect decisions about alarms, zone valves, and WAGD inlets.

Distinction between Medical Gases and Support Gases

Medical gas shall be piped only into areas where they will be used under the direction of licensed medical professionals as follows:

1. Direct respiration by patients.
2. Clinical application of gas to a patient, such as use of an insufflator to inject carbon dioxide into patient body cavities during laparoscopic surgery or carbon dioxide to purge heart-lung machine blood flow ways.
3. Medical device applications directly related to respiration.
4. Power for medical devices used directly on patients.

Medical gases are not to be used for things like blowing out or drying scopes.

**Support Gases** *(Nitrogen or Instrument Air)* can be used to provide power for surgeons tools, brakes for orbital arms in surgery, and drying medical equipment. They cannot be used for breathing purposes.

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**Remote Controls**

Final line regulators can now be located remote from the source within a secure enclosure.

55 psi Oxygen piping to patient outlets

70 psi Oxygen to hyperbaric chambers in Wound Care.
Ventilation requirements have moved to chapter 9.

Natural ventilation of manifold rooms shall be to the outside atmosphere without ductwork.

Mechanical exhaust fans shall provide not less than 50 cfm or more than 500 cfm. Size is based on gas contained in the largest single vessel in the room or in one header bar of cylinders or dewars.

Medical Air Compressor Intake

The distance from medical air intakes has been extended from 10 to 25 feet for ventilating system exhausts, fuel storage vents, combustion vents, plumbing vents, vacuum and WAGD discharges, or areas that can collect vehicular exhausts or other noxious fumes.

They are no longer required to be placed above roof level, but must still be at least 20 feet above the ground.
Liquid Ring Medical Air Compressors

- Service water and seal water must be treated to control waterborne pathogens and chlorine from hyperchlorination from entering the medical air.
- Reserve Med Air standby headers or a backup compressor (not liquid ring) shall be installed.
- There must be enough cylinders to last at least one hour of normal operation.

Medical Air Proportioning System

- Process to mix Oxygen USP and Nitrogen NF to make Medical Air with an oxygen concentration between 19.5% and 23.5%.
- If the mixture goes out of specification, an alarm shall activate and a 24 hour reserve supply of air be automatically supplied.
- Manual intervention is necessary to correct the composition before reconnecting the system.
Combined Medical Surgical Vacuum and WAGD systems

- The total concentration of oxidizers (oxygen and nitrous oxide) shall be maintained below 23.6% before reaching the vacuum pumps.
- Otherwise, the pumps must be designed of materials and use lubricants and sealants that are inert in the presence of oxygen, nitrous oxide, and halogenated anesthetics.

WAGD inlets

- There must be a Waste Anesthetic Gas Disposal inlet in all locations where nitrous oxide or halogenated anesthetic gas is intended to be administered.
- Vacuum exhaust must be directed away from places of public assembly.
Zone Valves

- Zone valves cannot be located in the same room with the outlets or inlets that they control.
- Zone valves shall be located immediately outside each vital life-support area, critical care area, and anesthetizing location of moderate sedation, deep sedation, or general anesthesia, readily accessible in an emergency.

Alarms

- Switches / sensors installed so as to be removable.
- Wireless communication introduced as an option.
- Alarm wiring may be protected by conduit, free air, wire, cable tray, or raceways.
- Joining commons is not allowed in alarm wiring.
- Master alarm wiring splices are allowed at junction boxes.
Testing

- Liquid leak detectant must be safe for use with oxygen and cannot contain ammonia.
- The installers pressure tests shall be documented and witnessed by the authority having jurisdiction or its designee.
- New air compressors must be run for 12 hours before performing the air quality tests.

New Maintenance Section

- Health care facilities shall develop and document periodic maintenance programs for their medical gas systems.
- Inventories shall include sources, control valves, alarms, manufactured assemblies, and outlets.
- Inspection schedules shall be established through the risk assessment of the facility and consider the original manufacturer recommendations and any required by the Authority Having Jurisdiction.
Who can perform the inspection?

- Employees trained and certified by the health care facility for the specific equipment installed there.
- ASSE 6040 credentialed Medical Gas Maintenance Personnel
- ASSE 6030 credentialed Medical Gas Verifiers

Inspection and Testing Operations
NFPA 99, 2012; 5.1.14.2.3

1. Medical Air Source, as follows:
   (a) Room temperature
   (b) Shaft seal condition
   (c) Filter condition
   (d) Presence of hydrocarbons
   (e) Room ventilation
   (f) Water quality, if so equipped
   (g) Intake location
   (h) Carbon monoxide monitor calibration
   (i) Air purity
   (j) Dew point
(2) Medical vacuum source — exhaust location
(3) WAGD source — exhaust location
(4) Instrument air source — filter condition
(5) Manifold sources as follows:
   (a) Ventilation
   (b) Enclosure labeling
(6) Bulk cryogenic liquid source inspected in accordance with NFPA 55, Compressed Gases and Cryogenic Fluids Code
(7) Final line regulation for all positive pressure systems — delivery pressure

(8) Valves — labeling
(9) Alarms and warning systems — lamp and audio operation
(10) Alarms and warning systems, as follows:
    (a) Master alarm signal operation
    (b) Area alarm signal operation
    (c) Local alarm signal operation
(11) Station outlets/inlets, as follows:
    (a) Flow
    (b) Labeling
    (c) Latching/delatching
    (d) Leaks
Central supply systems for nonflammable medical gases shall conform to the following:
(1) They shall be inspected annually.
(2) They shall be maintained by a qualified representative of the equipment owner.
(3) A record of the annual inspection shall be available for review by the authority having jurisdiction.