EMGS

Environmental & Medical Gas Services Inc.

1. CMS Notification of Final Ruling Adopting NFPA 99-2012
2. CMS Final Rule Adopting NFPA 99-2012
3. CMS Form 2786R
4. Category Definitions
5. Risk Assessment
6. NFPA 99 TIA 12-4
7. EMGS Document Listing NFPA 99 TIA 12-4 References
8. NFPA 99 Document – Medical Gas Cylinder Storage

DEPARTMENT OF HEALTH & HUMAN SERVICES
Centers for Medicare & Medicaid Services
7500 Security Boulevard, Mail Stop C2-21-16
Baltimore, Maryland 21244-1850

Center for Clinical Standards and Quality/Survey & Certification Group

Ref: S&C: 16-22-LSC

DATE: **May 06, 2016**

TO: State Survey Agency Directors

FROM: Director
Survey and Certification Group

SUBJECT: Notification of Final Rule Published: Adoption of 2012 Life Safety and Health Care Facilities Code

Memorandum Summary

- **Fire Safety Requirements for Certain Health Care Facilities:** On May 4, 2016, the Centers for Medicare & Medicaid Services (CMS) published a final rule titled "Medicare and Medicaid Programs; Fire Safety Requirements for Certain Health Care Facilities," which updates the fire safety requirements for health care providers and suppliers. This regulation requires certain providers and suppliers to meet the requirements of the 2012 edition of the Life Safety Code (LSC), National Fire Protection Association (NFPA) 101 and the 2012 edition of the Health Care Facilities Code, NFPA 99.

The Fire Safety Final Rule outlines the requirements for certain Medicare and Medicaid certified providers and suppliers to meet certain fire safety requirements. The final rule includes the adoption of the 2012 edition of the LSC, NFPA 101 and additionally the adoption of the 2012 edition of the Health Care Facilities Code, NFPA 99. The regulation does away with the use of the 2000 edition of the LSC and associated reference documents. CMS also established certain exceptions to the adoption of the 2012 Life Safety and Health Care Facilities Codes which are described in the regulation.

The Final Rule can be located at https://federalregister.gov/articles/2016/05/04/2016-10043/medicare-and-medicaid-programs-fire-safety-requirements-for-certain-health-care-facilities

CMS will be updating its surveyor training materials, guidance and forms to reflect these changes. Additional information about these updates will be forthcoming.

Training: CMS is currently developing online training that will be accessible ahead of the implementation date. We will send out a subsequent series of Admin Info Memos regarding training details.

Contact: For questions regarding the Fire Safety Rule, please contact SCG_LifeSafetyCode@cms.hhs.gov.

Effective Date: Immediately. The information provided in this memorandum should be communicated with all survey and certification staff, their managers and the State/Regional Office training coordinators within 30 days of this memorandum.

/s/
Thomas E. Hamilton

cc: Survey and Certification Regional Office Management

DEPARTMENT OF HEALTH & HUMAN SERVICES
Centers for Medicare & Medicaid Services
7500 Security Boulevard, Mail Stop C2-21-16
Baltimore, Maryland 21244-1850

Center for Clinical Standards and Quality/Survey & Certification Group

Ref: S&C: 16-29-LSC

DATE: **June 20, 2016**

TO: State Survey Agency Directors

FROM: Director
Survey and Certification Group

SUBJECT: Adoption of the 2012 edition of the National Fire Protection Association (NFPA) 101 - Life Safety Code (LSC) and 2012 edition of the NFPA 99 - Health Care Facilities Code (HCFC)

Memorandum Summary

- The Centers for Medicare & Medicaid Services (CMS) has adopted by regulation the 2012 LSC and the 2012 HCFC. The regulation effective date is July 5, 2016.
- CMS will begin surveying for compliance with the 2012 LSC and HCFC on November 1, 2016.
- CMS will offer an online transitional training course for existing LSC surveyors to provide an update on the new requirements. The course will be available on September 2, 2016 via the CMS Surveyor Training Website.
- CMS will update the ASPEN program (i.e., the information system which tracks surveys) and CMS Fire Safety Forms (2786) prior to the November 1, 2016 survey start date.

Background

The purpose of this policy memorandum is to notify the State Agencies (SA) and Regional Offices (RO) that CMS has adopted by regulation the NFPA 2012 LSC and 2012 HCFC. This memorandum supersedes S&C 03-21. In addition, this policy memorandum is intended to notify the SAs and ROs on the status of associated training, survey forms, and ASPEN program.

Regulation

On May 4, 2016, CMS adopted the 2012 LSC and the 2012 HCFC by final rule. The final rule was published in the Federal Register (Vol. 81, No. 86), is entitled "Medicare and Medicaid Programs; Fire Safety Requirements for Certain Health Care Facilities", and is effective July 5, 2016. The final rule also adopted 2012 LSC Tentative Interim Amendments (TIA) 12–1, 12–2, 12–3, and 12–4, and 2012 HCFC TIA 12–2, 12–3, 12–4, 12–5 and 12–6.

The final rule eliminates all references to the previously adopted 2000 edition of the LSC, and requires providers and suppliers to comply with the 2012 LSC with certain modifications, and the 2012 HCFC excluding chapters 7, 8, 12, and 13 by the effective date of July 5, 2016.

Buildings constructed before July 5, 2016 can meet Existing Occupancy requirements. In addition, buildings that receive design approval or building permits for construction before July 5, 2016 can meet Existing Occupancy requirements. All other building construction must meet New Occupancy requirements.

The final rule includes requirements for Religious Non-Medical Health Care Institutions (RNHCI), Ambulatory Surgical Centers (ASC), Hospice, Program of All-Inclusive Care for the Elderly (PACE), Hospitals, Long Term Care, Intermediate Care Facilities for Individuals with Intellectual Disabilities (ICFs/IID), and Critical Access Hospitals (CAH).

The final rules continues to allow CMS to waive, for periods deemed appropriate, specific provisions of the Life Safety Code, which would result in an unreasonable hardship upon a facility, providing the waiver will not adversely affect the health and safety of the patients.

The final rule also continues to allow the ability of a State to request that its State fire safety requirements, imposed by State law, be used in lieu of the 2012 edition of the LSC and HCFC with CMS.

Survey Process

CMS will begin surveying facilities for compliance with the 2012 edition of the LSC and HCFC on November 1, 2016. In addition, this will allow CMS the opportunity to train existing surveyors, revise fire safety survey forms, and update the ASPEN program.

Surveyors will continue to use the current process, tags and forms until November 1, 2016. In instances where the survey process identified deficiencies that would be compliant under the 2012 LSC, a facility may verify compliance with the 2012 LSC as an acceptable plan of correction and the deficiency would not be cited.

The LSC shortened survey process, outlined in the CMS Survey and Certification letter (https://www.cms.gov/Medicare/Provider-Enrollment-and-Certification/SurveyCertificationGenInfo/Downloads/Survey-and-Cert-Letter-13-22.pdf) will no longer be able to be used after October 31, 2016. CMS will analyze the data required to determine which facilities will be able to be surveyed using the shortened survey process. Any State that believes losing the shortened survey process for a period of time will cause it staffing and/or scheduling difficulty should contact their Regional Office immediately with their concerns. CMS will notify State Survey Agencies if the determination is made to use the LSC shortened survey process again.

Training: CMS will provide an online transition course for existing LSC surveyors. The transition course is intended to inform existing surveyors of the new regulatory requirements and instruct existing surveyors on how to apply the new Codes when surveying health care facilities.

The transition course will be self-paced and will take approximately 20 hours to complete. It will begin with a pre-test and conclude with a post-test that will require a passing score of 85 percent. All existing SA surveyors that conduct LSC surveys are required to complete the transition course and obtain a passing score before conducting LSC surveys using the 2012 LSC and HCFC.

The transition course will address: the requirements of the adopted regulation and associated policy and procedures; changes that have occurred in the Health Care Occupancies, Ambulatory Health Care Occupancies, Residential Board and Care Occupancies, and Building Rehabilitation chapters of the LSC; changes that have occurred in the NFPA 99; and the K-tags associated with new CMS-2786 forms.

This course will be available to all existing LSC surveyors on September 2, 2016 via the CMS Surveyor Training Website.

The reoccurring 2012 Basic Life Safety Code, NFPA 99, FSES/Health Care, and FSES/Residential Board and Care courses for new LSC surveyors will also be updated, and information regarding these courses will be provided when course development is complete. All previous prerequisites and requirements for new LSC surveyors to attend these reoccurring courses will continue.

ASPEN: The ASPEN program will be updated with new regulation sets that correlate with the 2012 LSC and HCFC requirements and associated K-tags. **The ASPEN system will be updated prior to the November 1, 2016 survey start date.**

If you have questions concerning this memorandum, please send them to SCG_LifeSafetyCode@cms.hhs.gov. To view the Final Rule, 05042016 Fire Safety Requirements Final Rule please see https://www.federalregister.gov/articles/2016/05/04/2016-10043/medicare-and-medicaid-programs-fire-safety-requirements-for-certain-health-care-facilities

Training: Immediately. The information provided in this memorandum should be communicated with all survey and certification staff, their managers, and the State/Regional Office training coordinators within 30 days of this memorandum.

Effective Date: CMS will begin to survey all health care facilities referenced in this final rule for compliance with the 2012 editions of the LSC and HCFC on November 1, 2016.

/s/
David R. Wright
Acting Director

cc: Survey and Certification Regional Office Management

ID PREFIX		MET	NOT MET	N/A	REMARKS
K323	**Anesthetizing Locations** Areas designated for administration of general anesthesia (i.e., inhalation anesthetics) are in accordance with 8.7 and NFPA 99. Zone valves are: located immediately outside each life-support, critical care, and anesthetizing location of moderate sedation, deep sedation, or general anesthesia for medical gas or vacuum; readily accessible in an emergency; and arranged so shutting off any one anesthetizing location will not affect others. Area alarm panels are provided to monitor all medical gas, medical-surgical vacuum, and piped WAGD systems. Panels are at locations that provide for surveillance, indicate medical gas pressure decreases of 20 percent and vacuum decreases of 12 inch gauge HgV, and provide visual and audible indication. Alarm sensors are installed either on the source side of individual room zone valve box assemblies or on the patient/use side of each of the individual zone box valve assemblies. The EES critical branch supplies power for task illumination, fixed equipment, select receptacles, and select power circuits, and EES equipment system supplies power to ventilation system. Heating, cooling, and ventilation are in accordance with ASHRAE 170. Medical supply and equipment manufacturer's instructions for use are considered before reducing humidity levels to those allowed by ASHRAE, per S&C 13-58. 18.3.2.3, 19.3.2.3 (LSC) 5.1.4.8.7, 5.1.4.8.7.2, 5.1.9.3, 5.1.9.3.4, 6.4.2.2.4.2 (NFPA 99)				

ID PREFIX		MET	NOT MET	N/A	REMARKS
	PART II – HEALTH CARE FACILITIES CODE REQUIREMENTS				
K900	**Health Care Facilities Code - Other** List in the REMARKS section any NFPA 99 requirements (excluding Chapter 7, 8, 12, and 13) that are not addressed by the provided K-Tags, but are deficient. This information, along with the applicable Health Care Facilities Code or NFPA standard citation, should be included on Form CMS-2567.				
K901	**Fundamentals – Building System Categories** Building systems are designed to meet Category 1 through 4 requirements as detailed in NFPA 99. Categories are determined by a formal and documented risk assessment procedure performed by qualified personnel. Chapter 4 (NFPA 99)				
K902	**Gas and Vacuum Piped Systems – Other** List in the REMARKS section any NFPA 99 Chapter 5 Gas and Vacuum Systems requirements that are not addressed by the provided K-Tags, but are deficient. This information, along with the applicable Life Safety Code or NFPA standard citation, should be included on Form CMS-2567. Chapter 5 (NFPA 99)				
K903	**Gas and Vacuum Piped Systems – Categories** Medical gas, medical air, surgical vacuum, WAGD, and air supply systems are designated: ☐ Category 1. Systems in which failure is likely to cause major injury or death. ☐ Category 2. Systems in which failure is likely to cause minor injury. ☐ Category 3. Systems in which failure is not likely to cause injury, but can cause discomfort. Deep sedation and general anesthesia are not to be administered using a Category 3 medical gas system. 5.1.1.1, 5.2.1, 5.3.1.1, 5.3.1.5 (NFPA 99)				
K904	**Gas and Vacuum Piped Systems – Warning Systems** All master, area, and local alarm systems used for medical gas and vacuum systems comply with appropriate Category warning system requirements, as applicable. 5.1.9, 5.2.9, 5.3.6.2.2 (NFPA 99)				

ID PREFIX		MET	NOT MET	N/A	REMARKS
K905	**Gas and Vacuum Piped Systems – Central Supply System Identification and Labeling** Containers, cylinders and tanks are designed, fabricated, tested, and marked in accordance with 5.1.3.1.1 through 5.1.3.1.7. Locations containing only oxygen or medical air have doors labeled with "Medical Gases, NO Smoking or Open Flame". Locations containing other gases have doors labeled "Positive Pressure Gases, NO Smoking or Open Flame, Room May Have Insufficient Oxygen, Open Door and Allow Room to Ventilate Before Opening." 5.1.3.1, 5.2.3.1, 5.3.10 (NFPA 99)				
K906	**Gas and Vacuum Piped Systems – Central Supply System Operations** Adaptors or conversion fittings are prohibited. Cylinders are handled in accordance with 11.6.2. Only cylinders, reusable shipping containers, and their accessories are stored in rooms containing central supply systems or cylinders. No flammable materials are stored with cylinders. Cryogenic liquid storage units intended to supply the facility are not used to transfill. Cylinders are kept away from sources of heat. Valve protection caps are secured in place, if supplied, unless cylinder is in use. Cylinders are not stored in tightly closed spaces. Cylinders in use and storage are prevented from exceeding 130°F, and nitrous oxide and carbon dioxide cylinders are prevented from reaching temperatures lower than manufacture recommendations or 20°F. Full or empty cylinders, when not connected, are stored in locations complying with 5.1.3.3.2 through 5.1.3.3.3, and are not stored in enclosures containing motor-driven machinery, unless for instrument air reserve headers. 5.1.3.2, 5.1.3.3.17, 5.1.3.3.1.8, 5.1.3.3.4, 5.2.3.2, 5.2.3.3, 5.3.6.20.4, 5.6.20.5, 5.3.6.20.7, 5.3.6.20.8, 5.3.6.20.9 (NFPA 99)				
K907	**Gas and Vacuum Piped Systems – Maintenance Program** Medical gas, vacuum, WAGD, or support gas systems have documented maintenance programs. The program includes an inventory of all source systems, control valves, alarms, manufactured assemblies, and outlets. Inspection and maintenance schedules are established through risk assessment considering manufacturer recommendations. Inspection procedures and testing methods are established through risk assessment. Persons maintaining systems are qualified as demonstrated by training and certification or credentialing to the requirements of AASE 6030 or 6040. 5.1.14.2.1, 5.1.14.2.2, 5.1.15, 5.2.14, 5.3.13.4.2 (NFPA 99)				

ID PREFIX		MET	NOT MET	N/A	REMARKS
K908	**Gas and Vacuum Piped Systems – Inspection and Testing Operations** The gas and vacuum systems are inspected and tested as part of a maintenance program and include the required elements. Records of the inspections and testing are maintained as required. 5.1.14.2.3, B.5.2, 5.2.13, 5.3.13, 5.3.13.4 (NFPA 99)				
K909	**Gas and Vacuum Piped Systems – Information and Warning Signs** Piping is labeled by stencil or adhesive markers identifying the gas or vacuum system, including the name of system or chemical symbol, color code (Table 5.1.11), and operating pressure if other than standard. Labels are at intervals not more than 20 feet, are in every room, at both sides of wall penetrations, and on every story traversed by riser. Piping is not painted. Shutoff valves are identified with the name or chemical symbol of the gas or vacuum system, room or area served, and caution to not use the valve except in emergency. 5.1.14.3, 5.1.11.1, 5.1.11.2, 5.2.11, 5.3.13.3, 5.3.11 (NFPA 99)				
K910	**Gas and Vacuum Piped Systems – Modifications** Whenever modifications are made that breach the pipeline, any necessary installer and verification test specified in 5.1.2 is conducted on the downstream portion of the medical gas piping system. Permanent records of all tests required by system verification tests are maintained. 5.1.14.4.1, 5.1.14.4.6, 5.2.13, 5.3.13.4.3 (NFPA 99)				
K911	**Electrical Systems – Other** List in the REMARKS section any NFPA 99 Chapter 6 Electrical Systems requirements that are not addressed by the provided K-Tags, but are deficient. This information, along with the applicable Life Safety Code or NFPA standard citation, should be included on Form CMS-2567. Chapter 6 (NFPA 99)				
K912	**Electrical Systems – Receptacles** Power receptacles have at least one, separate, highly dependable grounding pole capable of maintaining low-contact resistance with its mating plug. In pediatric locations, receptacles in patient rooms, bathrooms, play rooms, and activity rooms, other than nurseries, are listed tamper-resistant or employ a listed cover. If used in patient care room, ground-fault circuit interrupters (GFCI) are listed. 6.3.2.2.6.2 (F), 6.3.2.2.4.2 (NFPA 99)				

ID PREFIX		MET	NOT MET	N/A	REMARKS
K913	**Electrical Systems – Wet Procedure Locations** Operating rooms are considered wet procedure locations, unless otherwise determined by a risk assessment conducted by the facility governing body. Operating rooms defined as wet locations are protected by either isolated power or ground-fault circuit interrupters. A written record of the risk assessment is maintained and available for inspection. 6.3.2.2.8.4, 6.3.2.2.8.7, 6.4.4.2				
K914	**Electrical Systems – Maintenance and Testing** Hospital-grade receptacles at patient bed locations and where deep sedation or general anesthesia is administered, are tested after initial installation, replacement or servicing. Additional testing is performed at intervals defined by documented performance data. Receptacles not listed as hospital-grade at these locations are tested at intervals not exceeding 12 months. Line isolation monitors (LIM), if installed, are tested at intervals of ≤ 1 month by actuating the LIM test switch per 6.3.2.6.3.6, which activates both visual and audible alarm. For LIM circuits with automated self-testing, this manual test is performed at intervals ≤ 12 months. LIM circuits are tested per 6.3.3.3.2 after any repair or renovation to the electric distribution system. Records are maintained of required tests and associated repairs or modifications, containing date, room or area tested, and results. 6.3.4 (NFPA 99)				
K915	**Electrical Systems – Essential Electric System Categories** ☐ Critical care rooms (Category 1) in which electrical system failure is likely to cause major injury or death of patients, including all rooms where electric life support equipment is required, are served by a Type 1 EES. ☐ General care rooms (Category 2) in which electrical system failure is likely to cause minor injury to patients (Category 2) are served by a Type 1 or Type 2 EES. ☐ Basic care rooms (Category 3) in which electrical system failure is not likely to cause injury to patients and rooms other than patient care rooms are not required to be served by an EES. Type 3 EES life safety branch has an alternate source of power that will be effective for 1 1/2 hours. 3.3.138, 6.3.2.2.10, 6.6.2.2.2, 6.6.3.1.1 (NFPA 99), TIA 12-3				

ID PREFIX		MET	NOT MET	N/A	REMARKS
K916	**Electrical Systems – Essential Electric System Alarm Annunciator** A remote annunciator that is storage battery powered is provided to operate outside of the generating room in a location readily observed by operating personnel. The annunciator is hard-wired to indicate alarm conditions of the emergency power source. A centralized computer system (e.g., building information system) is not to be substituted for the alarm annunciator. 6.4.1.1.17, 6.4.1.1.17.5 (NFPA 99)				
K917	**Electrical Systems – Essential Electric System Receptacles** Electrical receptacles or cover plates supplied from the life safety and critical branches have a distinctive color or marking. 6.4.2.2.6, 6.5.2.2.4.2, 6.6.2.2.3.2 (NFPA 99)				
K918	**Electrical Systems – Essential Electric System Maintenance and Testing** The generator or other alternate power source and associated equipment is capable of supplying service within 10 seconds. If the 10-second criterion is not met during the monthly test, a process shall be provided to annually confirm this capability for the life safety and critical branches. Maintenance and testing of the generator and transfer switches are performed in accordance with NFPA 110. Generator sets are inspected weekly, exercised under load 30 minutes 12 times a year in 20-40 day intervals, and exercised once every 36 months for 4 continuous hours. Scheduled test under load conditions include a complete simulated cold start and automatic or manual transfer of all EES loads, and are conducted by competent personnel. Maintenance and testing of stored energy power sources (Type 3 EES) are in accordance with NFPA 111. Main and feeder circuit breakers are inspected annually, and a program for periodically exercising the components is established according to manufacturer requirements. Written records of maintenance and testing are maintained and readily available. EES electrical panels and circuits are marked, readily identifiable, and separate from normal power circuits. Minimizing the possibility of damage of the emergency power source is a design consideration for new installations. 6.4.4, 6.5.4, 6.6.4 (NFPA 99), NFPA 110, NFPA 111, 700.10 (NFPA 70)				

ID PREFIX		MET	NOT MET	N/A	REMARKS
K919	**Electrical Equipment – Other** List in the REMARKS section any NFPA 99 Chapter 10, *Electrical Equipment*, requirements that are not addressed by the provided K-Tags, but are deficient. This information, along with the applicable Life Safety Code or NFPA standard citation, should be included on Form CMS-2567. Chapter 10 (NFPA 99)				
K920	**Electrical Equipment – Power Cords and Extension Cords** Power strips in a patient care vicinity are only used for components of movable patient-care-related electrical equipment (PCREE) assembles that have been assembled by qualified personnel and meet the conditions of 10.2.3.6. Power strips in the patient care vicinity may not be used for non-PCREE (e.g., personal electronics), except in long-term care resident rooms that do not use PCREE. Power strips for PCREE meet UL 1363A or UL 60601-1. Power strips for non-PCREE in the patient care rooms (outside of vicinity) meet UL 1363. In non-patient care rooms, power strips meet other UL standards. All power strips are used with general precautions. Extension cords are not used as a substitute for fixed wiring of a structure. Extension cords used temporarily are removed immediately upon completion of the purpose for which it was installed and meets the conditions of 10.2.4. 10.2.3.6 (NFPA 99), 10.2.4 (NFPA 99), 400-8 (NFPA 70), 590.3(D) (NFPA 70), TIA 12-5				

ID PREFIX		MET	NOT MET	N/A	REMARKS
K921	**Electrical Equipment – Testing and Maintenance Requirements** The physical integrity, resistance, leakage current, and touch current tests for fixed and portable patient-care related electrical equipment (PCREE) is performed as required in 10.3. Testing intervals are established with policies and protocols. All PCREE used in patient care rooms is tested in accordance with 10.3.5.4 or 10.3.6 before being put into service and after any repair or modification. Any system consisting of several electrical appliances demonstrates compliance with NFPA 99 as a complete system. Service manuals, instructions, and procedures provided by the manufacturer include information as required by 10.5.3.1.1 and are considered in the development of a program for electrical equipment maintenance. Electrical equipment instructions and maintenance manuals are readily available, and safety labels and condensed operating instructions on the appliance are legible. A record of electrical equipment tests, repairs, and modifications is maintained for a period of time to demonstrate compliance in accordance with the facility's policy. Personnel responsible for the testing, maintenance and use of electrical appliances receive continuing training. 10.3, 10.5.2.1, 10.5.2.1.2, 10.5.2.5, 10.5.3, 10.5.6, 10.5.8				
K922	**Gas Equipment – Other** List in the REMARKS section any NFPA 99 Chapter 11 Gas Equipment requirements that are not addressed by the provided K-Tags, but are deficient. This information, along with the applicable Life Safety Code or NFPA standard citation, should be included on Form CMS-2567. Chapter 11 (NFPA 99)				

ID PREFIX		MET	NOT MET	N/A	REMARKS
K923	**Gas Equipment – Cylinder and Container Storage** **≥ 3,000 cubic feet** Storage locations are designed, constructed, and ventilated in accordance with 5.1.3.3.2 and 5.1.3.3.3. **> 300 but <3,000 cubic feet** Storage locations are outdoors in an enclosure or within an enclosed interior space of non- or limited- combustible construction, with door (or gates outdoors) that can be secured. Oxidizing gases are not stored with flammables, and are separated from combustibles by 20 feet (5 feet if sprinklered) or enclosed in a cabinet of noncombustible construction having a minimum 1/2 hr. fire protection rating. **≤ 300 cubic feet** In a single smoke compartment, individual cylinders available for immediate use in patient care areas with an aggregate volume of ≤ 300 cubic feet are not required to be stored in an enclosure. Cylinders must be handled with precautions as specified in 11.6.2. A precautionary sign readable from 5 feet is on each door or gate of a cylinder storage room, where the sign includes the wording as a minimum "CAUTION: OXIDIZING GAS(ES) STORED WITHIN NO SMOKING". Storage is planned so cylinders are used in order of which they are received from the supplier. Empty cylinders are segregated from full cylinders. When facility employs cylinders with integral pressure gauge, a threshold pressure considered empty is established. Empty cylinders are marked to avoid confusion. Cylinders stored in the open are protected from weather. 11.3.1, 11.3.2, 11.3.3, 11.3.4, 11.6.5 (NFPA 99)				
K924	**Gas Equipment – Testing and Maintenance Requirements** Anesthesia apparatus are tested at the final path to patient after any adjustment, modification or repair. Before the apparatus is returned to service, each connection is checked to verify proper gas and an oxygen analyzer is used to verify oxygen concentration. Defective equipment is immediately removed from service. Areas designated for servicing of oxygen equipment are clean and free of oil, grease, or other flammables. Manufacturer service manuals are used to maintain equipment and a scheduled maintenance program is followed. 11.4.1.3, 11.5.1.3, 11.6.2.5, 11.6.2.6 (NFPA 99)				

ID PREFIX		MET	NOT MET	N/A	REMARKS
K925	**Gas Equipment – Respiratory Therapy Sources of Ignition** Smoking materials are removed from patients receiving respiratory therapy. When a nasal cannula is delivering oxygen outside of a patient's room, no sources of ignition are within in the site of intentional expulsion (1-foot). When other oxygen deliver equipment is used or oxygen is delivered inside a patient's room, no sources of ignition are within the area are of administration (15-feet). Solid fuel-burning appliances is not in the area of administration. Nonmedical appliances with hot surfaces or sparking mechanisms are not within oxygen-delivery equipment or site of intentional expulsion. 11.5.1.1, TIA 12-6 (NFPA 99)				
K926	**Gas Equipment – Qualifications and Training of Personnel** Personnel concerned with the application, maintenance and handling of medical gases and cylinders are trained on the risk. Facilities provide continuing education, including safety guidelines and usage requirements. Equipment is serviced only by personnel trained in the maintenance and operation of equipment. 11.5.2.1 (NFPA 99)				
K927	**Gas Equipment – Transfilling Cylinders** Transfilling of oxygen from one cylinder to another is in accordance with CGA P-2.5, *Transfilling of High Pressure Gaseous Oxygen Used for Respiration*. Transfilling of any gas from one cylinder to another is prohibited in patient care rooms. Transfilling to liquid oxygen containers or to portable containers over 50 psi comply with conditions under 11.5.2.3.1 (NFPA 99). Transfilling to liquid oxygen containers or to portable containers under 50 psi comply with conditions under 11.5.2.3.2 (NFPA 99). 11.5.2.2 (NFPA 99)				

ID PREFIX		MET	NOT MET	N/A	REMARKS
K928	**Gas Equipment – Labeling Equipment and Cylinders** Equipment listed for use in oxygen-enriched atmospheres are so labeled. Oxygen metering equipment and pressure reducing regulators are labeled "OXYGEN-USE NO OIL". Flowmeters, pressure reducing regulators, and oxygen-dispensing apparatus are clearly and permanently labeled designating the gases for which they are intended. Oxygen-metering equipment, pressure reducing regulators, humidifiers, and nebulizers are labeled with name of manufacturer or supplier. Cylinders and containers are labeled in accordance with CGA C-7. Color coding is not utilized as the primary method of determining cylinder or container contents. All labeling is durable and withstands cleaning or disinfecting. 11.5.3.1 (NFPA 99)				
K929	**Gas Equipment – Precautions for Handling Oxygen Cylinders and Manifolds** Handling of oxygen cylinders and manifolds is based on CGA G-4, Oxygen. Oxygen cylinders, containers, and associated equipment are protected from contact with oil and grease, from contamination, protected from damage, and handled with care in accordance with precautions provided under 11.6.2.1 through 11.6.2.4 (NFPA 99). 11.6.2 (NFPA 99)				
K930	**Gas Equipment – Liquid Oxygen Equipment** The storage and use of liquid oxygen in base reservoir containers and portable containers comply with sections 11.7.2 through 11.7.4 (NFPA 99). 11.7 (NFPA 99)				
K931	**Hyperbaric Facilities** All occupancies containing hyperbaric facilities comply with construction, equipment, administration, and maintenance requirements of NFPA 99. Chapter 14 (NFPA 99)				
K932	**Features of Fire Protection – Other** List in the REMARKS section any NFPA 99 Chapter 15 Features of Fire Protection requirements that are not addressed by the provided K-Tags, but are deficient. This information, along with the applicable Life Safety Code or NFPA standard citation, should be included on Form CMS-2567. Chapter 15 (NFPA 99)				

ID PREFIX		MET	NOT MET	N/A	REMARKS
K933	**Features of Fire Protection – Fire Loss Prevention in Operating Rooms** Periodic evaluations are made of hazards that could be encountered during surgical procedures, and fire prevention procedures are established. When flammable germicides or antiseptics are employed during surgeries utilizing electrosurgery, cautery or lasers: • packaging is non-flammable. • applicators are in unit doses. • Preoperative "time-out" is conducted prior the initiation of any surgical procedure to verify: o application site is dry prior to draping and use of surgical equipment. o pooling of solution has not occurred or has been corrected. o solution-soaked materials have been removed from the OR prior to draping and use of surgical devices. o policies and procedures are established outlining safety precautions related to the use of flammable germicide or antiseptic use. Procedures are established for operating room emergencies including alarm activation, evacuation, equipment shutdown, and control operations. Emergency procedures include the control of chemical spills, and extinguishment of drapery, clothing and equipment fires. Training is provided to new OR personnel (including surgeons), continuing education is provided, incidents are reviewed monthly, and procedures are reviewed annually. 15.13 (NFPA 99)				

Category Definitions:

4.1* Building System Categories. Building systems in health care facilities shall be designed to meet system Category 1 through Category 4 requirements as detailed in this code.

A.4.1 *Four levels of systems categories are defined in this code, based on the risks to patients and caregivers in the facilities. The categories are as follows:*
(1) Category 1: Systems are expected to work or be available at all times to support patient needs.
(2) 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.
(3) 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.
(4) Category 4: Such systems have no impact on patient care and would not be noticeable to patients in the event of failure.
The category definitions apply to equipment operations and are not intended to consider intervention by caregivers or others. Potential examples of areas/systems and their categories of risk follow. A risk assessment should be conducted to evaluate the risk to the patients, staff, and visitors.
(1) Ambulatory surgical center, two patients with full OR services, Category 1
(2) Reconstructive surgeon's office with general anesthesia, Category 1
(3) Procedural sedation site for outpatient services, Category 2
(4) Cooling Towers in Houston, TX, Category 2
(5) Cooling Towers in Seattle, WA, Category 3
(6) Dental office, no general anesthesia, Category 3
(7) Typical doctor's office/exam room, Category 4
(8) Lawn sprinkler system, Category 4

Category Definitions:

Category 1:

4.1.1* Category 1. Facility systems in which failure of such equipment or system is likely to cause major injury or death of patients or caregivers shall be designed to meet system Category 1 requirements as defined in this code.

A.4.1.1 *Major injury can include the following:*
(1) Any amputation
(2) Loss of the sight of an eye (whether temporary or permanent)
(3) Chemical or hot metal burn to the eye or any penetrating injury to the eye
(4) Any injury that results in electric shock and electric burns leading to unconsciousness and that requires resuscitation or admittance to a hospital for 24 hours or more
(5) Any other injury leading to hypothermia, heat induced illness, or unconsciousness requiring resuscitation or admittance to a hospital for 24 hours or more
(6) Loss of consciousness caused by asphyxia or lack of oxygen or exposure to a biological agent or harmful substance
(7) Absorption of any substance by inhalation, skin, or ingestion causing loss of consciousness or acute illness requiring medical treatment
(8) Acute illness requiring medical treatment where there is reason to believe the exposure was to biological agents, its toxins, or infected materials

4.1.2* Category 2. Facility systems in which failure of such equipment is likely to cause minor injury to patients or caregivers shall be designed to meet system Category 2 requirements as defined in this code.

A.4.1.2 *Aminor injury means not serious or involving risk of life.*

4.1.3 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, shall be designed to meet system Category 3 requirements as defined in this code.

4.1.4 Category 4. Facility systems in which failure of such equipment would have no impact on patient care shall be designed to meet system Category 4 requirements as defined in this code.

Risk Assessment:

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

A.4.2 *Risk assessment should follow procedures such as those outlined in ISO/IEC 31010, Risk Management—Risk Assessment Techniques, NFPA 551, Guide for the Evaluation of Fire Risk Assessments, Guide for the Evaluation of Fire Risk Assessments, SEMI S10-0307E, Safety Guideline for Risk Assessment and Risk Evaluation Process, or other formal process. The results of the assessment procedure should be documented and records retained.*

Tentative Interim Amendment

NFPA® 99

Health Care Facilities Code

2012 Edition

Reference: 5.1.1.6, 5.2.1.2, and 5.3.1.1.2
TIA 12-4
(SC 13-3-8/TIA Log #1084)

Pursuant to Section 5 of the NFPA *Regulations Governing the Development of NFPA Standards*, the National Fire Protection Association has issued the following Tentative Interim Amendment to NFPA 99, *Health Care Facilities Code*, 2012 edition. The TIA was processed by the Technical Committee on Piping Systems and the Correlating Committee on Health Care Facilities, and was issued by the Standards Council on March 7, 2013, with an effective date of March 27, 2013.

A Tentative Interim Amendment is tentative because it has not been processed through the entire standards-making procedures. It is interim because it is effective only between editions of the standard. A TIA automatically becomes a public input of the proponent for the next edition of the standard; as such, it then is subject to all of the procedures of the standards-making process.

1. Revise 5.1.1.6 to read as follows:

5.1.1.6 The following subsections of this chapter shall apply to the operation, management, and maintenance of Category 1 medical gas and vacuum systems in existing facilities:

(1) 5.1.2
(2) 5.1.3.1
(3) 5.1.3.2
(4) 5.1.3.3.1.7
(5) 5.1.3.3.1.8
(6) 5.1.3.3.4
(7) 5.1.3.6.2
(8) 5.1.3.8.5.2
(9) 5.1.14
(10) 5.1.15

2. Revise 5.2.1.2 to read as follows:

5.2.1.2 The following subsections of this chapter shall apply to the operation, management, and maintenance of Category 2 medical gas and vacuum systems in existing health care facilities:

(1) 5.1.3.3.1.7
(2) 5.1.3.3.1.8
(3) 5.1.3.3.4
(4) 5.1.3.6.2
(5) 5.1.3.8.5.2
(6) 5.1.10.11.7.1
(7) 5.2.3.1
(8) 5.2.3.2

(9) 5.2.3.5(2)
(10) 5.2.3.6(2)
(11) 5.2.3.7(2)
(12) 5.2.13
(13) 5.2.14

3. Revise 5.3.1.1.2 to read as follows:

5.3.1.1.2 The following subsections of this chapter shall apply to the operation, management, and maintenance of Category 3 medical gas and vacuum systems in existing health care facilities:

(1) 5.3.1.5
(2) 5.3.1.6
(3) 5.3.2
(4) 5.3.6.19.4
(5) 5.3.6.20.3
(6) 5.3.6.20.4
(7) 5.3.6.20.5
(8) 5.3.6.20.6
(9) 5.3.6.20.7
(10) 5.3.6.20.8
(11) 5.3.6.20.9
(12) 5.3.6.21.14
(13) 5.3.6.23.1.5
(14) 5.3.10
(15) 5.3.12
(16) 5.3.13

Issue Date: March 7, 2013

Effective Date: March 27, 2013

NFPA 99 – TIA 12-4

NFPA 99 5.1.1.6

~~Paragraph 5.1.14.4.3 through 5.1.14.4.9 and 5.1.13 through 5.1.15 shall apply to existing health care facilities.~~

Revised to read as follows:

Category 1

The following subsections of this chapter shall apply to the operation, management, and maintenance of Category 1 medical gas and vacuum systems in existing facilities:

(1) 5.1.2
(2) 5.1.3.1
(3) 5.1.3.2
(4) 5.1.3.3.1.7
(5) 5.1.3.3.1.8
(6) 5.1.3.3.4
(7) 5.1.3.6.2
(8) 5.1.3.8.5.2
(9) 5.1.14
(10) 5.1.15

5.1.2 Nature of Hazards of Gas and Vacuum Systems. Potential fire and explosion hazards associated with positive pressure gas central piping systems and medical–surgical vacuum systems shall be considered in the design, installation, testing, operation, and maintenance of these systems.

5.1.3.1 Central Supply System Identification and Labeling.

5.1.3.1.1* Containers, cylinders, and tanks shall be designed, fabricated, tested, and marked (stamped) in accordance with regulations of DOT, Transport Canada (TC) Transportation of Dangerous Goods Regulations, or the ASME Boiler and Pressure Vessel Code, "Rules for the Construction of Unfired Pressure Vessels," Section VIII. [55:7.1.5.1]

A.5.1.3.1.1 *Regulations of the U.S. Department of Transportation (formerly U.S. Interstate Commerce Commission) outline specifications for transportation of explosives and dangerous articles (49 CFR 171–190). In Canada, the regulations of the Canadian Transport Commission, Union Station, Ottawa, Ontario, apply.*

5.1.3.1.2 Cylinder contents shall be identified by attached labels or stencils naming the contents in accordance with CGA C-7, Guide to the Preparation of Precautionary Labeling and Marking of Compressed Gas Containers.

5.1.3.1.3 Liquid containers shall have additional product identification visible from all directions with a minimum of 51 mm (2 in.) high letters such as a 360-degree wraparound tape for medical liquid containers.

5.1.3.1.4 Cryogenic liquid containers shall be provided with gas-specific outlet connections in accordance with CGA V-5, Diameter-Index Safety System (Noninterchangeable Low Pressure Connections for Medical Gas Applications), or CGAV-1, Compressed Gas Association Standard for Compressed Gas Cylinder Valve Outlet and Inlet Connections.

5.1.3.1.5 Cylinder and cryogenic liquid container outlet connections shall be affixed in such a manner as to be integral to the valve(s), unremovable with ordinary tools, or so designed as to render the attachment point unusable when removed.

5.1.3.1.6 The contents of cylinders and cryogenic liquid containers shall be verified prior to use.

Labels shall not be defaced, altered, or removed, and connecting fittings shall not be modified.

5.1.3.2 Central Supply System Operations.
5.1.3.2.1 The use of adapters or conversion fittings to adapt one gas-specific fitting to another shall be prohibited.
5.1.3.2.2 Cylinders and containers shall be handled in strict accordance with 11.6.2.
5.1.3.2.3 Only gas cylinders, reusable shipping containers, and their accessories shall be permitted to be stored in rooms containing central supply systems or gas cylinders.
5.1.3.2.4 No flammable materials, cylinders containing flammable gases, or containers containing flammable liquids shall be stored in rooms with gas cylinders.
5.1.3.2.5 If cylinders are wrapped when received, the wrappers shall be removed prior to storage.
5.1.3.2.6 Cylinders without correct markings or whose markings and gas-specific fittings do not match shall not be used.
5.1.3.2.7 Cryogenic liquid storage units intended to supply gas to the facility shall not be used to transfill other liquid storage vessels.
5.1.3.2.8 Care shall be exercised when handling cylinders that have been exposed to freezing temperatures or containers that contain cryogenic liquids to prevent injury to the skin.
5.1.3.2.9 Cylinders containing compressed gases and containers for volatile liquids shall be kept away from radiators, steam piping, and like sources of heat.
5.1.3.2.10 When cylinder valve protection caps are supplied, they shall be secured tightly in place unless the cylinder is connected for use.
5.1.3.2.11 Containers shall not be stored in a tightly closed space.

5.1.3.3.1.7 Cylinders in use and in storage shall be prevented from reaching temperatures in excess of 54°C (130°F).

5.1.3.3.1.8 Central supply systems for nitrous oxide and carbon dioxide using cylinders or portable containers shall be prevented from reaching temperatures lower than the recommendations of the central supply system's manufacturer, but shall never be lower than −29°C (−20°F) or greater than 51.6°C (125°F).

5.1.3.3.4 Storage.
5.1.3.3.4.1 Full or empty medical gas cylinders, when not connected, shall be stored in locations complying with 5.1.3.3.2 through 5.1.3.3.3 and shall be permitted to be in the same rooms or enclosures as their respective central supply systems.
5.1.3.3.4.2 Cylinders, whether full or empty, shall not be stored in enclosures containing motor-driven machinery, with the exception of cylinders intended for instrument air reserve headers complying with 5.1.3.9.5, which shall be permitted to be placed in the same location containing an instrument air compressor when it is the only motor-driven machinery located within the room. Only cylinders intended for instrument air reserve headers complying with 5.1.3.9.5 shall be permitted to be stored in enclosures containing instrument air compressors.

5.1.3.6.2* Uses of Medical Air. Medical air sources shall be connected to the medical air distribution system only and shall be used only for air in the application of human respiration and calibration of medical devices for respiratory application.
A.5.1.3.6.2 *It is the intent that the medical air piping distribution system support only the intended need for breathable air for such items as intermittent positive pressure breathing (IPPB) and long-term respiratory assistance needs, anesthesia machines, and so forth. The system is not intended to be used to provide engineering, maintenance, and equipment needs for general hospital support use. It is the intent that the life safety nature of the medical air be protected by a system dedicated solely for its specific use.*
As a compressed air supply source, a medical air compressor should not be used to supply air for other purposes, because such use could increase service interruptions, reduce service life, and introduce additional opportunities for contamination.

5.1.3.8.5.2 Automatic or manual alternation of producers shall allow division of operating time. If automatic alternation of producers is not provided, the facility staff shall arrange a schedule for manual alternation.

- Medical Air Compressors – (5.1.3.6.3.11 **(B)**)
- Medical Vacuum Pumps – (5.1.3.7.6.2)
- WAGD Vacuum Pumps – (5.1.3.8.5.2)
- Instrument Air Compressors where multiple compressors are used – (5.1.2.9.11.2)

5.1.14* Category 1 Operation and Management.

A.5.1.14 *All cylinders containing compressed gases, such as anesthetic gases, oxygen, or other gases used for medicinal purposes, whether these gases are flammable or not, should comply with the specifications and be maintained in accordance with regulations of the U.S. Department of Transportation.*
Cylinder and container temperatures greater than 52°C (125°F) can result in excessive pressure increase. Pressure relief devices are sensitive to temperature and pressure. When relief devices actuate, contents are discharged.

5.1.14.1 Special Precautions — Patient Gas, Vacuum, WAGD, and Medical Support Gas Systems.

5.1.14.1.1* Piping systems shall not be used for the distribution of flammable anesthetic gases.

A.5.1.14.1.1 *Piping systems for the distribution of flammable gases (e.g., hydrogen, acetylene, natural gas) are outside the scope of this chapter.*

5.1.14.1.2 Piping systems shall not be used as a grounding electrode.

5.1.14.1.3* Liquid or debris shall not be introduced into the medical–surgical vacuum or WAGD systems for disposal.

A.5.1.14.1.3 *Vacuum systems from station inlets to the exhaust discharge should be considered contaminated unless proven otherwise. Methods exist to disinfect the system or portions thereof.*
Clogging of regulators, for example, with lint, debris, or dried body fluids, reduces vacuum system performance.

5.1.14.1.4* The medical–surgical vacuum and WAGD systems shall not be used for nonmedical applications (e.g., vacuum steam condensate return).

A.5.1.14.1.4 *Other examples of prohibited use of medical–surgical vacuum would be scope cleaning, decontamination, and laser plume.*

5.1.14.2 Maintenance of Medical Gas, Vacuum, WAGD, and Medical Support Gas Systems.

5.1.14.2.1* General. Health care facilities with installed medical gas, vacuum,WAGD, or medical support gas systems, or combinations thereof, shall develop and document periodic maintenance programs for these systems and their subcomponents as appropriate to the equipment installed.

A.5.1.14.2.1 *The facility should retain a written or an electronic copy of all findings and any corrections performed.*

5.1.14.2.2 Maintenance Programs.

5.1.14.2.2.1 Inventories. Inventories of medical gas, vacuum, WAGD, and medical support gas systems shall include at least all source subsystems, control valves, alarms, manufactured assemblies containing patient gases, and outlets.

5.1.14.2.2.2* Inspection Schedules. Scheduled inspections for equipment and procedures shall be established through the risk assessment of the facility and developed with consideration of the original equipment manufacturer recommendations and other recommendations as required by the authority having jurisdiction.

A.5.1.14.2.2.2 *In addition to the minimum inspection and testing in 5.1.14, facilities should consider annually inspecting equipment and procedures and correcting any deficiencies.*

5.1.14.2.2.3 Inspection Procedures. The facility shall be permitted to use any inspection procedure(s) or testing methods established through its own risk assessment.

5.1.14.2.2.4 Maintenance Schedules. Scheduled maintenance for equipment and procedures shall be established through the risk assessment of the facility and developed with consideration of the original equipment manufacturer recommendations and other recommendations as required by the authority having jurisdiction.

5.1.14.2.2.5 Qualifications. Persons maintaining these systems shall be qualified to perform these operations.Appropriate qualification shall be demonstrated by any of the following:

(1) Training and certification through the health care facility by which such persons are employed to work with specific equipment as installed in that facility

(2) Credentialing to the requirements of ASSE 6040, Professional Qualification Standard for Medical Gas Maintenance Personnel

(3) Credentialing to the requirements of ASSE 6030, Professional Qualification Standard for Medical Gas Systems Verifiers

5.1.14.2.3 Inspection and Testing Operations.
5.1.14.2.3.1 General. The elements in 5.1.14.2.2.2 through 5.1.15 shall be inspected or tested as part of the maintenance program as follows:

(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
A.5.1.14.2.3.1(1) *Additional inspections for medical air sources include the following:*
(1) Aftercoolers (condition, operation of automatic drains)
(2) Operating pressures (cut-in, cut-out, and control pressures)
(3) Electrical operation
(4) Receiver elements (auto drain, manual drain, sight glass, pressure gauge)
(5) Pressure regulators (condition)
(6) Dryer (operation, outlet dew point, condition, housekeeping)
(7) Dew point calibration
(8) Housekeeping around compressors

(2)*Medical vacuum source — exhaust location
(3) WAGD source — exhaust location
A.5.1.14.2.3.1(2) *Additional inspections for medical vacuum sources and WAGD sources include the following:*
(1) Operating vacuum (cut-in, cut-out, and control pressures)
(2) Electrical operation
(3) Receiver elements (manual drain, sight glass, vacuum gauge)
(4) Housekeeping around pump

(4)*Instrument air source — filter condition
A.5.1.14.2.3.1(4) *Additional inspections for instrument air sources include the following:*
(1) Aftercoolers (condition, operation of drains)
(2) Operating pressures (cut in, cut out, and control pressures)
(3) Electrical operation
(4) Receiver elements (auto drain, manual drain, sight glass, pressure gauge)
(5) Pressure regulators (condition)
(6) Housekeeping around compressors

(5)*Manifold sources (including systems complying with 5.1.3.5.10, 5.1.3.5.11, 5.1.3.5.12, and 5.1.3.5.13), as follows:
(a) Ventilation
(b) Enclosure labeling
A.5.1.14.2.3.1(5) *Additional inspections for manifold sources include the following:*
(1) Cylinder leads (condition)
(2) Cascade (switching from one header to another)
(3) Source valve (labeling)
(4) Relief valves (discharge location and condition)
(5) Leaks
(6) Security (door or gate locks and signage)
(7) Housekeeping around manifolds

(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
A.5.1.14.2.3.1(8) *Additional inspections for zone valves include the following:*
(1) Locations (relationship to terminals controlled)
(2) Leaks
(3) Labeling
(4) Housekeeping around alarm

(9)*Alarms and warning systems—lamp and audio operation
A.5.1.14.2.3.1(9) *Additional inspections for alarms include the following:*
(1) Dew point monitor (operation and calibration)
(2) Carbon monoxide monitor (operation and calibration)
(3) All local alarms on medical air, vacuum, WAGD, manifolds, medical support gas sources (verify presence of required alarms, perform electrical test, test lag alarm)
(4) Locations (visible to staff)
(5) Housekeeping around alarms

(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
A.5.1.14.2.3.1(11) *An additional inspection for station outlets/inlets is a general condition (noninterchangeable indexing).*

5.1.14.2.3.2 Manufactured Assemblies Employing Flexible Connection(s) Between the User Terminal and the Piping System.

(A) Nonstationary booms and articulating assemblies, other than head walls utilizing flexible connectors, shall be tested for leaks, per manufacturer's recommendations, every 18 months or at a duration as determined by a risk assessment.

(B) The system pressure to nonstationary booms and articulating arms shall be maintained at operating pressure until each joint has been examined for leakage by effective means of leak detection that is safe for use with oxygen.

(C) Safe working condition of the flexible assemblies shall be confirmed.

(D) D.I.S.S. connectors internal to the boom and assemblies shall be checked for leakage.

(E) Leaks, if any, shall be repaired (if permitted), or the components replaced (if required), and the equipment retested prior to placing the equipment back into service.

(F) Additional testing of nonstationary booms or articulating arms shall be performed at intervals defined by documented performance data.

5.1.14.3 Medical Gas and Vacuum Systems Information and Warning Signs.
5.1.14.3.1 The gas content of medical gas and vacuum piping systems shall be labeled in accordance with 5.1.11.1.
5.1.14.3.2 Labels for shutoff valves shall be in accordance with 5.1.11.2 and updated when modifications are made changing the areas served.
5.1.14.4 Medical Gas and Vacuum Systems Maintenance and Record Keeping. See B.5.2.
5.1.14.4.1 Permanent records of all tests required by 5.1.12.3.1 through 5.1.12.3.14 shall be maintained in the organization's files.
5.1.14.4.2 The supplier of the bulk cryogenic liquid system shall, upon request, provide documentation of vaporizer(s) sizing criteria to the facility.
5.1.14.4.3 An annual review of bulk system capacity shall be conducted to ensure the source system has sufficient capacity.

5.1.14.4.4 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.
5.1.14.4.5 A periodic testing procedure for nonflammable medical gas and vacuum and related alarm systems shall be implemented.
5.1.14.4.6 Whenever modifications are made that breach the pipeline, any necessary installer and verification test specified in 5.1.12 shall be conducted on the downstream portions of the medical gas piping system.
5.1.14.4.7 Procedures, as specified, shall be established for the following:
(1) Maintenance program for the medical air compressor supply system in accordance with the manufacturer's recommendations
(2) Facility testing and calibration procedure that ensures carbon monoxide monitors are calibrated at least annually or more often if recommended by the manufacturer
(3) Maintenance program for both the medical–surgical vacuum piping system and the secondary equipment attached to medical–surgical vacuum station inlets to ensure the continued good performance of the entire medical–surgical vacuum system
(4) Maintenance program for the WAGD system to ensure performance

5.1.14.4.8 Audible and visual alarm indicators shall meet the following requirements:
(1) They shall be periodically tested to determine that they are functioning properly.
(2) Records of the test shall be maintained until the next test is performed.
5.1.14.4.9 Medical–surgical vacuum station inlet terminal performance, as required in 5.1.12.3.10.4, shall be tested as follows:
(1) On a regular preventive maintenance schedule as determined by the facility maintenance staff
(2) Based on flow of free air (Nl/min or SCFM) into a station inlet while simultaneously checking the vacuum level

5.1.15* Category 1 Maintenance. Facilities shall have a routine maintenance program for their piped medical gas and vacuum systems.

A.5.1.15 *Medical gas and vacuum systems should be surveyed at least annually for the items that follow and deficient items corrected.*

Survey of medical air and instrument air sources *should include, but not be limited to, the following:*
(1) Dew point monitor (operation and calibration)
(2) Carbon monoxide monitor (medical air only) (operation and calibration)
(3) Aftercoolers (condition, operation of drains)
(4) Operating pressures (cut-in, cut-out, and control pressures)
(5) All local alarms (verify presence of required alarms, perform electrical test, test lag alarm)
(6) Receiver elements (auto drain, manual drain, sight glass, pressure gauge)
(7) Filters (condition)
(8) Pressure regulators (condition, output pressure)
(9) Source valve (labeling)
(10) Intake (location and condition)
(11) Housekeeping around compressors

Survey of the medical vacuum and the WAGD source(s) *should include, but not be limited to, the following:*
(1) Operating vacuum (cut-in, cut-out, and control pressures)
(2) All local alarms (verify presence of required alarms, perform electrical test, test lag alarm)
(3) Receiver elements (manual drain, sight glass, vacuum gauge)
(4) Source valve (labeling)
(5) Exhaust (location and condition)
(6) Housekeeping around pump

Survey of the medical gas manifold source(s) *should include, but not be limited to, the following:*
(1) Number of cylinders (damaged connectors)
(2) Cylinder leads (condition)
(3) Cascade (switching from one header to another)
(4) All local alarms (verify presence of required alarms, perform electrical test, test all alarms)
(5) Source valve (labeling)
(6) Relief valves (discharge location and condition)
(7) Leaks
(8) Security (door or gate locks and signage)
(9) Ventilation (general operation, housekeeping)
(10) Housekeeping around manifolds

Survey of medical gas area alarms *should include, but not be limited to, the following:*
(1) Locations (visible to staff)
(2) Signals (audible and visual, use test function)
(3) Activation at low pressure
(4) Housekeeping around alarm

Survey of medical gas master alarms *should include, but not be limited to, the following:*
(1) Locations (visible to appropriate staff)
(2) Signals (audible and visual, use test function)
(3) Activation at low pressure
(4) Housekeeping around alarm

Survey of zone valves *should include, but not be limited to, the following:*
(1) Locations (relationship to terminals controlled)
(2) Leaks
(3) Labeling
(4) Housekeeping around alarm

Survey of medical gas outlet/inlets *should include, but not be limited to, the following:*
(1) Flow and function
(2) Latching/delatching
(3) Leaks
(4) General condition (noninterchangeable indexing)
The facility should retain a written or an electronic copy of all findings and any corrections performed.

Category 2

5.2.1.2 The following subsections of this chapter shall apply to the operation, management, and maintenance of Category 2 medical gas and vacuum systems in existing health care facilities:
(1) 5.1.3.3.1.7
(2) 5.1.3.3.1.8
(3) 5.1.3.3.4
(4) 5.1.3.6.2
(5) 5.1.3.8.5.2

(6) 5.1.10.11.7.1
5.1.10.11.7.1 *Two or more medical gas or vacuum piping systems shall not be interconnected for installation, testing, or any other reason.*
(7) 5.2.3.1 *– refers back to Category 1 requirements*
(8) 5.2.3.2 *– refers back to Category 1 requirements*
(9) 5.2.3.5(2)
(2) The facility staff shall develop their emergency plan to deal with the loss of medical air.
(10) 5.2.3.6(2)
(2) The facility staff shall develop their emergency plan to deal with the loss of medical–surgical vacuum.
(11) 5.2.3.7(2)
(2) The facility staff shall develop their emergency plan to deal with the loss of WAGD.
(12) 5.2.13 *– refers back to Category 1 requirements*
(13) 5.2.14*– doesn't directly refer back to Category 1 requirements however, when you go to the corresponding annex reference (A5.2.14) it lists all of the exact same requirements as in A5.1.15.*

Category 3

5.3.1.1.2 The following subsections of this chapter shall apply to the operation, management, and maintenance
of Category 3 medical gas and vacuum systems in existing health care facilities:
(1) 5.3.1.5
(2) 5.3.1.6
(3) 5.3.2
(4) 5.3.6.19.4
(5) 5.3.6.20.3
(6) 5.3.6.20.4
(7) 5.3.6.20.5
(8) 5.3.6.20.6
(9) 5.3.6.20.7
(10) 5.3.6.20.8
(11) 5.3.6.20.9
(12) 5.3.6.21.14
(13) 5.3.6.23.1.5
(14) 5.3.10
(15) 5.3.12
(16) 5.3.13

5.3.1.5* Deep sedation and general anesthesia shall not be permitted to be administered when using a Category 3 medical gas system.
A.5.3.1.5 *Category 3 medical gas systems are intended to be used where minimal or moderate sedation is administered. Deep sedation and general anesthesia are not allowed in Category 3; therefore,WAGD is not required. (See Scavenging, 5.3.8.)*

5.3.1.6 An existing Category 3 system that is not in strict compliance with the requirements of this code shall be permitted to continue in use as long as the authority having jurisdiction has determined that such use does not constitute a distinct hazard to life.
5.3.6.19.4 A remotely activated shutoff valve at a supply manifold shall not be used for emergency shutoff. For clinical purposes, such a remote valve actuator shall not fail-closed in the event of a loss of electric power. Where remote actuators are the type that fail-open, it shall be mandatory that cylinder shutoff valves be closed whenever the system is not in use.

5.3.6.20.3 Enclosures shall serve no purpose other than to contain the medical gas source equipment (oxygen and nitrous oxide), except that nitrogen source equipment in 5.3.7.7 and compressed air cylinders in 5.3.7.6 shall be permitted in the enclosure.
5.3.6.20.4 Storage of full or empty gas cylinders, or both, shall be permitted in the same enclosure.
5.3.6.20.5 Air compressors, vacuum pumps, and other equipment shall not be located in enclosures for medical gas cylinders (oxygen and nitrous oxide source equipment).
5.3.6.20.6 If enclosures are outdoors or remote from the treatment facilities that they serve, they shall be kept locked.
5.3.6.20.7 Cylinders in use and in storage shall be prevented from reaching temperatures in excess of 54°C (130°F). Nitrous oxide cylinders shall be prevented from reaching temperatures lower than −7°C (20°F).
5.3.6.20.8 Only gas cylinders, reusable shipping containers, and their accessories shall be permitted to be stored in rooms containing central supply systems or gas cylinders.
5.3.6.20.9 No flammable materials, cylinders containing flammable gases, or containers containing flammable liquids shall be stored in rooms with gas cylinders.
5.3.6.21.14 Where the source equipment is not remote and is accessible from a single treatment facility served and an "in use" bank is unable to supply the system, the manifold shall be manually (or automatically) switched to the secondary bank.
5.3.6.23.1.5 All documentation pertaining to inspections and testing shall be maintained on-site within the facility.
5.3.10 Compressed Gas Cylinders and Containers.
5.3.10.1 Only cylinders and containers constructed, tested, and maintained in accordance with U.S. Department of Transportation specifications and regulations shall be permitted to be used.
5.3.10.2 Cylinder contents shall be identified by attached labels or stencils naming the contents in accordance with CGA C-7, Guide to the Preparation of Precautionary Labeling and Marking of Compressed Gas Containers.
5.3.10.3 The contents of cylinders and containers shall be verified prior to use.
5.3.10.4 Labels shall not be defaced, altered, or removed, and connecting fittings shall not be modified.

5.3.12* System Use and Instructions.

A.5.3.12 *When the storage/supply enclosure is remote from the single treatment facility, it should be locked for security reasons to prevent tampering. Access should be via only authorized staff or fire department. When the enclosure is within the single treatment facility, it is left to the discretion of the single treatment facility management as to whether greater benefit is achieved by immediate access or by security. An enclosure with direct access from a public hallway should be locked. If the door to the enclosure opens onto an exit access corridor, see Figure A.5.3.12.*

5.3.12.1 Prohibited System Interconnections.

5.3.12.1.1 Two or more systems for Category 3 medical gas, gas-powered device gas, or vacuum and scavenging shall not be interconnected for testing or any other reason.

5.3.12.1.2 Leak testing shall be accomplished by separately charging and testing each individual piping system.

5.3.12.2 Changes in System Use.

5.3.12.2.1 Where a Category 3 positive pressure gas piping distribution system originally used or constructed for use at one pressure, or for one gas, is converted for operation at another pressure, or for another gas, all provisions and requirements of Section 5.3 shall apply.

5.3.12.2.2 Piping for Category 3 gas-powered devices or Category 3 vacuum shall not be permitted to be converted for use as a Category 3 medical gas piping system for oxygen or nitrous oxide.

5.3.12.3 System and Equipment Manufacturer's Instructions.

5.3.12.3.1 The installation of individual components shall be made in accordance with the system or equipment manufacturer's instructions.

5.3.12.3.2 Such instructions shall include directions and information deemed necessary by the manufacturer for attaining proper operation, testing, and maintenance of the system.

5.3.12.3.3 Copies of the manufacturer's instructions shall be left with the system owner.

5.3.13 Operation and Management of Category 3 Systems.
5.3.13.1 Precautions for handling cylinders shall be in accordance with Chapter 11.
5.3.13.2 Special Precautions for the Use of Category 3 Gas and Vacuum Piping Systems.
5.3.13.2.1 Category 3 gas piping systems shall not be used for the distribution of flammable anesthetic gases.
5.3.13.2.2 Piping systems for Category 3 gases shall not be used as grounding electrodes.
5.3.13.2.3 Category 3 vacuum piping shall not be used for vacuum steam condensate return or other nonmedical vacuum applications.
5.3.13.2.4 Every Category 3 facility shall establish a procedure for manually turning off the gas supply at the cylinder valves at the end of each work day.
5.3.13.2.5 Emergency shutoff valves or remote actuators shall not be used to turn off the gas supply at the end of the work day.
5.3.13.3 Category 3 Gas and Vacuum Systems Identification and Warning Signs. The labeling and identification of Category 3 gas and vacuum systems shall comply with the requirements of 5.3.11.
5.3.13.4 Category 3 Gas and Vacuum Systems Maintenance and Record Keeping.
5.3.13.4.1 Permanent records of all tests required by Section 5.3 shall be maintained on-site in the organization's files.
5.3.13.4.2 A periodic testing procedure for Category 3 gas and vacuum systems and related alarm systems shall be implemented.
5.3.13.4.3 Whenever modifications are made that breach the pipeline, any necessary installer and verification test specified in 5.3.9 shall be conducted on the downstream portions of the medical gas piping system.
5.3.13.4.4 A maintenance program shall be established for the following:
(1) Relief valves in accordance with applicable codes or manufacturer's recommendation
(2) Drive gas supply system in accordance with manufacturer's recommendations
(3) Vacuum source equipment and accessories in accordance with manufacturer's recommendations
(4) Vacuum piping system and the secondary equipment attached to vacuum station inlets to ensure the continued good performance of the entire vacuum system
(5) Scavenging systems to ensure performance

5.3.13.4.5 An audible and visual alarm indicator(s) shall meet the following requirements:
(1) It shall be periodically tested to determine that it is functioning properly.
(2) The records of the test shall be maintained until the next test is performed.

NATIONAL FIRE PROTECTION ASSOCIATION

The leading information and knowledge resource on fire, electrical and related hazards

Medical Gas Cylinder Storage

MEDICAL GAS CYLINDER STORAGE

There are two types of hazards associated with medical gas equipment: general fire and explosions, and mechanical issues such as physical damage to compressed gas cylinders.

Fire and explosions can be caused by incidents involving oxygen, which is the most common gas used in health care facilities, and nitrous oxide, which is used frequently as an inhalation anesthetic. These gases are oxidizers that, when present in sufficient quantity and concentration, form one side of the "fire triangle." When the other two sides of the triangle (heat and fuel) are added, fire and/or explosion can result. The hazard is intensified because many materials commonly available in health care facilities that are not flammable in normal room air become flammable (or extremely flammable) when the concentration of oxygen is raised above that in room air. Nitrous oxide is not an oxidizer at room temperature, but it dissociates and forms oxygen under elevated temperatures that might be present during a fire.

Compressed gas cylinders that sustain mechanical damage can also be a hazard. Gases inside cylinders are generally under high pressures, and the cylinders often have significant weight. The cylinders can cause injuries directly due to their weight and inertia. Damage to the regulators or valves attached to a cylinder can allow the escaping gas to violently propel the cylinder in a dangerous manner. The pin-index safety system and gas regulators can also suffer physical damage and cause hazards to patients if the wrong gas is delivered.

This document is provided to help identify the requirements of NFPA 99 that address the storage and handling of medical gas cylinders in a health care facility.

GAS CYLINDER STORAGE

Greater than 3000 ft³. These locations must include the following:

- Access to move cylinders and equipment on hand trucks
- Lockable doors or gates
- Minimum of two entries/exits (if outdoors)
- Enclosure of noncombustible construction (if outdoors)
- Interior finishes of noncombustible or limited combustible material (if indoors)
- Walls and floors with one-hour fire resistance rating, and other openings with ¾-hour fire protection rating (if indoors)
- Compliance with NFPA 70 for ordinary locations
- Heated by indirect means
- Racks, chains, or other fastenings to secure cylinders from falling

NOTE: this document is only intended to provide an overview of specific requirements or an individual topic. It does not include all of the requirements for every possible scenario and should not be used in place of the code or standard.

- Electrical power from the essential electrical system
- Racks, shelves, and supports of noncombustible or limited-combustible material
- Electrical devices protected from physical damage
- Access for delivery vehicles and management of cylinders
- Regulation of temperature (less than 125°F; over 20°F for nitrous oxide and carbon dioxide)
- Ventilation (see page X)
- Prohibition of motor-driven machinery

Between 300 ft3 and 3000 ft3.

These locations must be outdoors or in an interior enclosure of non-combustible or limited combustible construction. Indoor locations must include the following:

- Restriction of oxidizing gases from being stored with any flammable gas, liquid, or vapor
- Separation of oxidizing gases from combustibles or flammables by:
  - A minimum distance of 20 ft
  - A distance of 5 ft where the entire storage location is sprinklered
  - A gas cabinet constructed per NFPA 30
- Ventilation (see page X)
- Regulation of temperatures
- Appropriate restraints
- Cylinder valve protection caps

Less than 300 ft3.

- Cylinders containing this volume are not required to be stored in an enclosure
- Precautions for handling the cylinders must still be observed

SPECIAL CONSIDERATIONS/PRECAUTIONS FOR CYLINDER STORAGE

- Small-size cylinders (A, B, D, or E) that are "in use" are not considered to be in storage
- Cylinders that are "in use" must be attached to a cylinder stand or to medical equipment designed to receive and hold cylinders
- Small-size cylinders that are available for immediate use are not considered to be in storage
- Cylinders cannot be chained to portable or moveable apparatus
- Storage must be planned so that cylinders can be used in the order which they are received
- Where empty and full cylinders are stored together, empty cylinders must be segregated from full cylinders
- For cylinders that have an internal pressure gauge, the facility needs to establish a pressure at which the cylinder will be considered empty
- Empty cylinders must be marked
- Cylinders stored in the open (outdoors) need to be protected from weather extremes

SIGNS

Precautionary signs must meet the following requirements:

- Be displayed on each door or gate of the storage room or enclosure
- Be readable from a distance of 5 ft
- Include the following language at a minimum:

CAUTION:
OXIDIZING GAS(ES) STORED WITHIN
NO SMOKING

- If the facility does not prohibit smoking, additional precautionary signs indicating where oxygen is being administered must be provided
- If the facility does prohibit smoking and signs are prominently spaced at all major entrances, the additional signage is not required

---

Typical Volume (ft3) of Medical Gas Cylinders for Select Medical Gases

		Name of Gas			
Cylinder Style and Dimension	Nominal Volume (in.3)	Medical Air	Carbon Dioxide	Nitrous Oxide	Oxygen
B 3 ½ in. O.D. X 13 in.	87		13		7
D 4 ¼ in. O.D. X 17 in.	176	13	33	33	14
E 4 ¼ in. O.D. X 26 in.	293	22	56	56	23
M 7 in. O.D. X 43 in.	1337	101	267	267	122
G 8 ½ in. O.D. X 51 in.	2370	178	434	487	211
H or K 9 ¼ in. O.D. X 51 in.	2660	231	559	558	244

Source: Values taken from Table A.11.3.1 of NFPA 99, Health Care Facilities Code, 2015 edition.

VENTILATION

Storage rooms are permitted to be provided with natural ventilation or mechanical exhaust. The volume of fluid to be used in determining ventilation is the volume (at STP) of the largest single vessel, or the entire volume of connected vessels on a common manifold, whichever is greater.

Natural ventilation. Natural ventilation must consist of two nonclosable louvered openings. These openings must have the following requirements:

- Each opening must have an opening area of at least 24 in^2/1000 ft^3 of the fluid stored and no less than 72 in^2.
- One opening must be located within 1 ft of the floor, and one must be within 1 ft of the ceiling
- Openings need to be located to ensure cross ventilation
- Openings have to be directly to the outside atmosphere without ductwork

PRECAUTIONS FOR HANDLING CYLINDERS

Handle oxygen cylinders and manifolds based on CGA G-4, Oxygen

Protect from contact with oil and grease

Protect from contamination

Protect from damage

Handle with care

Remove/repair defective equipment

Mechanical ventilation. Mechanical ventilation must include the following:

- Continuous ventilation to maintain negative pressure in the space
- Rate of 1 cfm/5 ft3 of fluid designed to be stored in the space
- No less than 50 cfm
- No more than 500 cfm
- Inlets that are unobstructed and draw from within 1 ft of the floor
- Exhaust fans supplied with power from the essential electrical system
- Dedicated exhaust not required, but the system cannot connect to spaces that contain flammable materials
- Exhaust duct of noncombustible construction
- Make-up air is to be provided by one of the following:
  - Noncombustible ductwork transferred from adjacent spaces, outside, or from spaces that do not include flammable or combustible material
  - A corridor under the door up to 50 cfm or 15 percent the room exhaust per NFPA 90A (whichever is greater)
  - Any building ventilation system that does not contain flammable or combustible vapors

NOTE: Discharge from both mechanical and natural ventilation systems requires minimum separation distances, per NFPA 55, Compressed Gases and Cryogenic Fluids Code.

FAQ'S

Q When is a cylinder considered "empty"?

A NFPA 99 does not define the point where a cylinder is considered empty. All storage requirements are based on the total volume of gas in cylinders being stored. For the purpose of segregating empty cylinders from full, the facility should establish a level of where this delineation would be made. The Joint Commission issued a clarification on this issue which states that for the purposes of segregating cylinders, once one has been opened it is then considered empty regardless of how much of the gas has been used. This is specifically for segregation purposes and does not prevent a facility from having a "partial" cylinder designation. For facilities not accredited by The Joint Commission, NFPA 99 is still silent on this and leaves it to the facility to determine.

Q Can we only have 12 e-cylinders outside of storage throughout a smoke compartment?

A No, up to 300 ft3 (approximately 12-13 e-cylinders) is permitted to be stored within a 22,500 ft2 area without requiring to be in a special storage location. Cylinders that are "in-use" or available for immediate use do not need to be included in this determination. While 22,500 ft2 is the maximum allowed size for a smoke compartment per NFPA 101, Life Safety Code, it is worth noting that NFPA 99 does not use that terminology. Realistically, this has been applied per smoke compartment in the field.

Q What is the difference between the requirements for segregating empty cylinders and marking empty cylinders?

A NFPA 99 does not make this delineation very clear. The intent however is that segregation be specific to when both empty and full cylinders are stored within the same enclosure, they be clearly separated. This would allow a staff member to be able to quickly identify which cylinders are full and suitable for use when needed in emergency. Confusion or grabbing an empty cylinder in an emergency when one is needed in a rapid manner could pose a risk to patient safety. Marking empty cylinders is required for the same reason. The question normally centers around whether empty cylinders stored in the same enclosure as full cylinders need to both be marked and segregated. While this could be interpreted from the code language, it is rather the intent that one of the two be done and segregation must be provided when empty and full are stored together. When this is not the case and empty cylinders are kept on their own or have not yet been stored (are out in the open) then they need to be marked in order to avoid confusion in those emergency situations as is intended by the code.