HACKETTSTOWN REGIONAL MEDICAL CENTER
CARDIO PULMONARY POLICY MANUAL
MEDICAL GAS MANAGEMENT AND STORAGE

==========

Effective Date: March 2011 | **Policy No: 2.003**
Cross Referenced: AD101 | **Origin: Cardio Pulmonary**
Reviewed Date: 02/16 | **Authority: Cardio/Pulmonary Manager**
Revised Date: 02/14 | **Page: 1 of 5**

Scope: All members of the Cardio-pulmonary Department.

Purpose: To establish guidelines for the safe storage, handling and dispensing of medical gases throughout the facility.

Labeling and Color Coding:

All cylinders will be placarded with a label as to their contents. Cylinders will be color coded and labeled according to the compressed gas industry standards:

Flammable/ Combustible	Description	Color Code
NO	NF NITROGEN, 255 CU FT *(Note this Item (#R103G2) is a new item number for medical applications only)*	Black
YES	USP NITROUS OXIDE, 65LB	Blue
YES	USP OXYGEN,	Green/silver
YES	USP LIQUID OXYGEN	Green/white collar
NO	USP CARBON DIOXIDE 25 CU FT	Gray
YES	AIR, BREATHING QUALITY	Yellow
NO	HELIUM	BROWN
YES	ETHYLENE	RED
YES	CYCLOPROPANE	ORANGE
YES	OXYGEN/NITROGEN	Green/Black
YES	CARBON DIOXIDE 6% / OXYGEN 94%	Gray top/ Green bottom
YES	HELIUM 80% / OXYGEN 20%	Green top/Brown bottom

These color markings shall be applied to the shoulders of the containers except chromium plated cylinders for Cyclopropane so as to be clearly visible to the anesthetist. Where the marking is to consist of two colors, the pattern shall be such as to permit a sufficient amount of both colors be seen together.

Safety Guidelines:

The Department of Transportation and the Compressed Gas Association offer the following general rules for safe handling of high-pressure gas cylinders:

1. No petroleum-based lubricants should come in contact with cylinder valves, regulators, high-pressure gas hoses, or fittings.
2. Never use open flames to detect leaks, but use solutions of a leak detector or soapy water.
3. Never interchange regulators that are not intended for use with that specific gas or gas blend.
4. Open valves on cylinders or regulators slowly to allow dissipation of heat. Valves should be opened fully for use.

5. Unlabeled cylinders should be returned to the vendor.
6. Cylinders should not be subjected to temperatures exceeding 54.4 degrees C or put in areas with flames or sparks.
7. Do not attempt to modify or repair cylinders.
8. Cylinder valves should remain in the closed position when not in actual operation.
9. Cylinder valve caps (found on larger cylinders) should remain on when in storage or when being transported.
10. Do not drop cylinders, and move them only with suitable carts.
11. Cylinders should be stored in proper holders/carts. They should NEVER be placed on the floor unsecured.

Safety of "E" size tanks:

1. The "E" size tanks that we utilize here at Hackettstown Regional Medical Center come with regulators already attached to the tank. These regulators cannot be removed. They are attached permanently to the tank by the medical gas company to prevent any mixing or mistaken use of incorrect gases. A tank is considered empty when out of the GREEN range, and should then be placed in the 'EMPTY TANKS ONLY' rack. A tank can still be used until the tank reaches 500 psi, or at the beginning of the RED. Tanks housed in the 'FULL TANKS ONLY' rack are in the GREEN range. The "E" cylinder presently utilized is non-magnetic MRI walk- O2- bout and aluminum. The cylinder can be safely scanned under the following conditions: static magnetic field of 3.0 Tesla or less and spatial gradient field of 40mT/ min or less.

2. The non-regulator "E" size oxygen tanks are used only in the Operating Room, Labor and Delivery, and Respiratory Care Departments. In emergency situations, the non-regulator "E" size oxygen tanks may be used in other areas of the Hospital, when necessary.

General Cylinder Storage:

Wherever cylinders of medical gases are stocked by hospitals, doctors or distributors, the question of storage is of great importance. Many cities have local ordinances regulating the storage of medical gases. Persons storing medical gases should be familiar with these ordinances and fully comply with them. In the storage of medical gas cylinders, it is recommended that the rules listed below also are followed:

1. Storage conditions should comply with local and state regulations. The cylinder storage cabinet is NFPA-99 compliant. Storage cabinet should be dry, cool and well ventilated. Where practical, storage cabinet should be fireproof - ours is fire-rated. Storage in sub- surface locations should be avoided.
2. Full and empty cylinders should be stored separately with the storage layout so planned that cylinders comprising of old stock can be removed first with a minimum of handling of other cylinders.
3. Cylinders should be protected against excessive rise of temperature. Do not store cylinders near radiators or other sources of radiant heat. Do not store cylinders near highly flammable substances such as oil, gasoline, waste, etc. Keep sparks and flame away from cylinders.
4. Do not store reserve stocks of cylinders containing flammable gases in the same room with those containing oxygen or nitrous oxide. (It is good practice to include cylinders containing carbon dioxide in the storage room with these containing flammable gases, since carbon dioxide gas is, in itself, a fire extinguisher.)
5. Small cylinders may best be stored in bins - grouped as to various gases or mixture of gases.
6. Large cylinders should be chained or secured on a cart. Large cylinders should never be freestanding.
7. Dot-4L cylinders must be stored in an upright position.
8. Be careful to protect cylinders from any objects that will produce a cut or other abrasion in the surface of the metal. Do not store cylinders in locations where heavy moving objects may strike or fall on them. Where caps are provided for valve protection, such caps should be kept on cylinders in storage.
9. Cylinders may be stored in the open, but in such cases should be protected against

extremes of weather and from the ground beneath to prevent rusting. During winter, cylinders stored in the open should be protected against accumulations of ice or snow. When stored in the open, cylinders should be screened against continuous direct rays of the sun.

10. Cylinders should not be exposed to continuous dampness and should not be stored near corrosive chemicals or fumes. Rusting will damage cylinders and may cause the valve protection caps to stick.
11. Never store cylinders where oil, grease or other readily combustible substances may come in contact with them. Oil and certain gases such as oxygen or nitrous oxide may combine with explosive violence.
12. Cylinders should be protected against tampering by unauthorized individuals.
13. Valves should be kept closed on empty cylinders to avoid entry of atmospheric contaminants.

Specific Storage, Handling and Dispensing of Cylinders:

- Tanks removed from the loading dock will be signed out on the Medical Gas Tank Inventory Control Sheet (see attached). The number of tanks taken must be greater than or equal to the number returned. Materials management will monitor the completion of the Medical Gas Tank Inventory Control Sheet. Every Friday, the Medical Gas Tank Inventory Control Sheet will be sent via interoffice mail to the Cardio-pulmonary Department, Attention Andre.
- Cylinders, kept in their appropriate holders, at ready for immediate patient use are located in the following areas (PCU, Emergency Department, Surgical Breezeway, Anesthesia Room, Vascular Lab, Wound Care Center, and the Cardio-pulmonary Department).
- Cylinders in storage are located on the loading dock.
- The transport department will monitor the number of tanks in the above named locations.
- The transport department will ensure there are enough full tanks and restock the areas as needed from the tanks on the loading dock.
- Transport is also responsible for checking that only one oxygen tank is kept on each stretcher used for transporting patients.
- Correct holders for cylinders located on wheelchairs, stretchers, in wheeled carts and specific cylinder racks.

Bulk Medical Air and Oxygen Testing:

1. The existing bulk medical air and oxygen systems are tested on an annual basis using Joint Commission and NFPA compliance. Annual testing includes piping purity, pressure testing and cross-connection testing. Adjustments are made as needed.

2. Testing of bulk medical air and oxygen is provided by an outside agency whose records meet or exceed Joint Commission requirements.

3. A copy of the report is forwarded to the Biomedical Department, Maintenance Manager and Manager of the Cardio-pulmonary Department.

4. In the event of oxygen shut down, portable oxygen tanks would be provided to patients by the Cardio-pulmonary Department to provide continuous oxygen therapy.

Piped Medical Gas System:
The inspection, testing and maintenance of the critical components of piped medical gas systems are done annually by an outside vendor, under the supervision of the managers of the Maintenance and Cardio-pulmonary Departments.

Maintenance performs a comprehensive checklist 3 times daily. This checklist is kept in a binder in the Maintenance Department. (see attached)

Testing is done on an annual basis, however if the systems are modified or repaired, testing will be done prior to use for patients. Testing will include cross-connection, piping purity testing and pressure testing.

A copy of the report is forwarded to the Biomedical Department, Maintenance Manager and the Cardio-pulmonary Manager, and will be reported at Safety Committee.

An outside contractor provides maintenance of the main supply valve and all shut off valves on an annual basis or, as needed. All piped medical gas systems are accessible and clearly labeled throughout the facility.

Manifold:
Maintenance will maintain the manifold as per NFPA 99.

The manifold system alarms and automatically switches to the full bank. Maintenance is responsible to change the empty bank within 24 hours.

New tanks are ordered for the manifold when the banks are replaced.

Standard EC.7.50 The hospital maintains, tests and inspects its medical gas and vacuum systems.

EP.7.50.1 Medical Gas Test

The hospital inspects, tests, and maintains critical components of piped medical gas systems including master signal panels, area alarms, automatic pressure switches, shutoff valves, flexible connectors, and outlets.

EP.7.50.2 Medical Gas & Vacuum Initial Test

The hospital tests piped medical gas and vacuum systems when the systems are installed, modified, or repaired. The testing is done prior to patient use and includes cross-connection testing, piping purity testing, and pressure testing.

EP.7.50.3 Medical Gas & Vacuum Label

The hospital maintains the main supply valve and area shut-off valves of piped medical gas and vacuum systems to be accessible and clearly labeled.

EC.02.05.09.1 - Medical Gas System Testing
All medical gas systems are maintained and periodically tested to assure system performance by an outside service vendor. Testing and maintenance reports are on file with the Cardio-Pulmonary Department. All testing and inspection is done in accordance with the requirements of the current edition of NFPA 99 and the policies & procedures maintained by that department.

EC.02.05.09.2 - Modifying / Repairing Medical Gas Systems
When a new medical gas system is installed or an existing system is breached for any reason, the Cardio-Pulmonary Manager will coordinate certification of the system by a qualified service provider. The certification testing is done in accordance with the requirements of the current edition of NFPA 99. The Cardio-Pulmonary Manager maintains a permanent record of all certification testing.

EC.02.05.09.3 - Labeling & Accessibility of Medical Gas Controls
The Cardio-Pulmonary Manager is responsible for assuring that all medical gas system control valves and monitoring station are identified appropriately as well as assuring that each monitoring station and valve is accessible. Accessibility is evaluated during scheduled environmental tours. Deficiencies are reported to the appropriate manager for resolution. The Cardio-Pulmonary Manager shall provide proper identification nomenclature to the Facilities Manager such that identification is coordinated with Cardio-Pulmonary records.

Oxygen Shut Off Procedure can be found in Administrative Policy AD101 (Safety Manual) found on the hospital intranet.