Title:	Safe Storage, Handling, Use and Disposal Procedures of Compressed Gas Cylinders
Effective Date:	November 2005
Revision Date:	March 1, 2017
Issuing Authority:	VP, Capital Projects & Facilities
Responsible Officer:	Director Environmental Health and Safety

PURPOSE OF THE POLICY

The purpose of this policy on the safe storage, handling and use of compressed gas cylinders is to provide best practice guidance for the use and storage of compressed gas cylinders. These procedures are to assist employees on information to minimize the hazards associated with this type of equipment.

SCOPE OF THIS POLICY

Serious fire, explosion or rupture accidents may result from the misuse or mishandling of compressed gas cylinders. Observance of the following rules will help control hazards in the storage, handling and use of compressed gas cylinders.

WHO NEEDS TO KNOW THIS POLICY

This policy applies to all New York University academic, commercial and residential facilities utilizing compressed gas cylinders.

Responsibilities:

Department of Environmental Health and Safety

- Responsible for developing and updating the policy
- Work with Facilities, Department Heads, and Lab Managers to ensure proper use and storage
- Enforce compliance with all safety regulations and FDNY regulations

Directors, Department Chairs, and Principal Investigators

- Directors, Chairs, and PIs are responsible for enforcing this policy.
- Periodically review and monitor the effectiveness of safe CGC use and storage.
- Allocate the resources necessary for safe handling, use, and to monitor the program.

Department Managers and Supervisors

- Department Managers and Supervisors ensure staff working with compressed gas cylinders have the appropriate training and understand all aspects of safety associated with this equipment.
- Assure the equipment associated with the movement, storage, and use of compressed gas cylinders is available and properly inspected before being used.
- Ensure all requirements contained in the written policy are in compliance.

Maintenance and Housekeeping Personnel

All compressed gas cylinders should be stored properly and maintained according to this policy.

Complaint Response

Complaints involving improper use and storage or an immediate safety concern should be addressed to Environmental Health and Safety at 8-1450.

POLICY DEFINITIONS

Asphyxiation: To lose consciousness by impairing normal breathing, to suffocate, or smother typically occurring by the displacement of air.

Compressed Gas Association – Organization to promote ever-improving safe, secure, and environmentally responsible manufacture, transportation, storage, filling, and disposal of industrial and medical gases and their containers.

Compressed Gas: According to OSHA Hazard Communication Standard a compressed gas is defined as the following: A gas or mixture of gases having, in a container, an absolute pressure exceeding 40 pounds per square inch (psi) at 70°F (21.1°C) or a gas or mixture of gases having, in a container, an absolute pressure exceeding 104 psi at 130°F (54.4°C) regardless of the pressure at 70°F (21.1° C) A liquid having a vapor pressure exceeding 40 psi at 100°F (37.8°C) as determined by the American Society for Testing and Materials (ASTM) 323-72

Compressed Gas Cylinder: Any portable pressure vessel of 45.4 kg (100 lb) water capacity or less designed to contain a gas or liquid that is authorized for use at gauge pressures over 276 kPa (40 psi) at 21° C (70° F) by the U. S. Department of Transportation (DOT).

Cryogenic liquid: A liquid with a normal boiling point below -130°F (-90°C). Common industrial gases transported, handled and stored in the liquid state at cryogenic temperatures are Argon, Helium, Hydrogen, Nitrogen, and Oxygen.

Cryogenic Storage Dewar: A specialized vacuum flask used for the storage of cryogenic liquids.

Hydrostatic Testing: The FDNY requires all CGCs to be hydrostatically tested every 10 years. A hydrostatic test is an approved way to test the structural integrity of a compressed gas cylinder.

Lecture Bottle: Small compressed gas cylinders typically 12-18 inches long and 1-3 inches in diameter. Used in laboratories working in small quantities of specialty gases.

Oxygen Deficient Atmosphere: An atmosphere containing less than 19.5% oxygen by volume.

Oxygen Sensor: A device that measures the amount of oxygen in the atmosphere.

Pressure Regulator: A control valve that reduces the input pressure of a fluid to a desired value at its output. Regulators are used for gases and liquids.

Safety Relief Device: A device intended to prevent rupture on a cylinder under certain conditions of exposure or release of pressure.

Valve Protective Cap: A rigid, removable cover provided for compressed gas container valve protection.

UNIVERSITY PROCEDURES

Storage of Cylinders:

1. Compressed gas cylinders shall be clearly labeled with a contents stencil or shipping tag at all times. All compressed gas cylinders shall be inspected upon receipt. Damaged or unidentified compressed gas cylinders shall be immediately returned to the supplier.

2. Compressed gas cylinders shall be stored in a safe, dry, well ventilated area. Storage room temperature shall not exceed 130^{o} F (54.4^{o} C).

3. Flammable substances, such as oil or volatile liquids, shall not be stored in the same area as compressed gas cylinders.

4. Compressed gas cylinders should not be exposed to continuous dampness and shall not be stored near corrosive chemicals. Corrosion may damage the cylinders and cause the valve protection cap to be inoperable.

5. Compressed gas cylinders shall not be stored near elevator shaft ways, stairways or other places where they can fall, be knocked down or damaged.

6. Compressed gas cylinders shall not be staged, stored or otherwise located near exits, in stairways or in areas normally used or intended for egress.

7. Compressed gas cylinders shall be stored in an upright position with the valve end up, the valve cap in place and the cylinder chained to the wall or otherwise secured. This protects the vulnerable cylinder valve and prevents the cylinder from falling and becoming a dangerous projectile.

8. Compressed gas cylinder storage shall be planned so that cylinders are used in the order in which they are received from the supplier. Empty cylinders shall be identified and stored separately from full or partially full cylinders.

9. Compressed gas cylinders shall not be stored more than five (5) years from date of delivery. Cylinders should be tagged with the date of delivery, for tracking purposes. Compressed cylinders of corrosive gases shall be recycled to the supplier at least annually.

10. Storage rooms for compressed gas cylinders shall be properly ventilated to prevent the accumulation of fugitive gases in the event of a leak.

11. No source of ignition is permitted and smoking is strictly prohibited in all indoor areas and of course where cylinder gas is stored or in use. NO SMOKING signs shall be posted in areas where cylinder gas is stored or in use.

12. CGCs shall be grouped by classification of gas, and groups arranged to provide compatible storage.

13. Storage of compressed gas cylinders shall be minimized to volumes needed for current usage. Delivery by suppliers should be planned to accommodate routine and special deliveries for academic semesters and research. Excess storage of CGCs is prohibited in order to increase storage safety.

14. Compressed gas cylinders, that are highly toxic, exotic or otherwise not normally used in typical lab or facility operations should be disused with EHS to ensure proper storage and safe use.

Handling Cylinders

1. Compressed gas cylinders are difficult to carry by hand because of their shape, smooth surface and weight. All CGCs shall be transported on a hand truck. They shall not be dropped or permitted to violently strike against each other or other surfaces.

2. Safety devices in valves on the cylinders shall not be tampered with. The valve shall be closed and the valve protection cap replaced when the cylinders are empty or when cylinders are moved from one location to another. Never lift a cylinder by the valve cap.

3. Compressed gas cylinders shall never be left in hallways, aisles or unprotected in laboratories. If the user is not present at the time of the delivery, provisions should be made to secure gas cylinders in a designated location.

Using Cylinders

1. Compressed gas cylinders shall be used in an upright position after the cylinder has been secured by chain or other devise to prevent falling or being knocked over.

2. The metal cap shall be kept in place to protect the valve when the cylinder is not connected for use.

3. Only Compressed Gas Association (CGA) standard combinations of valves and fittings shall be used on compressed gas systems. The possibility of accidentally mixing incompatible gases will be reduced by this safety practice. The threads and condition of cylinder valves, regulators and fittings should be examined prior to connecting new supplies, to ensure that fittings are undamaged and correct for the gas to be connected.

4. Only appropriate tools shall be used on gas valves and piping systems. Improper tools may damage or exert unacceptable stresses on a compressed gas system.

5. A compressed gas cylinder shall not be used without a pressure regulator with rupture protection attached. Bench size compressed gas cylinders shall use the appropriate safety fittings.

6. Compressed gas cylinder valves should be opened slowly to prevent "over stressing" compressed gas systems.

7. The valve and opening should always be pointed away from the body and not toward anyone else.

8. Compressed gases should not be used to dust off clothing as this may cause injury to the body or create a fire hazard.

9. Compressed gas cylinders shall not be placed where they may become part of an electrical circuit.

10. A Safety Data Sheet (SDS) shall be available for each compressed cylinder gas used in a work environment.

11. Appropriate personal protective equipment shall be worn when working with compressed cylinder gas.

Cylinder Disposal

1. Compressed gas cylinders shall be leased through a vendor approved by New York University and returned to the vendor when empty (this may not apply to small, lecture size cylinders).

2. Should it be necessary to dispose of non-returnable, lecture size, compressed gas cylinders, the Environmental

Health & Safety Department will locate an approved vendor and disposal location.

3. Under no circumstances shall compressed gas cylinders be disposed of as conventional waste.

RELATED POLICIES

NYU Environmental Health and Safety Policy

RELEVANT RESOURCES

Compressed Gases (General Requirements) OSHA 1910.101