



Chemical Safety Program

Chemical Hygiene Program

Compressed Gas Safety Program

Manual

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Table of Contents

Purpose	1
Scope	1
Responsibilities	1
Introduction	1
Applicable Regulations	2
Procedure	2
A. Ordering	2
B. Receiving	2
C. Handling/Transport	3
D. Storage.....	4
E. Use	6
F. Emergency Procedures.....	8
G. Disposal	9
H. Training.....	10
Resources	10
Appendix A: Compressed Gas Safety Checklist (General Use)	11
Appendix B: Compressed Gas Safety Checklist (Welding and Cutting)	13
Appendix C: Quick Reference Guide for Vented Gas Cabinet for Cylinders	14

Purpose

The purpose of this program is to establish procedures for use of compressed gas cylinders and dewar tanks at Towson University. It discusses the potential hazards associated with the handling, storage, and use of such containers.

Scope

This program applies to all University employees, students, contractors, and visitors who work in areas that contain compressed gas cylinders and dewar tanks. The manual refers to the receipt, handling, transport, storage, use, and removal of compressed gases on campus. Compressed gases mentioned are limited to individual, portable items that are gas cylinders (including lecture bottles) and dewar tanks. Compressed gas cylinders will be used to refer to cylinders and dewar tanks unless otherwise specified.

Responsibilities

A. Environmental Health & Safety (EHS)

1. EHS will periodically inspect compressed gas storage facilities on campus.
2. EHS will provide training or access to training.

B. Other Departments/End User

1. It is the responsibility of departments/end users to order gas items and to not accept any damaged, unstable, or leaking gas cylinders or tanks.
2. It is the responsibility of end users to receive, handle, transport, store, use, and remove items safely with the appropriate equipment and PPE.
3. It is the responsibility of end users and their departments to notify EHS that employees (new or current) require Compressed Gas Cylinder Program training.
4. It is the responsibility of end users and their departments to return partial and empty gas cylinders and dewar tanks to the vendor.

Introduction

Compressed gas cylinders are in use all over campus in both academic and administrative areas and present a potentially serious risk to the campus community, if they are not handled or stored properly. A past campus audit indicated that, in a few areas on campus, this appeared to be the case, and overall that there was a general lack of knowledge of proper compressed gas cylinder safety procedures. The audit also indicated a need for more accountability of gas cylinders. Some departments did not know if they had any cylinders, or if they did, they did not know what was in them, to whom they belonged, or if they were purchased or leased from the supplier.

Compressed gas cylinders may be classified as EPA regulated hazardous wastes depending on their contents. If this is the case, TU is responsible for their disposal from “cradle to grave”. The proper disposal of unused or old compressed gas cylinders is extremely expensive. For example, lecture bottles (small gas cylinders, approximately 12 inches long and 3 inches in diameter) cost over \$1,000.00 each to properly dispose; larger cylinders can cost much more.

Gas cylinders are virtually impossible to dispose of through traditional domestic waste channels. Given the problems society has recently experienced with hazardous wastes contaminating public landfills, waste haulers and landfills will refuse to accept gas cylinders regardless of their condition or status. As you can see, it is to the University's advantage to lease compressed gas cylinders wherever possible.

Therefore, to assist the campus community in the safe handling and storage of compressed gas cylinders, EHS has prepared this document for all users of compressed gases. It is by no means complete. The included information should be read by everyone who uses or has the potential to use any type of compressed gas cylinder on campus. If you have any specific questions pertaining to gas cylinders, contact the cylinder supplier or Environmental Health & Safety (EHS) at 410-704-2949 or at safety@towson.edu.

Applicable Regulations

- 29 CFR 1910.101 – Compressed Gases
- 29 CFR 1910.252 – Welding, Cutting and Brazing
- 29 CFR 1910.253 – Oxygen-Fuel Gas Welding and Cutting
- 29 CFR 1910.1200 – Hazard Communication
- 29 CFR 1926.350 – Gas Welding and Cutting

Procedure

A. Ordering

1. Wherever possible, compressed gas cylinders should not be purchased outright but rather leased from a reputable compressed gas supplier. Leasing ensures that the gas cylinder will be properly inspected and maintained in accordance with OSHA and DOT regulations and properly disposed of when the cylinder is no longer needed or becomes unserviceable. If the cylinder is purchased, TU assumes the responsibility for inspection, maintenance, and disposal.
2. Assure that there is storage space where cylinders are to be delivered, if the cylinder is not going directly to the end user.
3. Do not order more cylinders or dewar tanks than can be safely stored.

B. Receiving

1. Upon receiving a new cylinder, do a visual inspection to assure that the container is in a safe condition.
 - a) Check for proper labeling of the contents. The shoulder label for the cylinder should detail supplier information, chemical identity and contents, and hazard information per the OSHA Hazard Communication Standard. The contents of the gas cylinder should be stamped on the cylinder.
 - b) Check to see that the cylinder is capped.
 - c) Check the cylinder's last pressure test date.

- d) Check for any visible defects such as leaks, damage, gouges, or bulges on the container.
2. If so equipped, assure that any attached gauges, such as on a dewar tank, is properly working.
3. If the cylinder/tank is damaged; the cylinder has a missing cap; the label is incorrect, illegible, or missing; or the gauge does not work, do not accept the cylinder/dewar tank.
4. If the container is mishandled or dropped, do not accept the cylinder/dewar tank.
5. Do not remove the product information labels or change the cylinder colors.

C. Handling/Transport

1. Personnel Preparation

- a) Only trained personnel should handle and transport gas cylinders. Adequate training must include lifting techniques to prevent back injury, correct connection/disconnection of valves, and actions to take in case of gas discharge or spills. Cylinders are heavy whether filled or empty, so handle appropriately.
- b) Proper personal protective equipment (PPE) should be worn in case of an accident while transporting containers. Dependent upon the container contents, the gas may produce environmental hazards that are flammable, corrosive, oxidizing, oxygen-deficient or asphyxiating, toxic, cryogenic, reactive, or otherwise hazardous to your health. Protective equipment should be appropriate for the items being handled. Typical equipment for handling includes safety glasses, protective gloves (e.g. cryogenic gloves), and protective footwear (e.g. closed-toe shoes or steel-toed boots). PPE may help prevent injury from impact, frostbite or burns, or other contact.

2. Cylinder Transport Preparation

- a) Before transport, remove regulators and ensure cylinder valves are closed and protective caps are installed. The valve protection cap should be left in place until the cylinder has been secured against a wall, bench, placed into a cylinder stand or on a cylinder cart, and is ready to be used.
- b) Cylinders should be moved by using a cylinder cart or hand truck designed for cylinders. Assure that the cart or hand truck are in good condition before use.
- c) Securely fasten cylinders to cart or hand truck with straps or chains.

3. General Handling & Transport Guidelines

- a) Always transport cylinders in an upright position.
- b) Always push, never pull, cylinder carts or hand trucks. If dewar tanks are not moved by a hand truck (or cart) designed to move large dewar

tanks, they should have a built-in handle and caster wheels to facilitate handling and transport.

- c) Avoid dragging, rolling, or sliding cylinders, even for short distances.
- d) Never lift a cylinder by the cap, except with an approved cylinder cart designed for this purpose.
- e) Never use lifting magnets.
- f) Never drop cylinders or permit them to strike each other violently. When cylinders are moved, they should not be subjected to abnormal mechanical shocks that may cause damage to their valves, pressure relief devices, or the cylinders themselves.
- g) Never tamper with pressure relief devices in valves or cylinders.
- h) Never permit oil, grease, or other readily combustible substances to come into contact with oxygen cylinders, valves, or regulators.
- i) Do not use cylinders as rollers for moving materials or other equipment.

D. Storage

1. Container Labels and Signage

- a) Make sure all cylinders/tanks are properly (and legibly) labeled for its contents and have the appropriate DOT approval.
- b) Prominently post all compressed gas storage areas in accordance with current OSHA requirements and with “No Smoking” signs.
- c) Empty cylinders/tanks should be prominently marked either “EMPTY” or “MT”. Alternatively, use a hangtag stating that the cylinder/tank is empty. Such cylinders should also have their valves closed and their protective caps installed until disposal.

2. Storage Area and Conditions

- a) Indoor storage areas shall be designed and constructed in strict compliance with:
 - i. *National Fire Protection Association (NFPA) Standard 55, Standard for the Storage, Use, and Handling of Compressed and Liquefied Gases in Portable Cylinders*;
 - ii. *American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) recommended guidelines*;
 - iii. *Compressed Gas Association (CGA) Standard P-1 2008*;
 - iv. *American National Standards Institute ANSI Z49.1 Safety in Welding; and*
 - v. *OSHA Subpart H (specifically 1910.101) regulations.*
- b) Bulk storage areas should have signage and/or placards detailing the type of gas stored as follows:
 - i. *Red, Class 2.1 placard for flammable gases*;
 - ii. *Green, Class 2.2 placard for nonflammable gases*;
 - iii. *Yellow, Class 2.2 placard for oxygen; and*
 - iv. *White, Class 2.3 placard for poison gases/poison inhalation hazards.*

- c) In public areas, cylinders/tanks should be protected from tampering. Locked cages, such as cylinder cage cabinets and cylinder cage lockers are the preferred method. These are not to be confused with gas cabinets that are metal enclosures within laboratories with independent ventilation/exhaust systems, which are also appropriate for cylinder storage.
- d) Smoking or other open flames should be prohibited in oxygen or flammable gas cylinder storage areas. Keep all stored cylinders at least 50 feet away from all sources of ignition such as sparks, electric arcs, open flames, heaters, etc.
- e) The area should be dry, cool, well-ventilated, and preferably fire resistant. Keep cylinders protected from excessive temperatures by storing them out of direct sunlight and away from radiators and other sources of heat. Cylinders may be stored in the open (outdoors), but they should be protected against weather extremes (including temperature extremes), and from damp ground to prevent rusting. Storage areas should be above grade, dry, and protected from the weather.
- f) If stored indoors, cylinders should be stored in such a way as to avoid the accumulation of asphyxiating, toxic, or otherwise harmful gases/vapors. Avoid heat or ignition sources, which can potentially lead to fire or an explosion for flammable gases.
- g) Never store cylinders in drawers, cupboards, cabinets, or enclosed areas that are not designed for gases. They should not be located in subsurface areas.
- h) Never store cylinders (even temporarily) in high traffic areas, near where vehicles are operated, building entrances, exits, stairwells, or other areas used for the safe exit of building occupants.
- i) Store cylinders/tanks away from drain covers.
- j) Cylinders/tanks should not be stored near unprotected platform edges or ramps. They should also be stored away from falling objects.
- k) Keep cylinders/tanks from corrosive environments, away from fumes, salt, and exposure to corrosive chemicals.
- l) Do not store cylinders, empty or otherwise, on hand trucks or cylinder carts.

3. Orientation

- a) Always store compressed gas cylinders/tanks in an upright position.
- b) Cylinders/tanks should be stored separately according to hazard class (flammable gas, poisonous gas, oxygen, etc.) Inert gases are compatible with all other gases.
- c) Full and empty cylinders/tanks should be segregated.
- d) Oxidizers, such as oxygen cylinders, must be stored in such a manner as to be separated from flammable gases (i.e., propane, acetylene, etc.) or other flammable or combustible materials by at least 20 feet or by a noncombustible masonry wall at least five feet high.
- e) Full cylinders/tanks should be stored such that the oldest cylinders are consumed first.

4. Equipment Maintenance

- a) In general, cylinders should be secured with a chain, strap, or other securing device while in storage. There should be a wall- or floor-mounted support bracket, clamp, rack, stand, cylinder cabinet or locker, or other support, and restraints such as metal chains, straps, or bands made of noncombustible materials. Restraints should be positioned at approximately 1/3 and 2/3 the height of the cylinder. Chains should be tight enough to hold the cylinders in place and prevent it from falling.
- b) Cylinders should never be stored with regulators in place. The regulator and valve are vulnerable if the cylinder were to fall. Remove the regulator if the cylinder is not in use.
- c) Protect the valve with the cylinder cap to prevent the sudden release of gas under high pressure. The release of pressurized gas can cause the cylinder to become a projectile. All cylinders shall be stored with the protective cap in place when not in use and use the cap that arrived with the cylinder.

E. Use

1. Before Use

- a) Identify and use the appropriate gas cylinder. The cylinder decal or label is the only positive way to identify the gas contained in a cylinder. Do not remove or deface the label in any way. Do not paint cylinders or otherwise deface a cylinder/tank. Color-coding of cylinders is an identification method used by suppliers as a convenience, but do not use this as positive identification of a gas.
- b) Know and understand the properties, uses, and safety precautions of the gas before using the gas and/or associated equipment. Consult the manufacturer Safety Data Sheets (SDS) for the particular gases being used. SDS are available at no cost from gas suppliers. If unavailable from gas suppliers, contact EHS at 410-704-2949 or safety@towson.edu.
- c) Cylinders should always be secured when in use. Assure that cylinders are oriented upright and that restraints are properly fastened prior to use.
- d) Assure that such engineering controls such as ventilation equipment such as (e.g. gas cabinets, fume hoods, snorkel exhaust) is fully functional prior to use. Periodic testing for such devices (through EHS, et al.) will not offset responsibility by the end user to confirm functionality prior to use.
- e) Assure that safety devices and emergency equipment such as fire extinguishers, eyewash stations and safety showers, and ambient air monitors are nearby and fully functional.
- f) Gather appropriate personal protective equipment.

- i. Use appropriate PPE for all applications. Protective equipment will depend upon the gas, environment, and application being used. For example, this may involve use of respiratory protection such as during use of toxic gases (user should receive prior fit test), or welding helmet, apron, and gloves for welding/cutting.*
 - ii. Strictly adhere to operating procedures and regulations, including OSHA and CGA guidelines.*
- g) If a cylinder protective cap is extremely difficult to remove, do not apply excessive force or pry the cap loose with a bar or other object inserted into the ventilation openings. This could break the valve. Attach a label or tag identifying the problem and return the cylinder to the supplier.
- h) Do not use adapters or exchange fittings between tanks and regulators.
- i) Assure that thread connections and fittings meet properly. Most valve outlet connections are designed with metal-to-metal seals; use washers only as directed.
- j) Do not use pipe dope or Teflon tape on valve threads as this can become powdered or get caught in the mechanism. Never force fittings or turn threads the wrong way, as this can cause damage and produce metal particles that might get caught in the mechanism. Additionally, do not cross-thread or use adapters between non-mating equipment and cylinders.
- k) Use regulators and pressure relief devices when connecting cylinders to circuits of lower pressure service ratings. Regulators should be equipped with two gauges that show both the cylinder and outlet pressures. Only regulators approved for the specific gas should be used. Open the cylinder before adjusting the pressure on the regulator.

2. During Use (All Cylinders)

- a) Use gas cabinets or fume hoods to isolate gas hazards from cylinders during use. Vent relief valves to a fume hood or ventilated gas cabinet when using flammable or toxic gases.
- b) Open valves slowly and carefully after the container has been connected to the system/apparatus. Stand to the side of the valve outlet when opening the valve.
- c) Hand tools, such as wrenches, should never be used on valves equipped with a hand wheel. If you experience any problems operating the cylinder valve, discontinue use and immediately contact the supplier. If the valve is faulty, attach a label or tag to the cylinder identifying the problem and return the cylinder to the supplier. Never use a hammer, pliers, wrench, or other such hand tools to open valves.
- d) Never attempt to mix gases in a cylinder or attempt to put other substances into a gas cylinder.
- e) Use check valves or traps to prevent backflow of water or other contaminants if backflow can occur into the cylinder. If backflow

occurs, mark the cylinder **“CONTAMINATED”** and notify the supplier immediately.

- f) Use non-sparking tools when working with flammable gases.
- g) Check for leaks in hoses or fittings using soapy water.
- h) Never tighten any fittings while the gas connection is under pressure. Take cylinder out of service prior to any maintenance work. If such work goes beyond the scope of setup and maintenance, return to the equipment/cylinder to the supplier or contact them to come service the equipment/cylinder. Only qualified technicians should perform repairs.
- i) No part of a cylinder should be subjected to temperatures above 125°F or artificially low temperatures.
- j) Prevent sparks or flames from welding and cutting torches or any other source from coming in contact with cylinders.
- k) Never allow cylinders to come into contact with electrical circuits or apparatus.

3. Acetylene and Oxygen Use

- a) Always open an acetylene or oxygen cylinder slowly.
- b) Acetylene cylinders must be equipped with reverse flow check valves and flashback arrestors.
- c) Ensure that grease and oil do not come into contact with oxygen cylinders, especially near the nozzle or the valve in order to protect against fire. Do not handle oxygen cylinders with oily or greasy hands.
- d) Never use oxygen as a substitute for compressed air.

4. After Use

- a) Cylinder valves should be closed on cylinders, and all pressure released from equipment connected to a cylinder at the end of a work shift or prior to any extended periods of nonuse.

F. Emergency Procedures

- 1. If cylinder is bulging, mark it as “DEFECTIVE”, remove from service, and contact the vendor. Exit from the area, warn others in the area, and post a sign stating the issue.
- 2. In Case of Minor Leak (Slow, Controllable) Involving Compressed Gases:
 - a) Use emergency shutoff panel, if available and it is safe to do so. If in a laboratory, activate emergency mode on fume hoods and open sash or use emergency shut off to gas cabinets, if it is safe to do so.
 - b) Notify people in the area of the leak, evacuate if necessary, and post signs to prevent others from entering.
 - c) Notify TUPD and EHS of the location and identity of the gas.
 - d) Remain outside the immediate area until the cylinder contents have been exhausted.
 - e) Return cylinder to vendor for repairs.
- 3. In Case of Major Leak (Uncontrollable) Involving Compressed Gases:

- a) Immediately evacuate the area, shutting doors, and windows on the way out, if possible. If in a laboratory, activate emergency mode on fume hoods and open sash or use emergency shut off to gas cabinets, if it is safe to do so.
 - b) Pull fire alarm and dial 911.
 - c) Notify TUPD and EHS of the location and identity of the gas.
 - d) Ensure that anyone who may have been exposed or contaminated is attended to.
 - e) Provide all relevant information to authorities upon their arrival.
4. In Case of Fire Involving Compressed Gases:
- a) Immediately activate the building fire alarm, and evacuate the building via the nearest emergency exit. If possible, shut off the gas at the source or secondary shut-off panel.
 - b) If you can do so safely, as you evacuate, close doors behind you to contain the fire, smoke, or gas vapors.
 - c) From a safe location, dial 911 and request emergency assistance. TUPD will be notified and report the event to other internal departments such as EHS and Facilities Management, as necessary.
 - d) When the fire department arrives, identify yourself and be prepared to provide any information they may require.
 - e) It is TU policy for employees not to attempt to fight fires in a campus building.
5. In the Event of a Personal Injury Involving Compressed Gases:
- a) Immediately request medical assistance through 911.
 - b) Use eyewash/safety shower, if necessary, particularly with corrosive materials. Otherwise, leave the area as soon as possible.

G. Disposal

1. When compressed gas cylinders or dewar tanks are no longer needed, they should be promptly disposed of rather than allowed to accumulate and potentially deteriorate.
2. Before shipment to returning cylinders/tanks, close the valve(s). Leave some positive pressure in the cylinder/tank. A cylinder is considered empty when the pressure is approximately 30 psi. Cylinders should be returned to the vendor with at least this pressure to reduce the risk of foreign materials entering the empty vessel. Once the valve is closed, disconnect service equipment from the cylinder.
3. Replace any valve outlet and protective caps originally shipped with cylinders.
4. Mark and label the cylinder/tank "EMPTY" or "MT". Alternatively, use a hangtag stating that the cylinder/tank is empty.
5. The disposal of compressed gases and cylinders is strictly regulated by the Maryland Department of the Environment (MDE) and the U.S. Environmental Protection Agency (EPA). Shipment of a compressed gas without the consent of the owner is a violation of federal law. The

improper disposal of either is a felony and may result in criminal and civil penalties.

6. Leased gas cylinders should be returned to the gas supplier for disposal.
7. Compressed gas cylinders/dewar tanks should not be refilled except by qualified compressed gas suppliers.
8. TU-owned (or of questionable/unknown ownership) gas cylinders should be identified and disposed of immediately by contacting the EHS at 410-704-2949 or at safety@towson.edu.

H. Training

Any worker required to use Compressed Gas Cylinder Safety shall receive training in the proper handling and use of gas cylinders and dewar tanks. Periodic retraining shall be offered by EHS to both the employees and the supervisors, as needed. The training shall include, but not necessarily be limited to, the following subjects:

- How to make sure compressed gases are properly identified.
- The safe handling and use of compressed gases.
- How to store cylinders properly.
- How to transport compressed gas cylinders safely.

Training will be assigned virtually through Vector Solutions SafeColleges found at the following URL: <https://towsonehs-md.safecolleges.com/training/home>. Workers shall request training by emailing safety@towson.edu or by calling the Environmental Health & Safety (EHS) office at 410-704-2949.

Resources

If there are any questions about the handling, use, storage, or disposal of gas cylinders/dewar tanks, contact EHS at 410-704-2949 or safety@towson.edu. For SDS or specific questions about a compressed gas cylinder, contact the supplier, which should be labeled on the container. Click the hyperlink below for more information about gas hazards and types through the primary gas supplier to the University.

[Airgas Compressed Gas Basics](#)

Appendix A: Compressed Gas Safety Checklist (General Use)

Based on Compressed Gas Association (CGA) Standard P-1 2008

✓	<u>Instruction</u>	<u>Reference Number</u>
	Are containers/cylinders labeled properly?	3.1.3
	Pressure relief device present and free from damage	3.2.4
	Container free of corrosion and other recognized damage?	3.2.10-3.2.11
	Valve protection caps in place and at least hand tight?	3.3.2
	Containers are not used as rollers, supports, or other unintended purposes?	3.3.3
	Are empty cylinders marked as such and valves closed?	3.3.4
	Cylinders are not placed where they may become part of an electrical circuit?	3.3.5
	Cylinders are not exposed to temperatures greater than 125°F?	3.3.6
	Are cylinders leaking?	3.3.8
	<i>Tighten Valve</i>	
	<i>Close Valve</i>	
	<i>Tag Unserviceable</i>	
	<i>Toxic? Provide proper respirator protection</i>	
	<i>Keep away from flames</i>	
	<i>Take outdoors or place in exhaust system</i>	
	<i>Place warning tag on cylinder</i>	
	<i>Notify supplier</i>	
	Valve caps are not used to lift cylinders?	3.4.3.1
	Ropes, slings, or chains are not used to suspend cylinders without appropriate lifting attachments?	3.4.3.3
	Storage	3.5
	<i>Grouped by types and labeled with name of gas</i>	
	<i>Full and empty containers separate and stored upright</i>	
	<i>Storage rooms dry and well ventilated</i>	
	<i>Not stored near salts, corrosive chemicals or fumes, dampness</i>	
	<i>Protected from damage by other material</i>	
	<i>Stored away from walkways, gangplanks, aisles, doors, exits, etc.</i>	
	<i>Outside storage chemicals protected from bottom corrosion</i>	
	Employees trained on handling and use of cylinders?	3.6.1
	Containers are secured to prevent them from being knocked over?	3.6.4
	Compressed gases are not used to dust off clothing?	3.6.11

Additional Precautions for Specific Gases

✓	<u>Instruction</u>	<u>Reference Number</u>
	Flammable Gases	4.1
	Adequate fire extinguishers near storage areas	
	No Smoking signs posted near storage	
	Oxygen	4.2
	Containers, valves, regulators, hose, and other apparatus free from oil and grease	
	Stored 20 feet from combustibles or separated by a wall at least 5 foot high and made of non-combustible material with at least a 30-minute fire rating	
	Ambient air oxygen content not greater than 23 percent except hyperbaric chambers	
	Acid and Alkaline Gases (see Table 1 below)	4.3
	Proper Personal Protective Equipment (PPE) – Safety glasses/goggles, faceshields, gloves, aprons, long sleeve shirts, long pants. No open-toed shoes or sneakers	
	Proper respiratory protection available	
	Eyewash stations and showers	
	Highly Toxic Gases (see Table 2 below)	4.4
	Proper respiratory protection available	
	Store outside or in separate, noncombustible building, without other occupancy	
	Used in forced ventilation	
	Employees trained on proper use and handling	

<u>Table 1. Some Common Acid and Alkaline Gases</u>		
Ammonia	Sulfur dioxide	Ethylamine
Boron	Trifluoride	Methylamine
Hydrogen chloride	Chlorine	Trimethylamine
Hydrogen bromide	Hydrogen sulfide	Nitrosyl chloride
Fluorine	Dimethylamine	

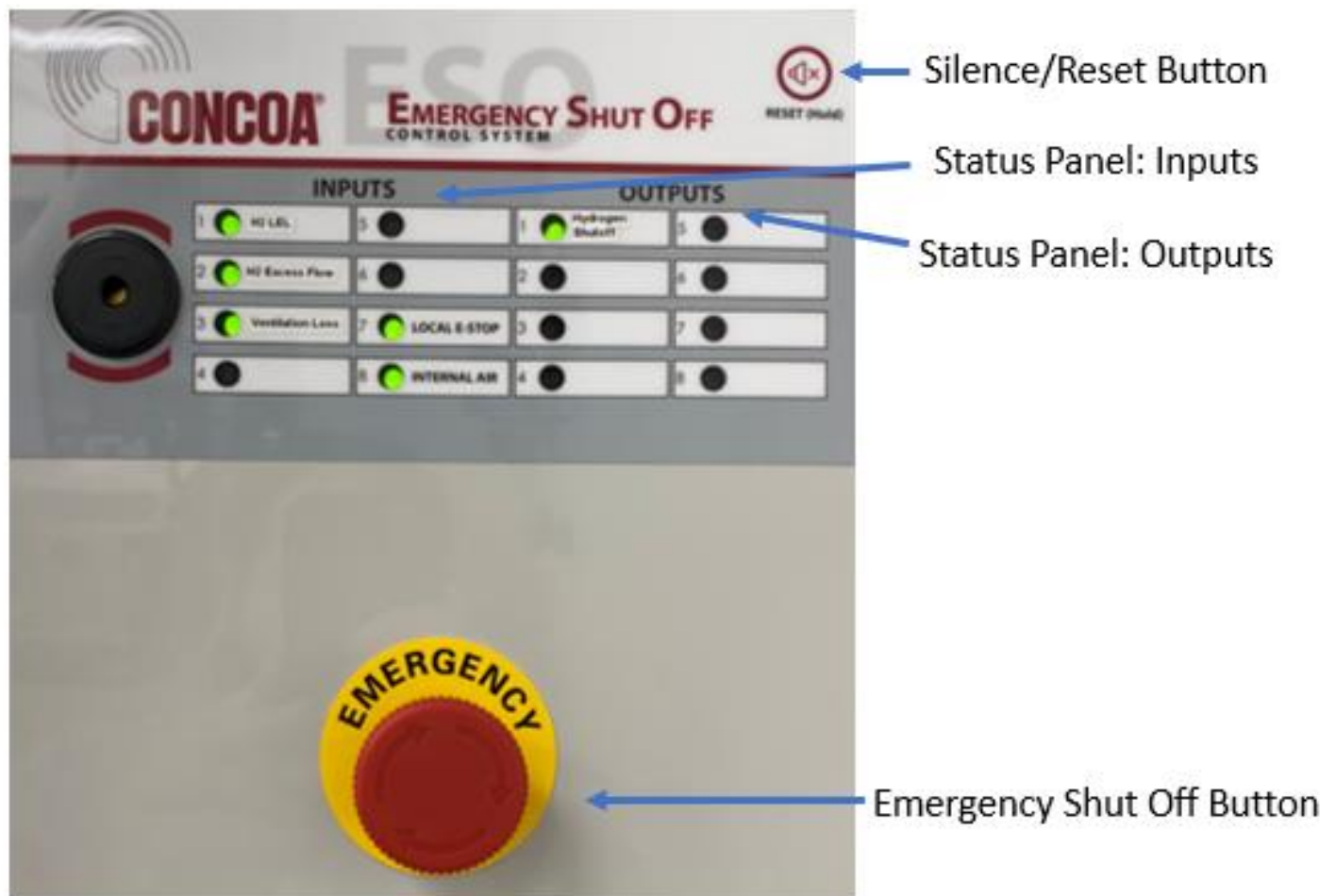
<u>Table 2. Some Common Highly Toxic Gases</u>		
Carbonyl fluoride	Chlorine	Phosphine
Fluorine	Germane	Hydrogen cyanide
Hydrogen selenide	Nitric oxide	Nickel carbonyl (liquid)
Nitrogen dioxide	Ozone	Phosgene

Appendix B: Compressed Gas Safety Checklist (Welding and Cutting)

Based on ANSI Z49.1

✓	<u>Instruction</u>	<u>Reference Number</u>
	Mixtures of fuel and air or oxygen guarded against?	3.1.1
	Acetylene used < 15 psi, < 30 psi absolute pressure?	3.1.2
	Only approved apparatus used?	3.1.3
	Employees trained on handling and use?	3.1.4
	Cylinders labeled properly?	3.2.2
	Storage	3.2
	<i>Kept away from heat and flame</i>	
	<i>Empty cylinders valves closed</i>	
	<i>Valve protection caps in place and hand tight</i>	
	<i>Greater than 20 feet from combustibles</i>	
	<i>Ventilation</i>	
	<i>Protected from damage</i>	
	Oxygen cylinders, valves, regulators, hose, and apparatus free of oil and grease?	3.2.4
	Cylinder valves open and closed by hand?	3.2.5
	When parallel lengths of oxygen and acetylene hose are taped together, not more than 4 inches out of 12 inches shall be cover with tape?	3.5.5
	Proper pressure reducing regulators used for gas and pressures for which they are intended?	3.5.6

Appendix C: Quick Reference Guide for Vented Gas Cabinet for Cylinders



In Case of Emergency:

In case of emergency, press the Emergency Shut Off Button. This will shut off the gas. Afterwards, please contact EHS at 410-704-2949 or safety@towson.edu or the Building Manager (contact listed below) to alert them to the situation.

How to shut off alarm:

If alarm is sounding, push the Silence/Reset Button in the top right corner. This will not turn the gas back on, but it will silence the noise.

How to reset:

If the Status Panel has all lights green (steady or flashing) on the Input column, push and hold the Silence/Reset Button for 5-10 seconds until the Outputs column light turns green; the gas is now able to be used. If the Inputs column has a red light, please contact the Building Manager for assistance.