



Compressed Gas and Cryogenics Safety Policy

Category: Health and Safety;

Jurisdiction: Vice President, Administration and Finance;

Approval Authority: Executive Team;

Established on: January 1, 2006;

Amendments: None.

Preamble

This policy was created to outline appropriate safety precautions when working with or around compressed gases and cryogenic liquids. Compressed gas cylinders and cryogenic liquids present several safety hazards:

- A falling cylinder may cause injuries.
- The cylinder may become a dangerous projectile, if the valve is sheared off.
- Damaged or faulty valves may cause the release of dangerous gases.
- Elevated temperatures, i.e. in a fire, may cause sudden release of the compressed contents.
- Pure oxygen or other oxidizing gases can present fire or explosion hazards if mishandled or improperly stored.
- Toxic and corrosive gases can cause serious, irreversible respiratory injuries that may result in fatality.
- Cryogenic liquids can cause serious burns.

Policy

- Compressed gases can only be purchased in cylinders that are returnable to the supplier or in disposable cylinders.

- Manifold and piped systems using bulk compressed gas tanks or those without a pressure regulator for compressed gases require consultation by a professional engineer.
- When moving cylinders **any distance**, the safety cap must be on the cylinder protecting the valve.
- When moving cylinders a distance greater than 1 metre, a cylinder cart must be used with the cylinder restrained to the cart.
- Cylinders must be secured with a chain or strap at all times regardless of whether they are full or empty.
- When not in use, cylinders must be stored with safety valve caps and stored in an area where the ambient temperature does not exceed 52C.
- Storage of compressed gas cylinders must conform to the *Ontario Fire Code O.Reg.388/97, section 5.6* and shall only be stored in areas that are designated for the storage of compressed gases.
- Any area where compressed gases and cryogenics are stored/used must have signage on the doors depicting the hazard, type of gases, and contact information of the Person in Authority.
- Cylinders and cryogenic liquids must be stored in a secure location, and not, under any circumstances be stored in aisles, hallways, doorways, stairwells or exits.
- Material safety data sheets for compressed gases shall be available in the areas that the gases are used.
- All open-flame equipment requiring flammable gas delivery systems (ie. Atomic absorption units) shall incorporate flash arrestors in the gas lines.
- Gases denser than air must not be stored in the basement.
- Persons using compressed gases and cryogenic liquids must have current WHMIS training.
- Appropriate personal protective equipment must be worn when using cryogenics and compressed gases.
- Flammable, toxic and corrosive gas cylinders must be kept to a minimum number necessary to support ongoing work.

- Compressed gas cylinders may only be used with a pressure reduction regulator attached to the valve. The regulator must be appropriate for the gas. Regulator adaptors are not allowed.
- Oil, grease or Teflon tape should never be used on the regulator or valve fittings. Oil and grease can become explosive when they come in contact with oxygen gas or other oxidizers.
- Cylinders must be positioned so that the cylinder valve is accessible at all times.
- The regulator should never be used as the shut off valve, and should be decompressed once the cylinder valve has been closed.
- Regulators and associated piping should be checked regularly for leaks, using a soap solution, and every time the tank is changed.
- Transfilling of compressed gas cylinders is prohibited. Once a tank is empty it should be marked "MT" and left for pickup by the supplier.
- Cryogenics may only be stored in a secure area and only in vacuum-jacketed dewar flasks designed for that purpose. All such dewars must be properly vented to accommodate the release of pressure.
- Personal protective equipment including face shield, loose fitting cryogenic gloves, trousers, closed toe shoes or boots should be worn when pouring cryogenics liquids.
- This policy will be reviewed by the Health and Safety Office and the Joint Occupational Health and Safety Committee every year, comments regarding this policy can be made there.

Common Compressed Gases

Transport Classification: Examples

Flammable: Hydrogen, acetylene, propane, methane, butane, ethane, ethylene, isobutane, silane, vinyl chloride

Inert: Helium, neon, nitrogen, carbon dioxide, air, nitrous oxide, sulphur hexafluoride, argon

Toxic: Carbon monoxide, phosgene, nitric oxide, arsine, chlorine trifluoride, cyanogen, methyl bromide, nitrogen trioxide

Corrosive: Hydrogen chloride, boron trifluoride, ammonia, chlorine

Common Cryogenic Liquids

Gas: Normal Boiling Point C: Volume expansion to gas

Helium: -268.9: 757 to 1

Hydrogen: -252.7: 851 to 1

Nitrogen: -195.8: 696 to 1

Argon: -183.7: 847 to 1

Oxygen: -183.0: 860 to 1

Carbon dioxide: -78.5 (sublimes): 553 to 1

Review Period: 7 years;

Date for Next Review: 2022-2023;

Related Policies and Procedures: To be determined;

Policy Superseded by this Policy: None.

The University Secretariat manages the development of policies through an impartial, fair governance process, and in accordance with the Policy Governance Framework. Please contact the University Secretariat for additional information on University policies and procedures and/or if you require this information in another format:

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