PURPOSE
This document serves as Supplemental Information to the UCalgary Cryogenic Materials Standard. It provides guidance on safety checks for non-pressurized and pressurized Dewars used to hold and/or handle cryogenic liquids. Individuals handling cryogenic materials must also review and adhere to the UCalgary Cryogenic Materials Standard.

TYPES OF DEWARS
Non-pressurized Dewars
- Smaller, portable, double-walled/vacuum-jacketed container or flask designed for temporary storage or handling of cryogenics.
- Typically used for sample storage, transfer of cryogenic liquids or cryogenic liquid use in experiments.
- Inner container is made of glass or other material suitable for cryogenic liquid handling, and container is encased in a protective outer cover (Figure 1 and Figure 2, left and middle).
- All-plastic Dewar flasks are suitable for handling of cryogenic liquids (Figure 2, right) – check with supplier.
- Dewar has an open top, loose fitting lid/cover or vented cap to release excess pressure.
- Lids, covers or caps also prevent moisture and air from entering to reduce condensation.

Figure 1. Examples of non-pressurized Dewars for temporary sample storage or transfers.1

1 VWR CryoPro Liquid Dewars; LabX CryoPro Dewar for Sample Storage
Pressurized Dewars

- Type of container that is specifically designed to hold cryogenic liquid under higher pressure for an extended period of time (> 22 pounds-force per square inch gauge (psig)) (Figure 3).
- Also often referred to as pressurized vessel, tank or cylinder.
- Equipped with pressure-relief valve as safety measure for venting of excess pressure (Figure 4 and 5).
- Dewar has rupture disk for backup protection in case of over-pressurization (Figure 4 and 5).
- Fitted with specific valves and hoses for filling and dispensing of cryogenic liquids (Figure 4 and Figure 6).
- Can be fitted with specific set up for gas usage with a regulator (Figure 4).

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2 VWR Nalgene Dewar Flasks; Chemglass Dewar Flask; Cole-Parmer Low Form Dewar Flask
Figure 3. Examples of pressurized Dewars.³

Figure 4. Pressurized Dewar (top view) with labelled parts.⁴

³ Cryofab Liquid Nitrogen Tanks
⁴ RF Cryogenic Equipment - Cryogenic Liquid Cylinder Valves
SAFETY CHECKS
Safety checks are to be completed before use, at minimum, for any type of Dewar.

Non-pressurized Dewars
- Visually inspect Dewar for any damage or flaws (outside & inside, if possible): cracks, scratches, chips on inside; dents, damage to or corrosion of casing/cover material on outside.
- Ensure lid, cover or cap is in place; check for any damage.
- Check for loss of insulation (faster evaporation of liquid).
- If applicable: Check wheels for damage and suitability for travel path before moving any non-pressurized Dewar.
- No inspection records are required to be kept.

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5 Grainger - Cryogenic Hose
Note:

- Only use a container designed to hold cryogenic materials, as other containers can easily crack, split and/or explode.
- Refer to Manufacturer’s instruction for safe use of containers suitable for cryogenic material handling and cryogenic storage (e.g. cryogenic vials).
- Do not use any non-pressurized Dewar that has visible damage or flaws. Mechanical or thermal stress on the material can lead to spontaneous implosion of the glass part of the container.
- If Dewar shows a faster evaporation of liquid than usual, this can be a sign of damage or contamination.
- Mark any damaged non-pressurized Dewar as defective and submit for disposal.
- Damaged lids, covers or caps might be replaceable. Check with supplier.

Pressurized Dewars

- Visually inspect pressure-relief valve (Figure 4, right). Ensure that the valve is in place and that it is unobstructed (not capped or restricted).
- Check for excessive ice build-up at valves or other parts of the Dewar that cannot be explained by normal operation.
- Visually inspect outside of Dewar for any damage or flaws (e.g. dents).
- Check wheels for damage and suitability for travel path before moving any pressurized Dewar.
- For dispensing operations: Check that dispensing hose is properly connected to dispensing valve outlet. Only use dispensing hoses designed for cryogenic liquid handling (e.g. corrugated stainless steel hose, Figure 6).
- For gas operations: ensure that gas regulator is properly connected to gas use valve (refer to UCalgary Compressed Gas Cylinder Standard for Compressed Gas Regulator Installation and Leak Testing Standard Operating Procedure)
- No inspection records are required to be kept.

More extensive safety checks on pressurized Dewars are performed by UCalgary staff before, during and after each fill. Records are to be retained.

Note:

- Do not use any pressurized Dewar that has visible damage or flaws.
- Do not use any pressurized Dewar that is continuously venting.
- Never attempt to repair or manipulate any parts of a pressurized Dewar.
- In case of failed safety checks, take the Dewar out of service. Inform PI/Supervisor and contact supplier for maintenance/repairs.

RELATED DOCUMENTS
UCalgary Cryogenic Materials Standard
UCalgary Compressed Gas Cylinder Standard
UCalgary Fixed Gas Detection (FGD) System Standard
REFERENCES
NFPA 55 – Compressed Gasses and Cryogenic Fluids Code
Canadian Centre for Occupational Health and Safety – Cryogenic Liquids - Hazard
Information and Operating Instructions for Dewar – KGW Isotherm
Air Liquide