

Safe Storage of Chemicals in Low Temperatures: A Winter Guide



Winter conditions create a unique set of chemical storage hazards across Canada. Freezing temperatures, heavy snow loads, reduced ventilation, and increased use of fuels and de-icers can all contribute to incidents – especially when chemicals are stored outdoors, in unheated trailers, or in partially heated warehouses. For OHS managers and worksite directors, safe winter storage is about more than preventing frozen containers. It's about controlling chemical reactions, preventing spills and leaks, maintaining product integrity, and ensuring compliance with requirements (including WHMIS and applicable jurisdictional OHS regulations).

Why Cold Temperatures Change Chemical Risks

Low temperatures can cause:

- Container cracking or rupture (especially water-based products that expand when frozen).
- Viscosity changes (thicker liquids = harder dispensing = higher strain and spill risk).
- Phase separation in emulsions (making products ineffective or unstable).

- Pressure changes in aerosols and compressed gas cylinders.
- Increased ignition hazards when heaters, heat guns, and temporary warming devices are used near flammables.

Cold weather can also lead to poor housekeeping such as blocked exits, icy walkways, and snow-covered secondary containment, making spill response slower and more hazardous.

Chemicals that require extra protection in winter

Water-based chemicals (freeze-sensitive)

These are among the most commonly damaged in the wintertime. When frozen, they may expand and rupture containers or become unusable.

Examples:

- Latex paints and coatings
- Many adhesives and sealants
- Water-based degreasers and detergents
- Some disinfectants and cleaning solutions
- Certain water-based lubricants and coolants

Typical worksites affected:

- Construction sites (finishing trades)
- Facilities maintenance shops
- Schools and municipal buildings
- Warehouses and distribution centres

Corrosives and reactive products

Cold temperatures can affect stability and increase risk when containers are compromised.

Examples:

- Sodium hypochlorite (bleach)
- Ammonia solutions
- Some acids (including cleaning acids)
- Pool chemicals (chlorine products)
- Two-part reactive products (epoxies, catalysts)

Typical worksites:

- Water and wastewater treatment facilities
- Pool and recreation centres
- Food processing plants
- Janitorial and sanitation operations

Fuels and flammable liquids

These products may remain liquid, but winter conditions increase ignition risk due to heating equipment and static electricity.

Examples:

- Gasoline, diesel, aviation fuel
- Propane and heating fuels
- Solvents (acetone, toluene, MEK)
- Paint thinners and lacquer thinners
- Many aerosol products

Typical worksites:

- Construction and roadwork sites
- Transportation yards and fleet depots
- Forestry and resource operations
- Industrial maintenance shops

Batteries and battery-related chemicals

Cold temperatures reduce battery performance and can increase charging hazards indoors.

Examples:

- Lead-acid batteries
- Lithium-ion batteries (tools, equipment, forklifts)
- Battery electrolytes

Typical worksites:

- Warehouses using forklifts
- Utilities and telecom sites
- Remote field operations

Pressurized containers (compressed gases and aerosols)

Cold can reduce pressure and performance, but heat exposure creates serious hazards.

Examples:

- Oxygen, acetylene, nitrogen cylinders
- Propane cylinders
- Aerosol lubricants, cleaners, paints

Typical worksites:

- Welding shops and fabrication facilities
- Construction sites
- Mechanical rooms and maintenance areas
- Chemicals that can often be stored in the cold (with conditions)

Some products are generally cold-tolerant, but still require proper storage controls:

- Diesel fuel (but can gel—use winter blends and manage

additives properly).

- Road salt and sand (should still be protected from moisture and runoff).
- Certain oils and greases (may thicken but remain stable).
- Some alcohol-based windshield washer fluids.
- Many solid materials (powders/granules) that are non-reactive and kept dry.

Important note: "Cold-tolerant" does not mean "store anywhere." You still need:

- WHMIS-compliant labelling.
- Secondary containment where appropriate.
- Segregation (e.g., oxidizers away from fuels).
- Spill prevention and environmental controls.

Sector-Specific Winter Storage Locations and Risks

Construction sites

Common winter storage issues include unheated sea cans, jobsite trailers, and outdoor storage. Temporary heating creates added ignition risk.

High-risk chemicals: adhesives, paints, solvents, propane cylinders, fuel.

Transportation and fleet operations

Often store fuels, oils, DEF (diesel exhaust fluid), and solvents.

Special note: DEF freezes around -11°C and expands—containers can burst if mishandled.

Agriculture

Winter storage of pesticides, fertilizers, and fuels requires careful segregation and temperature control.

High-risk chemicals: pesticides, ammonia products, fuel, disinfectants.

Manufacturing and warehouses

Large volumes stored indoors, but loading docks and unheated corners can freeze.

High-risk chemicals: cleaners, adhesives, corrosives, aerosols.

Municipal/public works

Salt storage, fuels, herbicides, and maintenance chemicals are common.

High-risk chemicals: de-icers, fuels, herbicides, solvents.

Practical Winter Controls for OHS Managers and Directors

☐☐☐ ☐ Review SDS temperature limits for each product (don't guess).

☐☐☐☐ Store freeze-sensitive chemicals in heated areas or insulated cabinets.

☐☐☐☐ Use approved flammable storage cabinets for flammables—never near heaters.

☐☐☐☐ Maintain segregation (acids, bases, oxidizers, flammables).

☐☐☐☐ Inspect containers weekly for cracking, bulging, and leaks.

☐☐☐☐ Keep spill kits accessible and unfrozen (absorbents must remain usable).

☐☐☐☐ Train workers on winter chemical handling, including safe warming practices (no open flames).

☐☐☐☐ Control outdoor storage runoff (salt, chemicals, and contaminated snowmelt).