



Know the risks for industrial refrigeration

By Jesse Marchand

If you are responsible for owning, managing, or maintaining a refrigeration system, you need to ensure you know the risks and how to manage them. Training from Technical Safety BC and a new toolkit from WorkSafeBC can help to ensure you're meeting your health and safety obligations.

If you own, operate, or maintain equipment that uses ammonia, such as an ice rink or curling rink, cold-storage facility, supermarket, or food-processing/packing facility, you need to be aware of the risks.

The basics

You may see the word “anhydrous” when it comes to ammonia used as a refrigerant. This means it's without water. It can be a liquid or gas depending on which part of the system it's in — each posing their own hazards.

Ammonia gas is colourless and has a suffocating, pungent, penetrating odour. A person can be overexposed whether or not they can see a white ammonia cloud. It is corrosive to the eyes, nose, and respiratory system.

Liquid ammonia has a lower explosive limit (LEL) concentration of 15 percent, which means this

concentration of ammonia in conjunction with oxygen and an ignition source can result in a fire or explosion. If there are leaks in the system, oil can mix with the ammonia refrigerant and further increase the risk of fire or explosion by expanding the flammability range of ammonia, including reducing the concentration of ammonia necessary for a fire or explosion. In the presence of oil, even low-flammable, synthetic refrigerants have the potential for fire or explosions.

“At higher concentrations and with ineffective controls in place, a fire or explosion can occur,” notes Andrew McSherry, an occupational hygiene officer at WorkSafeBC. The inhalation and corrosive effects of ammonia can harm workers in the event of an accidental release.

“Employer ownership of the risk starts with understanding the hazards, understanding the risks, and implementing effective controls,” adds McSherry. “From there, regularly inspecting and maintaining equipment and controls are critical for sustaining a safe operation. Controls include equipment, procedures and practices, and equipment working in conjunction those with procedures and practices.”

Training your joint committee

Preventing an incident that could lead to injury or death is at the core of what Technical Safety BC does. The independent and self-funded organization

oversees the safe installation and operation of technical systems across the province. A message they want to share is about the importance of maintaining ammonia refrigeration equipment and systems across their life cycle.

“Employers need to be knowledgeable about the equipment they operate. This includes understanding the risks associated with their ammonia refrigeration equipment and systems, implementing programs for maintaining them throughout their life cycle, and planning for the replacement of aging equipment” says Liam McKearney, technical leader, for Technical Safety BC.

Under the Occupational Health and Safety (OHS) Regulation, employers have an obligation to develop and implement an effective health and safety program, and to ensure that their workers and supervisors receive the right training for the roles that they do. This includes ensuring that joint health and safety committee members get annual education. Under the *Workers Compensation Act*, joint committee members are entitled to an annual education leave totalling eight hours.

Technical Safety BC offers a free educational program that’s a perfect fit for anyone who needs to understand ammonia risks, says McKearney. “Developed in collaboration with industry professionals, the [ammonia safety awareness program](#) provides training and downloadable tools to fill in knowledge gaps and share best practices for maintaining ammonia refrigeration equipment and systems across their life cycle.”

The program is open to anyone in the refrigeration industry, with a focus on asset owners, managers, and supervisors, notes McKearney. “The information, training, and tools provided through this program are a valuable resource for any refrigeration industry professional.”

Reducing the risk in the workplace

As an employer, you need to know if there is the potential for an ammonia-related fire or explosion in your workplace, and if so, ensure there are effective controls in place.

The following controls can help prevent a fire or explosion from occurring:

- Preventive maintenance and ensuring mechanical integrity of piping and equipment is sustained throughout their life cycle

- Continuous monitors connected to a central alarm system in areas where loss of containment of ammonia could happen
- Continuous and emergency ventilation of machine-room enclosure with air flow meeting the current CSA B52-13 Mechanical Refrigeration Code standard
- Emergency shutoff or shutdown of system that can be accessed remotely (i.e., outside of machine-room enclosure)
- Control of ignition sources

A new tool can help

To aid employers and joint committee members who want to assess the risk, WorkSafeBC released a new self-assessment tool last year.

[Anhydrous ammonia safety for industrial refrigeration systems](#) is a fillable template designed for employers using ammonia in industrial refrigeration systems, including food and beverage processing and cold-storage facilities.

“Employers can use this self-assessment tool to better understand the risk, and to determine whether the facility has effective protocols in place to protect workers from exposure to ammonia,” adds McSherry.

The tool walks employers through the general characteristics of ammonia, the relevant OHS requirements, and how to assess your risks and controls, exposure control plans, and emergency plans.

For more information

You can register for the Ammonia safety awareness program at [technicalsaftybc.ca](https://www.technicalsaftybc.ca). Earlier this year, WorkSafeBC released a risk advisory on [Fire or explosion in the use of anhydrous ammonia](#). You can search for that, and the following resources on [worksafebc.com](https://www.worksafebc.com):

- [Anhydrous ammonia safety for industrial refrigeration systems: Guide to risk identification and controls for employers](#)
- [OHS Regulation](#)
 - [Section 5.27](#): Ignition sources
 - [Section 5.31](#): Flammable gas or vapour
 - [Sections 5.97–5.102](#): Emergency procedures
 - [Sections 6.116–6.132](#): Toxic process gases
- [OHS Guideline G6.116-1–G6.127](#): Toxic process gases 