

## **SHIPPING CONTAINER REQUIREMENTS WHEN STORING FLAMMABLE/COMBUSTIBLE LIQUIDS INCLUDING GAS POWERED EQUIPMENT**

Please watch the following video regarding the use of Shipping Containers for Storage.

<https://www.youtube.com/watch?v=U2GYL95FL3c>

In order to prevent build up of vapour pressure and resulting explosion when exposed to high heat, metal shipping containers must be properly ventilated prior to any use for storage.

-One ventilation opening must be added within 150 millimetres of the floor in the container door primarily used for opening.

- One ventilation opening must be added within 150 millimetres from the top of the container on the opposite end from the doors for cross ventilation.

-A passive wind vent designed to generate a venturi effect during low wind speeds is also required to be installed on the roof.

The high ventilation opening cannot be directly venting toward a structure. Neither ventilation opening can be obstructed by stored materials at any time and must be kept clean of internal and external debris.

The additional ventilation openings must be constructed based upon the following minimums:

- o Two – 0.3 x 0.3 metre openings for containers six metres or less.
- o Two – 0.5 x 0.5 metre openings for containers over six metres.
- o Both openings will be covered by open grate wire mesh with greater than 50% free area.
- o Higher opening will also have a wind vent device, designed to generate a venturi effect during low wind speeds

**NOTE: Standard existing environmental vents normally built into shipping containers ARE NOT ACCEPTABLE as ventilation openings for land-based storage applications. These were designed for air movement based upon atmospheric weather changes only and do not provide adequate air flow.**

**Any electrical installations must be reviewed and approved by an Electrical Engineer to ensure conformance to the BC Electrical Safety Regulation requirements for Hazardous locations if planning to store flammable/combustible liquids.**

Compressed gases shall not be stored in the shipping containers, such as Propane.

No smoking shall be allowed in shipping containers.

UN Placards for all stored Dangerous Goods must be visible on the two container sides most visible to emergency responders

## Mitigation and Prevention

Key mitigation strategies for shipping container fire safety are as follows.

### 1. Regulate

As noted above, it is key to regulate:

- What shipping containers are used for,
- What contents can be safely stored in them, and
- Potential fire risks the container may either be exposed to or may create for other critical structures or access points on the site.

### 2. Weaken

Shipping containers should be weakened to prevent high pressures from building up that exceed their rupture strength. Currently, standard shipping containers are very strongly constructed in order to prevent theft and to withstand cargo loading and being stacked, twisted and dropped on ships, trucks and trains.

The containers can be weakened by:

- Installing explosion-relief panels that may have to exceed 25% of the wall surface,
- Replacing the end doors with lightweight walls, and
- Installing conventional doors and windows in the sides.

The degree to which the container has to be weakened depends on its use. If dangerous goods are to be stored, specially designed relief panels will have to be determined by a professional engineer. Small top and bottom vents can also create some low-level weakening and provide ventilation.

### 3. Venting

The lack of indication of what is happening inside the shipping container was one of the key issues with the Enderby incident. The firefighters were not fully aware of the hazardous conditions building inside the shipping container. The provision of the top and bottom-level openings at opposite ends of the container may have revealed the hazardous conditions by emitting smoke from the container. This may have allowed them to change their tactics.



**Suggested solutions include a lower ventilation opening in the lower door (above) and an upper ventilation opening and wind vent (below).**

*Photos courtesy of BC Hydro Fire Marshal's office.*

