

**Corrosive Flammable & Combustible Liquid Chemical
Storage in Aboveground Storage Tanks**

ISSUE:

The Chief Fire Administrator has been made aware of product contamination and rapid corrosion of aboveground steel storage tanks when used to store certain flammable and combustible chemicals and chemical mixtures or products which are corrosive to steel tanks.

BACKGROUND:

The distributors of corrosive flammable and combustible liquids have been encountering corrosion problems with aboveground storage tanks constructed in accordance with Section 4.3.1. of the Alberta Fire Code (AFC). Although this list is quite comprehensive distributors have had difficulty in finding tanks that meet these requirements that are built in a manner that will prevent liquid contamination, corrosion and subsequent leakage of these flammable or combustible corrosive liquids.

Sentence 4.3.1.2.(3) does permit non conformance with flammable and combustible liquid storage tanks standards when it is possible that the product could be contaminated or the product stored could cause rapid corrosion of the tank. Such non-conformance would be reliant on the storage tank being built in conformance with good engineering practice and this may lead to a lack of uniform application and consistency in design, installation and safe operation.

This Variance has been developed with the above in mind to provide direction on flammable and combustible liquid storage tanks used for corrosive chemical storage.

CODE REQUIREMENTS:*

4.3. Tank Storage

4.3.1. Design, Construction and Use of Storage Tanks

4.3.1.1. Application

1) This Section applies to *storage tanks for flammable liquids and combustible liquids.*

4.3.1.2. Atmospheric Storage Tanks

1) Except as permitted in Sentence (3) and in Section 4.10., *atmospheric storage tanks* shall be built in conformance with the following:

- a) API 650, "Welded Steel Tanks for Oil Storage,"
- b) ULC-S601, "Shop Fabricated Steel Aboveground Horizontal Tanks for Flammable and Combustible Liquids,"
- c) CAN/ULC-S602, "Aboveground Steel Tanks for the Storage of Combustible Liquids Intended to be Used as Heating and/or Generator Fuels,"
- d) ULC-S603, "Steel Underground Tanks for Flammable and Combustible Liquids,"

*All references are to the Alberta Fire Code, Division B, unless otherwise stated

- e) CAN/ULC-S603.1, "External Corrosion Protection Systems for Steel Underground Tanks for Flammable and Combustible Liquids,"
- f) ULC-S615, "Reinforced Plastic Underground Tanks for Flammable and Combustible Liquids,"
- g) ULC-S630, "Shop Fabricated Steel Aboveground Vertical Tanks for Flammable and Combustible Liquids,"
- h) ULC-S643, "Shop Fabricated Steel Aboveground Utility Tanks for Flammable and Combustible Liquids,"
- i) ULC-S652, "Tank Assemblies for Collection of Used Oil,"
- j) ULC-S653, "Aboveground Steel Contained Tank Assemblies for Flammable and Combustible Liquids,"
- k) ULC-S655, "Aboveground Protected Tank Assemblies for Flammable and Combustible Liquids,"
- l) ULC/ORD-C58.10, "Jacketed Steel Underground Tanks for Flammable and Combustible Liquids,"
- m) ULC/ORD-C142.5, "Concrete Encased Steel Aboveground Tank Assemblies for Flammable and Combustible Liquids,"
- n) ULC/ORD-C142.18, "Rectangular Steel Aboveground Tanks for Flammable and Combustible Liquids," or
- o) ULC/ORD-C142.22, "Contained Steel Vertical Aboveground Tank Assemblies for Flammable and Combustible Liquids."

(See Appendix A.)

2) Reserved

3) When necessitated by possible contamination of the liquid to be stored or possible rapid corrosion of the tank, *storage tanks* need not conform to Sentence (1), provided that they are designed and built in conformance with good engineering practice for the material being used.

INTENT:

To provide specific direction for the manufacture of aboveground storage tanks which are appropriate for the storage of corrosive flammable and combustible liquids to meet the intention of the Alberta Fire Code 2006.

4.3.1.2.(1) – 01

Intent 1 -To limit the probability of the escape of liquid from the tank, which could lead to harm to the public.

4.3.1.2.(1) – 02

Intent 1 – To limit the probability of the escape of liquid from the tank, which could lead to the release and subsequent ignition of vapour which could lead to harm to persons.

Intent 2 – To limit the probability of the release and subsequent ignition of vapour from the tank, which could lead to harm to persons.

CONCLUSION:

Acceptance of tank construction and installation standards and methods for the appropriate storage of corrosive flammable or combustible liquids will enhance the longevity of these tanks resulting in increased safety for persons and the environment.

VARIANCE:

Aboveground flammable and combustible storage tanks used solely for the storage of chemicals that may be subject to product contamination, or chemicals that may have a detrimental effect on the storage tank construction materials, are permitted to be constructed under the following conditions:

- Storage tanks are to be used exclusively for the storage of product that is proven to have an adverse effect on the stored product or containment vessel if it were to be made of steel.
- The contents of the storage tank shall be clearly identified by product type (Corrosive Flammable Liquid) in accordance with Sentence 4.3.1.7.(2) of the AFC and placarded in accordance with the Transportation of Dangerous Goods Regulations primary and secondary classification markings (typically Class 3 + Class 8) including UN Number.
- Tank shall be constructed as:
 - A double wall above ground tank for the storage of flammable liquids and combustible liquids manufactured using a single wall steel tank, built to ULC specifications as outlined in Article 4.3.1.2., lined on the inside with a 3-dimensional reinforced fiberglass product which creates a leak detection interstitial space and an inner tank built using a fiberglass reinforced corrosion resistant resin, or
 - A single wall above ground tank for the storage of flammable liquids and combustible liquids manufactured to ASTM-D3299-10, "Standard Specification for Filament-Wound Glass-Fiber-Reinforced Thermoset Resin Corrosion Resistant Tanks", or
 - A single wall above ground tank for the storage of flammable liquids and combustible liquids manufactured to ASTM-D4097-01, "Standard Specification for Contact-Molded Glass-Fiber-Reinforced Thermoset Resin Corrosion Resistant Tanks".
- If an aboveground storage tank is constructed of fiberglass with no steel outer shell all of the spatial separation distances specified in Sub-Section 4.3.2. of the Alberta Fire Code shall be doubled.
- The storage tank shall be prevented from being overfilled as per Article 4.3.1.8. of the Alberta Fire Code.
- All remaining applicable requirements of the Alberta Fire Code shall be complied with.
- All tanks installed under this variance shall require engineered drawings to be submitted to, and written approval obtained from, the authority having jurisdiction.
- All tanks constructed under this variance of 2500 Litres capacity or greater must be registered with the Petroleum Tank Management Association of Alberta.

This Variance applies throughout Alberta.