

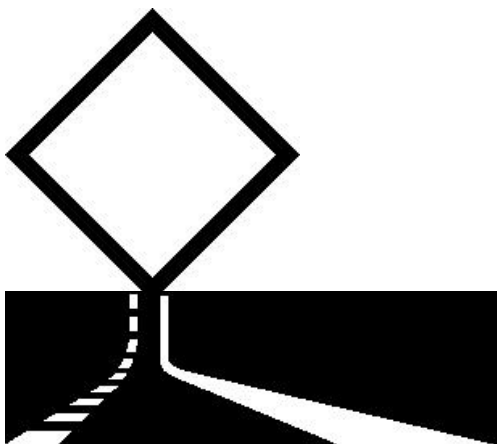
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**A Technical Publication  
from the Co-ordination  
and Information Centre**

## **Dangerous Goods Transport Tanks**

March 2010

**Dangerous Goods  
And Rail Safety**



**Government  
of Alberta** ■  
Transportation

**This material is meant as a guide to certain parts of the Transportation of Dangerous Goods Regulations and is not meant to be a substitute for them. It is the responsibility of handlers, offerers and transporters of dangerous goods to consult the Regulations for the exact requirements. The Coordination and Information Centre of Alberta Transportation can provide accurate information regarding the Regulations 24 hours a day.**

**Co-ordination and Information Centre**

**Alberta Transportation  
Dangerous Goods and Rail Safety Branch  
Main Floor, Twin Atria Building  
4999 – 98 Avenue  
Edmonton, Alberta, T6B 2X3**

**Tel. Edmonton: (780) 422 – 9600  
Tel. Province-wide: 1 (800) 272 – 9600  
Fax: (780) 427 – 1044**

**These telephone lines are recorded to assist in responding to the emergency (natural/manmade) and/or inquiry regarding dangerous goods and to ensure that the information is accurate. Direct any questions regarding the recording to the Compliance Officer responding to your call or contact the Manager of the CIC at 780-427-8660. *Legal Authority: Dangerous Goods Transportation and Handling Act, Section 13(1).***

# Bulk Transport Tanks

There are two pieces of legislation which cover the use of bulk tanks for transporting dangerous goods: the federal Transportation of Dangerous Goods Regulations; and the Dangerous Goods Transportation and Handling Regulation. The provincial regulations adopt the federal regulations to maintain consistency of the rules within all of Canada for moving dangerous goods.

## Federal Legislation

Part 5.10 requires that anyone offering for transport or transporting Class 2 gases in large tanks comply with the selection and use criteria set out in CSA Standard B622. Part 5.14 requires that anyone offering for transport or transporting Class 3, 4, 5, 6.1, 8 and 9 dangerous goods in large tanks comply with the selection and use criteria set out in CSA Standard B621. These two standards allow the shipper and the carrier of dangerous goods to select the correct type of tank to use for each dangerous good.

Both standards refer to the manufacturing standard CSA B620, which outlines how a tank must be constructed and maintained for continued dangerous goods service. All tanks constructed after July 1, 1995 must be built to standard.

Only facilities that are registered with Transport Canada can manufacture, assemble, modify, repair or test tanks that are used to transport dangerous goods. A list of registered facilities is available on the Transport Canada website.

<http://wwwapps.tc.gc.ca/saf-sec-sur/3/fdr-rici/highway/tanks.aspx>

## US Tanks

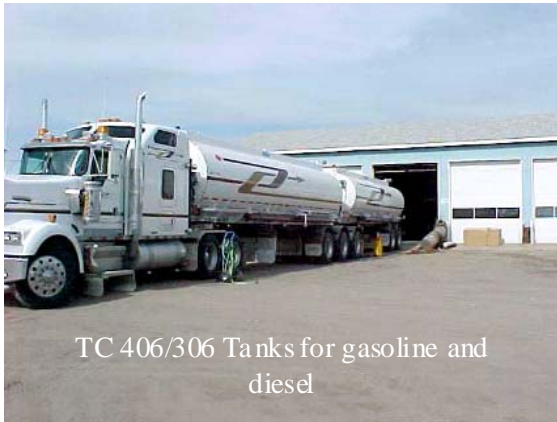
Tanks built in the US to the US Department of Transport standard set out in the Code of Federal Regulations (CFR) Title 49 will have information on identification plates that is similar to their Canadian equivalent tanks. They will be marked MC or DOT instead of the TC mark used in Canada. These tanks are considered equivalent to a tank designed to the Canadian standard and, providing they are built in the US or built before August 31, 2008 in Canada, they can be used in Canada. After August 31, 2008 tanks manufactured in Canada, for use in Canada, must be constructed and maintained according to CSA B620.

## Tank Types

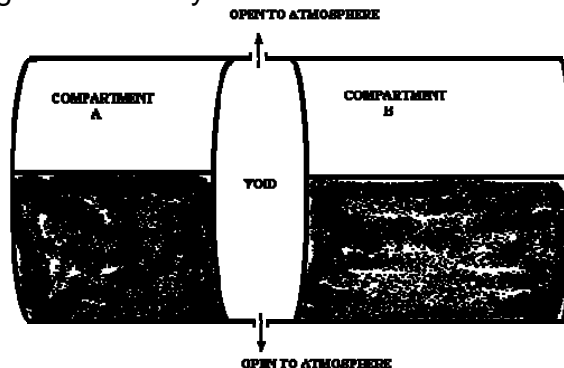
**TC 406/306** low pressure, oval shaped, highway tank for general flammable liquids including gasoline, crude oil and diesel. They operate at about atmospheric pressure or 21 kPa (3 psi).

It should be noted that TC 406 and TC 306 used in petroleum crude oil service may differ from units used for gasoline and other flammable liquids. There may be design changes such as no internal automatic safety shut off valves. These units are marked “TC 306 Crude” or “TC 406 Crude” and are to be used **solely** for the purposes of transporting crude oil, tars, asphalts, oils, bitumen and cutbacks.

Safety features on these tanks include rollover protection by means of a trough at the top of the tank to prevent damage to manholes and vents. Other features include high strength bumpers, safety relief vents and internal baffles to minimize liquid surge and provide added strength to the barrel of the tank.



Some tanks have more than one compartment. A “void” section often separates these compartments to prevent contamination between compartments. These voids must be open to atmosphere. There is a hole at the top and bottom of the void, which must not be plugged. Sometimes the presence of a plug indicates damage to the internal integrity of the tank. A tank found by enforcement staff with a plug will be placed out of service until the unit is repaired at a registered facility.



**TC 407/307** circular tank. These tanks are capable of operating at pressures higher than those set down for TC 406/306 tanks at 138 kPa (20 psi). They can be constructed to take all flammable liquids including the more volatile Packing Group I liquids, sour crude oil and some corrosives such as CORROSIVE LIQUIDS N.O.S (HYDROCHLORIC ACID).



TC 407/307 Tanker for sour crude and extremely flammable liquids

**TC 412/312** circular tank. These tanks are capable of operating at pressures higher than those set down for TC 406/306 tanks. Some are steel with large outer stiffening rings and are often lined. The type of lining may prevent the construction of internal baffles in these units and hence they are usually long and narrow to minimize surging. Some tanks constructed to this standard are manufactured from fibreglass reinforced plastic. This type of tank is often used in dual service because it can handle both corrosive liquids and, with suitable grounding capabilities, flammable liquids such as crude oil.



TC 412/312 Lined Steel Tanker for acids and caustic material



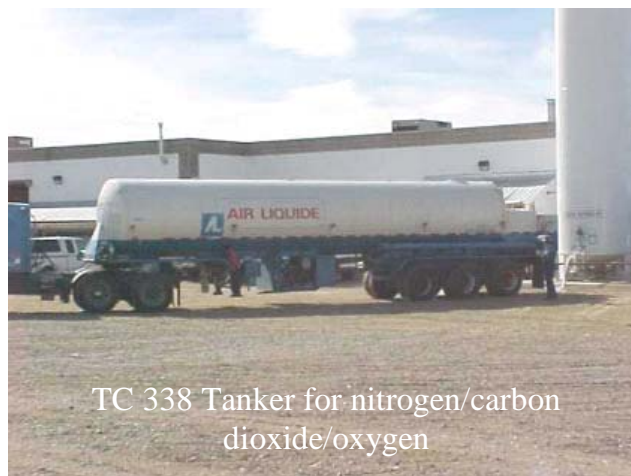
TC 412/312 Fibre Glass Tanks for acids and crude oil

**TC 331** is a high pressure tank designed for liquefied gases such as propane and anhydrous ammonia. They are designed for high pressures around 1723 kPa (250 psi) depending upon the liquefied gas. Additional features on these tanks may include off tank shutdown systems in the event of a failure during loading or offloading.



TC 331 Tank for propane and  
anhydrous ammonia

**TC 338** cryogenic gas insulated highway tanks. These are used for cold liquefied gases such as Nitrogen. A variation on this design is the **TC 341**, another cryogenic unit generally used for Oxygen. Both these types of tanks are designed in a similar manner to a “Thermos” bottle. They are engineered to keep the cold in and the heat out of the product by having a tank within a tank with a vacuum in-between to lessen heat transfer. They are not designed for high pressure service and operate at pressures of about 345 kPa (50psi) and above depending upon the product. These units often periodically vent gases to maintain the pressure in the tank, especially on hot days.



TC 338 Tanker for nitrogen/carbon  
dioxide/oxygen

**TC 407/412/350** vacuum truck. These tanks are commonly designed with a characteristic large rear door, which opens for dumping. They are generally used for cleanup of chemical spills, oil spills and cleanout of storage tanks. They are also haul crude oil and water from the oil separation process at well heads. A unit dedicated to hauling crude oil may be designated as a “TC 350 Crude” and the certification plate on the tank would be marked accordingly. A full specification TC 350 tank must have a thermal and remote shutoff installed on all product outlet points, including “mud gates”, unless it is marked as a “TC 350 Crude”. As with “TC 406/306 Crude” tanks, only crude oil or water/oil mixtures from an oil well would be allowed in one of these units.



TC 350/407/412 Vacuum Tanker for wastes including oilfield wastes

**TC 3AXM/3AAXM/3T** tube trailers are specialized units that are designed to the CSA B340 Standard used for cylinders. They hold gases, which cannot be easily liquefied, such as natural gas, at very high pressure. These units are usually re-tested using acoustic methods under permits issued by Transport Canada. U.S. DOT units are allowed if they were constructed and in service in Canada prior to January 1, 1993.



DOT 3AXM Tube Trailer for hydrogen or natural gas

## Identification Plates

All tanks used in the service of transporting dangerous goods must have a plate attached to the shell or an integral part of the structure of the tank. The plate must be constructed of a metal that is not subject to corrosion and it must be located on the left side of the tank near the front or, prior to 1 July 1985, on the right side near the front. The plate must be legible.

A tank built after 1 July 1995 must be built to the CSA B620 standard and must have a plate attached to it with at least the following information (5.1.6.1.6 in CSA B620):

- TC Specification e.g. TC 406 or TC 406 Crude;
- tank vehicle assembler (Tank veh. assembler);
- tank vehicle serial number;
- tank vehicle completion and certification date – month and year (cert. date);
- tank manufacturer (Tank mfr.);
- tank maximum allowable pressure in kPa (MAWP);
- tank test pressure in kPa (Test P);
- vessel material specification number;
- weld material (Weld Matl.);
- minimum allowable thickness of shell – in millimeters (Min. shell thick);
- minimum allowable thickness of heads – in millimeters (Min. head thick);
- volumetric capacity – in litres (Vol. Cap. Litres);
- date of tank manufacture – month and year (Date of mfr.).
- Manufacturer

\*Note: Additional information may be required depending on the type of tank and when the tank was constructed. Please refer to the version of the CSA B620 Standard at the time of construction of the tank when determining what information is needed on the tank plate.

## Tank Testing and Marking

All tanks must be tested on a periodic basis as shown in the following table (Table 7.1 in CSA B620):

Type	External Inspection	Internal Inspection	Lining Inspection	Leakage Test	Pressure, Hydro or Pneumatic
<b>406/306</b>	1 year	5 years		1 year	5 years
<b>406/306 Crude</b>	2.5 years	5 years		2.5 years	5 years
<b>407/307</b>	1 year	5 years		1 year	5 years
<b>407 Vacuum with full opening heads</b>	6 months	5 years		1 year	2 years
<b>412/312</b>	1 year	5 years		1 year	5 years
<b>412 Vacuum with full opening heads</b>	6 months	5 years		1 year	2 years
<b>423</b>	1 year	1 year		1 year	5 years
<b>350</b>	6 months	1 year		1 year	2 years
<b>350 Crude</b>	1 year	1 year		1 year	2 years
<b>331</b>	1 year	5 years		1 year (2 years for Chlorine)	5 years (2 years for Chlorine)
<b>338</b>	1 year				5 years
<b>341</b>	1 year	10 years (unless alternative testing is used)			10 years
<b>11</b>	1 year	10 years if it has a manhole		1 year	5 years
<b>51 Portable</b>	2.5 years	5 years	5 years		5 years
<b>56/57 Portable</b>	2.5 years				2.5 years
<b>60 Portable</b>	2 years	4-8-10-12 years then every year	4-8-10-12 years then every year		4-8-10-12 years then every year
<b>Types 1,2 and 3 Intermodal</b>	2.5 years	2.5 years	5 years		5 years
<b>UN 31 Intermediate Bulk Container (Slip Tanks)</b>	5 years			5 years	

Lined and unlined tanks in corrosive service must have an annual internal inspection. The lined tanks must also have the lining checked at the same time interval. Unlined tanks in corrosive service must have an annual internal inspection and a thickness test done every 2 years.

All tanks with an upper coupler must have the tank checked for corrosion under the upper coupler every 5 years.

For additional requirements, refer to Table 7.1, Table 7.2, Table 7.3 and related legend from CSA B620.

Each tank must be marked on the side near the metal identification plate or head end with the following letters, as applicable, to show that the periodic tests have been carried out. A new tank requires the initial test information on the manufacturer's plate only:

<b>Letter</b>	<b>Test or Inspection</b>
<b>V</b>	Visual (External) Inspection
<b>I</b>	Internal Inspection
<b>P</b>	Pressure Test
<b>T</b>	Thickness Test
<b>L</b>	Lining Inspection
<b>K</b>	Leak Test
<b>UC</b>	Upper Coupler Area Inspection
<b>WF</b>	Wet Fluorescent Magnetic Particle Inspection
<b>C</b>	For TC 341 tanks only if a Cold Vacuum Retention test has been carried out instead of an internal (alternative testing).

The date the tests were carried out must also appear on the tank, for example (one possible format):

**02/09 V I K P 123**

shows that visual, internal, leak and pressure tests were carried out in February 2009. The digits "123" represent the last three digits in the Transport Canada registration number of the test facility.