Concept of the ISO Container

The standard box container was developed in the mid 50's by the Americans, in a move to use the container as the 'outer packaging' as opposed to the then traditional cargo sling methods of unloading the contents from a lorry, into a ship, and then into another lorry for final delivery. The container concept 'did away' with the wheels, and the manpower, and improved the storage and handling methods – an altogether more flexible mode of carriage. By the early 60's the container dimensions had standardised to an international standard size of 20' long, 8' wide & 8' 6" high – the ISO (International Standards Organisation) Frame. At each corner of the container is fitted with a corner casting, which allows for the container to sit on a chassis, a railcar, in a ships cell guide or be handled by a spreader. To prevent movement, a twistlock twists into the corner casting, locking it in position. By the mid 60's the first Tank Containers were being built – a cylindrical pressure vessel set within the ISO frame. They are constructed in accordance with strict international codes for the worldwide carriage of bulk liquids on land or at sea.

The ISO Tank Container was developed for the carriage of all types of liquids, ranging from, but not limited to, potable (food grade) liquids, non hazardous, and hazardous liquids, including corrosives, flammables, toxics, and explosives. The Tank Container eliminates the risks in transferring liquids from one vessel to another, and provides for an extremely safe, secure, cost effective, and viable mode of transportation. Once the Tank Container has discharged, it is taken to a recognized cleaning station, cleaned thoroughly for that product, and then made ready for it's next load. Although tank containers have a fairly uniform external appearance, the construction materials, linings, and fittings vary. Tanks are classified according to the specification of the tank shell and fittings. It is this classification which determines what type of product maybe carried. The function of the frame is to support and protect the tank as well as to facilitate the stowage, securement and handling by standard ISO container equipment. When properly handled, the frame is designed to cope with the stresses of a fully loaded tank.

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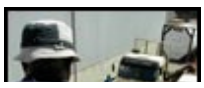
Tank Guide - Advantage

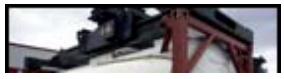
Advantage of the Tank Container Over Other Modes

Tankspan tank containers offer safe, reliable and cost effective transport medium for moving bulk liquids around the world.
Tank containers are designed, tested and approved for the safe, economical and efficent transportation of a broad range of liquid products.

Tank Containers compared with other Transport Modes

	DRUMS	PARCEL TANKERS	TANK CONTAINERS
Cost Effect-ivenes	Costly to buy, handle, store, dispose	Transportation • Terminal • Storage high costs	Cost effective Fill • Ship • Empty
Efficiency in use	Rarely reused or reusable, costly disposal	Large minimum cargo size - 200 to 500 tonnes	Minimal handling flexible pipeline
Safety	Susceptible to leakage and damage	Risk of contamination from pipelines, pumpsand storage	Optimum safety, robust primary package
Convenience	Multiple handling and labeling, costly	Restricted destination choice, not door to door	Totally Intermodal Road• Rail • Sea, door to door
Storage	Large storage area requirement	Compatible tank storage, costly	Immediate, low cost, secure storage





5 reasons why not to choose drums

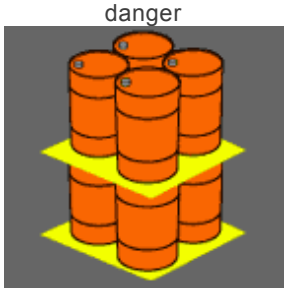
Drums:
•hazardous • inefficient • expensive • potentially dangerous.
For the transporation of bulk liquids from the factory to the customer, the use of drums is costly

Filling

1.The filling of dozens of drums is costly and time consuming with the risk of spillage.

Storage

2. Storage of drums is expensive and due to the danger of damage, risks spillage and potential danger

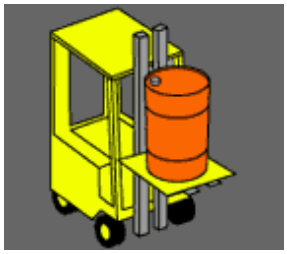


Shipping

3. the transport of drums is difficult and costly. The potential for damage and spillage due to multiple handling is high

Unloading

4. Drums awaiting suitable transportation to the end user for unloading are prone to handling damage and possible tampering and contamination



Disposal

5. Drums are difficult to clean. Re-use is limited, disposal is expensive and environmentally unfriendly.

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Tank Guide- Methods

Loading methods

Gravity loading through manhole

The cargo flows freely from an overhead storage tank through the manhole into the tank container.

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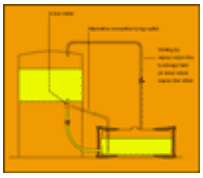
'Closed system' gravity loading through top or bottom outlets

The cargo flows into the tank container under gravity, the vapours are vented back to the storage tank via the airline connection.



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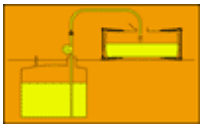
Pumped loading through manhole

The cargo is pumped from the storage tank through the manhole into the tank container.



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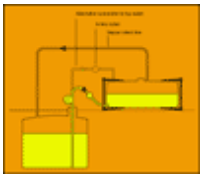
'Closed system' pumped loading through top or bottom outlet.

The cargo is pumped into the tank container, with vapours vented back to the storage tank via the air line connection.



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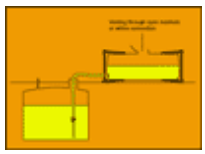
Pressure loading through top or bottom outlet

The cargo is loaded by top pressure in the storage tank. For sensitive or hazardous cargo, vapours are vented via the air-line connection to a vent tank or back to the storage tank.

Discharge methods

Gravity discharge

The cargo flows freely through the bottom outlet to low-level storage tanks. Ensure adequate venting to prevent damage caused by vacuum.



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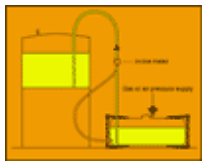
Pressure discharge

The cargo is discharged through the top or bottom outlets by top pressure in the tank container.

Products carried under an inert gas blanket are normally discharged using nitrogen or another inert gas as the pressure medium.
The maximum working pressure of the tank must under no circumstances be exceeded.



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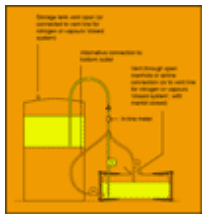
Pumped discharge

The suction side of a suitable pump may be connected to the top or the bottom outlets or to a hose via the manhole to pump the cargo to higher level storage tanks. Air or gas must be allowed into the tank container to replace the cargo being discharged. Depending on the nature of the cargo this can be achieved by opening the manlid or air-line connection, or by connection to an inert gas supply.

When using a high capacity pump it is recommended that a vacuum safety valve is incorporated in the suction line to protect the tank from vacuum collapse.



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Methods

The choice of method of loading and discharge will depend upon the relative position of the storage tanks and upon the hazard rating or nature of the cargo.

Cargoes which are not hazardous or noxious and which do not require protection from oxygen or water vapour may be loaded by any of the methods shown:

Noxious or hazardous cargoes

Loading or discharge through the top or bottom outlet may be necessary. To create the totally closed system any air, gas or vapour displaced by the liquid must be returned to the storage tank through the vapour return line fitted between the airline connection and the storage tank.

Cargoes which must not be contaminated by oxygen or water vapour should be loaded through the top or bottom outlet.

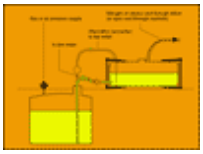
The tank should be purged of air before loading and the cargo should be carried under a blanket of inert gas. Cargoes which foam or are susceptible to oxidation should be loaded through the bottom outlet, or if this is not possible, through the top outlet and syphon pipe.

Measurement of cargo

The quantity loaded can be measured on a flow meter, by using a diprod, or by means of a weighbridge. With hazardous cargoes and 'closed system' loading diprods should not be used.

Check the complete system

All equipment from the main product storage tanks through to the tank container, including valves, hoses, pumps, gauges, connections, vapour return



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lines etc, should be regarded as 'total systems' exposed to the same cargo characteristics, (viscosity, corrosivity, temperature and pressures), and must be thoroughly checked for suitability and condition.

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Tank Guide- Loading

Loading Through Top Outlet

1. Refer to “Before Loading”
Click here to view 'Before loading'

2. Check that all bottom valves are closed.


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3. Remove top outlet blank flange. Bolt hose coupling to top outlet flange.

4. Connect vapour return line and open valve to vent tank.

5. Load tank to required level. Check constantly for leaks in hoses and connections.

6. Drain hose, close top outlet valve and remove from tank. Replace top outlet blank flange.

7. Close airline valve, disconnect vapour return line and replace blanking cap.

8. refer to section "After Loading"
Click here to view "After Loading"

Loading Through Manhole

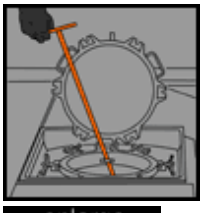
1. Refer to “Before Loading”
Click here to view 'Before loading'

2. Check that all tank bottom valves are closed.

3. Open manlid and insert hose into tank.

4. Secure hose to stop possible whiplash

5. Load tank to required level. Check constantly for leaks in hoses and connections.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6. Drain hose and remove from tank.

Loading Through The Bottom Outlet

1. Refer to “Before Loading”
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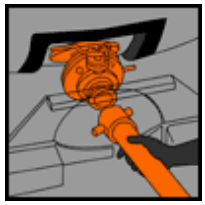
2. Remove bottom outlet blank flange or cap connect hose ensuring connection is correct and tight. Open valves.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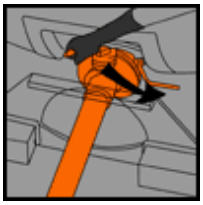
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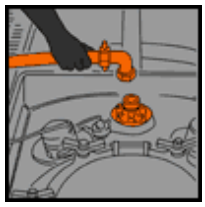
3. Connect vapour return line and open valve to vent tank.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4. Open valve. Load tank to required level. Check constantly for leaks in hoses and connections.


enlarge


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5. **Tanks with foot valve and external valve:**

- Close valve and then drain hose.
- Disconnect hose and replace blanking cap

Tanks with foot valve and external valve:

Close foot valve. Drain hose. Close external valve. Disconnect hose and replace blanking cap or flange. (This sequence is important to ensure that no product remains between foot valve and external valve).

6. Close airline valve and disconnect vapour return line and replace blanking cap.

Click here to view 'Before loading'

Click here to view "After Loading"

Safety points to note during loading and discharge

There will always be a pressure differen between a closed tank and atmosphere. Valves must be opened carefully. Always relieve pressure before opening the manlid. Do not stand on the manlid when loosening wing nuts.
When using the bottom outlet always open or close the foot valve first.
Manlid wing nuts need only be handtight. If the seal is in a serviceable condition, further tightening will not be necessary.
Never enter a tank until all the safety recommendations have been complied.

Product approval list (RID / ADR) Oddy TASU 116 series (26k)

Product approval list (IMDG) IMDG - 5A Oddy TASU 116 series (26k)

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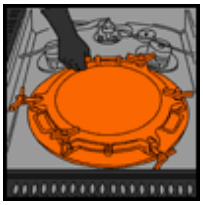
7. Close manlid and tighten down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8. Refer to “After Loading”
Click here to view "After Loading"

7. Refer to section “After Loading”
Click here to view "After Loading"

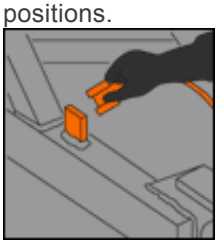
Procedure Before Loading or Discharge

1. Ensure that the vehicle is securely braked, chocking wheels if necessary.

2. Contact the local supervisor to ensure that the cargo is of correct specification and quantity.

3. Where safety or fire fighting equipment is required, it should be positioned upwind of the tank.

4. Make earth connection from tank earthing point to local earth positions.

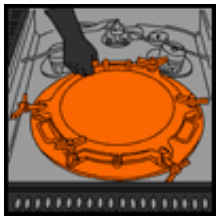


5. Check that the hose connections have the same thread or fitting as the tank connections. Ensure that the correct joint rings and gaskets are compatible with the cargo.

6. Check that appropriate facilities exist for the draining of hoses and vavles.

Additional checks for Loading only:

7. Check if a Cleanliness Certificate or Gas Free Certificate is required
(depending on the cargo).



8. Open manlid and examine tank/Outlet valves for cleanliness.

9. Check relief valves are in sound condition

Note: For cargoes being carried under an inert gas blanket, see section on gas blanketing.

After loading

1. Clean and stow the supply and return hoses, replacing caps and blanks.

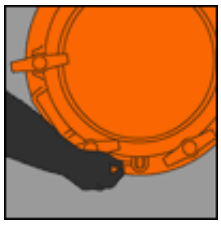
2. Ensure that all tank fittings are correctly closed and capped and any cargo spillage removed.

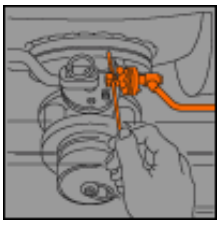
3. Remove earth connection.

4. Replace safety equipment.

5. If required, seal tank and fittings in accordance with Customs requirements.

6. Check that the tank container is properly labelled for the product loaded, and that any redundant labels have been removed.





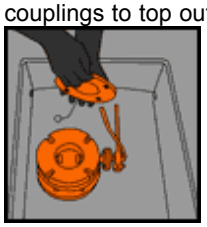
Pumped Discharge

Click here to view 'Before Discharge'

Click here to view 'After Discharge'

1. Refer to section 'Before Discharge'
Click here to view 'Before Discharge'

2. **Top outlet discharge:**
Remove top outlet blank flange, bolt hose couplings to top outlet flange.



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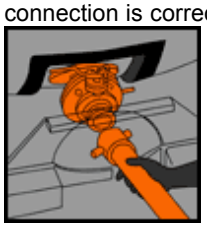
Bottom outlet discharge:
remove bottom outlet blanking cap or flange, connect hose ensuring that hose connection is correct and tight.



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3. Open manlid or airline connection to vent tank.

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4. Open tank outlet valve or valves and commence discharge. Check constantly for leaks in hoses or connections.

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5. Drain tank.

6. When discharge is complete,

Top outlet discharge:
Drain hose, close top outlet valve and remove hose from tank. Replace top outlet blank flange.

Tanks with single bottom outlet valve
- Close valve and then drain hose.
- Disconnect hose and replace blanking flap or flange.

Tanks with foot valve and external valve:
- Close foot valve.
- Drain hose.
- Close external valve.
- Disconnect hose and replace blanking cap or flange. (This sequence is important to ensure that no product remains between foot valve and external valve).

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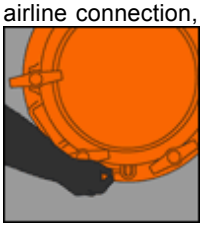
7. Close manlid and tighten down, or close airline connection, replacing blanking cap.



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8. Refer to selection 'After discharge'
Click here to view 'After Discharge'

Gravity Discharge

1. Refer to section 'Before discharge'.
Click here to view 'Before Discharge'

2. Remove bottom outlet blanking cap or flange and connect hose ensuring that the connection is correct and tight.

3. Open manlid or airline to vent the tank or

Tanks with foot valve and external valve
Close foot valve.
Drain hose.
Close external valve
Disconnect hose and replace blanking cap or flange. (This sequence is to ensure that no product remains between foot valve and external valve).

vent back to storage tank.


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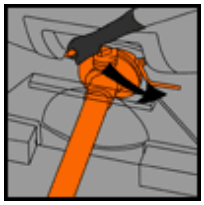
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4. Open outlet valves and commence discharge. Check constantly for leaks in hoses and connections.

5. Drain Tank.

6. **Tanks with bottom outlet valve:**

Close valve and drain hose.
Disconnect hose and replace blanking cap or flange.


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7. Close manlid and tight en down or close airline connection and replace blanking cap.


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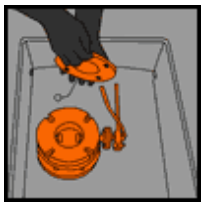
8. Refer to section ‘After discharge’.
Click here to view 'After Discharge'

Pressure Discharge

1 Refer to section 'before Discharge'
Click here to view 'Before Discharge'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2. Top outlet discharge
remove top outlet blank flange, bolt hose couplings to top outlet flange and open top outlet valve.
NOTE: The syphon tube extends to approximately 12mm from tank bottom at outlet end of tank, so that the minimum of cargo remains after discharge via top outlet.

Bottom outlet discharge: connect hose to bottom outlet assembly
Remove bottom outlet cap or flange, connect hose, ensuring that hose connection is correct and tight, open foot valve (if fitted) and open outlet valve.

3. Connect airline and open airline valve (if fitted)


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4. Open tank outlet vlave or valves and commence discharge. Check constantly for leaks in hoses or connection.


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5. Apply pressure until discharge is completed, (not exceeding tank and hose working pressure). Check constantly for leaks in hoses and connections. Pressure will drop when discharge is complete.

6. When discharge is complete, and hose line is empty, close airline valve, disconnect airline and replace blanking cap.
NOTE: It is important to relieve any remaining pressure in the tank through the hose when noxious and hazardous vapours are present.


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7 Bottom outlet discharge: Tanks with single bottom outlet valve.
Close valve and drain hose.
Disconnect line and replace blanking cap or flange.


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Tanks with foot valve and external valve:
Close foot valve:
Drain hose.
Close external valve.
Disconnect hose and replace blanking cap or flange.

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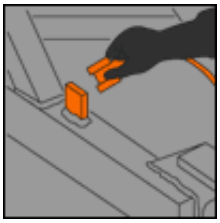
Procedure Before Discharge

1. Ensure that the vehicle is securely braked, choking wheels if necessary.

2. Contact the local supervisor to ensure that there is adequate space in the receiving tank. If product is already present in the receiving tank check that it is identical to the cargo being discharged.

3. Where safety or fire fighting equipment is required, position it upwind of the tank.

4. Make earth connection from tank earthing point to local earthing positions.



5. Check that the hose connections have the same thread or fitting as the tank connections. Ensure that the correct joint rings and gaskets are used, and that they are compatible with the cargo.

6. Check appropriate facilities for the draining of hoses and valves.

7. Check the setting of the valves to the receiving tanks.

8. For discharge by pumping or by gravity ensure that the danger of implosion is avoided b opening the manlid (or airline valve to vapour return line if closed system is being used). Ensure that venting is not prevented by any solidified cargo in the airline or relief valves.

9. For discharge with top pressure ensure a gauge is visible and a serviceable condition to monitor the pressure applied.

Procedures after Discharge

1. Check the tank is empty

2. Stow hoses, replacing caps and blanks.

3. Ensure that all tank fitings are correctly closed and capped and any cargo spillage removed.

4. Remove earth connection

5. Replace safety equipment

6. In the case of hazardous cargo, the tank must be regarded as dangerous until clean and gas free.

7. Where cargo residue may spoil or may become corrosive to the tank with atmospheric air humidity, the nitrogen used to discharge the tank should remain in the tank until it is cleaned or reloaded with cargo

8. To prevent hardening of solvent soluble resins and paints approximately 15 litres of solvent should be added to the tank and the tank should be maintained under pressure awaiting cleaning.

9. To prevent drying out of latex and emulsions, the tank should be maintained under air pressure awaiting cleaning.

Tank Guide - Categories

Tankspan tanks are designed to ensure the greatest degree of acceptance by the authorities and comply with the following international approvals, recommendations, conventions, standards and regulations:

IMO International Maritime Dangerous Goods Code
DOT US Code Federal Regulations CFR49
DOT UK Carriage of Dangerous Goods
UN Transport of Dangerous Goods
ADR European Agreement Int Dangerous Goods by Road
RID European Agreement Int Dangerous Goods by Rail
UIC International Rail Approval
CTC Canadian Transport Commission (Rail)
AAR American Association of Railroads
CSC International Convention for Safe Containers
BAM G.D.R Domestic Approval
TIR International Transport Goods under Custom Seal
FRA Federal Rail Association USA

The Tankspan fleet includes tanks in the following categories:

IMO Type 1 (hazardous) tanks

These units are designed for the carriage of:

- Liquids with a flashpoint of less than 0 deg C
- Certain high-hazard toxins or corrosives
- Spontaneously combustible materials
- Cargoes which are dangerous when exposed to moisture
- Oxidising substances
- Liquids with a total containment pressure of not more than the maximum allowable working pressure of the tank

Note: Corrosive or unstable cargoes may require the vessel to be constructed from special types of steel or specially lined. In no circumstances should liquids be carried if the vapour pressure is at 65 deg C, plus other pressures induced at this temperature, plus 0.35kg/sq cm (15 psi) exceeds the design pressure of the tank.

The standard IMO 1 tank is provided with both a top and bottom outlet.

IMO Type 2 (low hazardous) tanks

These tanks are designed for the carriage of:

- Liquids with a flashpoint of 0 deg C to 61 deg C with no secondary hazard requiring a type 1 tank.
- Certain low-hazard toxins and corrosives
- Liquids with a total containment pressure of less than 1.724 bar (25psi) always provided that the total containment pressure does not exceed the maximum allowable working pressure of the tank.

IMO Type 5 (gas) tanks

These units are designed for the carriage of gases liquefied under pressure. Specific operating instructions apply to IMO Type 5 tanks.
See Gas Tank Section

"T" Codes

The listing of IMO Types has been replaced by the “T” code system. We have retained the above detail for point of reference, as the “T” code system has to be read in conjunction with the current Regulations.
These provisions apply to the transportation of hazardous materials in UN portable tanks. Portable tank instructions specify the requirements applicable to a portable tank when use for the transportation of a specific hazardous material.

Portable tank instructions T1 through T22 specify the applicable minimum test pressure, the minimum shell thickness (in reference steel), bottom opening requirements and pressure relief requirements. We list below the T code and minimum test pressure (bar) only, as the relevant Regulations need to be consulted to deduce the correct requirements of the other factors.

Click for T Codes Table

Multi – product use

It is permissible to carry products of a lesser hazard class or non-regulated products in IMO type 1 or 2 tank containers. However, if hazardous products were previously carried in these tanks, careful consideration should be given to the cleaning procedures necessary to prevent contamination of subsequent cargoes.
It is the operator’s responsibility to ensure that the correct type of tank is used for any particular product. Each tank is fitted with a data plate that indicates the class of tank and gives essential information relating to the operating limitations.

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Tank Guide - What Makes A Tank Special

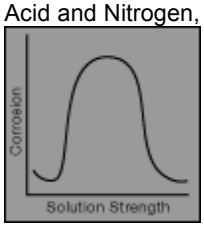
So What Makes A Tank, Special?

1) Maximum Operating Weights in different parts of the world.
The Maximum Operating Weights can vary from one country to another. Some states within the USA are more restrictive than many other country's. Japan used to be about the most restricted, but they are now in line with Euorpean standards. For example, in California the maximum payload for the tank, the chassis and the cab (including the driver!!) is 80,000 lbs. To combat this, the manufacturers have produced lightweight tanks of a Beam design, where the tare weight is as low as 3,300kg. Of course, rail can handle higher operating weights.

2) Pressure / Shell Thickness.
The more dangerous the liquid, the higher the pressure rating of the tank required. The calculation pressure for some substances may exceed the test pressure of a 'standard tank', therefore a thicker shell would be required - building in more safety of the tank from impact, etc. and from the product itself. Also the higher the vapour pressure of the liquid will determine the tank used. To convert from mild steel to stainless steel, requires the manufacturer to calculate it for you, as he will be the only person who has the mil certificates stating the values of the steel used for that tank. Some products, such as bromine (UN No1744) requires a minimum shell thickness of 12mm in mild steel. Due to the high SG of 3.12, the tank would be made of mild steel, and would require a lead lining.

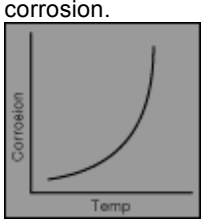
3) Top or Bottom Discharge Valve?
Certain high hazardous cargoes are prohibited to load / unload through the bottom valve, so a valve on the top is required. This then becomes a so-called "top discharge" tank. It may also be referred to in the regulations as a tank where no openings "below the level of the liquid" are allowed. Apart from the bottom outlet, it'll probably have all other fittings as described for a 'standard tank'. However, a top discharge tank is fitted with a syphon tube (dip pipe / tube) which is placed inside the tank, usually over a little sump set into the bottom of the tank shell. The syphon tube will normally be closed by one outlet valve and a bolted blind flange. Such a tank is fitted with two or more connections on top of each of which is closed with its own valve and bolted blind flange for purposes of filling, pressure discharging and vapour return in order to balance pressure.To move the valve from the

4) Linings (continued)
A wall thickness measurement stating the exact thickness of each such Container shall be detailed on the on-hire survey. At the end of the Lease the wall thickness of each such Container shall be measuered by a competent authority to determine any corrosion during the period of on hire. The results thereof shall be binding for both parties.
A following graph is a very crude 'rule of thumb' indicator for corrosion versus solution strength. It works for Sulphuric Acid and Nitrogen, but not for HCL.



enlarge

The higher the temperature the increase in corrosion.



enlarge

Purity levels of the product is a factor. The less pure the product is, the higher the corrosion.

5) Relief Valves
Does the PV give the flow capacity required by law? For calculating the flow rate, contact Fort Vale. Hydrogen Peroxide requires a venting system special relief capacity more than most. Bursting disc is 'in parellell' . i.e. PV valve and a separate bursting disc are next to each other, as opposed to 'in series'. i.e. where the PV valve has the busting disc below it.

6) Design temperature
Some products need to be transported at temperatures higher than than 120°C, therefore a special tank with thicker steel is required.

7) Electrics – for heating or cooling.
Where products have to be maintained within a specified temperature range, then an electrical unit is required, whether its for keeping a chemical at 45°C or beer at 1°C. We use Mannings units for heating, and Klinge units for cooling.

8) Insulation
Rather than going to the expense of electrics, it might be more viable to increase the insulation to 100mm, or in

A Standard Tank - T11.

What do we mean by a 'standard tank', and what things make a tank 'special'? The most common tank type (Portable Tank Instruction T11) within the Lessors fleets has the following specification:-

a) 4 Bar working pressure and a 6 Bar test pressure.
b) Minimum shell thickness of 6mm in mild steel or the equivalent in stainless steel.
c) a bottom discharge valve with a 3" BSP, plus a provision for top.
d) steam heating.
e) 1 PV
f) Tare weight between 3,750 – 4,200kg.
g) Insulation of 50mm.
h) Design temperature – typically 120°C, but could be as low as 93°C.
i) Capacities ranging between 17,500 – 26,000 litres.
j) Within ISO.
This tank type will generally carry more variety of products than any other.

bottom to the top, would cost in the region of US$1,000.00. Any conversion needs to be certified by a competent authority (BV, DNV, ABS). A Hydrostatic Test (5 year periodic test) has to be performed. The heat from the welding up the plate could cause corrosion at a later date.

4) Linings
Linings should be continious of the shell, pipes and valves (through the welds). i.e. continues to all areas where the product can go.
Most common is rubber. There are many types – butyl, nitrile, natural, etc. These are closely followed by resinous type linings. Glass flake is also used. PVDF has been used as a substitute for lead. It all comes down to compatability.
An alternative to a lining, is a thicker shell, but an allowance for corrosion is required.

EXAMPLE. Due to the corrosive properties of Hydrofluoric Acid, the Lessor shall apply a corrosion allowance of 0.2 mm per annum. Any corrosion above this allowance will be charged at a rate of US$400.00 per 0.1mm per annum.

(continued in next column) **^top^**

some cases 200mm. This allows for the product temperature to remain more constant. Increasing the insulation will reduce the size of the tank, otherwise there is a danger of being outside ISO.

Reflective Sunshields. These can be added to the tank, to enhance the insulation properties.

9) Swap Body's
Their dimensions are outside ISO. They are generally higher, wider, and of course longer than the 'standard tank'. Typical dimensions are:
Click here for dimension table

They have additional corner castings to the standard ISO container, however they retain corner castings at ISO so that they can be treated / handled by the same equipment.

10) IMO 5 Gas Tanks
Gas tanks are generally made of mild steel, as opposed to stainless steel, as the tare weight is generally a constraint. Mild is also cheaper than stainless.
Routine shotbasting of the interior maybe required from time to time to remove build up of scaling and or rust, due to oxidisation. See section on **Gas Tanks** for further details.

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Tank Guide - Glossary

BS Table D Specification for bolted flanges for pressure applications.
BSP British Standard Pipe Thread. A thread form common on pipe fittings.
CFM Cubic Feet per Minute. Imperial measurement of rate of flow. Usually applied to airflow.
Closed Cup (CC) Closed Cup (CC) describes a method used to ascertain the flash point of a liquid.
Design Pressure The pressure used to calculate the thickness of the shell of the tank. Design Pressure to equal or exceed the maximum allowable working pressure or equal or exceed the Test Pressure, depending on which code is applicable.
Filling Ratio Maximum permissible weight of cargo per unit volume.
Hg Inches of Mercury. Units of measurement for low pressure (usually vacuum).
ISO International Standards Organisation. An advisory body, whose recommendations have been accepted and incorporated into the official technical standards of many countries in the area of the transportable container. The aim of the organisation is to achieve a unified approach to cargo container design and handling.
MAWP Maximum allowable working pressure.
NPT National Pipe Thread. The thread form for pipe fittings used in the USA.
ØorPh Phase. Applied to electrical power supply.
PCD Pitch Circle Diameter. Diameter of circle upon which bolt holes are placed on flanges etc.
Plate Valves A valve consisting of a plug which is moved in and out of its seating by an operating mechanism. Most foot valves are plate.
TIR / Custom seals The term TIR is commonly used to denote the approved customs sealing on a container.
Periodic Tests These are performed every 2.5 years. The depot ensures the tank is repaired and made ready for the test. Then a competent authority who are certified to do the test (BV, DNV, ABS, etc.) are instucted to perform it. In the 2.5 year test the tank is filled with air, and checked to see it is completely airtight. Whereas the 5 year periodic test (A Hydrostatic Test) which has to be performed every 5 years, the tank is filled with water and checked for leaks. Hazardous cargoes may only be transported in tank containers which have a valid Test certificate.
Psi (lb/in) Pounds force per square inch gauge.
SG Specific Gravity
The relative weight or density of a solid or fluid expressed by the ratio of its weight to that of an equal volume of a substance taken as a standard, water in the case of liquids and solids, air for gases. e.g. Water = 1.Other examples –Whisky = 0.90, Turpentine = 0.86, Kerosene = 0.80, Fruit Juice = 1.34, Phosphoric Acid = 1.8 – 1.9, Bromine Trifluoride = 2.49, Aviation Fuel = 0.63 – 0.79. The higher the SG, the smaller the tank will be, all things being equal.
Total Containment Pressure The sum of the internal pressure to which a tank container is subjected in normal service. The total pressure may not be greater than the Maximum Allowable Working Pressure of the tank.
Vapour Pressure The development pressure within a closed vessel containing a liquid. Each liquid has its own vapour pressure which varies with temperature.
Ullage area Free space within the tank after cargo has been loaded. The fill ranges between a minimum 80% and a maximum of 95% (97% on some chemicals) Actual filling ratio must never be less than 80% for tanks not partitioned in compartments of less than 7,500 litres.
Walkway This runs the length of the tank, allowing safe access to all the components on the top of the tank. Generally made from non-skid / marine aluminium, and about 3mm thick.

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