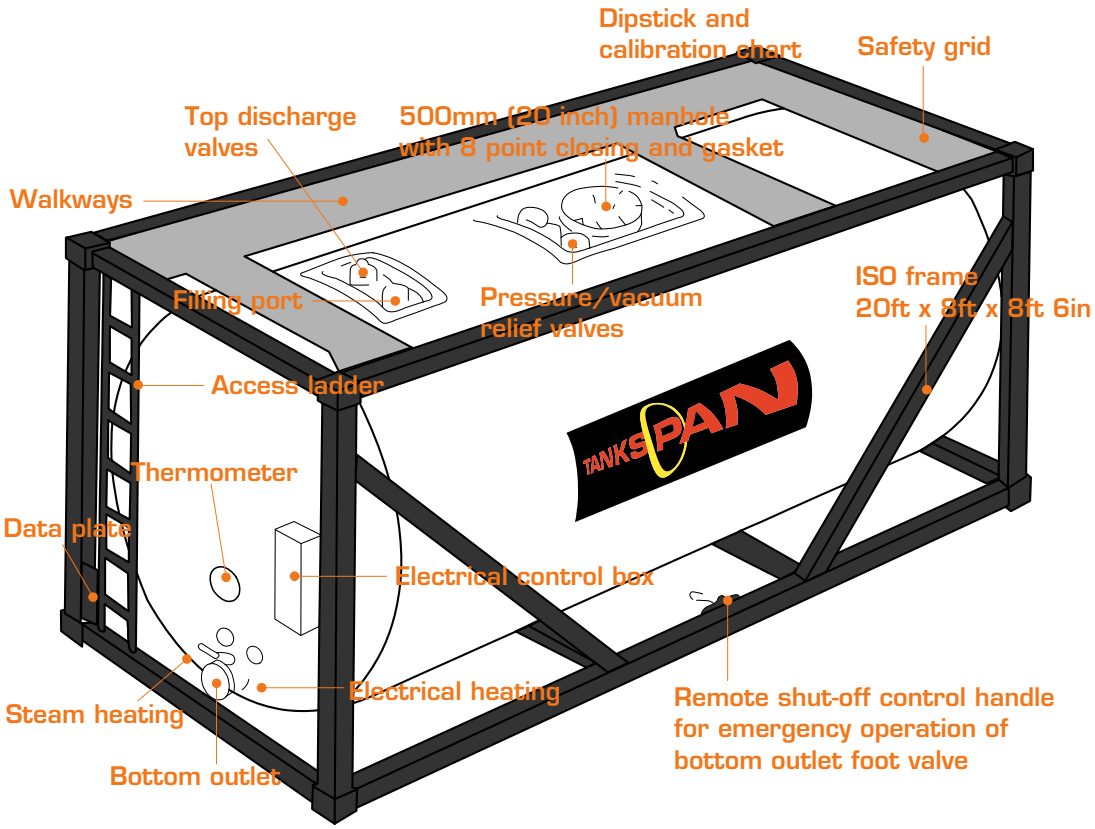
Tank Guide - Components

Components



History 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 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 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 and 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 cel guide or be handled by a spreader. To prevent movement, a twistlock twist into the corner casting, locking it in position.

By the mid 60's the first tank Containers were being built - a cylindrical vessel set within the ISO frame.

The ISO Tank Container was developed for the carriage of all types of liquids, ranging from, but not limited to, portable (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.

Tankspan Leasing Ltd
The Old Farm Office, Peper Harow, Godalming, Surrey, UK
Tel: +44 (0) 1483 425900
Email: enquires@tankspan.com Web: www.tankspan.com

Components – Tank Fitments

To resolve any ambiguities when describing tank container component locations, the end of the tank fitted with the discharge valve is termed the Rear End. The opposite end is the Front End. Right and Left Hand side designations are described when facing the Rear End.

Airline Valve

The valve is used for pressuring the tank during discharge (pushes out the loaded product) or testing, and for vapour recovery. It terminates in a 1½" or 2" BSP male threaded airline connection and screw cap.

Ball Valve

A valve which is closed by rotating a ball with a central hole through 90°. Provides unrestricted flow.

3 inch Ball Valve

3 inch Ball Valve

Butterfly Valve

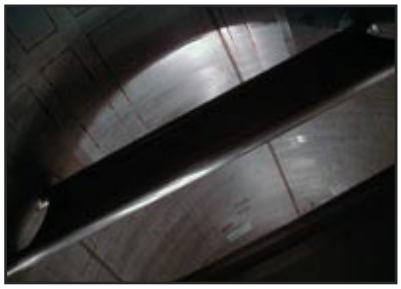
3 inch Clamped Butterfly Valve

3 inch Flanged Butterfly Valve

A valve containing a circular plate which rotates through 90° to close the opening. A 'butterfly' valve (because of the way it opens and closes) is generally preferred to a 'ball' valve as they're easier to clean, and won't protrude out of ISO.

Baffles

Baffles are used to allow the operator to transport smaller quantities than the 80% rule, plus the driver finds it safer to driver. The downside is baffles add weight, and give can be difficult to clean.



Tankspan Leasing Ltd
The Old Farm Office, Peper Harow, Godalming, Surrey, UK
Tel: +44 (0) 1483 425900
Email: enquires@tankspan.com Web: www.tankspan.com

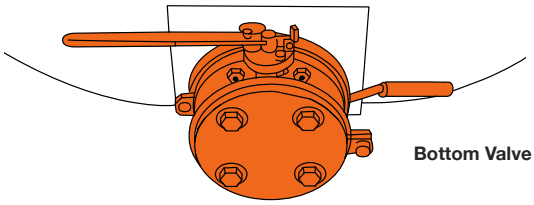
Components – Tank Fitments

Bursting Disc / Rupture Disc / Frangible Disc

A thin membrane made of a suitable material such as S/S of teflon (PTFE) which has a known tolerance to pressure. It has two functions one to protect the valve from corrosion, (especially in the case of highly corrosive materials) & secondly a pressure relief device which breaks when the pressure exceeds the pressure set. The Bursting Disk is set between the MAWP and the Test Pressure. For a Standard Tank (see separate section) the MAWP is 4 BAR. e.g. Bursting Disk set at 4.84 BAR. Used for emergency relief or used as a hermetic seal for relief valves to prevent the release of toxic or especially hazardous vapours. When it is in series it sits under the Relief Valve, and looks like an egg poacher / frying pan. However some products, such as Hydrogen Peroxide the bursting disc is in parallel – a separate hole next to the PV. It also requires a venting system with a special relief capacity (more than most).

Bottom Outlet

IMO 1 tanks normally have a bottom outlet similar to that fitted to the IMO 2 but the outlet is flanged and drilled for bolting in accordance with British Standard table 'D' and closed with a stainless steel blanking plate. However, bottom outlets are prohibited with certain high hazard cargoes.



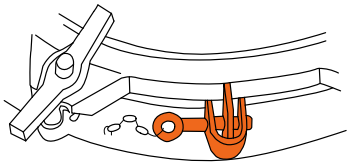
Bottom Valve Assembly

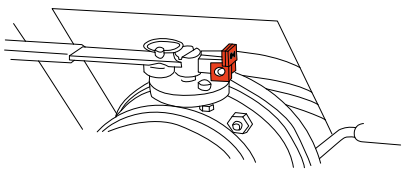
Customs Sealing

Facilities for customs sealing are provided in accordance with the requirements of the Customs Convention on Containers.

Permanent sealing consists of approved rivets, welded bars or bolts. Temporary seals at cargo access points are fitted by customs officers using the approved locking devices.

The permanent sealing method used should be noted before removing or stripping any fittings. The approved permanent welded sealing bars or TIR/wires should always be replaced if damaged or after maintenance is completed.





Tankspan Leasing Ltd
The Old Farm Office, Peper Harow, Godalming, Surrey, UK
Tel: +44 (0) 1483 425900
Email: enquires@tankspan.com Web: www.tankspan.com

Components – Tank Fitments

Cladding

Cladding – GRP (FRP) – Glass reinforced plastic (Fibre reinforced polyester) resin sheet with glass fibre used to encase insulation. The cladding jacket is to protect the insulation against rain / sea water.

GRP or Aluminium?

From a cosmetic point plain aluminium looks dreadful, within 6 months it's oxidised, and looks dull and distinctly shabby. White aluminium looks better than plain. Plain aluminium corrodes much faster than white aluminium. Small cracks / holes can have drastic consequences: increase in weight, the water will stop keeping it insulates, sagging, and possible corrosion - seawater - chlorine = corrosive. Water finding it's way through a split cladding could take 6 months before it comes out of the bottom of the tank. There have been such cases where they thought the tank was leaking.

The salt in seawater initially corrodes in the bottom panels, and then the side panels. Corrosion takes place from the inside, as well as the outside. Corrosion will become apparent within 5-7 years. Our preference is GRP finished in white, even though it's generally more expensive than aluminium, but in the long term it becomes cheaper, and its benefits become more apparent. With GRP you wouldn't have patching problems, you wouldn't have creases, you wouldn't have dents, you wouldn't have bumps. It looks good aswell.

Cladding Aluminium Sides

Cladding

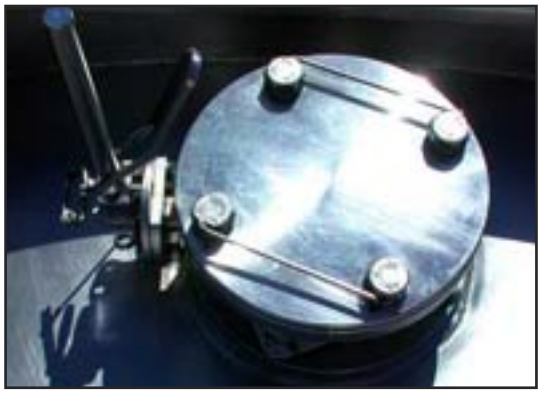
Cladding Aluminium

Data / CSC Plate

The tanks passport. A plate that identifies the owner / manager of the tank, the unique serial number, the date of manufacture, as well as indicating significant data and recording the test period validity. (See web for image.)

Discharge Valves

Discharge Valves – usually have 3 shut off devices. IMO 1 and IMO 2 tanks have a double valve system consisting of an internal stainless steel foot valve, (also known as a emergency valve) operated by an external handle biased-closed by a spring, plus a 3" butterfly valve with a 3" BSP screwed outlet and a blanking cap.



Dip Stick / Tube

A calibrated bar situated in the manhole that is used to measure the amount of liquid in the tank. A measurement is taken off the bar, and then cross referenced with the calibration chart (see an example in "Samples". This can only be used with non hazardous products.

Tankspan Leasing Ltd
The Old Farm Office, Peper Harow, Godalming, Surrey, UK
Tel: +44 (0) 1483 425900
Email: enquires@tankspan.com Web: www.tankspan.com

Components – Tank Fitments

Document Holder

A sealed tube for carrying documents, such as the transport action, cleaning certificate, etc.

Earth Point

A Connection for attaching an earthing strap. This should be made of a non corrodible, good conducting metal, be left bare, and be in direct contact with the tank shell. In some cases it is fitted to lower rear frame cross-member, which is directly connected to the shell. Ensure that the earth connection is made from the tank earthing point to a local earth position, before making connections.

Earth Lead

Earth Lead

Flame Trap

A metal gauze, which is used when carrying flammable liquids. It permits pressure to be expelled, but prevents flashback.

Flame Gauze

Frames

There are two basic tank container frame designs - the full frame and the beam frame. Both types fully meet the requirements of ISO regulations and are used for identical purposes. On each corner there is a hole to allow for a twist lock to secure the tank to the chassis / spreader / ships cellular guide.

The FULL FRAME (box type) supports the tank within a steel framework with continuous side rails.

The BEAM FRAME The BEAM Tank has been developed by some manufacturers whereupon the frame ends are welded into the shell giving inherent strength, but with no top or bottom rails. The beam tank has a lower tare weight due to its construction, and is thereby able to carry a higher payload.

Tankspan Leasing Ltd
The Old Farm Office, Peper Harow, Godalming, Surrey, UK
Tel: +44 (0) 1483 425900
Email: enquires@tankspan.com Web: www.tankspan.com

Components – Tank Fitments

Fusible Link

Fusible Link Assembly

A fusible Link has been designed to melt in the event of a fire, thereby closing the foot valve without any human intervention.

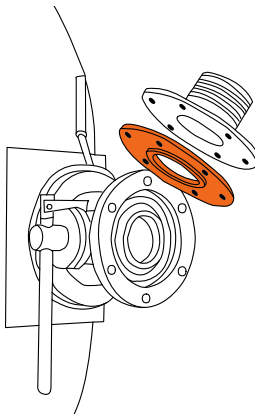
The U.S. DoT proposes to enforce the fitting of this device to all IM portable tanks transporting flammable, pyrophoric, oxidizing or toxic cargoes on a transport vehicle with the power unit attached. The system has to be fitted to all tanks by October 1st 2003.

The kit comprises of 2 brackets, which are welded to the tank, between which a spring and fusible element are fastened. A cable then links the spring to the existing remote closure system. Should a fire melt the fusible element, the spring is allowed to pull the remote closure cable and close the foot valve.

Gaskets

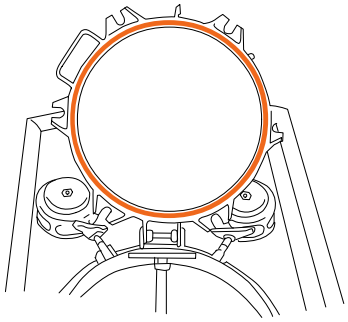
PTFE Polytetrafluoroethylene.
A plastic used for gaskets and bearings. It has a wide temperature tolerance and is resistant to most chemicals.

SWR Sweet White Rubber.
A rubber used for Food grade products.



Viton A
A synthetic rubber used for gaskets. Has good sealing properties and is tolerant to a wide spectrum of chemicals.

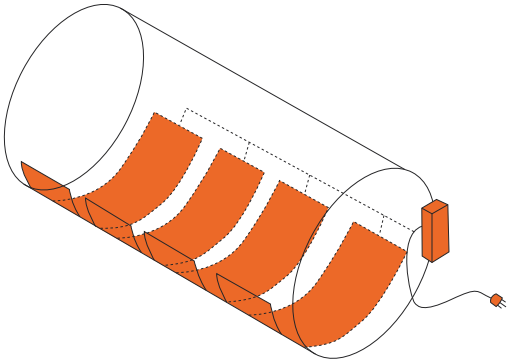
Standard seal and gasket materials vary according to the tank type. The operation must ensure that the seals are compatible with the product to be carried.



Hand Rail

Collapsible hand rails cover the full length of the tank container, which allows for safe access. There is increasing pressure for operators to use tanks with hand rails, especially in Europe, but as a tank could go anywhere in the world, there is a chance of damage, being out of ISO, or stolen. Both operators and lessors are reluctant to invest in them, as chemical companies won't pay a premium for them. However it is an essential piece of equipment on the European Swap Body.

Heating - Electric **Continue Overleaf**



The external shell heating systems consist of a network of elements in contact with the shell over the bottom third of the circumference of the tank. These heaters are especially suitable for heat sensitive products. This system operates on either 200-280 V 3-phrase or 340-480 3 phase. Power output at 440 V is 15kW.

Note: That in principle, electric heating is designed to maintain temperature only. It is not designed to reheat the product.

Tankspan Leasing Ltd
The Old Farm Office, Peper Harow, Godalming, Surrey, UK
Tel: +44 (0) 1483 425900
Email: enquires@tankspan.com Web: www.tankspan.com

Components – Tank Fitments

Heating - Electric ...Continued

Control Box
The electrical controls are mounted on the frame at the rear of the tank container.

The control box or boxes contain the following equipment:

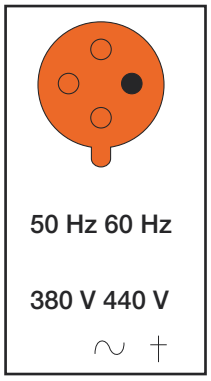
- Fuses or circuit breakers
- Temperature controls to Limit the maximum and minimum cargo
- Temperature
- Main switch to isolate the unit from the power supply

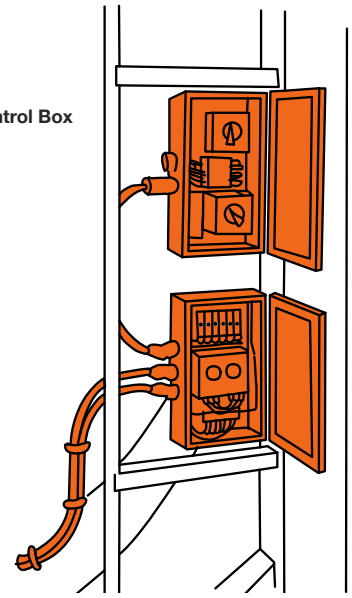
Reefer - Standard Electric Plug
All electric tanks should be equipped with a 4 pin plug (3 pins phase and 1 big pin earth) in the following way:

Elecrical Unit

Elecrical Unit Connections

Control Box





32 Amps CEE 17
How to check to see if you have the correct plug. Look at the pins of plug, with the 'nose' of plug in the 6 o´clock position, the big pin (earth) should be in 9 o´clock position.
View on socket for a.m. plug:

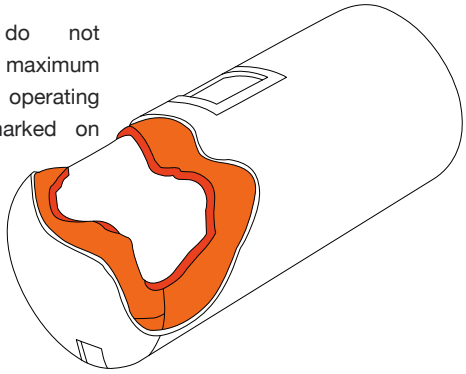
Heating - Steam

Steam Heating is the most efficient means of heating the tank cargo. Typical heating area – 8 sq.m. The steam channels, continuous loops of pipework, usually on the outside of the lower half of the tank, terminate at the rear of the tank and are closed by threaded dust caps. The inlet and outlet can be fitted with a valve, and the outlet should be fitted with a steam condensate trap. Care should be taken to ensure the maximum working pressure of the system is indicated on the date plate.

Insulation

Standard thickness is 50mm. Examples: Polyurethane foam (greenish), or Rockwell, similar to loft insulation, or Fibreglass. Rockwell is better for high temperature products. Foam crumbles away at about 110^{0}C - 115^{0}C.

This insulation may degrade at excessive temperature. Before loading check that the loading and operating temperature do not exceed the maximum permissible operating temperature marked on the data plate.



Tankspan Leasing Ltd
The Old Farm Office, Peper Harow, Godalming, Surrey, UK
Tel: +44 (0) 1483 425900
Email: enquires@tankspan.com Web: www.tankspan.com

Components – Tank Fitments

Labelling

These identify the product inside the tank. They have to be precise and must conform to all the relevant regulations, wherever the tank travels.

Note: All odd labels must be removed prior to loading, to save confusion / potential accidents happening.

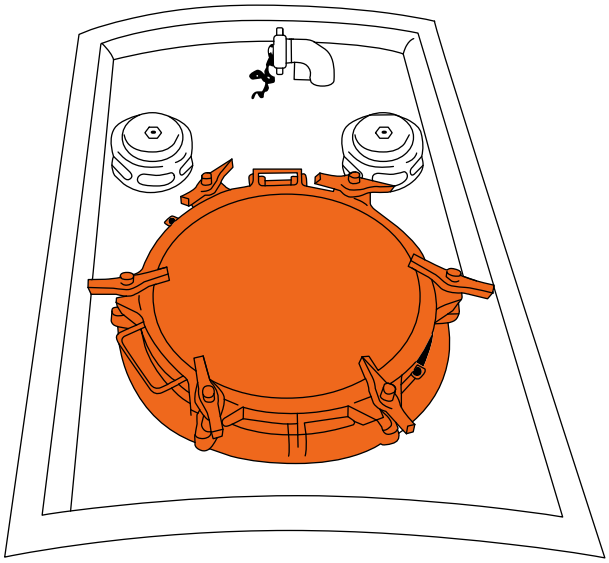
Manlid

The manlid has to be the same pressure as the tank, and allow enough space for a person to enter the tank. The manlid is held down with a minimum of six swing bolts, the wing nuts are of a softer metal, otherwise they could weld together when tightened. Our tanks have a 500mm diameter manlid with eight swing bolts. A gasket is fitted between the tank and the manlid.

A 'safe bolt' may be fitted to the manlid as a safety precaution against opening, e.g. when the tank is under pressure.

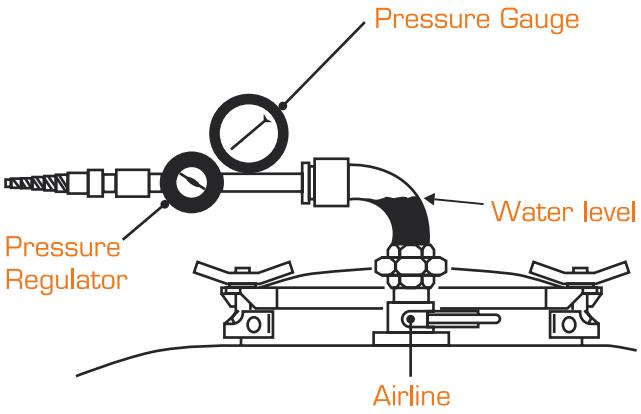
Manlid

Manlid food Grade MVC-032



Manometer / Pressure Gauge

A Manometer / Pressure Gauge is fitted to the airline connection, and can be fitted during filling, discharging or testing.



Tankspan Leasing Ltd
The Old Farm Office, Peper Harow, Godalming, Surrey, UK
Tel: +44 (0) 1483 425900
Email: enquires@tankspan.com Web: www.tankspan.com

Components – Tank Fitments

Placard Boards

Placard Boards are used for putting on current labels

Labels are fairly difficult to remove from the cladding, and look very messy - thus the reason for using a placard board.

Pressure / Vacuum Safety Relief Valve (PV)

A combined pressure vacuum relief valve to protect the tank against excessive overpressure and or vacuum. How many are used is dependant upon the product. The usual for a standard tank is to have just one Maxi-flow (a combined pre-vac valve). When pressure builds up, the PV springs open to prevent the tank blowing up. It will allow air into the tank to stop it crushing inwards. The PV is set between the MAWP and Test Pressure.

Remote Control

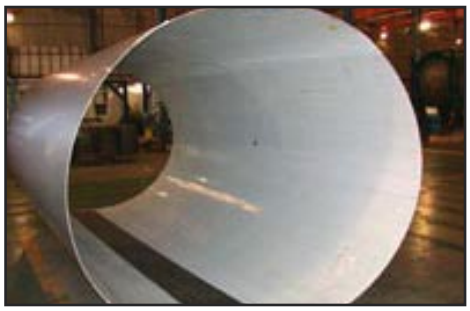
Remote Control for Bottom Asembly

Remote Control for Bottom Outlet

Remote Control on the side of the tank, allows the driver to close off the discharge valve from this safe location.

Shell

IMO 1's are made of stainless steel (currently 316L – low in carbon 1.4401 to DIN 17441, older tanks were sometimes made of 316TI - Titanium) and approximately 4.6 – 4.8mm thick. IMO 5 Gas Tanks are usually made from carbon steel.

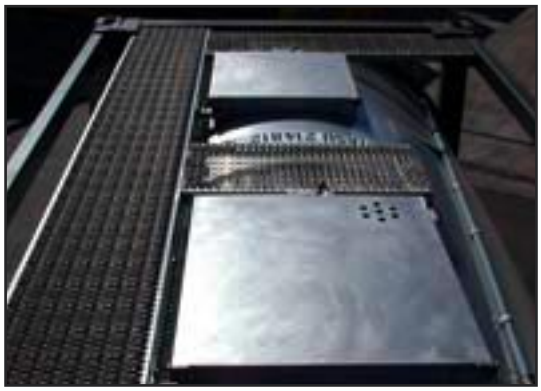


Tankspan Leasing Ltd
Suite 5, 50 Churchill Square, Kings Hill, West Malling, Kent ME19 4YU
Tel: +44 (0) 1732 229 800 Fax: +44 (0) 1732 522 992
Email: enquires@tankspan.com Web: www.tankspan.com

Components – Tank Fitments

Spill Boxes

2 Stainless steel boxes fitted around manlid / relief valve and around top discharge / air inlet. 25mm PVC external drainage tubes fitted.



Steam Trap / Relief Valve

Thermodynamic steam trap, situated on the outlet which automatically sensors condensate and utilises the pressure of the steam to eject the condensate from the system thus maintaining optimum heating characteristics.

Stem Relief Valve
When the steam cools down, the steam relief valve opens, only permitting water to pass. The remaining steam is condensed, ensuring live hot steam continually replaces the cooled down steam.

Syphon Pipe

A tube from the top outlet to the bottom of the tank, which allows liquid to be discharged through the top outlet by means of pressure or suction.

Syphon Tube **Syphon Tube Top** **Syphon Tube Bottom**

Tank Number

Tank Number has a four letter prefix, followed by six numbers and then a check digit. (See 'check digit programme' SG calculator). If all other information is missing from the container, the owner can still be identified by the prefix, by checking this in the code book produced by BIC of Paris (see useful links).

Tankspan Leasing Ltd
The Old Farm Office, Peper Harow, Godalming, Surrey, UK
Tel: +44 (0) 1483 425900
Email: enquires@tankspan.com Web: www.tankspan.com

Components – Tank Fitments

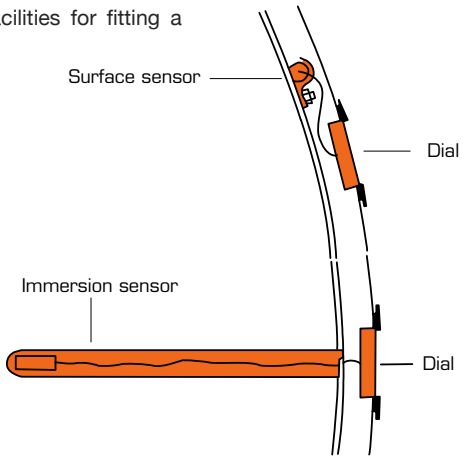
Temperature Gauge / Thermometer

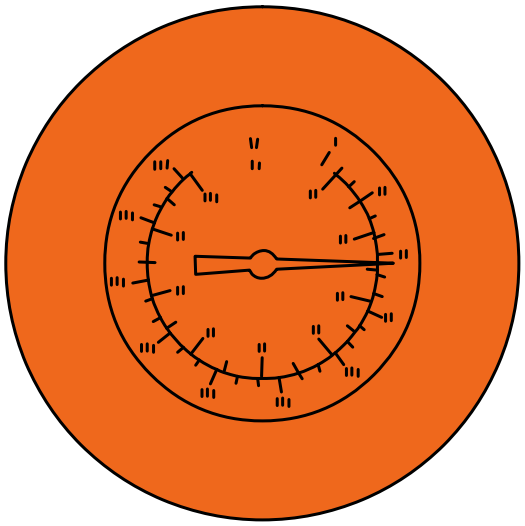
Temperature Gauge / Thermometer will only give the temperature of the product in that location. A digital gauge is superior to a thermometer, better sealed, but more expensive. The stainless steel surround is generally made of a different quality (not 316) and seawater will eventually destroy it, as seawater is dilute hydrochloric acid!

Thermometer

A thermometer, indicating the cargo temperature, is fitted on all electrically heated tanks. The majority of steam heated tanks have facilities for fitting a thermometer if required.

The thermometer sensor is either immersion or surface type, connected to a dial.



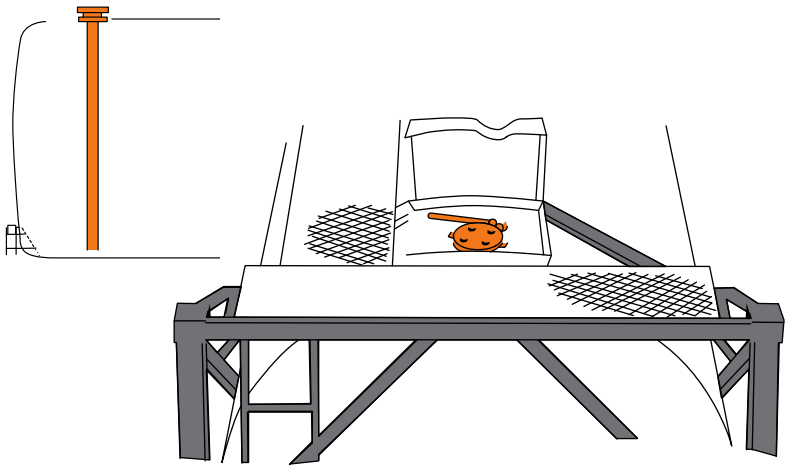


Top Outlet

The top outlet is situated at the rear of the tank and consists of a syphon pipe, a 3 inch plate valve or butterfly valve, a 3 inch BS table 'D' flange and a blanking plate.

NOTE: Top outlet loading/discharge is not commonly used, so to avoid unnecessary maintenance and cleaning, the syphon pipe and valve may be supplied on IMO 1 tanks only when specifically requested.

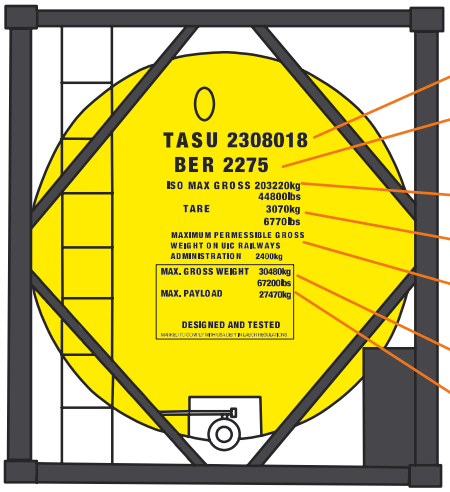
Top Discharge Assembly



Tankspan Leasing Ltd
The Old Farm Office, Peper Harow, Godalming, Surrey, UK
Tel: +44 (0) 1483 425900
Email: enquires@tankspan.com Web: www.tankspan.com

Components – Tank Fitments

Tank Markings



Owners code and serial number

Country code
Size of container
Pressure rating of vessel

ISO Max gross weight

Weight of empty container

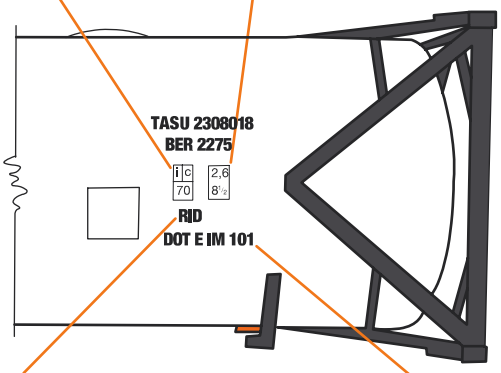
Max gross weight permitted on European railways

Max gross designed weight

Max designed payload

International (european) railway approval and country of registration

Container height marking



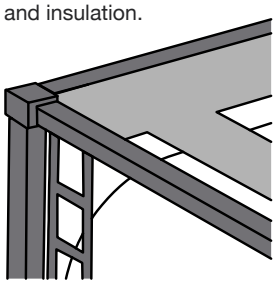
Compliance with RID requirements

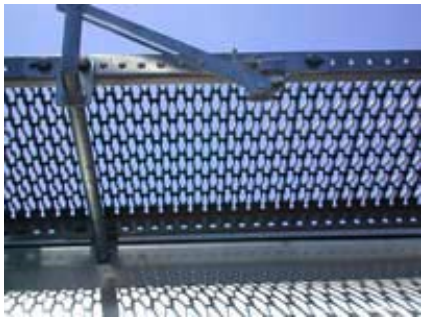
Compliance with US DOT (CFR 49)

Walkway

A ladder and anti-slip walkway are provided for easy and safe access to top fittings and top corner castings. To reduce the overall weight of the tank, walkways (these days) do not run the whole length of the tank, as it is only necessary to reach the components.

Care should be taken not to walk directly on the tank, as this could be very dangerous, plus it avoids damage to the cladding and insulation.





Tankspan Leasing Ltd
The Old Farm Office, Peper Harow, Godalming, Surrey, UK
Tel: +44 (0) 1483 425900
Email: enquires@tankspan.com Web: www.tankspan.com