StopLoss
Tank containers

Managing risk in the tank container supply chain

TT CLUB
IS MANAGED
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Contents

Acknowledgements

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StopLoss series

StopLoss briefings are developed on a broad range of topics that give rise to recurring problems. They seek to provide a straightforward summary of an issue, essential good practice advice and, where applicable, sources of further information. The complete series and further information is available at www.ttclub.com/lossprevention and printed copies are available from the TT Club's Regional Centres.

Managing risk in the tank container supply chain

The intermodal transport of bulk liquid and solid cargoes can present operational challenges for all stakeholders in the transport chain. This StopLoss focuses on TT Club's claims experience, considering common risks that arise and providing clear risk mitigation strategies.
This document is intended to be a practitioner's good practice guide covering all stakeholders through the tank transport chain whether operating, filling, discharging or handling tanks. It is structured in such a way that it follows the natural chronology of the transport chain.

This StopLoss is primarily aimed at owners, operators, lessors and lessees of tank containers. In particular, those who hold positions of responsibility in respect of health and safety, insurance, legal, sales, security and risk management. The content will also be of interest to wider stakeholders in the bulk liquid supply chain such as intermodal container terminals, shipping lines, cargo surveyors, intermediaries, service providers, shippers and consignees.

Who is this for?

- Tank owner
- Tank operator
- Tank lessor
- Depot operator
- Shipper
- Consignee
- Carriers (road, rail & maritime)

1

Introduction

The portable tank is an intermodal cargo transport unit (CTU) used for the transport of liquids, gases and powders as bulk cargo. Whilst sections of this text may be applicable to the operation of road tank-vehicles, rail tank-wagons, non-metallic tanks and intermediate bulk carriers (IBCs) used for transport, the focus here is the UN portable tank, notably the International Organization for Standardization (ISO) tank container.

For ease of reference, the term “tank” will be used to apply to portable tanks, UN portable tanks, intermodal portable tanks and tank containers, unless specifically noted.

Analysis of TT Club’s claims experience has identified a number of common errors and misconceptions, which can result in the deterioration or total loss of the cargo and damage to the equipment itself.

The IMO / ILO / UN ECE Code of practice for packing cargo transport units (CTU Code)[1] is mentioned throughout this document. Chapter 2 of the CTU Code defines various functional stakeholders in the modern supply chain whilst Chapter 4 provides details of the responsibilities for each.

In addition to the guidance and information contained within this document,stakeholders should be aware of national, regional and international regulations concerning the preparation and transport of certain commodities.

[1] https://unece.org/transportintermodal-transport/imoilounece-code-practice-packing-cargo-transport-units-ctu-code

2

Tank overview and development

In this section:

- History of the tank container
- Tank container overview
- Tank container development

2.1 Tank overview

In the freight container industry, the term "tank" usually refers to a 20 ft tank container consisting of a stainless-steel pressure vessel supported and protected within a steel frame. Tanks are often thought to carry dangerous goods exclusively.

However, this perception is far from the whole truth and as can be seen below, the term "tank" can cover a number of containment designs intended to transport all sorts of bulk liquids, powders, granules and liquefied gases; tank containers are a type of tank.

Various bodies have defined tanks, tank containers and portable tanks (see glossary of terms), and it is worth considering how they relate to each other.

Dangerous goods regulations refer to portable tanks but generally refer to UN portable tanks and tank containers manufactured to ISO 1496-3[2].

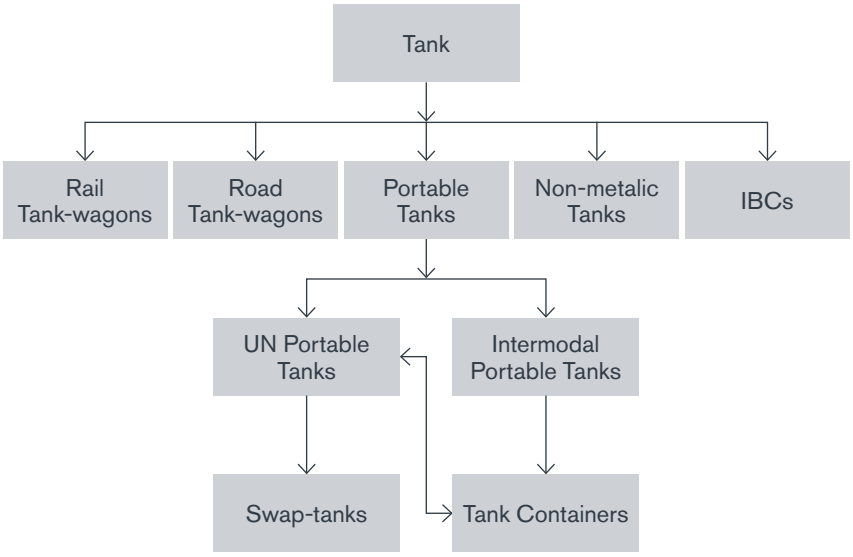
This guide will concentrate on the most commonly used designs which are generally 20 ft intermodal loading units designed to carry pressurised liquids or liquefied gases. However, the text will include some information and details relevant to other designs.

2.2 Tank containers

The first design of the tank dates back to 1969 and developments of that design through the 1970s resulted in the general design and structure seen in today's fleets.

Tanks are built to the same exacting standards as other Series 1 ISO or European Committee for Standardization (CEN) freight containers and, with a few exceptions, can be handled in exactly the same way as all intermodal freight containers. They are suitable for transport by all surface modes.

Tank divisions



The term "tank" commonly refers to several different tank solutions.

[2] https://www.iso.org/obp/ui/#iso:std:iso:1496:-3:ed-5:v1:en

Tank container telematics have proven to be successful in monitoring and controlling cargo temperatures in transit, and therefore reducing associated risks. Telematics provide important data to monitor and ensure delivery reliability, safety and product quality. When for instance the cargo temperature increases and exceeds a defined threshold during transit, the operator can be notified that the tank requires attention, highlighting the heightened risk. Actions can immediately be taken to mitigate further escalation. Sharing this type of notification for tanks carrying temperature sensitive products could certainly expedite reaction in case of an emergency.

Digitisation of tank containers increases transparency and can help to increase utilisation, drive operational efficiencies and ultimately reduce costs.

Both dangerous goods and non-regulated goods (hazardous and non-hazardous cargoes) can be transported in tanks.

Due to its robust design and durability the tank has become recognised as the safest, most cost efficient, flexible and environmentally friendly means of transporting bulk liquids and chemicals globally. The tank's multimodality allows seamless transfer between road, rail and sea. Shippers increasingly recognise the versatility of the tank and favouring its use over traditional parcel tankers and drums.

A tank is a pressure vessel, manufactured in stainless-steel, carbon steel or a composite material depending on its intended use and is positioned within a steel frame which meets ISO, CEN and International Convention for Safe Containers (CSC) standards[3], which may be:

- surrounded by an insulation layer (usually rock wool or glass wool fibre block) and a protective outer layer ordinarily constructed from polyurethane and aluminium and/or glass reinforced plastic (GRP), or
- protected by a steel sunshield A standard 20ft ISO tank is 6.05 metres long, 2.438 metres wide and 2.6 metres high. The volume capacity of a standard tank generally ranges from 14,000 litres to 26,000 litres.

There are currently understood to be in excess of 650,000 tanks in the global fleet, and the fleet continues to grow year on year. Swap tanks are regional (mainly European) CTUs that are used on short sea, rail and road transport modes and are typically 7.15 or 7.85 metres long, 2,5 or 2.55 metres wide and 2.67 metres high.

The volume capacity is larger accordingly, and can carry up to 36,000 litres.

Tanks constructed to transport dangerous goods are usually constructed to meet the requirements of IMDG but may also have approval for a variety of regulations including but not limited to ADR, RID 6.7 and CFR494.

2.3 Tank development

Whilst the tank remains largely unchanged over the years, there are emerging technologies, which are being increasingly used across the industry.

Global Positioning System (GPS) tracking solutions are being implemented to provide greater transparency to operators, owners and lessors improving operational efficiencies.

Dual temperature control units are available to provide electrical heating and cooling in transit, providing back-up systems where particularly sensitive cargoes are concerned. Telematics solutions are available to assist or monitor heating control and to monitor and record severe shocks during transit, which may assist in providing an evidential audit trail throughout the transit period.

Manufacturers also continue to seek to incorporate solutions and controls for ground level operation, thus minimising the need for personnel to be present on top of the tank.

[3] http://www.imo.org/en/About/Conventions/ListOfConventions/Pages/International-Convention-for-Safe-Containers-(CSC).aspx


AAMU 800074 5
22K7
LIQUID ARGON
1951
REAR
SMAU999117 4
22K7
FRONT
SMAU999107 1
22K7
LIQUID ARGON
1951
NOMINAL CAPACITY 21700 L 5732 US gals
SMART-GAS PTE.LTD.
RMTU 268017 6
22K2
PLEASE PUT LABELS HERE
AAMU 800069 0
22K7
ITTU 268158 2
22K2
RID/ADR
UN PORTABLE TANK
CIMC南通

3

Regulation and standards

In this section:

- Applicable regulations
- Testing requirements

Several areas of the tank industry are standardised or regulated. Regulations include:

- The International Convention for Safe Containers, 1972 (CSC) as amended
- An approved pressure vessel code (in most instances ASME VIII Div.1)
- IMDG Code (or similar modal specific dangerous goods regulations)[4].

Tanks used for international transport including a maritime leg must comply with the CSC, which requires that before approval for construction is given, prototype testing is carried out to ensure compliance with the Convention. Swap tanks may not need to comply with this regulation if it is to be carried on land- based transport modes (road and rail). Tanks should also fully comply with the requirements of the Transports Internationaux Routiers (TIR) Convention[5] and specific transport mode requirements such as the Union Internationale des chemins (UIC) Code (railway)[6].

Tank pressure vessels are required to:

- undergo weld non-destructive tests (usually radiographic) and a hydrostatic test on completion of construction
- undergo testing every 2.5 years and 5 years. Failure to pass these tests results in the portable tank no longer being approved for the carriage of dangerous goods
- adhere to ISO 1496-3 – Series 1 freight containers – specification and testing – Part 3: Tank containers for liquids, gases and pressurised dry bulk
- adhere to EN 1432 Swap bodies Swap tanks, dimensions, requirements, test methods, operating conditions

[4] International Maritime Dangerous Goods Code (IMDG Code)
The European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) The Regulation concerning the International Carriage of Dangerous Goods by Rail (RID)
Code of Federal Regulations Title 49 (CFR49)
- https://www.asme.org/mwg-internal/de5fs23hu73ds/progress?id=SES93HiOH14_Hou0G-3Gw1F3cVs2VM1rEXOKBqDImpbU,&dl

[5] https://www.unece.org/tir/welcome.html

[6] https://uic.org/

4

Equipment selection

In this section:

- Portable tank instructions
- Portable tank instructions table
- Tank characteristics

In this section, we will explore the various options available and considerations to be taken when selecting the most appropriate tank for the shipment of cargo. The selection of the correct equipment is of importance and will be determined by the volume, mass and characteristics of the cargo to be shipped, the nature of the journey, and the required transport temperature for the cargo.

Many of the chemicals shipped globally are classified as dangerous goods and will fall under the relevant modal regulations.

For example, under the IMDG Code, portable tank instructions specify the requirements applicable for a tank when used for the carriage of specific substances. The Dangerous Goods List (DGL) in Chapter 3.2 of the IMDG Code defines the tank instruction required for each substance that may be transported. Portable tank instructions T1to T22 specify the applicable minimum test pressure, the minimum shell thickness, the pressure- relief and bottom opening requirements. In practice most tanks for general purpose use are constructed to T1.

Portable tank instructions T1 to T22 are generally used for the carriage of dangerous cargoes (liquids and solids) of Class 1 and Class 3 through to Class 9 except Class 7, and non-hazardous bulk liquid cargoes. Some bulk solid cargoes are also shipped in tanks.

Tanks under codes T23, T50 and T75 are more specialised in nature and are frequently designed for the carriage of a specific intended cargo.

T23 portable tank instruction applies to self-reactive substances of Class 4.1 and organic peroxides of Class 5.2. The minimum test pressure is 4 bar, other specifications such as the shell thickness, pressure relief requirements and bottom openings are specific to certain cargo types.

T50 tank instructions apply to the carriage of non-refrigerated liquefied gases and chemicals under pressure.

T75 tank instructions apply to the carriage of refrigerated liquefied gases and chemicals under pressure.

For T50 and T75 tank instructions, the specification of the tank must meet the criteria for the intended cargo to be carried. The minimum test pressures vary from 7 bar to 43 bar; there are also cargo specific stipulations concerning openings below the liquid level, maximum fill ratio and pressure relief requirements.

When a given portable tank instruction is specified for an intended dangerous cargo, tanks which possess higher minimum test pressures, greater shell thicknesses, more stringent bottom opening, and pressure relief device arrangements may be used. The table below provides a guide as to which tanks are appropriate for the carriage of particular substances.

It is necessary to refer to the table in IMDG at 4.2.5.2.5 to determine additional tank instructions. It should not be assumed that the next higher tank instruction meets the requirements.

For example, the table shows the alternatives for T10 are T14, T19, T20 or T22 and excludes the use of T1 , T12, T13, T15, T16, T17, T18 and T21.

In addition to the items covered under the tank instructions below, a tank owner must consider the compatibility of the tank material with the substance (cargo) to be transported, especially the resistance of the tank material to chemical attack. Corrosive substances with a chloride content are not compatible with stainless steel and might require a special tank lined with chemical resistant material.

Portable tank instruction	Minimum shell thickness (reference steel)	Minimum test pressure (bar)
T1	See 6.7.2.4.2	1.5
T2	See 6.7.2.4.2	1.5
T3	See 6.7.2.4.2	2.65
T4	See 6.7.2.4.2	2.65
T5	See 6.7.2.4.2	2.65
T6	See 6.7.2.4.2	4
T7	See 6.7.2.4.2	4
T8	See 6.7.2.4.2	4
T9	6mm	4
T10	6mm	4
T11	See 6.7.2.4.2	6
T12	See 6.7.2.4.2	6
T13	6mm	6
T14	6mm	6
T15	See 6.7.2.4.2	10
T16	See 6.7.2.4.2	10
T17	6mm	10
T18	6mm	10
T19	6mm	10
T20	8mm	10
T21	10mm	10
T22	10mm	10

Extract from Table IMDG 4.2.5.2.6 – Portable tank instructions

Specifications for portable tanks are designated according to the portable tank instructions under the IMDG Code. This table is extracted from the IMDG Code at 4.2.5.2.6 and provides an illustration of the specifications required to meet each instruction.

Portable tank instruction specified	Portable tank instruction also permitted																					
	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15	T16	T17	T18	T19	T20	T21	T22	T23
T1	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
T2			●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
T3			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
T4				●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
T5									●				●					●	●		●	
T6						●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
T7							●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
T8								●	●			●	●					●	●	●	●	
T9									●			●	●					●	●	●	●	
T10													●					●	●		●	
T11											●	●	●	●	●	●	●	●	●	●	●	
T12													●		●		●	●	●		●	
T13													●					●	●	●	●	
T14																		●	●		●	
T15															●	●	●	●	●	●	●	
T16																	●	●	●		●	
T17																	●	●	●	●	●	
T18																		●	●		●	
T19																			●		●	
T20																					●	
T21																					●	
T22																						
T23																						

Determination of the appropriate tank instruction

Where a portable tank instruction is specified in the dangerous goods list against a specific entry, additional portable tanks that posses higher specifications might also be permitted for carriage. For example, for an entry requiring a T10 tank instruction, a T14, T19, T20 and T22 tank instruction could also be used. The table here illustrates which additional tank instructions are permitted.

5

Maintenance and testing

Maintaining the tank is of great importance in the context of potential claims. Whether a claim directly relates to the maintenance of the tank itself or not, it is prudent to be able to evidence upon request that a tank has been maintained within the regulatory requirements, demonstrating professionalism, credibility and commitment to safety. Not being able to evidence adherence to your or a regulatory maintenance regime might bring into question credibility of other areas of defence that you might otherwise seek to rely upon.

In this section:

- Importance of maintenance
- 2.5 and 5 year periodic inspections

Why run the risk of equipment breakdown?

Even the newest, most sophisticated equipment requires maintenance; tanks are no exception. Under the CTU Code, the CTU operator (in this instance generally the tank owner or a leasing company) is responsible for providing a CTU that is fit for purpose.

It is essential to keep the equipment in a sound state of repair to ensure the efficient operation of the tank. Containers used for international transport must comply with the CSC with regard to keeping the container safe. Improper maintenance can cause inconvenient downtime, costly consequential repairs and potential loss of cargo. Establishing a preventative maintenance schedule can prove extremely valuable.

Under the CSC, CTU operators are required to develop and operate a maintenance system that describes how the container will be inspected, examined and maintained. This scheme should cover the frame of the tank, plus its connection to the pressure vessel and the prevention of the loss of portable tank service items.

The maintenance of the pressure vessel and service items must comply with the approved pressure vessel regulations and the relevant modal specific regulations. This will include the maintenance and refurbishment of valves and the reseating of hatches.

Additionally, tanks are required to be subjected to a periodic inspection and test every 5 years and an intermediate inspection and test every 2.5 years. As a guide, the requirements of the inspections are set out below.

IMDG 6.7.2.19

The intermediate 2.5 year periodic inspection and test shall at least include:

- An internal and external examination of the tank and its fittings with due regard to the substances intended to be carried, noting that the internal examination can be waivered for product-dedicated equipment at the discretion of the independent inspection authority
- A leakproofness test
- A check of the satisfactory operation of all service equipment
- Sheathing, thermal insulation shall be removed only to the extent required for reliable appraisal of the condition of the tank

The 5 year periodic inspection and test shall at least include:

- An internal and external examination
- A hydraulic pressure test
- Sheathing and thermal insulation shall be removed only to the extent required for reliable appraisal of the condition of the tank
- When the shell and equipment have been pressure-tested separately, a leakproofness test of the assembly shall be undertaken

IMDG 6.7.2.19.6

A tank may not be filled and offered for carriage after the date of expiry of the last 5 year or 2.5 year periodic inspection and test. However, a tank filled prior to the date of expiry of the last periodic inspection and test may be carried for a period not to exceed three months beyond the date of expiry.

IMDG6.7.2.19.7

On occasion exceptional inspections will be required, where for instance a tank shows evidence of damage, corrosion, leakage or other conditions which indicate a deficiency which could affect the integrity of the tank. The extent of the exceptional inspection and test shall depend on the amount of damage or deterioration of the tank. It shall, however, include at least the 2.5 year inspection and test.

For tanks not covered by the CSC, this requirement would include the tank frame.

6

Corrosion

In this section:

- Introduction to corrosion risks
- Corrosive substances
- Properties of stainless steel

6.1 General

The pressure vessel of the tank is typically constructed of stainless steel, basic grades of which contain a minimum of 10.5% chromium by mass. It is the chromium that provides stainless steel with its corrosion resistant properties by formation of an adherent oxide layer.

304L and 316L grades of stainless steel, which are commonly used in the construction of tanks, are classes of "austenitic" stainless steel. Stainless steel resists many mineral acids, such as nitric acid and concentrated sulphuric acid. It has an excellent general corrosion resistance against a wide range of chemicals that would otherwise corrode normal carbon steel.

The chromium within the stainless-steel forms an oxide layer of protection, which is only a few atoms thick, it is this alone that resists corrosion. It should be highlighted, however, that this passive layer can be susceptible to damage and attack.

There are six primary types of corrosion:

- Pitting corrosion – Local disruption of the passive layer
- Crevice corrosion – A localised attack on a metal surface at, or immediately adjacent to, the gap or crevice between two joining surfaces
- General corrosion/attack – Aggressive chemical corrosion
- Stress corrosion cracking – Tensile stress, temperature and corrosive species
- Inter-granular corrosion – Sensitisation
- Galvanic corrosion – Dissimilar metal corrosion

Corrosion should be a primary concern for tank owners and operators. Whilst tanks are generally constructed from stainless steel and are thus resistant to staining and corrosion, the carriage of certain cargoes or certain cleaning and maintenance operations can lead to corrosion and pitting. What might initially appear to be minor surface pitting might be developing under the surface into areas of catastrophic corrosion.

6.2 Corrosive substances

Class 8 cargoes (corrosive substances) with chloride content are the predominant challenge where corrosion of tanks is concerned. All substances in this class are damaging to metals and textiles.

Many substances contain chloride, including non-regulated substances. For example, sea water can be corrosive to stainless steel.

Substances that are compatible at low temperatures might be corrosive at high temperatures.

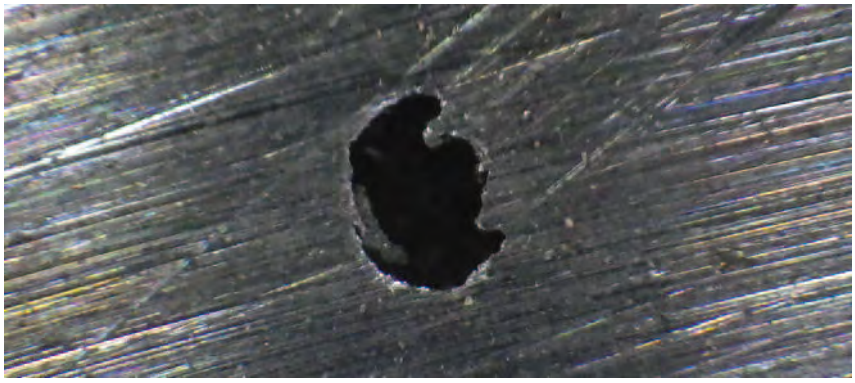
Approximately 25% of TT Club claims notifications by frequency involve pitting damage to the tank container.

25%

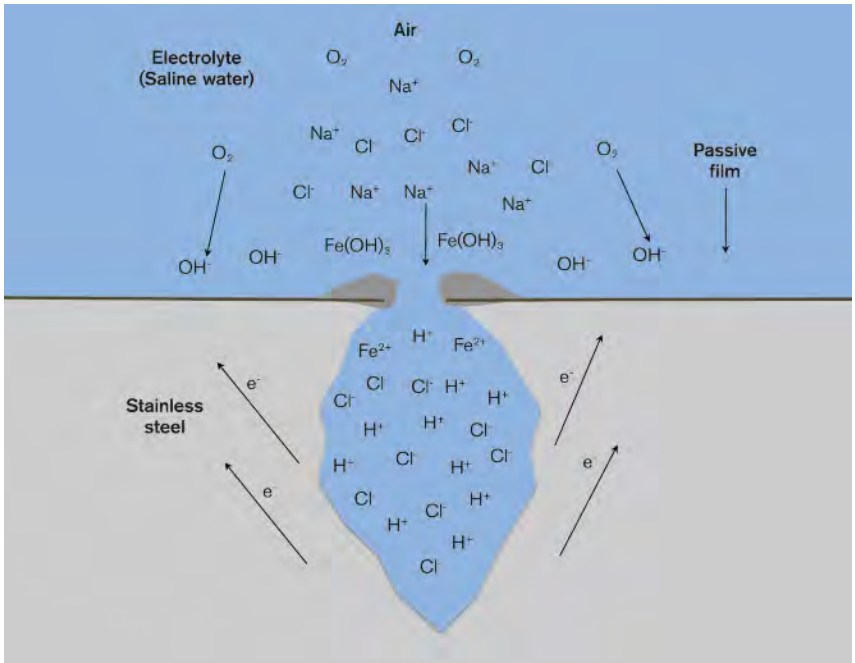
There are various corrosion compatibility charts and data available to enable assessment of the substance prior to filling the tank. Care should be taken to ensure that the current condition of the steel is well understood, as such charts will benchmark on the basis that the steel is in new and perfect condition.

When the classification is carried out for the transport of dangerous goods, corrosive substances are tested against criteria that include causing severe damage when in contact with living tissue and in the event of leakage are capable of damaging or destroying other goods, or means of transport. Substances under Class 8 also include those which form a corrosive liquid only in the presence of water, or which produce corrosive vapour or mist in the presence of natural moisture of the air. For the purposes of classification under the IMDG code, substances identified in Packing Groups I and II are not tested against their corrosivity towards the stainless steel shell of the tank.

Corrosive substances assigned to Packing Group III demonstrate corrosion that does not damage living tissue to full skin thickness but does exhibit a corrosion rate on either steel or aluminium surfaces exceeding 6.25 mm per year at a test temperature of 55°C when tested on both materials.



Example of a corrosion pit. Visual inspection of the pit provides no information about the damage to the subsurface



Pitting corrosion. Complex interaction of ionic species during pit formation. Note the concentration of chloride ions within the pit

6.3 How vulnerable is the passive layer to damage/corrosion?

Stainless steel is only “stainless” when the surface oxidises with chromium and other elements to develop a protective film that resists further oxidation. This protected oxide film is considered a passive surface.

To passivate stainless steel, a minimum of 10.5-12% chromium is needed.

Once the passive layer is breached, the local area becomes active. This results in the formation of a corrosion cell which then drives the corrosion further owing to the surrounding material remaining passive (in this way, pit). Damage can generally be caused by the following:

- Exposure to aggressive halide ions (chloride and fluoride)
- Contamination (free iron ions)
- Physical damage
- Low oxygen environments
- Under-deposit corrosion

It should be noted that in an oxygen rich environment, in the absence of pitting, the passive layer can self-repair.

Pitting resistance equivalent numbers (PREN) are a theoretical way of comparing the pitting corrosion resistance of various types of stainless steels, based on their chemical compositions.

The PREN (or PRE) numbers are useful for ranking and comparing the different grades, but cannot be used to predict whether a particular grade will be suitable for a given application, where pitting corrosion may be a hazard. 304L grade stainless steel has PREN of 18.

316L grade stainless steel has PREN of around 25.

To resist sea water continuously, a PREN of around 40 is required.

Pitting is most commonly effected by contamination and the presence of halides (such as chlorides). The greater the PREN, the more resistant to halides the stainless steel will be. However, after long periods of exposure to cleaning regimes, aggressive chemicals, sediments and the general rigours of transport, the stainless steel of tanks will become depleted of the beneficial chromium at the surface resulting in decreased passivity. The passivity is easily monitored and can be restored by passivating or, pickling and passivating, in solutions containing nitric acid. If the surface has become pitted over time, then this often needs to be mechanically removed by grinding as the geometry of pits can limit oxygen at the surface, making passivation difficult.

Practical causes of pitting damage in tank containers include:

- Sub-standard cleaning procedures.
- The quality of water used to clean the tank container (Ph, chlorine, impurities)
- Prolonged period of the tank being in empty dirty condition before cleaning.

7

Pre-trip inspections and cleaning

In this section:

- Objective of a pre-trip inspection
- The tank cleaning process

7.1 Pre-trip inspection

The objective of the pre-trip inspection (PTI) carried out on every tank prior to filling with cargo is to ensure:

- that the equipment is in a safe condition, in proper working order
- that it is fit for purpose
- that the tank frame is visually in a safe condition and that the frame is within the ISO or CEN specification envelope; and that the correct components have been installed and are sufficient to withstand the rigours associated with the carriage of the given cargo

7.2 Cleaning

After the carriage of dangerous goods, the applicable regulations continue to apply until the tank is cleaned.

There may be the need to transport the tank in empty dirty condition to a location where a suitable cleaning station exists.

It is generally good practice to ensure that the tank is cleaned as soon as practicably possible following the carriage of cargo.

Operators should be mindful that a cargo can change its composition if and when air or humidity are introduced, especially following discharge.

Operators should be mindful that water used in the cleaning process in some parts of the world will contain differing levels of chlorine and or impurities which can "damage" the tank during the cleaning process itself.

The European Federation of Tank Cleaning Organisations (EFTCO) defines 'clean' in the following way:

"A tank shall be described as clean when there are no visible traces or odour of the last product or cleaning agent following an inspection from the man-lids."

It is important that the CTU operator performs due diligence when selecting a service provider where cleaning is concerned. As well as the cleaning station's ability to physically clean the tank, there are ethical sourcing and environmental considerations. Each stakeholder has a corporate social responsibility to ensure where possible that the environment is sufficiently protected.

For example, does the cleaning station have a sufficient effluent process system and a licence, as well as a means of disposing of the remnant cargo?

The availability of a suitable cleaning station should be taken into account prior to a cargo being accepted for transport. It should be appreciated that not all cargoes will be able to be processed by an individual cleaning station. Checks should be made to verify the cleaning station's:

- Permits, licences and environmental requirements
- Range of substances licenced and equipped to clean
- Quality and safety records
- Commercial arrangements

The operator should report the following information to the cleaning station regarding the last carried cargo:

- UN number
- Proper shipping name
- Technical name – both to meet the regulatory requirements for certain dangerous goods, or for nondangerous goods if it is not clear from the substance name.
- The presence of inert gas or if the tank is under pressure.
- The presence of substance residue if over 5 litres.

Virtually any conceivable cargo type can be cleaned providing the necessary facilities are available. The key criteria for success in this context are:

- The correct identification and communication of the last carried cargo
- The correct instructions identified and passed to the cleaning station.
- Any additional relevant information passed to the cleaning station regarding prior carried cargoes.
- Heeding expert recommendation from the cleaning station.

The processing of excess cargo and tank washings is dependent on the capability of the cleaning facility and national environmental waste disposal licences.

Some levels of cleaning may also require personnel to enter the tank and manually inspect. This requires special safety procedures including the issue of a tank entry certificate (see also paragraph 11.4 of this document).

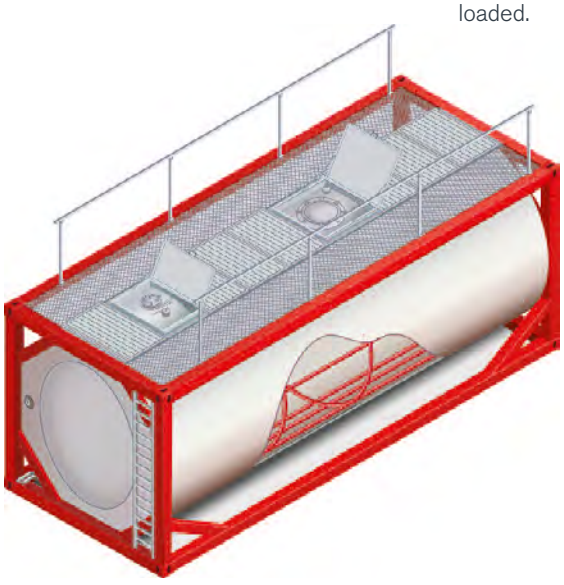
Certain types of tank can give rise to additional challenges through the cleaning process. Inevitably, tanks fitted with surge/baffle plates have a greater internal surface area to clean due to the additional internal structure. Moreover, the areas where the baffle plates are fixed in place provide excellent locations for stubborn cargo remnants to reside.

Examples of common wash instructions:

- Cold water wash
- Detergent wash
- Chemical rinse
- Caustic wash
- Steam purge
- Solvent pre-solve diesel spin
- Pickling

The cleaning station should maintain a database of known cargoes and therefore be in a position to recommend the required cleaning method in order to clean the tank. Some of the more challenging cargoes to clean are not necessarily the most dangerous. Seemingly innocuous cargoes, such as milk, are inherently challenging as are more obvious cargoes such as inks and dyes.

Many shippers have developed extensive lists of banned prior cargoes, which typically include substances that, even in small quantities, are known to compromise the quality of their cargo. Their motivation is to mitigate the risk of contamination as a result of carriage in the tank. Such practices can provide additional procedural challenges for the tank operator who must also consider banned prior cargoes as a part of the PTI and prior to allocating a tank to be loaded.



PTI: Is the equipment in a safe condition, proper working order and fit for purpose?

Inevitably, a more intensive cleaning process will attract an additional premium in terms of both financial cost and the time required. Following the cleaning process, where appropriate, the tank must be dried internally to ensure no water remains in the tank prior to the loading process, recognising that some cargoes are more sensitive than others. In some cases cargoes can be rendered out of specification due to high moisture content measured in parts per million (PPM); the margins for error are very small.

Once the tank has been cleaned, the cleaning station should issue a cleaning certificate (a cleanliness certificate can also be requested but this would be made out by an independent inspection company to confirm the level of cleanliness of the tank – this would normally involve the inspector entering the tank to confirm the condition of the barrel).

The cleaning certificate will vary in form globally, noting that there are regional recognised standards such as the European Cleaning Document (ECD)[7] which is often issued by European Federation of Tank Cleaning Organisation (EFTCO) approved cleaning stations. Other documents are used globally such as the ITCO ACC Cleanliness Certificate[8].

Such standards set the benchmark for the services to be provided but also seek to address and clarify the liability of the cleaning station in the event of a loss post clean. The primary requirement is for the tank to be clean, dry and odour free.

Once the cleaning process is complete, the placards and markings on the tank should be removed. After it has cooled, so as to prevent a vacuum forming, valves and fittings may be secured and the tank made ready for the next assignment.

The cleaning certificate does not guarantee that the tank is safe to enter. Problems can occur, for example, with rubber lined tanks which can hold product even after the tank has been thoroughly cleaned, thus creating a hostile environment which may not support life. In particular, be alert to enclosed space risks[9].

Once the certificate has been signed and the tank has left the premises of the cleaning station, it is difficult to establish any liability on the part of the cleaning station in the event of a post clean loss.

Invasive pests.

There are a number of international organisations concerned with the spread of invasive pests through the sea container pathway and the catastrophic repercussions where certain invasive species spread. Tank containers are no exception, as they are often loaded inland and traverse the globe. While cleanliness of the internal surfaces is paramount in ensuring the integrity of the cargo carried, ensuring cleanliness of external surfaces to mitigate the risk of harbouring invasive pests should also be considered by operators.

Approximately 20% of TT Club claims notifications by frequency involve allegations of cargo contamination.

20%

[7] https://www.eftco.org/eftco-cleaning-document/explanation-and-guidance
[8] https://www.international-tank-container.org/storage/uploads/ACC09-2017-A4.pdf
[9] https://www.ttclub.com/loss-prevention/publications/stop-loss/stop-loss-19-confined-spaces-managing-the-risk-of-entering-cargo-transport-tanks-145295/

8

Loading cargo into a tank

In this section:

- The packing/filling process
- Free surface movement risks
- Safety data sheets

8.1 General

The process of loading cargoes into a tank will be influenced by the classification and the characteristics of the cargo being shipped. The shipper/consignor is responsible for the classification of the cargo under the applicable regulations.

The classification of the cargo prescribes how it should be stored, handled, loaded and treated during transit. It is important to maintain compliance with such requirements relating to loading cargo into a tank.

Of course, not all cargoes shipped in tanks are dangerous, for example many food grade cargoes are shipped globally. In terms of equipment selection, these cargoes require dedicated food grade tanks.

8.2 Pre-checks

Given the complexities of the modern day supply chain the shipper or the freight forwarder could be performing the functions of the packer. Under the CTU Code, the packer is responsible for ensuring that:

- the tank has been checked and verified as fit and clean for use before loading commences
- the tank is safe to use
- a banned prior cargo has not been shipped in the tank that may be incompatible with the planned consignment
- the cargo has been correctly prepared in terms of temperature and treatments where applicable.

8.3 Packing/filling

Under the CTU Code the Consignor is responsible for providing all information required for the proper filling of the subject cargo. The packer (loader) is responsible for ensuring that the transport and packing instructions are adhered to and that the the cargo is sufficiently “secured” by, for example, fully closing all the valves.

General good practice regarding loading:

- Ensure that the cargo is loaded according to any consignor’s guidelines which may be available for that particular substance
- Ensure that the tank is not over or under filled by volume according to the degree of filling assigned by the IMDG dangerous goods list tank provision (TP)
- Tanks shall not be offered for transport with a degree of filling for liquids having a viscosity less than 2,680 mm^2/s at 20°C, or at the maximum temperature of the substance during transport in the case of a heated substance, of more than 20% but less than 80% unless the shell is divided, by partitions or surge plates, into sections of not more than 7,500 L capacity
- Ensure that the gross mass of the loaded tank does not exceed the maximum permissible operating gross mass of the container or any road or rail limitations in any country passed through during the planned transport
- Close the man lids and valves, and secure the fastenings

- Close any compartments fitted and securely fasten to prevent any risk of opening during transport. Be aware that a compartment breaking open in transit can be extremely dangerous and cause high consequence damage
- Where IMDG regulated cargoes are concerned, affix the applicable placards and markings
- Where appropriate, affix Customs and security seals to valves and entry points to ensure that they cannot be opened during transport

Loading facilities will vary in their levels of sophistication in terms of the equipment used to fill tanks.

The filling process should be appropriate to the consignment and tank packing instruction. When filling, it is important that the filled tank does not present a risk to those involved with handling and transporting it, or to members of the general public. Therefore, it is essential that liquids are not allowed to surge uncontrollably resulting in the tank becoming unstable (see also section 8.4). In dangerous goods regulations, such as the IMDG Code at chapter 4.2.1.9.6, calculations are given for the degree of filling, however, these calculations are just as valid for non-regulated liquids. Therefore, no tank should be overfilled (which may over pressurise the barrel or cause spillages) or under filled (which may increase the instability of the tank unless fitted with baffles or sub-divided into compartments).

On completion of loading, the IMDG Dangerous Goods Declaration should be completed including, where applicable, a "Shipper's Declaration" and a "Container/ Vehicle Packing Certificate".

Example of a shipper's declaration:

I hereby declare that the contents of this consignment are fully and accurately described below by the proper shipping name, and are classified, marked and labelled/ placarded and are in all respects in proper condition for transport according to the applicable national and international governmental regulations.

Example of a container/vehicle packing certificate declaration:

I hereby declare that the goods described above have been packed/ loaded into the container/ vehicle identified above in accordance with the applicable provisions.

This must be completed and signed for all container/ vehicle loads by the person responsible for packing.

All tanks being transported internationally by sea are subject to SOLAS which requires that a Verified Gross Mass (VGM) is provided by the shipper to the ship's master and the terminal before it can be loaded. SOLAS[10] also prohibits the loading of any container where the VGM or actual gross mass is greater than the maximum operational gross mass of the container[11].

[10] International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended
[11] https://www.ttclub.com/loss-prevention/container-weighing/

8.4 Free surface movement (liquid surge)

The free surface effect is a mechanism which can cause a tank to become unstable and refers to the tendency of liquids to move in response to the forces to which the tank is exposed. During extreme manoeuvres (sudden turning, starting or stopping) the tank and carrying vehicle can become so unstable that they can severely affect the driving characteristics of the transport vehicle which may result in the vehicle turning over. A sub-design of tank is the baffle tank, which is designed to reduce product surge and thus the risk of vehicle turnovers. This type of tank can be used to reduce the movement of smaller loads but can also increase the volume of load that can be safely transported in a tank of a given size Baffle or surge plates are installed within the barrel to compartmentalise the load space to a maximum of 7,500 litres each. A standard 26,000 litre tank would, therefore, require three sets of baffle/surge plates.

To mitigate the effects of free surface movement, the IMDG Code stipulates minimum and maximum permissible fill levels for tanks. Where lower volumes of cargo are to be shipped, either specialised low capacity tanks or tanks fitted with surge plates are required.

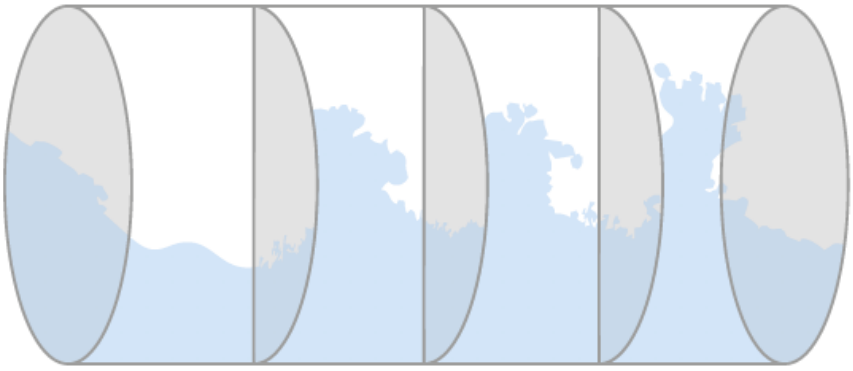
Generally, tank containers should have a minimum fill capacity of 80% by volume. Where the tank is being shipped in empty dirty condition the tank should not be transported with more than 20% by volume.

8.5 Safety Data Sheet (SDS)

A safety data sheet is a document that lists information relating to occupational safety and health for the use of various substances and products. This forms a non-mandatory widely used system for cataloguing information on chemicals, chemical compounds, and chemical mixtures.

An SDS is a document created for substances or mixtures highlighting a wide range of information on the composition, physical, chemical, health and environmental effects along with information as to safe usage, storage, transport and disposal.

An SDS for a substance is not primarily intended for use by the general consumer, focusing instead on the hazards of working with the material in an occupational setting. There is also a duty to properly label substances on the basis of physico-chemical, health, or environmental risk.



Mitigating the risks of liquid surge with a baffled tank

Some countries impose an explicit duty of care that each SDS be regularly updated, usually every three to five years. However, when new information becomes available, an SDS must be revised without delay.

Substances which are not classified as dangerous goods are referred to as nonregulated (or commonly non-dangerous or non-hazardous goods). Non-regulated does not mean that the substance is free of danger or hazard.

The format of the SDS is specified by the Globally Harmonized System of Classification and Labelling of Chemicals (GHS)[12].

The GHS stipulates that the SDS should follow a standard 16-section format and detail all of the characteristics of the cargo under various different sections.

All of the sections are important but the four sections of particular importance in the context of this document are:

Section 2 – Hazard identification

This section includes the label elements that should accompany the cargo.

Section 6 – Accidental release measures

Of particular importance to those transporting or handling the tank where there is an incident that results in a release of the cargo.

Section 7 – Handling and storage

Precautions for safe handling and the conditions for safe storage include incompatible substances and segregation.

Section 14 – Transport information

UN number and proper shipping name, plus transport classes and packing groups.

Tank operators require that consignors provide up to date SDSs for the consignments, and in turn undertake due diligence checks on cargoes to ensure, as far as is practicable, that the information they are receiving is accurate and appropriate. A dangerous goods advisor may be able to ascertain whether the information provided within the SDS is reasonable and correctly classified. Prior knowledge of the cargo may also be useful since related incidents involving storage, handling and transport may result in useful recommendations for best practice.

Where the applicable sections of the SDS are incomplete, the information is inconsistent or the tank operator has doubts, then concerns should be raised with the shipper and/ or consignor prior to the cargo being packed.

[12] https://www.unece.org/trans/danger/publi/ghs/ghs_welcome_e.html

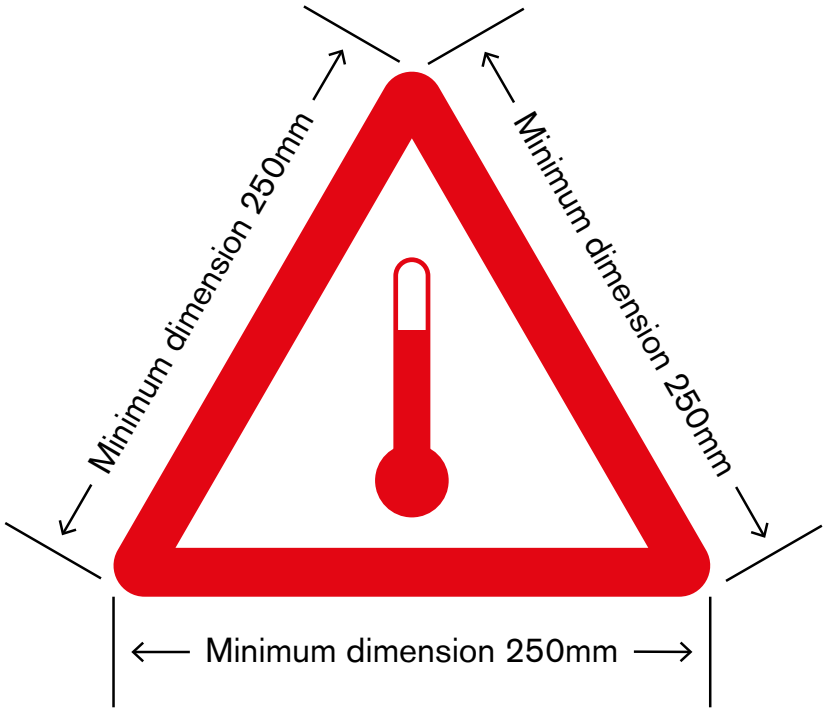
8.6 Temperature sensitive cargoes

Some cargoes are temperature sensitive and require either temperature-controlled tanks or chemical stabilisation when being shipped. Shippers must undertake due diligence to establish such requirements and ensure that suitable tanks are requested, and provided, for the consignment to ensure safe transport. Where such cargoes are concerned there is a requirement that the shipper forwards accurate information and any regulatory requirements onto all stakeholders in the transport chain.

8.7 Hot loading

Certain cargoes become solid at ambient temperatures and therefore are required to be packed into the tank at an elevated temperature. Once packed, the cargo will cool and likely solidify during transport. Care must be taken by tank operators to ensure that the loading temperature is known along with the rate at which the cargo cools and solidifies. If the cargo must be shipped before the cargo has cooled and solidified, there may be requirements for additional notations and markings on the tank to remain compliant with the applicable regulations and to ensure other stakeholders are aware of the potential dangers.

Tanks being packed/filled with a hot cargo that is to be released from the packing facility for transport in a liquid state at a temperature at or above 100°C or in a solid state at or above 240°C shall be marked on both sides and each end with a special elevated temperature marking as below.



Elevated temperature carriage mark

9

In transit instructions

In this section:

- Security provisions
- Importance of accurate communications
- What to do in the event of a loss

9.1 Security

The IMDG Code requires a security plan designed to prevent misuse of high consequence dangerous goods in a terrorist event.

National authorities might also apply additional security provisions.

High consequence dangerous goods are defined by the Code as those which have a potential for misuse in a terrorist incident and which may, as a result, produce serious consequences such as mass casualties or mass destruction.

The table in the IMDG Code at 1.4.3.1 provides an indicative list of these (not Class 7).

Notwithstanding the Code's provisions for high consequence dangerous goods, operators are recommended to consider developing a security plan to ensure the safekeeping of all tanks and substances transported. Not least to ensure secure processes, depots, transport contractors and shipping routes are considered.

9.2 Chain of communication

Each stakeholder in the transport chain has a responsibility to pass sufficient and relevant information regarding the cargo and transport requirement to stakeholders so that safety in the transport chain and the integrity of the cargo is maintained. Careful scrutiny of the instructions at each stage is fundamental to the successful shipment of cargoes in tanks.

The shipper is responsible for ensuring that the cargo is correctly described and classified and to notify the packer (who may be a freight forwarder) of any specific instructions in relation to the pending shipment.

The bulk liquid transport chain can be complex especially where international shipments are concerned.

9.3 In the event of a loss

When incidents arise, it is often due to simple instructions not being passed between the various stakeholders, highlighting the need for accuracy in data, instructions and documentation.

Where dangerous goods are concerned, it is imperative to ensure that the cargo is correctly identified, classified and declared and the relevant supporting documents are obtained. The SDS will take prominence through the booking acceptance and the Dangerous Goods Declaration (DGD) will be pivotal in stowage planning.

It should be highlighted that ensuring the correct classification and SDS are obtained is not always sufficient. Of the many documents which may accompany a dangerous goods shipment, the DGD is the critical document in terms of information being communicated to the shipping line. This document is prepared by the consignor or shipper thus certifying that the dangerous goods being shipped have been packaged, labelled and declared in accordance with the applicable regulations. It is this document rather than the SDS upon which the shipping line will rely in determining the ship stowage plan.

Each stakeholder in the transport chain has a duty of care and obligation to warn other stakeholders of any known dangers concerning the cargo being shipped, especially where these characteristics may not be immediately apparent.

Ambiguity or poorly worded notations can also be an attributing factor. Where instructions appear to be less than certain, the relevant stakeholder should seek clarification prior to proceeding.

10

Final mile delivery

In this section:

- Visual inspections
- Heating of cargo
- Discharge process

10.1 Collecting the tank for delivery

Operators should undertake due diligence[13] when appointing a haulier or third-party service provide.

At the time the tank is collected from the destination port or depot for delivery to the consignee, the following checks should be carried out by the trained and qualified collecting driver, regardless of whether the inland haulage is arranged by the carrier or the consignee:

- Visual check that the tank appears structurally sound
- The areas and structures around the discharge valve are free of apparent impact damage.
- There are no apparent leaks
- The security seal remains intact and displays the correct seal number
- The temperature gauge on the tank reflects the details in the transport documentation (where applicable)
- All handles on the discharge valve remain in the fully closed position
- The correct chassis/ low loader is used and all twist locks are engaged.
- The required cargo placards are displayed and securely fitted

In some countries, additional consideration may have to be given to the available equipment, the expertise of the local haulage contractors, poor road quality and general infrastructure.

Upon arrival at the delivery point, the consignee should always carry out the same initial checks of the tank structure, seal and settings as listed above.

10.2 Re-heating (if required)

If the cargo must be heated prior to discharge, ensure that an appropriate service provider is appointed to undertake the work and that accurate, unambiguous instructions in writing are always provided to them.

Where cargoes must be heated to facilitate discharge there are various options open to the operator. Each tank is constructed with a series of coils around the shell of the pressure vessel. The number of coils varies from tank to tank dependant on the initial specification. Generally, the more coils, the more quickly the cargo can be heated, although the steam allowable pressure rating of the tank is also a determining factor.

[13] https://www.ttclub.com/loss-prevention/publications/stop-loss/stop-loss-21-due-diligence-to-increase-safety-and-security-151227/

The type of heating applied will depend on the sensitivity of the cargo to be heated and the urgency to achieve a liquefied state. The coils are designed to be plugged into different heat sources. Applying hot water into the coils provides a sensitive increase in temperature. Applying pressurised steam through the coils provides the fastest heating option; more sensitive cargoes however may be damaged as a result of the associated sharp rise in temperature.

Careful management of the heating process is critical to ensure that cargo integrity is maintained as well as avoiding potentially catastrophic explosion incidents. Where steam is used to heat the cargo, over pressurising the system is a risk. This can result in temperatures that exceed the design of the steam coils (usually 130 degrees Celsius).

It is necessary to ensure that the temperature gauge remains undamaged and in sound working order as this is often used as a guide to monitor the temperature of the cargo within.

10.3 Discharging

A tank is normally discharged from the bottom valve opening, although top discharge is possible too. During the discharge there is a risk of creating a vacuum which can result in catastrophic damage to the tank.

The consignee must monitor the discharge to ensure that the negative pressure inside the tank barrel remains at tolerable levels.

The consignee should have a means in place to determine and verify the volume of cargo discharged.

It is good practice to ensure that pre-discharge samples are secured and analysed. The consignee should have an established method of analysing pre-discharge samples to ensure that the cargo conforms to the expected specification.

In the event that any quality irregularities are noted immediately upon taking pre-discharge samples, the consignee should not commence discharge but should instead notify the carrier and arrange for a surveyor to attend.

In cases where quality irregularities are only noted during or after the tank has been fully discharged, the consignee should undertake a risk assessment and endeavour to notify the shipper as soon as possible, and an independent surveyor should be appointed to investigate.

Upon completion of the discharge there will often be some residue of the cargo remaining within the tank. The tank should be as empty as practicably possible. Cargo residue is expensive to remove at the cleaning facility and dangerous goods will attract additional safety procedures.

At this point the tank is considered to be in an empty dirty state. Placards and IMDG dangerous goods regulations continue to apply until the tank is cleaned (see paragraph 7.2 Cleaning).

Approximately 35% of TT Club claims notifications by frequency involve impact damage to tank containers, often incurred through intermodal handling.

11

Actions in the event of an incident

In this section:

- Tank safety features overview
- Notifying your liability insurer
- Incident handling guidance

Whilst the tank is recognised as the safest means of transporting bulk liquids, there are occasions where incidents occur which may give rise to insurance claims. Whilst such incidents are relatively few in number, given the nature of some of the cargoes being transported, there is the risk of potentially large exposure incidents. In this section we look to highlight the safety features of the tank and provide good practice guidance in the event of an incident.

11.1 Typical safety features

The thermal insulation layer of the tank shell provides, in addition to its thermal qualities, a degree of protection in the event of an impact.

Flame guards and bursting/frangible discs are fitted to vacuum relief devices and spring-loaded valves to mitigate the risks where tanks are exposed to external fire incidents.

The bottom discharge valves comprise of three closures in series; the internal spring-loaded foot valve, the outlet valve and a screwed sealing cap or flange.

In the event of a catastrophic damage to the external portions of the bottom discharge valve, the outlet valve support pipe is designed with a shear groove allowing the external part of the valve to shear from the tank, leaving the tank barrel and the internal valve intact and containing the cargo.

A safety valve is provided in the top of the tank to relieve excess pressure that might build as a result of a cargo chemical reaction or overheating.

The many safety features of the tank are such that even in the event of reasonably serious damage incidents, the cargo is contained within the barrel and, therefore, the integrity of the cargo is maintained. If the damage sustained results in the frame of the tank no longer conforming with CSC safety criteria, it may not be possible for it to continue its intended transport. There may be the need to tranship the cargo into a replacement tank, ensuring compliance with all loading and regulatory requirements.

11.2 Leaking cargo

Where tanks are severely damaged, cargo may leak from the barrel. In such circumstances, where practicable, the leak should be stemmed or, if not possible, the tank placed in a leak tray, bunded area (walled concrete surfaced area) or surrounded with containment boom/bund to ensure that the cargo is contained – preventing a wider pollution risk.

The type of cargo being carried will influence how those responding to the incident will be able to proceed and the level of personal protective equipment (PPE) they may require. The type of cargo will also influence how the surrounding areas should be managed; areas may need to be evacuated if it is assessed that they might be exposed to danger.

11.3 Contamination

The most common type of loss relates to cargo contamination, including where the cargo does not meet the specification expected by the consignee. These incidents arise for a number of reasons, often not directly attributable to the tank itself. Occasionally the stubborn remnants of a prior cargo will be freed by an aggressive Class 8 cargo and show in the pre-discharge samples at the consignee. Pre-discharge samples indicating problems may include discolouration or the presence of suspended particles.

These particles may be attributable to a prior cargo or an incompatible component.

Where contamination cases are concerned, early and transparent interaction with the cargo owner will encourage a positive handling of the incident which can result in early resolution. The solution to many cargo contamination incidents is reasonably cost-effective filtering or reworking. However it is imperative that the cargo interests are involved in the early stages of the investigation in order to encourage them to take such action.

11.4 Injuries

Frequency of injury incidents for those working with tanks are typically few in number.

However, when they occur, they can have serious consequences and fall into two primary categories:

- The risks associated with confined spaces for those working inside the tank barrel can be high if the correct equipment is not available or used and confined entry permit procedures are not strictly followed. For more in-depth advice concerning confined space risk, please see TT Club's StopLoss 19: Confined spaces: Managing the risk of entering cargo transport tanks.[14]
- Another potential bodily injury risk exposure is working at height. There is the need to work on top of the tank for a variety of reasons. Where work is carried out at height, robust procedures should be in place, and followed, to ensure that personnel are sufficiently protected and not at risk of falling. All stakeholders must comply with the applicable regulations where working at height is concerned, recognising that there will likely be national and regional variations.

Example working at height regulations:

European Directive 2001/45/EC "Working at Height"[15] UK: The Work at Height Regulations 2005

11.5 Crisis management

When considering risk assessment and management it is generally good practice for all stakeholders in the tank supply chain to have a robust crisis management plan in place which is tested periodically. This plan should also consider an emergency response plan in the event of a catastrophic incident.

11.6 Post incident

Stakeholders need to scrutinise the physical and contractual chain to identify (if possible) where the error has occurred with a view to holding the responsible party liable at an early stage.

At the earliest practicable opportunity following the discovery of an issue (once any immediate risk is contained and under control) the priority should be to notify your liability insurer, and consider the early appointment of an independent surveyor/expert. Depending on the type and seriousness of the incident early action investigating and gathering relevant information will assist in mitigating the potential loss and liability.

[14] https://www.ttclub.com/news-and-resources/publications/stoploss/stoploss-confined-spaces/
[15] https://op.europa.eu/en/publication-detail/-/publication/c4e26d24-8bd3-4d15-8204-3cbfe-43fa32c/language-en

Operational checklist

Tank containers

Whilst the earlier chapters consider each stage of the tank transport chain in detail, below is a 13-point checklist which can serve to provide guidance for an intended shipment. If the answers to the thirteen questions are in the positive, then whilst it doesn't cover every eventuality, the risk of loss through the supply chain will be greatly reduced.

- [ ] Has the cargo to be shipped been clearly identified and correctly classified – do I have a current and fully completed SDS?
- [ ] Have any special requirements/instructions been adequately considered and communicated?
- [ ] If required to do so, do I have sufficient information to complete the Dangerous Goods Declaration?
- [ ] Is the selected tank appropriate for the cargo to be carried (see tank instructions)?
- [ ] Has the pre-trip inspection been successfully completed?
- [ ] Is a valid cleaning certificate available for the tank?
- [ ] Is the last cargo transported in the tank compliant with the shipper's requirements?
- [ ] Are the components of the tank to be used in good condition and compatible with the cargo to be shipped?
- [ ] Is the volume of cargo suitable to avoid over or under filling and within the weight limits for the entire journey?
- [ ] Has the shipper provided instructions and have these been passed accurately to all stakeholders through the intended transport chain?
- [ ] Upon completion of filling have the valves and fittings been correctly closed and seals applied?
- [ ] Has a transport plan been considered including any applicable national restrictions for the entire journey?
- [ ] Are the correct placards and markings in place?

Glossary of terms

Cargo transport unit (CTU)

Means a road freight vehicle, a railway freight wagon, a freight container, a road tank vehicle, a railway tank or a portable tank. Used as an alternative to Intermodal Loading Unit (ILU)

Carrier

The party who, in a contract of carriage, undertakes to perform or to procure the performance of carriage by rail, road, sea, inland waterway or by a combination of such modes.

Clean

A tank shall be described as clean when there are no visible traces or odour of the last product or cleaning agent following an inspection from the man-lids.

Cleaning certificate

Document issued by the cleaning facility to confirm that the tank is clean.

Consignee

The party to whom a cargo is consigned under contract of carriage or transport document or electronic record. Also known as the receiver.

Consignor

The party who prepares a consignment for transport. If the consignor contracts the transport operation with the carrier, the consignor will undertake the function of the shipper.

CTU Code

IMO / ILO / UN ECE Code of practice for packing cargo transport units intended to assist the industry, employers' and workers' organisations as well as Governments in ensuring the safe stowage of cargo in containers.

CTU Operator

The party who operates the CTU and provides empty CTUs to the consignor/ shipper/packer may be referred to as tank operator.

DGN

The Dangerous Goods Note (or Dangerous Goods Declaration) is used to accompany deliveries of hazardous goods in transit.

IMDG Code

Means the current edition of the International Maritime Dangerous Goods (IMDG) Code adopted by the Maritime Safety Committee of International Maritime Organisation (IMO).

Intermodal portable tank

Means a specific class of portable tanks designed primarily for international intermodal use.

Lessor

A person or company who leases equipment to another company.

NVOCC

Non-vessel operating common carrier. A shipment consolidator or freight forwarder who does not own any vessel, but functions as a carrier by issuing its own bills of lading or waybills and assumes responsibility for the shipments.

Packer

The party that loads, places or fills the cargo within or on the CTU; the packer may be contracted either by the consignor, the shipper, by the freight forwarder or by the carrier; if the consignor or the shipper packs a CTU within his own premises, the consignor or the shipper is also the packer.

Portable tank

Means:

- For the purposes of the transport of substances of Class 1 and Classes 3 to 9, a multimodal portable tank. It includes a shell fitted with service equipment and structural equipment necessary for the transport of dangerous goods.
- For the purposes of transport of non- refrigerated, liquefied gases of Class 2, a multimodal tank having a capacity of more than 450 litres. It includes a shell fitted with service equipment and structural equipment necessary for the transport of gases.
- For the purposes of transport of refrigerated liquefied gases, a thermally insulated tank having a capacity of more than 450 litres fitted with service equipment and structural equipment necessary for the transport of refrigerated liquefied gases.

The portable tank shall be capable of being loaded and discharged without the need of removal of its structural equipment. It shall possess stabilising members external to the shell and shall be capable of being lifted when full. It shall be designed primarily to be loaded on a vehicle or vessel and is equipped with skids, mountings or accessories to facilitate mechanical handling. Road tank-vehicles, rail tank-wagons, non-metallic tanks, gas cylinders, large receptacles and intermediate bulk containers (IBCs) are not considered to fall within this definition.

PTI

Pre-trip inspection. A series of checks carried out before the CTU in question is assigned to carry out its assigned tasks.

SDS

Safety data sheet is a document created for substances or mixtures containing a wide range of information on the composition, physical, chemical, health and environmental effects of the substance or mixture and on the safe usage, transport, storage and disposal of the products.

Shipper

The party named on the bill of lading or waybill as shipper and/or who concludes a contract of carriage (or in whose name or on whose behalf a contract of carriage has been concluded) with the carrier. In tank operations, under the ocean bill of lading, the “shipper” may be the CTU operator acting as NVOCC.

Tank

Means a portable tank, including a tank container, a road tank-vehicle, a rail tank- wagon or a receptacle to contain solids, liquids, or gases, having a capacity of not less than 450 litres when for the transport of gases.

Tank Container

Means a portable tank with fittings, structural capabilities and dimensions that enable it to be handled and secured by the same means as any ISO configured container and complies with the requirements of ISO 1496-3.

For more information

Please contact us at **riskmanagement@ttclub.com** or visit us as **ttclub.com**

TT Club

TT Club is the established market-leading independent provider of mutual insurance and related risk management services to the international transport and logistics industry. TT Club's primary objective is to help make the industry safer and more secure. Founded in 1968, the Club has more than 1200 Members, spanning container owners and operators, ports and terminals, and logistics companies, working across maritime, road, rail, and air. TT Club is renowned for its high-quality service, in- depth industry knowledge and enduring Member loyalty. It retains more than 93% of its Members with a third of its entire membership having chosen to insure with the Club for 20 years or more.

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TT Club is managed by Thomas Miller, an independent and international provider of market leading insurance services. Most of the businesses we currently own or manage are acknowledged leaders in their chosen market. Our portfolio includes mutual organisations and, increasingly, specialist insurance services businesses.

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