



Flexible Tanks for Liquid Bulk Cargo

Recommended Best Practice

Introduction

This paper offers recommended best practice for the use of flexible tanks to transport liquid bulk cargo. It includes checklists to be used for container selection, flexible tank preparation and loading of the prepared flexible tank. The objective is to provide underwriters, brokers, and assureds with practical guidance to ensure the safe and efficient transport of the various commodities transported by this cargo stowage method. The implementation of this best practice should help reduce claims associated with the use of flexible tanks within ISO containers.

Flexible tanks

A flexible tank (or flexitank), is a flexible transport bladder made of poly film which is used to transport liquid bulk cargoes within a standard ISO container. The goods transported are primarily liquid products of the food industry such as additives, dairy products, chocolate, fruit juice concentrates as well as wines and oils for human consumption, latex, hydraulic and lubricating oils and chemicals that do not have to be declared in accordance with the IMDG Code. That said, some substances transported in flexitanks that do not require IMDG Code declaration are still able to cause environmental damage should they be spilt.

According to the Container Owners Association (COA), the number of flexible tanks in use worldwide rose from around 400K in 2010 to around 1.1 million in 2020 and is now more than 1.5 million. Growth in flexible tanks is outpacing dedicated tank containers due to significantly lower transport costs. Today, transported volumes are around 36 billion litres of liquids, with a strong upward trend.

Benefits

There are a number of benefits that have led to the development and growth in use of flexible tanks including:

- Larger transport volumes per container compared to single packs/containers.
- No requirement to return or dispose of reusable containers such as drums, canisters or IBCs.
- Use of standard ISO containers without the need to return tank containers.
- Greater flexibility, availability and simplified access to transport capacity compared to using tank containers.
- Elimination of cleaning costs for reusable containers.

However, despite their economic advantages and widespread use, flexible tanks are only lightly regulated. There are a range of risks associated with their use, not least the likelihood of damage. This makes them a specific focus for the insurance industry.

General Risk

In general, if a flexible tank is not properly installed and loaded, or if it is overloaded, damage to the flexible tank and/or the ISO container can occur. Damage includes bulging/deformation of the container walls which can further damage the poly material of the flexible tanks. Repaired areas within a container often have sharp edges and sharply shaped points of contact such as those caused during welding. These sharp areas, if not addressed prior to loading the flexible tank, may cause punctures and leaks. Even if the container is not obviously damaged and no material loss has occurred, an overloading of the container can lead to structural damage that becomes problematic much later.

The issue of maximum safe total weight of a flexible tank continues to be reviewed and debated by various stakeholders, as are the various forces acting on a CTU (Cargo Transport Unit) as a result of the route, stow position, vessel size, or fluid density of the cargo. This information is available elsewhere and is not discussed in this paper in detail. Suffice to say that manufacturer and transport provider (both ocean and over the road (OTR)) carriage guidelines, and the CTU Code are to be adhered to.

Annex 1 provides further information.

Specific risks

In addition to the general risks, there are additional specific risks which must also be taken into account.

- Use of unsuitable containers.
- Various installation errors.
- Pre-existing damage.
- Material and production deficiencies.
- Unusual transport stresses/handling damage.
- Over or underfilling.
- Risks resulting from the goods being transported.

Annex 2 provides further information.

Consequences

The transport of liquid bulk cargoes in flexible tanks is naturally prone to total loss. In addition to the loss of the cargo, further costs may be incurred due to:

- Cleaning of seagoing vessels, operational areas and public areas.
- The use of liquid collection containers (drip trays).
- Transloading.
- Environmental damage.



- Storage, detention and container demurrage.
- Container damage.
- Destruction or disposal.

The use of flexible tanks must also be critically examined from an ESG (environmental, social, governance) perspective and their environmental impact must be compared with that of tank containers. Paired transports (where cargoes are moved in both directions with no “empty leg”), if they can be arranged, are often more sustainable and safer when using tank containers. If unpaired transports are arranged, the use of disposable flexible tanks can make economic and ecological sense. The biggest point of criticism from the insurance industry's perspective is the accepted overloading of the containers which can lead to damage. This can be the cause of container losses at sea years later. In addition, leaking tanks in harbour can lead to environmental damage.

As damage to a flexible tank will almost always lead to a total loss of the cargo, the overall economic risk is significantly increased. In a road traffic situation, for example, the consequences of a leak can be particularly significant or even fatal for third parties.

Root cause analysis is difficult and costly and is not always successful or possible. The involvement of various parties involved in the process with different areas of responsibility makes successful recovery more difficult.

Recommendations

To minimise risk and costs, the following measures are recommended:

Selection of flexible tanks and containers

- Ensure the flexible tanks comply with COA standards. Ideally, only flexible tanks that have COA certification should be used.
- Check the suitability of the product to be transported in a flexible tank and verifying product-specific requirements for flexible tank transport.
- Choose flexible tanks made of materials compatible with the liquid being transported. Verify chemical compatibility to prevent contamination or degradation.
- Select the appropriate size and capacity of the flexible tank based on the volume of the liquid and the dimensions of the container.
- Choose 40' containers instead of 20' containers for the same product volume and thus tanks with a lower loading height to reduce strain on the container side walls.

Container Preparation

- Thoroughly inspect the shipping container for any damage, sharp edges or contamination that could compromise the integrity of the flexible tank.
- Record the suitability of the container and its condition both inside and outside before transport by using checklists supplemented with photographic material.
- Follow the COA code of practice, i.e. ensure the container is clean, dry, suitable and undamaged before installing the flexible tank.
- Mark the container with appropriate labelling in the door area (work safety) as well as on the roof. This will indicate to the van carrier/crane operator that a flexible tank



containing liquids is loaded and that necessary care should be taken during handling operations.

Installation

- Diligent observance/implementation of the manufacturer's installation instructions which include, among other aspects, various steps of container wall and corner preparation to prevent mechanical damage to the flexible tank during transport.
- Use trained personnel to ensure proper installation of flexible tanks as well as during loading and unloading of the liquids to avoid mishandling.
- When conducting sterilisation processes on the flexible tank or when the loading of heated product is carried out, limits regarding maximum temperatures must be taken into account to prevent thermal distortion to the flexible tank and/or valve.
- Ensure the filling process is conducted slowly to avoid creating air pockets and pressure imbalances. Use calibrated equipment to monitor the fill level.
- Record flexible tank installation by using photographic material, checklists and documentation of loading and unloading. See Annex 3 for more detail.

Transportation

- Ensure the weight of the filled flexible tank does not affect the container's stability, considering the demands and risks during the shipment.
- Optimise the stowage position to minimise external forces on the container and its load. See Annex 1.
- Select destination ports that provide knowledge, experience and support.
- In the transport planning stages, rail transits should be minimised due to the higher longitudinal forces incurred when compared with road transport.

Emergency preparedness

- Have an emergency response plan to ensure a timely, appropriate and loss-minimising reaction in the event of damage/leakage and to keep consequential costs to a minimum.
- Establish a contractual agreement between seller and buyer, independent of Incoterms, outlining obligations and procedures in the event of leakage, to be implemented before shipment. Since such an agreement would define obligations on a contractual basis, any increase of damage and consequential costs due to inactivity (refusal of shipment acceptance or similar) would be prevented.



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International Union of Marine Insurance

Grosse Elbstrasse 36, 22767 Hamburg, Germany
Telephone +49 (0) 40 2000 747-0
info@iumi.com