

# Carriage of Containers

## Flexitanks in Containers

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### Introduction

Flexitanks have been in use for the carriage of non-hazardous chemicals, oils, wine and other bulk liquids in 20' maritime dry containers since the 1970s. They are now widely available in sizes ranging from 10,000 to 25,000 litres for use with liquids of varying densities.

The main problems with the carriage of flexitanks in standard containers appear all to be related to the stowage, filling, handling and securing of the flexitanks, which result in leakage of the contents. Containers with flexitanks may not be declared as 'specials' and may not appear on the specials list along with dangerous goods, reefer, out-of-gauge and high-cube containers – so problems may only show up on board if there is a leak or the flexitank has been stuffed in an inappropriate container.

### Problems with Flexitanks

Flexitank construction ranges from single to multi-layered. Multi-layered flexitanks – with a minimum of four layers – are recommended for all applications involving sea transport in a 20' container. Most manufacturers and suppliers of flexitanks offer detailed training for customers and loading assistance from attending technicians.

Some flexitanks manufacturers and suppliers produce warning labels for the doors of containers so it may be possible for the crew on board to identify a container with a flexitank after stowing.

#### Disclaimer

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# Carriage of Flexitanks in Containers

Leakage of contents could cause wet damage to other cargo but if the contents are foodstuffs there should be no 'chemical' hazards but there may be a hazard from slips, trips and falls. However, care should be taken in disposing of leaked contents since they might be 'cargo residues', which are classified as category 4 garbage under the International Convention for the Prevention of Pollution (MARPOL), annex 5.



Even if the contents are not foodstuffs, the risk of the leakage being harmful should be low since the carriage of hazardous products is not permitted in flexitanks in accordance with the International Maritime Dangerous Goods (IMDG) Code. Leakage of contents could cause wet damage to other cargo.

Some of the factors causing leakage following damage to the flexitank are:

- incorrect assembly in the container, resulting in chaffing damage during the voyage
- not following procedures in closing container doors, resulting in pinching damage
- not following procedures in stowing filling pipe, resulting in pinching damage
- poor handling practice, resulting for example in forklift damage.

Expansion and contraction problems where the container is subject to very high and low temperatures may also cause damage. There is a pressure-release valve and the tanks are rated in expansion and contraction to limits that should cater for these extremes.

## Structural Damage to the Container or Loss of Ship Stability from Flexitanks

There may be safety issues resulting from static or dynamic stresses from slopping liquid affecting container structure or affecting ship stability.

Flexitanks are chosen by size and density of liquid to be carried on the basis of being 100% full, which is said to avoid the dynamic slopping liquid stresses that can be associated with less-than-full tank containers. The fact that flexitanks are 100% full also suggests there may be no significant free surface effect on the stability of the ship.

Typical advice from manufacturers and suppliers of flexitanks is that the container must be a standard 20' ISO container suitable for the safe transport of up to 24,000 kg of non-hazardous liquid in a flexitank.

A 2013 study of [Flexitank carriage carried out by Germanischer Lloyd](#) (GL) on behalf of the German Insurance Association (GDV) examined the structural strength of a 20' container in relation to lateral accelerations from Flexitanks at sea. The study concluded that for unrestricted ocean carriage in a ship over 170 m in length – including in the North Atlantic – the maximum recommended weight of a Flexitank container should be 15 tonnes. If avoiding the North Atlantic the maximum weight should be 18 tonnes. In ships of less than 170 m in length a lateral acceleration force of 0.8G (CTU Guidelines) is often exceeded and the recommended weights for Flexitanks are correspondingly much lower.

The maximum age of a container should be no more than three years and the Container Safety Convention (CSC) data plate must be valid or show a valid ACEP (Approved Continuous Examination Program) and certify that the container is rated for a minimum of 30,480 kg.

# Carriage of Flexitanks in Containers

## Effect of Increase Use of Flexitanks

Indications are that almost all liquid commodities that are suitable for shipment by flexitanks are already being carried.

Apart from the general increase in all cargo volumes, there are no current industry reports that forecast a significant increase in the types of products for which flexitanks are used.

## Common Standards of Flexitank Carriage

In June 2006 the Container Owners Association's flexitank working group set in motion a process of discussion and investigation with flexitank manufacturers and suppliers, with the aim of developing a code of practice for flexitank operation.

## Acknowledgements

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# CARRIAGE OF FLEXITANKS IN CONTAINERS

## Checklist to Assist Members

The following checklist should assist Members with the carriage of flexitanks by ensuring that suitable preparations are carried out. In general terms if the answer to one or more of these questions is 'NO' then there may be a potential problem.

1. Is the flexitank selected suitable for the product in terms of density – total weight of product and container considered?
2. Is the flexitank selected going to be 100% full?
3. Is the flexitank constructed of four or more layers?
4. Is the flexitank top loading?
5. Is the top of the flexitank fitted with a pressure relief valve?
6. Has a standard steel 20' ISO container suitable for the safe transport of up to 24,000 kg of non-hazardous liquid in a flexitank been allocated?
7. Is the allocated container less than 3 years old?
8. Does the allocated container have a valid CSC plate (rated to minimum of 30,480Kg)?
9. Is the allocated container free of any apparent damage/weakness in the side panels?
10. Are the side panels of the allocated container corrugated?
11. The ship will not be sailing in the North Atlantic?
12. The ship on which the Flexitank is carried is 170 meters or more in length?
13. The total weight of the flexitank is 15 tonnes or less?
14. Is the flexitank being installed in the allocated container by trained persons from the manufacturer or the supplier?
15. Is the flexitank being filled by trained persons from the manufacturer or the supplier?
16. Is the retaining bulkhead at the container doors approved/supplied by the flexitank manufacturer or supplier?
17. Are the insides of the container side walls (at least 1.5m high) and the floor lined - for example - with single face cardboard?
18. Are the manufacturer's or supplier's approved inspection, installation, loading and discharging procedure being followed?
19. Has a warning label been fixed to the left hand door? Example: Caution flexitank container with bulk non-hazardous liquid (Commodity). Do not open left hand door until flexitank is emptied. Do not loose shunt.