

## 5 Packing bulk material

### 5.1 Non-regulated liquids in tank CTUs

5.1.1 Tank CTUs filled with liquids having a viscosity less than 2,680 mm<sup>2</sup>/s at 20°C and to be transported by road, rail or sea should be filled to at least 80% of their volume for avoiding dangerous surging, but never more than 95% of their volume, unless specified otherwise. A filling ratio of maximum 20% is also accepted. A filling ratio of more than 20% and less than 80% should only be permitted when the tank shell is subdivided, by partitions or surge plates, into sections of not more than 7,500 l capacity.

5.1.2 The tank shell and all fittings, valves and gaskets should be compatible with the goods to be carried in that tank. In case of doubt, the owner or operator of the tank should be contacted. All valves should be correctly closed and checked for leak tightness.

5.1.3 For the transport of foodstuffs, the tank should comply with the following requirements:

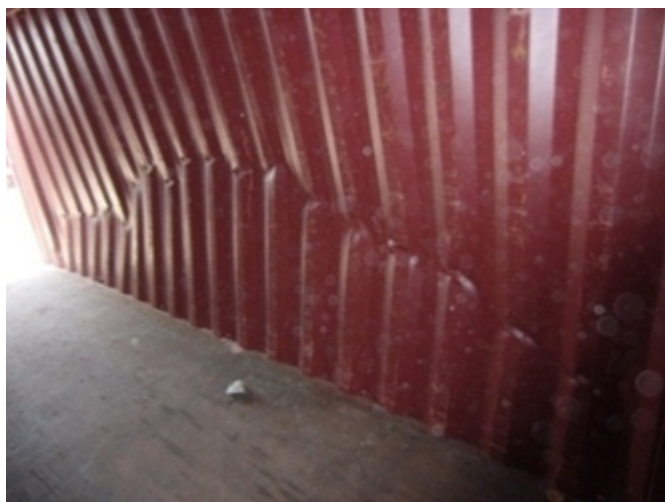
- All parts of the tank which are in direct contact with the food stuff should be so conditioned that the overall food-grade property of the tank is guaranteed;
- The tank should be easily accessible and suitable for cleaning and disinfection;
- Inspection of the interior should be possible;
- The exterior should be conspicuously marked with a marking "FOR FOODSTUFFS ONLY" or with a similar wording.

### 5.2 Liquids in flexitanks

5.2.1 Flexitanks used for the transport of bulk liquids by road, rail or sea should carry a label that confirms the type approval by a recognized consultative body. The flexitank manufacturer's fitting instructions should always be followed, and the cargo intended to be carried should be checked for compatibility with the material of the flexitank. The transport of dangerous goods in flexitanks is prohibited.

5.2.2 During transport the contents of a flexitank will be subject to dynamic forces without significant retention from friction. These forces will act upon the boundaries of the CTU and may cause damage or complete failure.

5.2.3 Therefore the payload of a CTU should be appropriately reduced, when it is used for carrying a loaded flexitank. The reduction depends on the type of CTU and on the mode of transport. When a flexitank is loaded into a general purpose CTU, the mass of the liquid in the flexitank should not exceed a value agreed with the [CTU operator](#), to prevent the CTU from suffering bulging damages (see figure 7.50).



**Figure 7.50 Damaged CTU side wall**

5.2.4 Road vehicles intended to carry loaded flexitanks should have boundaries of a certified strength that is sufficient to confine the weight of the cargo under the accepted load assumptions. The certification of fitness of the vehicle should explicitly address the bulk transport of liquid under the assumption of zero-friction. Nevertheless, the lining of the bottom of the loading area with friction increasing material and the application of over-the-top fibre lashings every two metres is recommended for stabilizing the position and the strength of the flexitank.

5.2.5 Before being fitted with a flexitank, the CTU should be carefully inspected for structural integrity and fully functional locking bars for each door panel. The CTU should then be prepared by thorough cleaning, removing of all obstacles like protruding nails and by lining the bottom and walls with cardboard. In 40-foot containers plywood should be used for lining of the side walls in order to avoid bulging damage. The door end of the CTU should be reinforced by battens, fitted into suitable recesses, and by a strong lining of cardboard or plywood. If the flexitank is equipped with a bottom connection tube, this lining should have an aperture matching with the position of the tube in way of the right hand door. The empty flexitank should be unfolded and laid out accurately to facilitate a smooth filling process.

5.2.6 For filling an empty flexitank the left hand door of the CTU should be firmly closed so that the inserted barrier is appropriately supported (see figure 7.51). The flexitank should be filled at a controlled rate. The use of spill protection devices like collecting bag or drip tray is recommended. After filling and sealing the tank the door of the CTU should be closed and a warning label should be attached on the left hand door panel (see figure 7.52). No part of the flexitank or retaining battens or bulkhead should touch either door when fully loaded.



**Figure 7.51 Container fitted with flexitank**



**Figure 7.52 Flexitank warning label**

5.2.7 For unloading a flexitank, the right hand door of the CTU should be opened carefully for getting access to the top or bottom connection tube of the flexitank. The left hand door should be kept closed until the flexitank is substantially empty. The use of spill protection devices like collecting bag or drip tray is recommended. The empty flexitank should be disposed according to applicable regulations.

### 5.3 Non-regulated solid bulk cargoes

5.3.1 Non-regulated solid bulk cargoes may be packed into CTUs provided the boundaries of the cargo spaces are able to withstand the static and dynamic forces of the bulk material under the foreseeable transport conditions (see [chapter 5](#) of this Code). [Freight containers](#) are equipped with shoring slots in the door corner posts which are suitable to accommodate transverse steel bars of 60 mm square cross section. This arrangement is particularly designed to strengthen the freight container door end for taking a load of 0.6 P, as required for solid bulk cargoes. These bars should be properly inserted. The relevant transport capability of the CTU should be demonstrated by a case-related certificate issued by a recognized consultative body or by an independent cargo surveyor. This requirement applies in particular to general purpose freight containers and to similar closed CTUs on road vehicles, which are not explicitly designed to carry bulk cargoes. It may be necessary to reinforce side and front walls of the CTU by plywood or chipboard facing in order to protect them from bulging or scratching (see figure 7.53).



**Figure 7.53 Lining a 40-foot container with chipboard panels**

5.3.2 The CTU intended to carry a bulk cargo should be cleaned and prepared adequately as described in subsection 5.2.5 of this annex, in particular if a cargo-specific liner will be used for accommodating bulk cargoes like grain, coffee beans or similar sensible materials (see figure 7.54).



**Figure 7.54 CTU with liner bag for accommodating a sensitive bulk cargo**

5.3.3 If crude or dirty material will be transported, the CTU boundaries should be lined with plywood or chipboard for avoiding mechanical wastage of the CTU. In all cases an appropriate door protection should be installed consisting of battens fitted into suitable recesses and complemented by a strong plywood liner (see figure 7.55).



**Figure 7.55 CTU with wall liners and door barrier loaded with scrap**

5.3.4 Scrap and similar waste material to be carried in bulk in a CTU should be sufficiently dry to avoid leakage and subsequent [contamination](#) of the environment or other CTUs, if stacked ashore or transported in a vessel.

5.3.5 Depending on the internal friction and the angle of repose of the solid bulk cargo, the CTU may be inclined to a certain degree, to facilitate the loading or unloading operation. However, it should always be ensured that the walls of the CTU are not overstressed by the filling operation. It is not acceptable to turn a CTU by 90° to an upright position for filling, unless the CTU is especially approved for this method of handling.