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**COMMITTEE OF EXPERTS ON THE TRANSPORT OF
DANGEROUS GOODS AND ON THE GLOBALLY
HARMONIZED SYSTEM OF CLASSIFICATION
AND LABELLING OF CHEMICALS**

Sub-Committee of Experts on the
Transport of Dangerous Goods

Thirty-third session
Geneva, 30 June-9 July (a.m.) 2008
Item 7 of the provisional agenda

**MISCELLANEOUS PROPOSALS OF AMENDMENTS TO THE MODEL
REGULATIONS ON THE TRANSPORT OF DANGEROUS GOODS**

Protection of shell and service equipment on portable tanks

Transmitted by the expert from Australia*

Background

1. As a result of a number of incidents, the expert from Australia has been examining the structure of portable tanks with respect to the level of protection provided to the shell and service equipment. This examination, and the investigation of one incident in particular, has raised issues with respect to the application of section 4.2.1.2 in respect of protection of the shell, section 6.7.2.6.3 in respect of the discharge valve and internal stop valve, and section 6.7.2.5.1 in respect of service equipment being arranged in such a way that it is protected from being wrenched off or damaged during handling and transport.

* In accordance with the programme of work of the Sub-Committee for 2007-2008 approved by the Committee at its third session (refer to ST/SG/AC.10/C.3/60 para. 100 and ST/SG/AC.10/C.3/34, para. 14).

2. The response from industry to the specific incident under investigation suggested that these requirements should be read in a way that relates primarily to road and rail transport, particularly section 4.2.1.2 which currently reads:

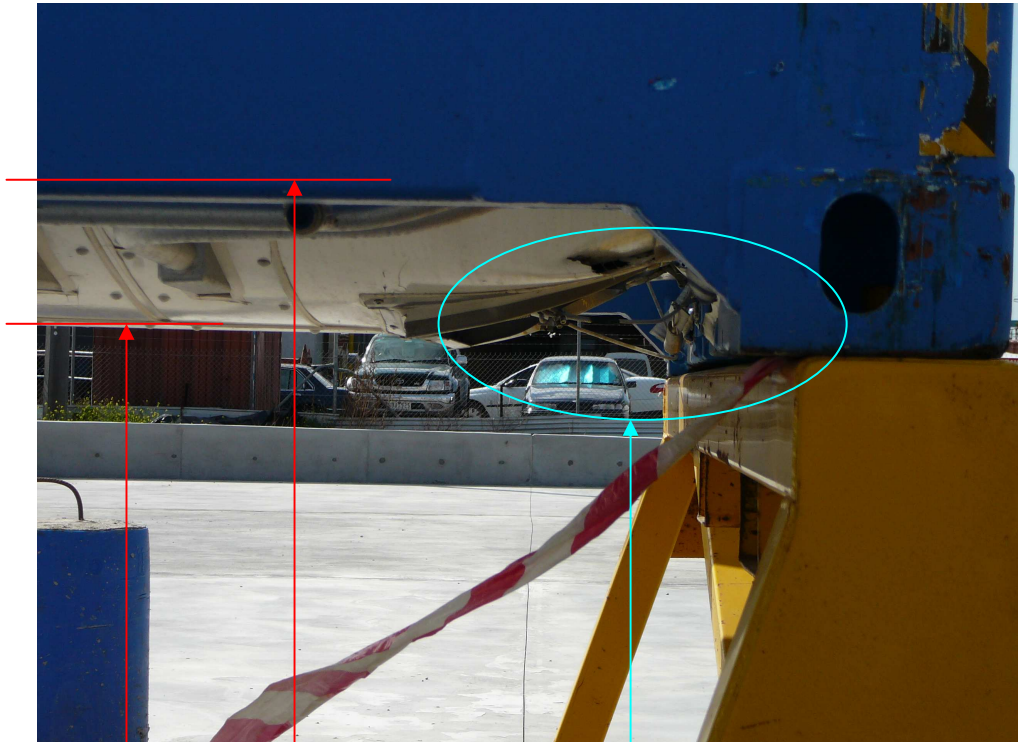
4.2.1.2 During transport, portable tanks shall be adequately protected against damage to the shell and service equipment resulting from lateral and longitudinal impact and overturning. If the shell and service equipment are so constructed as to withstand impact or overturning it need not be protected in this way. Examples of such protection are given in 6.7.2.17.5.

The industry response suggests this section is being read as relating only to side and end impact, of the type occurring with a collision, and protection from overturning.

3. The expert from Australian does not support a view that impacts under section 4.2.1.2 are limited to side and end impacts. Further, the requirements of section 6.7.2.5.1 are that service equipment is to be, "*protected against the risk of being wrenched off or damaged during handling and transport*". This indicates that protection should be arranged in a way that ensures service equipment is protected against any impact that could be foreseen in normal operational use.

4. In September 2007, an insulated portable tank complying with tank instruction T11 and containing Ethyl Acrylate (UN1917) was being discharged from a container ship using a container gantry crane. Due to the use of automatic and semiautomatic twist locks, the standard practice is to land tanks and containers on a 'pin cradle' to facilitate the fitting or removal of twist locks. When the tank was landed on the cradle it was slightly misaligned longitudinally. As a result the tank did not come to rest on the cradle structure by way of the bottom transverse rail and bottom corner fittings, but rather 120mm - 150mm beyond.

5. The design of the portable tank was such that the bottom of the valve structure, vent fittings and shell insulation all sat below the line of the longitudinal side rails. When the tank was landed without being properly aligned on the cradle, the load was taken by the bottom of the tank and valve (see photograph below). The same situation would occur if the tank had been landed on top of another container in the same manner, noting portable tanks are stacked in ship board stows and container terminals, so the risk is not isolated to the use of materials handling equipment such as pin cradles.



Bottom of the tank insulation
and the lower portion of valve

Longitudinal side rail

Area where the tank
landed on the pin cradle
Note: valve has been
removed

6. As a result of the landing, the insulation and vent lines were pushed up and a securing bracket on the vent lines was sheared. More seriously, the valve stem was pushed up and sheared off at the flange. The impact was also sufficient to displace the internal stop valve resulting in a slow leak of the contents from the tank. While compliance with section 6.7.2.6.3 should have prevented displacement of the foot valve, it appears the amount and type of damage to the valve stem may have made the leak inevitable. The level of protection of the valve stem was a major factor in this incident.



Damaged Valve stem

Displaced vent line and sheered bracket

7. It was determined by the Australian authorities that the tank did not comply with the requirements of the UN Model Regulations/IMDG code with respect to 4.2.1.2 (protection of the shell) and section 6.7.2.5.1 (protection of service equipment against the risk of being wrenched off or damaged during handling and transport).

8. The Australian authorities contacted the certifying authority with respect to compliance with the UN Model Regulations/IMDG code. The certifying authority was of the view that the valve was adequately protected, and on that basis the design complied with the “spirit” of the requirements. The conclusions drawn by the tank operator and certifying authority were not accepted by the Australian authorities, but it appears there is a need for greater clarity in the UN Model Regulations to ensure tanks are more adequately protected.

9. During investigation of this incident Australian authorities examined other tanks to assess the level of protection provided to bottoms openings and fittings. In many examples the level of protection provided was much greater than that provided for the tank involved in this incident. In most cases, the arrangement of longitudinal rails, end rails and/or corner braces was such that intrusion into the area surrounding the valve and fittings by handling devices such as pin cradles or while stacking, would be prevented. An example is provided in the following image.



Line of end and side (longitudinal) rails providing protection against intrusion during cargo operations.

Additional protection provided by corner cross brace set just above the line of the side and end rail.

10. The level of protection provided to portable tanks approved in a manner consistent with the UN Model Regulations should be such that the risk of damage from use with materials handling equipment or being landed on a ship, a trailer or another container is minimised, given this is a normal part of operations. It is the view of the expert from Australian that this was always the intent of section 4.2.1.2 and section 6.7.2.5.1 of the UN Model Regulations, but it is apparent that other interpretations are being applied.

Proposal

11. It is proposed that section 4.2.1.2, 6.7.2.5.1 and 6.7.2.17.5 be amended to read:

4.2.1.2 “During transport *and handling operations*, portable tanks shall be adequately protected against damage to the shell and service equipment resulting from *vertical*, lateral and longitudinal impact and overturning. If the shell.....”

6.7.2.5.1 “Service equipment shall be so arranged as to be protected against the risk of being wrenched off or damaged during the handling, transport *and stowage of portable tanks*. When the connection between the frame.....”

6.7.7.17.5 When portable tanks are not protected during transport, according to 4.2.1.2, the shells and service equipment shall be protected against damage to the shell and service equipment resulting from *vertical*, lateral or longitudinal impact or overturning. External fittings.....”

12. A new sub-paragraph (e) be added to section 6.7.2.17.5 to read:

(e) *Protection against vertical impact which may consist of enclosures, fenders, corner braces and appropriately positioned longitudinal and end rails.*
