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**ECONOMIC COMMISSION FOR EUROPE**

**INLAND TRANSPORT COMMITTEE**

Working Party on the Transport of Dangerous Goods

Joint Meeting of the RID Safety Committee and the  
Working Party on the Transport of Dangerous Goods

Geneva, 11-15 September 2006

Agenda item 2

**TANKS\***

**Chapter 6.8 - Requirements for discharge pipes**

**Proposal of the Government of Germany**

**SUMMARY**

<i>Executive summary:</i>	For RID/ADR tanks, chapter 6.8 contains only a few general requirements for discharge pipes and the testing thereof. Based on gas leak incidents, a specification of requirements for tank discharge pipes is proposed.
<i>Action to be taken:</i>	Moving requirements from chapter 6.7 to chapter 6.8.
<i>Related documents:</i>	None.

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## **Introduction**

1. During the filling of an LPG tank-vehicle at a refinery, a leak was noted in a discharge pipe. Fortunately, the leaked gas produced no flare, which could have had serious consequences. A similar occurrence had taken place with a tank-wagon; there too, a defective discharge pipe had produced leaks. A subsequent inquiry into the causes showed that the discharge pipes had cracks resulting from substandard welding and, in the case of the tank-vehicles, also from vibration stress caused by the use of a pump to increase pressure during discharge.
2. Subsequently, the discharge pipes of a large number of tank-vehicles and tank-wagons were checked, and it was found that in over three quarters of the tanks examined the discharge pipes had substandard welds. Since then, many LPG tank discharge pipes have been repaired or replaced. Incidents such as these should be avoided in the future through a uniform testing programme and through regulatory requirements.

### *Standards and regulations*

3. For tests of bodies subject to pressure, such as discharge pipes, requirements are contained in the technical regulations and the European standard for unfired pressure vessels (EN 13445), but these have so far not been taken sufficiently into consideration in the requirements listed in RID/ADR for tanks.

### *Prescriptions*

4. In accordance with the RID/ADR construction requirements for tanks, shells must be designed and built according to the provisions, or in accordance with the requirements, of a code recognized by the competent authorities for pressure receptacles. However, discharge pipes are not considered to be parts of the shells.

On the whole, chapters 6.7, 6.8 and 6.10 contain only general requirements for discharge pipes. Chapter 6.7 contains more extensive requirements for portable tanks.

## **Proposal**

5. The table below presents an overview of the requirements for bodies (discharge pipes) in sections 6.7.3 (non-refrigerated liquefied gases) and 6.8.2 (all tanks). The working group on tanks should consider incorporating the adapted texts that appear in bold into chapter 6.8, and recommend their adoption to the Joint Meeting.

<p><b>6.7.3 Tanks for non-refrigerated liquefied gases (excerpts)</b></p>	<p><b>6.8.2 Tanks (excerpts)</b></p>
<p><b>6.7.3.2.2</b> Portable tank shells, fittings and pipework shall be constructed of materials which are:</p> <ul style="list-style-type: none"> <li>(a) Substantially immune to attack by the non-refrigerated liquefied gas(es) intended to be carried; or</li> <li>(b) Properly passivated or neutralized by chemical reaction.</li> </ul>	<p><b>6.8.2.1.8</b> Shells shall be made of suitable metallic materials which, unless other temperature ranges are prescribed in the various classes, shall be resistant to brittle fracture and to stress corrosion cracking between -20° C and +50° C.</p> <p><b>6.8.2.2.1</b> Suitable non-metallic materials may be used to manufacture service and structural equipment.</p>
<p><b>6.7.3.5.1</b> Service equipment shall be so arranged as to be protected against the risk of being wrenched off or damaged during handling and carriage. When the connection between the frame and the shell allows relative movement between the sub-assemblies, the equipment shall be so fastened as to permit such movement without risk of damage to working parts. The external discharge fittings (pipe sockets, shut-off devices), the internal stop-valve and its seating shall be protected against the danger of being wrenched off by external forces (for example using shear sections).</p>	<p><b>6.8.2.2.1</b> The items of equipment shall be so arranged as to be protected against the risk of being wrenched off or damaged during carriage or handling. They shall exhibit a suitable degree of safety comparable to that of the shells themselves, and shall in particular:</p> <ul style="list-style-type: none"> <li>- be compatible with the substances carried; and</li> <li>- meet the requirements of 6.8.2.1.1.</li> </ul> <p><b>6.8.2.2.2</b> The internal shut-off device shall continue to be effective in the event of damage to the external control device.</p> <p>In order to avoid any loss of contents in the event of damage to the external fittings (pipes, lateral shut-off devices), the internal stop-valve and its seating shall be protected against the danger of being wrenched off by external stresses or shall be so designed as to resist them.</p>

<p><b>6.7.3.5.10</b> Piping shall be designed, constructed and installed so as to avoid the risk of damage due to thermal expansion and contraction, mechanical shock and vibration. All piping shall be of suitable metallic material. Welded pipe joints shall be used wherever possible.</p>	<p><b>6.8.2.2.1</b> New first subparagraph before the words “The leakproofness of the service equipment ...”:   <b>“Piping shall be designed, constructed and installed so as to avoid the risk of damage due to thermal expansion and contraction, mechanical shock and vibration. All piping shall be of suitable metallic material. Welded pipe joints shall be used wherever possible.”</b></p>
<p><b>6.7.3.5.11</b> Joints in copper tubing shall be brazed or have an equally strong metal union. The melting point of brazing materials shall be no lower than 525° C. The joints shall not decrease the strength of tubing as may happen when cutting threads.</p>	
<p><b>6.7.3.5.12</b> The burst pressure of all piping and pipe fittings shall be not less than the highest of four times the MAWP of the shell or four times the pressure to which it may be subjected in service by the action of a pump or other device (except pressure-relief devices).</p>	<p><b>6.8.2.2.1</b> New second subparagraph before the words “The leakproofness of the service equipment ...”:   <b>“The burst pressure of all piping and pipe fittings shall be not less than the highest of [four times the MAWP]* of the shell or four times the pressure to which it may be subjected in service by the action of a pump or other device (except pressure-relief devices).”</b></p> <p>* Note: Standard EN 12972 refers to 1.5 times the test pressure.</p>

<p><b>6.7.3.5.13</b> Ductile metals shall be used in the construction of valves and accessories.</p>	<p><b>6.8.2.2.1</b> New subparagraph before the words “Suitable non-metallic materials ...”:</p> <p><b>“Ductile metals* shall be used in the construction of valves and accessories.”</b></p> <p>* Note: See the first sentence of 6.8.2.2.1. It would be useful to discuss whether the use of non-metallic materials should be restricted (for example, “... appropriate non-metallic materials may also be used with the consent of the competent authority”).</p>
<p><b>6.7.3.15.8</b> The internal and external examinations shall ensure that:</p> <ul style="list-style-type: none"> <li>(a) The shell is inspected for pitting, corrosion, or abrasions, dents, distortions, defects in welds or any other conditions, including leakage, that might render the portable tank unsafe for carriage;</li> <li>(b) The piping, valves, and gaskets are inspected for corroded areas, defects, or any other conditions, including leakage, that might render the portable tank unsafe for filling, discharge or carriage;</li> <li>(c) Devices for tightening manhole covers are operative and there is no leakage at manhole covers or gaskets;</li> <li>(d) Missing or loose bolts or nuts on any flanged connection or blank flange are replaced or tightened;</li> </ul>	<p><b>6.8.2.4.1</b> Shells and their equipment shall either together or separately undergo an initial inspection before being put into service. This inspection shall include:</p> <ul style="list-style-type: none"> <li>- a check of conformity to the approved type;</li> <li>- a check of the design characteristics</li> <li>- an examination of the internal and external conditions;</li> <li>- a hydraulic pressure test 9 at the test pressure indicated on the plate prescribed in 6.8.2.5.1; and</li> <li>- a leakproofness test and a check of satisfactory operation of the equipment.</li> </ul> <p><b>6.8.2.2.4</b> There are two proposals:</p> <p><b>Take up the whole subparagraph or parts of 6.7.3.15.8 (adapting the wording to chapter 6.8), or take up only (b).</b></p> <p>Note: 6.7.3.15.8 explains the preceding test directives.</p>

<p>(e) All emergency devices and valves are free from corrosion, distortion and any damage or defect that could prevent their normal operation. Remote closure devices and self-closing stop-valves shall be operated to demonstrate proper operation;</p> <p>(f) Required markings on the portable tank are legible and in accordance with the applicable requirements; and</p> <p>(g) The framework, the supports and the arrangements for lifting the portable tank are in satisfactory condition.</p>	
<p><b>MEGCs</b></p> <p><b>6.7.5.3.1</b> Service equipment shall be configured or designed to prevent damage that could result in the release of the pressure receptacle contents during normal conditions of handling and carriage. When the connection between the frame and the elements allows relative movement between the sub-assemblies, the equipment shall be so fastened as to permit such movement without damage to working parts. The manifolds, the discharge fittings (pipe sockets, shut-off devices), and the stop-valves shall be protected from being wrenched off by external forces. Manifold piping leading to shut-off valves shall be sufficiently flexible to protect the valves and the</p>	<p><b>MEGCs</b></p> <p><b>6.8.3.2.18</b> Service and structural equipment shall be configured or designed to prevent damage that could result in the release of the pressure receptacle contents during normal conditions of handling and carriage. When the connection between the frame of the battery-vehicle or MEGC and the elements allows relative movement between the sub-assemblies, the equipment shall be so fastened as to permit such movement without damage to working parts. Manifold piping leading to shut-off valves shall be sufficiently flexible to protect the valves and the piping from shearing, or releasing the pressure receptacle contents. The filling and discharge devices (including flanges or threaded plugs) and any</p>

	<p>protective caps shall be capable of being secured against unintended opening.</p> <p><b>6.8.3.2.19</b> In order to avoid any loss of content in the event of damage, the manifolds, the discharge fittings (pipe sockets, shut-off devices), and the stop-valves shall be protected or arranged from being wrenched off by external forces or designed to withstand them.</p>
<p><b>6.7.5.3.4</b> Piping shall be designed, constructed and installed so as to avoid damage due to expansion and contraction, mechanical shock and vibration. Joints in tubing shall be brazed or have an equally strong metal union.</p>	

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