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Working Party on the Transport of Dangerous Goods
(Geneva, 10-14 September 2001)

CARRIAGE OF LIQUEFIED GASES IN TANKS WITH RECESSED VALVE CHEST

Transmitted by the Government of the United Kingdom */

Scope

To permit the use of tanks with connections below the level of the liquid for the carriage of UN 1017 chlorine and UN 1079 sulphur dioxide.

NOTE: This proposal was initially presented to the 70th session of WP15 meeting in Geneva in May 2001. There the United Kingdom was requested to submit it first to the RID/ADR Joint Meeting (see comments in "Justification" below).

Background

Tank Code "D" in the third part of the tank code for gases in 4.3.3.1.1 of RID/ADR specifies that tanks used for the carriage of UN 1017 chlorine and UN 1079 sulphur dioxide must have all connections above the liquid level. This proposal requests that the text be modified to allow the carriage of these substances in tanks with connections which are always below the liquid level and are mounted inside a valve chest.

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In certain countries both these products have been carried in considerable quantities in road tankers which have an enclosed valve chest located inside the dished end of the tank. The filling and discharge connections are located inside the valve chest and are protected during transit by steel doors. The valves are mounted so that they do not project outside the contour of the shell and they are therefore highly protected from impact.

Such road tankers have been used in the United Kingdom for over thirty-five years without any incidents occurring. Tankers of a similar design have also been used in South Africa and Australia for a long period of time, again with a good safety record. Although the RID and ADR Framework Directives allow tanks that meet national regulations to continue to be used for domestic transport, the construction of new tanks of such a design will be prohibited under the present terms of RID and ADR. This would be regrettable as they have a proven safety record and it is believed that their continued use is safe and appropriate.

The normal alternative to "top filling" is "bottom filling", where there is an outlet from the bottom of the tank, usually with a pipe which runs to a convenient discharge point at the back. This is *not* proposed, as it would be most inappropriate for such substances as chlorine and sulphur dioxide.

The Eurochlor publication *Protection of road tankers for the carriage of chlorine* (1) recommends two alternatives for the protection of chlorine filling/discharge valves from damage during carriage, one of which is as follows:

"Valve protection is provided by a valve chest whereby the valves are recessed inside the tanker barrel. This is ideally located at the front, behind the cab unit. The valve chest should be covered by a suitable substantial access door, which can be secured closed during transport."

Proposal

Add a new Special Provision TExx to 6.8.4(b) and in column 13 of Table A in 3.2 against the entries for 1017 Chlorine and 1079 Sulphur Dioxide, as follows:

"TExx Shells of tanks may have filling or discharge openings below the surface level of the liquid, provided the valves are recessed inside the contours of the shell protected by a valve chest. This valve chest shall be protected by doors affording protection against external damage at least equivalent to that afforded by the shell. The doors shall be capable of being securely closed during carriage."

Justification

Tank vehicles

The advantages of such a change are as follows:

1. Tank vehicles involved in serious accidents often do not remain upright. This results in any top-mounted valves being below the liquid surface and highly exposed to impact. The tank vehicle may roll upside down, in which case the top-mounted valves and dome could be subject to the full weight, impact and sliding loads. An end-mounted valve chest system is never exposed in this way.
2. Following a serious accident in which a vehicle rolls over, it may be desirable to empty the contents safely before it is moved. There is a significant probability that top-mounted valves would be inaccessible whereas those in the proposed valve chest are more likely to be accessible.

3. A valve mounted inside a valve chest that is welded inside the dished end has far more protection from impact than a valve mounted on top of the tank, outside the tank shell surface and in an external dome. The position - recessed within the bounds of the shell - and external protection provide protection against rear impact.
4. Access is at a lower level and allows a safer working environment for connection and testing of hoses.
5. Neither of the substances in question are difficult to seal. Extensive experience of performance in both carriage and static operations show that proper sealing is easily achievable. There is no case for the prohibition of joints below the liquid level on those grounds.
6. The proposal is highly specific about the design that may be used and continues to prohibit bottom outlets, thus avoiding the risks associated with these.
7. There is an exemplary safety record in several countries regarding the use of such a valve chest arrangement. The design of the shell to accommodate the valve recess is taken into account within national and international pressure vessel design codes.

Tank wagons and tank-containers

When this proposal was initially submitted to WP.15 for road tankers, several delegates considered it was an issue more appropriate for consideration by the Joint Meeting.

Similar arguments would apply in the case of tank wagons and tank-containers and the principles are the same.

Although it would not be appropriate to locate the valve chest arrangement in the dished ends for tank wagons, the text proposed for TExx would allow valve chests in the sides as well as the ends of a tank.

Indeed a valve chest arrangement has been used on tank wagons carrying liquefied petroleum gases in Great Britain, and on tank-containers (with both types of design of the valve chest in the end and the side) generally carrying non-toxic gases for many years with very good safety records.

Reference

1. Eurochlor, *Protection of road tankers for the carriage of chlorine*, GEST 96/221, 1st edition, May 1998.
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