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Economic Commission for Europe**Inland Transport Committee****Working Party on the Transport of Dangerous Goods****Joint Meeting of the RID Committee of Experts and the
Working Party on the Transport of Dangerous Goods**

Bern, 13–17 March 2017

Item 2 of the provisional agenda

Tanks**Rupture pressure of bursting discs in 6.8.2.2.10****Transmitted by the Government of the Netherlands^{*, **}***Summary*

Executive summary:	This document responds to the remarks made on this subject in the Working Group on Tanks at the September 2016 session of the RID/ADR/ADN Joint Meeting.
Action to be taken:	Amend subsection 6.8.2.2.10 and introduce a transitional measure.
Related documents:	Document ECE/TRANS/WP.15/AC.1/2016/25, informal document INF.9 submitted at the September 2016 session, and ECE/TRANS/WP.15/AC.1/144/Add.1 paragraphs 10-14 .

Introduction

1. The proposals by the Netherlands in document ECE/TRANS/WP.15/AC.1/2016/25 were in principle acceptable for tanks for the carriage of liquids, but questions arose on the way this would influence hermetically closed tanks for the carriage of gases. One of the

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findings was that the definition of “hermetically closed” in 1.2.1 was not applicable to tanks carrying gases as would be expected by the reference in 4.3.3.1.1, part 4 under “H” in RID/ADR. Some experts expressed the opinion that tanks for the carriage of toxic gases were not allowed to have safety valves.

2. Three questions can be identified:

a) What is the interpretation of the definition of hermetically closed tanks for the carriage of gases?

b) Are tanks for toxic gases allowed to have safety valves, and if so are bursting disks mandatory?

c) What is the relation between 10% above start to discharge pressure of the safety valve and the test pressure of the tank?

3. **Add a:** what is the interpretation of the definition of hermetically closed tanks for the carriage of gases?

Conclusion

4. Originally the definition of “hermetically closed tank” allowed the use of tanks with safety valves preceded by a bursting disc in general, so for liquids, solids and gases. For ADR 2005 the wording was amended in the form it is in ADR 2017, limited to tanks for the carriage of liquids. The definition needs to be corrected.

Proposals

Proposal 1

5. Amend the definition of “hermetically closed tank” in 1.2.1 to read (deleted wording ~~stricken~~ through, new or replaced wording in *italic script*):

"Hermetically closed tank" means a tank that: ~~intended for the carriage of liquid substances with a calculation pressure of at least 4 bar or intended for the carriage of solid substances (powdery or granular) regardless of its calculation pressure, the openings of which are hermetically closed and which:~~

- is not equipped with safety valves, bursting discs, other similar safety devices or vacuum valves; or

~~- is not equipped with safety valves, bursting discs or other similar safety devices, but is equipped with vacuum valves, in accordance with the requirements of 6.8.2.2.3; or~~

- is equipped with safety valves preceded by a bursting disc according to 6.8.2.2.10, but is not equipped with vacuum valves.;~~or~~

Tanks intended for the carriage of liquid substances with a calculation pressure of at least 4 bar or intended for the carriage of solid substances (powdery or granular) regardless of its calculation pressure are also considered hermetically closed if it:

- is equipped with safety valves preceded by a bursting disc according to 6.8.2.2.10 and vacuum valves, in accordance with the requirements of 6.8.2.2.3;

- is not equipped with safety valves, bursting discs or other similar safety devices, but is equipped with vacuum valves, in accordance with the requirements of 6.8.2.2.3.

Justification to Add a

6. For ADR 2003 the definition was as follows:

“Hermetically closed tank means *a tank whose openings are hermetically closed and which are not equipped with safety valves, bursting discs or other similar safety devices. Tanks having safety valves preceded by a bursting disc shall be deemed to be hermetically closed.*”

7. The definition in the current wording was introduced in ADR 2005 after discussions that tanks for the carriage of liquid or solid substances equipped with vacuum valves could be considered as hermetically closed. The application of the definition for tanks for the carriage of gases must have been overlooked.

8. **Add b:** Are tanks for toxic gases allowed to have safety valves and if so are bursting discs mandatory?

Conclusion

9. Based on the wording of the definition for “hermetically closed tank” in ADR 2003 as reproduced under Add a) above, hermetically closed tanks for the carriage of gases were allowed to be fitted with a safety valve preceded by a bursting disc. According to 6.8.3.2.9 the fitting safety valve is optional.

Justification to Add b

10. In the product catalog of a global supplier of tank equipment, safety valves for gases are available with the option to fit a bursting disc, availability also means that there is a market for these valves and consequently use of these valves.

11. Also in 6.7.3.7.3 and 6.7.5.4.3 safety valves preceded by a bursting disc are allowed on tanks for the carriage of gases, although the wording seems to be more related to the compatibility of the safety valve with the substance carried (i.e. bursting disc not required for dedicated service).

12. **Add c:** What is the relation between 10% above start to discharge pressure of the safety valve and the test pressure of the tank?

Conclusion

13. A rupture pressure of 10% above the start to discharge pressure of the safety valve can safely be used on tanks for liquids and refrigerated liquefied gases as in design of the tank a factor of 1.3 is to be maintained between the maximum working pressure and test pressure.

14. For compressed, liquefied and dissolved gases, a rupture pressure of 10 % above the start to discharge pressure may in theory create a problem as the start to discharge pressure is prescribed to be between 0.9 and 1.0 times the test pressure of the tank.

Proposal 2

15. Modify the second paragraph of 6.8.2.2.10 to read (new wording in *italic* script, deleted wording ~~stricken~~ through):

If tanks required to be hermetically closed are equipped with safety valves, these shall be preceded by a bursting disc and the following conditions shall be observed:

The bursting disc shall rupture at a nominal pressure 10% above the start to discharge pressure of the safety valve. For tanks intended for the carriage of compressed, liquefied or dissolved gases ~~The arrangement of the bursting disc and safety valve shall be such as to satisfy the competent authority. A pressure gauge or other suitable indicator shall be provided in the space between the bursting disc and the safety valve, to enable detection of any rupture, perforation or leakage of the disc which may disrupt the action of the safety valve.~~

Justification to Add c

16. In chapter 6.8 of ADR for tanks for liquids a factor of 1.3 is used between the maximum working pressure and test pressure. With a rupture pressure of 10 % above the start to discharge pressure of the valve there will be sufficient “reserve” before the test pressure of the tank is reached.

17. Most tank vehicles of chapter 6.8 of ADR are approved for toxic liquids and are not equipped with a safety valve-bursting disc arrangement unless they are expected to be used on short sea voyages as IMO 4 tanks. These arrangements will already comply with the proposed amendment.

18. For the carriage of gases in tanks according to chapter 6.8 of ADR a different setting for a safety valve applies. For compressed, liquefied or dissolved gases the setting of the safety valve is 0.9 to 1.0 times the test pressure.

19. A rupture pressure of 10 % above the start to discharge pressure of the safety valve when set at 0.9 times the test pressure will see a rupture before the test pressure, but higher set pressures of the safety valve will not.

20. The background to the high set pressures of the safety valves may have been the hydraulic full situation at the 55 °C for insulated tanks or 65 °C for non-insulated tanks. Because the start to discharge capacity at 1.0 times the test pressure is very limited, it would still be sufficient for “hydraulic relief”. The safety valve and bursting disc arrangement are not applicable to tanks for refrigerated liquefied gases as the tables of 2.2.2.3 do not provided for toxic refrigerated liquefied gases.

Proposal 3

Transitional measure

21. Introduce a new transitional measure in case bursting discs with alternative values are applied (new wording in *italic script*):

“1.6.3.yy /1.6.4.xx

Fixed tanks (tank-vehicles) and demountable tanks/tank wagons /tank-containers constructed before 1 July 2019 in compliance to the regulation in force up to 31 December 2018 but which do not conform to the requirements of 6.8.2.2.10 concerning the pressure rating of the bursting disc may continued to be used until the next periodic inspection is performed.”