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Item 2 of the provisional agenda

Tanks

Shells made of aluminium alloy with protective linings

Transmitted by the Government of the Netherlands^{1, 2}

Summary

- Executive summary:** This proposal seeks to limit the use of aluminium alloy as construction material for shells with protective linings. In the case of leakage of the lining the shell shall exhibit a level of chemical resistance to the substance carried.
- Action to be taken:** Amend 6.8.2.1.9 and introduce new transitional measures to 1.6.3 and 1.6.4 for existing tanks.
- Related documents:** Informal document INF.30 of the September 2013 session.
ECE/TRANS/WP.15/AC.1/132 paragraph 5.
ECE/TRANS/WP.15/AC.1/132/Add.1, paragraphs 25/26.

Introduction

In informal document INF.30 of the September 2013 Joint Meeting the Netherlands asked the opinion on the use of aluminum alloy for the construction of the shell of a tank in

¹ In accordance with the programme of work of the Inland Transport Committee for 2014–2015 (ECE/TRANS/240, para. 100, ECE/TRANS/2014/23, cluster 9, para.9.2).

² Circulated by the Intergovernmental Organisation for International Carriage by Rail (OTIF) under the symbol OTIF/RID/RC/2015/10.

combination with a protective lining. Based on the outcome of the discussions the following amendments are proposed.

Proposals

Proposal 1:

Amend 6.8.2.1.9 to read (existing wording in normal script, *new wording in italic script*):

6.8.2.1.9 The materials of shells or of their protective linings which are in contact with the contents shall not contain substances liable to react dangerously (see "Dangerous reaction" in 1.2.1) with the contents, to form dangerous compounds, or substantially to weaken the material.

Aluminum alloys shall not be applied as materials for shells with protective linings unless the pH value of the substance carried is not lower than 4,0 and not higher than 8,0.

If contact between the substance carried and the material used for the construction of the shell entails a progressive decrease in the shell thickness, this thickness shall be increased at manufacture by an appropriate amount. This additional thickness to allow for corrosion shall not be taken into consideration in calculating the shell thickness.

Proposal 2:

Introduce a new transitional provision 1.6.3.x and 1.6.4.y.

Tank wagons / Fixed tanks (tank-vehicles) and demountable tanks / Tank-containers constructed before 1 July 2017 in accordance with the requirements in force up to 31 December 2016, but which do not conform to the requirements of 6.8.1.9 relating to the use of aluminum alloy for the construction of shells with a protective lining may continued to be used until 1 January 2026/2023/2022.

Justification

On 3 July 2013 a tanker carrying hydrofluoric acid developed a leak in the protective lining that resulted in a hole in the shell. The shell was made of aluminum alloy and the leaking hydrofluoric acid spilling out from above the waistline of the tank dissolved approximately one quarter of the diameter of the shell material and part of a stiffener in short period of time.

Subsection 6.8.2.1.9 regulates that materials for shells or protective linings in contact with the substances carried do not react dangerously, form dangerous compounds or substantially weaken the material. When a protective lining is applied these requirements are not applicable to the material of the shell. In principle this is correct because protective linings are used where the shell material will not be sufficiently compatible with the substance carried for an acceptable service life.

However it also allows to use materials for shells that are not suitable but which may reduce weight.

During the lifetime of a tank the lining will develop defects. Defects may develop due to mechanical damage by cleaning apparatus, by remaining droplets of product or water and

the next product loaded or inhomogeneity of the lining itself. A defect and subsequent leak on steel tanks will be noticed at periodic inspections or by small traces on the outside of the tank in use. A defect on an aluminum alloy tank will result immediately in a hole and loss of integrity of the tank.

Protective linings are in principle only used for corrosive substances. For less corrosive substances the use of aluminum alloy in combination with a protective lining should remain possible. When the pH value remains between 4 and 8 the protective skin of aluminum alloy will remain intact.

Below images of damage of the tank of the 3 July 2013 incident in the Netherlands.



The dark grey area with the plug is the protective lining, the light grey colour is the aluminium alloy shell material and the peeling off white/grey is the paint.

- Feasibility: No problems to be expected. Many contraction parties do not approve the use of aluminum alloy in combination with a lining for many years. Introduction of amendment will improve safety and will realize a level playing field (empty vehicle mass) for carriers.
- Cost: Linings are difficult to remove. Tanks made of aluminum alloy can no longer applied for the intended use and have to be written off. Benefits will be a lower probability of emergency situations reducing costs for transferring load and closing of roads. A full period between periodic inspections is given to phase out these tanks and allow for replacement.
- Enforceability: The material used for the shell is stated on the tank plate, type approval certificate and test report and can be checked in use.
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