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RID **14th session of the RID Committee of Experts' working group on tank and vehicle technology**
(Hamburg, 12 - 13 April 2016)

Subject: **Examination of the new provisions that apply in the USA and Canada to the construction and retrofitting of tank-wagons for the carriage of flammable liquids**

Discussion paper submitted by Germany

SUMMARY

Executive Summary: The new provisions applicable in the USA and Canada on the construction and retrofitting of tank-wagons for the carriage of flammable liquids are to be examined by the working group on tank and vehicle technology to see if they are relevant to RID. This document is to serve as a basis for discussion. It explains the modified provisions and compares them with the currently applicable RID provisions.

Action to be taken: Discussion of the new provisions with a view to their relevance to RID.

Related documents: Document OTIF/RID/CE/GTP/2015/4 and report OTIF/RID/CE/GTP/2015-A, paragraphs 43 to 47.

Introduction

1. At its 5th session (Zagreb, 23 to 27 November 2015), the RID Committee of Expert's standing working group agreed to ask the working group on tank and vehicle technology to examine the new provisions applicable in the USA and Canada on the construction and retrofitting of tank-wagons for the carriage of flammable liquids to see if they are relevant to RID.

2. With document “80 FR 26643” (Hazardous Materials: Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains, Final rule) of 8 May 2015, the Pipeline and Hazardous Materials Safety Administration (PHMSA) of the US Department of Transport published the new provisions on the construction and retrofitting of tank-wagons for the carriage of flammable liquids. These provisions entered into force on 7 July 2015; the United States Code of Federal Regulations (CFR 49), which contains the US dangerous goods regulations, has been amended accordingly.

3. The new provisions define a new tank type of DOT specification 117 that, in accordance with the hazardous materials table in §172.101 in conjunction with §§173.241 to 243 of CFR 49, is intended for the transport of Class 3 hazardous material. However, the provisions also allow for the use of a few other tank types; the DOT 111 tank type is currently especially widespread. The development of new provisions for the DOT specification 117 was thus based on analyses and discussions on vulnerabilities of the DOT specification 111 (see Document OTIF/RID/CE/GTP/2015/4).

4. To raise the safety standards in the carriage of dangerous goods of Class 3, a transitional provision was created in §§173.241 to 243 of CFR 49 that increasingly limits the use of DOT Specification 111 tanks until 2025 depending on the packing group. At the same time, retrofitting of DOT Specification 111 tanks is permitted. If retrofitted in an appropriate way, these tanks comply with the newly defined DOT Specification 117R that partly corresponds to DOT Specification 117 (see §179.202-13 of CFR 49).

Comparison of DOT Specification 117 with the provisions of RID

5. Compared to DOT Specification 111, various provisions were amended for the new DOT Specification 117. These new requirements are listed and explained in the table below. For every new requirement, the table also contains a comparison with the currently applicable RID provisions.

Note:

The US Code of Federal Regulations 49 (CFR 49) is available online under: www.ecfr.gov

Requirements in accordance with DOT Specification 117	Explanations	References CFR 49	Comparison with requirements in accordance with RID	References RID/ADR/Other
Minimum plate thickness	The minimum plate thickness is 14.3 mm (= 9/16 inch) and is independent of tank construction (diameter, bottom geometry, openings), material properties (minimum requirement: Specification AAR TC-128, Grade B, normalized steel with a tensile strength σ = 560 N/mm² and elongation at fracture A = 19%), operating conditions as well as test of weld seams. A calculation pressure is not provided for (test pressure is always 100 psig = 6.9 bar). The minimum shell thickness takes a self-supporting construction into account.	Minimum thickness of plates: §179.202-4 Test pressure §179.202-11 Material properties: §179.202-4	The minimum shell thickness is calculated in accordance with EN 14025 (determinants: calculation pressure, tank construction, material properties, operating conditions, test of weld seams). The calculation pressure depends on the substance-specific classification (test pressure depends on calculation pressure and does not exceed 4 bar for Class 3). For self-supporting tank constructions, the resulting additional stresses have to be taken into account separately in the calculation.	EN 14025: 6.8.2.6.1 of RID in conjunction with 6.8.2.1.13 ff. of RID Calculation pressure: Tank code in accordance with Table A (substance list) in 3.2 of ADR Test pressure: 6.8.2.4.1 of RID
Thermal protection system and jackets	The thermal protection system has to prevent the cargo from leaking in the event of a fire for 100 minutes (pool fire) or 30 minutes (torch fire). The thermal protection system must be covered with ASTM A1011 steel sheets of a thickness not less than 11 gauge (= 3 mm) or equivalent. Additionally, for certain materials, a protective coating against corrosion must be applied to the exterior surface of the tank and the inside surface of the jacket.	Protective coating: §179.202-6 in conjunction with §179.18 and §173.31 Jackets: §179.202-7	A thermal protection system and/or the related jacket are currently not prescribed in RID; an informal working group on the reduction of the risk of a BLEVE in cases of fire was established at the Joint Meeting in spring 2006 and last presented discussion results at the Joint Meeting in autumn 2014. Protective coatings against corrosion for the exterior surface of the tank and/or jacket are (with the exception of special provision TE 16 for wooden components) not provided for in RID.	Establishment of BLEVE working group: OCTI/RID/GT-III/2006-A (20-21) Last discussion results: OTIF/RID/RC/2014-B (ECE/TRANS/WP.15/AC.1/136) (51-54)
Protective shield fully covering the tank heads	The protective shields must have a minimum wall thickness of 12.7 mm, be made of a material with a tensile strength of at least σ = 380 N/mm², fully cover the tank heads as well as be adapted to the shape of the tank heads and can be integrated into the jackets. In the event of an collision of the central buffer coupling and tank head (gauge pressure in the tank = 6.9 bar, impact of a tank-wagon with a gross weight of 120 t, coupled with one or more other wagons of at least 218 t gross weight, last wagon with handbrake on, impact speed = 29 km/h), they have to prevent leakage of cargo.	§179.202-5 in conjunction with §179.16	Special provision TE 25 describes measures to prevent or limit damage resulting from the overriding of buffers and provides various construction options for implementation. Within Class 3, this provision is currently only assigned to UN 1921 PROPYLENEIMINE, STABILIZED. For central buffer couplings, variant TE 25 (e) is comparable; it requires separate protective shields at least 1200 mm wide and 1100 mm high from the headstock with a minimum wall thickness of 12 mm. For side buffers, variant TE 25 (c) (sandwich cover: protective shield integrated into the jacket covering the entire area of the tank ends with a minimum wall thickness of 6 mm for reference steel) as well as TE 25 (d) (separate protective cover covering the entire width of the tank ends and two thirds of the height or at least 900 mm + arresting device for climbing buffers with a minimum wall thickness of 6 mm for reference steel) are comparable. Instead of reference steel (tensile strength 370 N/mm², elongation at fracture A = 27 %), other materials can also be used, if an equivalent thickness is determined.	6.8.4 of RID (TE 25)
Top fittings protection	Fittings at the top must be protected by means of a device conforming to the AAR Specification for Tank Cars, appendix E paragraph 10.2.1. With this provision, the originally discussed approach of preventing damage resulting from overturning at a speed of 14 km/h (already prescribed for toxic by inhalation substances = TIH) was dismissed.	§179.202-9 Discussion approach overturning: Department of Transportation (DOT), PHMSA: 80 FR 26667 – Final Rule, Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains (May 8, 2015)	In accordance with 6.8.2.2.1 of RID, the leakproofness of the service equipment must be ensured (independent of orientation) even in the event of overturning (not considering speed). In ADR, this protection objective is specified by 6.8.2.1.28 (for Class 6 also special provision TE 19) according to which fittings and accessories mounted on the upper part can be protected by strengthening rings, protective canopies or transverse or longitudinal members.	6.8.2.2.1 of RID 6.8.2.1.28 of ADR
Protection safety systems to prevent unintended actuation of bottom outlets	If there are bottom outlets, the control device must be designed in such a way as to prevent unintended actuation in the event of accidents. This can be achieved by removing the service elements or by an equivalent, not otherwise specified constructive version.	§179.202-8 Other provisions for bottom outlets: §179.200-17	In accordance with 6.8.2.2.2 of RID, internal stop-valve control devices of bottom valves shall be so designed as to prevent any unintended opening through impact or an inadvertent act.	6.8.2.2.2 of RID
Improved classification of substances	As before, the consignor has to classify the dangerous goods in accordance with parts 172 and 173 of CFR 49. For unrefined petroleum-based products, this provisions is further specified by stating that the natural variability of the chemical composition and its potential consequences for classification have to be taken into account. For this purpose, an appropriate classification programme has to be established that, among other things, specifies frequency, sampling, test methods and quality controls.	§173.41 in conjunction with §173.22	In accordance with 1.4.2.1.1 of RID, the consignor shall ascertain that the dangerous goods are classified and authorized for carriage (if necessary by means of information provided by other participants in accordance with 1.4.2.1.2 of RID). There is no explicit obligation to establish a classification programme; however, an accurate substance classification is a prerequisite for every dangerous goods transport operation.	1.4.2.1.1 of RID in conjunction with 1.4.2.1.2 of RID

Risk-based routing of trains	In line with the already existing provisions for certain transport operations of Classes 1 and 7 as well as toxic by inhalation substances, each calendar year, the carrier has to perform risk analyses for all relevant transport routes of its HHFT* on the basis of various route-related data (see Appendix D to Part 172). These risk analyses have to be considered when selecting suitable routes and have to be made available to the safety and/or investigating authorities.	§172.820 in conjunction with Appendix D to Part 172	RID does not contain provisions on risk-based route selection for dangerous goods transport operations. There are, however, individual national provisions on risk-based route selection (NL: Basisnet).	INF.3 for the 51st session of the RID Committee of Experts (spring 2012); Regeling basisnet, nr. IENM/BSK-2014/67724
Speed restrictions	A maximum authorized speed of 80 km/h (= 50 mph) applies to HHFT*. For HHFT* with tank-wagons that do not comply with DOT Specification 117, a limited maximum authorized speed of 64 km/h (= 40 mph) applies in urban areas in accordance with Appendix A to Part 1580.	§174.310 in conjunction with §1580.3	RID does not contain provisions on a maximum authorized speed for dangerous goods transport operations. Maximum authorized speeds result from technical vehicle properties and national operating rules. Normally, loaded tank-wagons run at a maximum of 100 km/h, in certain cases at a maximum of 120 km/h.	
Improved braking effect	As from January 2021 (packing group I) or May 2023 (all packing groups), HHFUT* must be equipped with electronically controlled pneumatic brakes (ECP brakes) that comply with the specifications mentioned in §232.603 (i.a. AAR S-4200 ff). These brakes help to reduce braking distances and longitudinal forces in the train.	§179.102-10 in conjunction with §174.310 and §232.603	RID does not contain provisions on braking technology of tank-wagons. Braking technology requirements are laid down in TSI WAG or the codes referenced therein as well as other national regulations, if appropriate. Electronically controlled pneumatic brakes (ECP brakes) are normally not used in the speed range up to 120 km/h; train lengths comparable with HHFUT* are uncommon in Europe.	

** HHFT = High-hazard flammable train (at least 20 loaded tank-wagons of Class 3 in a continuous block or at least 35 loaded tank-wagons of Class 3 distributed throughout the train)*	*§171.8*
** HHFUT = High-hazard flammable unit train (at least 70 loaded tank-wagons of Class 3)*	*§171.8*