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Joint Meeting of the RID Committee of Experts and the
Working Party on the Transport of Dangerous Goods
(Berne, 13 - 17 March 2017)

Agenda item 5 (b): Proposals for amendments to RID/ADR/ADN – New proposals

Interpretation of tank forms in 6.8.2.1.18 – 6.8.2.1.20 ADR and in EN 13094:2015

Transmitted by the European Conference of Fuel Distributors (ECFD)

SUMMARY

Executive summary: With reference to document ECE/TRANS/WP.15/AC.1/2017/20 France is asking questions concerning the conformity of some types of tank constructions that have a concave part. This informal document summarises the results of a recent WG2/EN13094 and CEN/TC296 meeting where a majority decision was to consider the tank type as cylindrical.

Action to be taken: With reference to informal document INF.15 of the March 2015 Joint Meeting, it is still recommended that the interpretation of standard tank forms proposed in that document be followed in the event of local variations. According to this interpretation, a construction as described below would clearly have to be regarded as cylindrical.

Related documents: ECE/TRANS/WP.15/AC.1/2017/20;
informal document INF.15 of the March 2015 Joint Meeting

Introduction

1. This document refers to the items in document ECE/TRANS/WP.15/AC.1/2017/20. The original parts of the French paper and comments on them can be found below.

Comments

2. The French representatives have the following objections.

French Objection:

2. *The Working Group on Tanks then decided that it should await the outcome of the discussions on this subject in the CEN/TC 296 working group dealing with standard EN 13094.*

Comment on 2.

3. WG2/EN13094 of CEN/TC 296, meetings held on 12/13.10.2016 and 18/19.10.2017: A majority decision (with the sole exception of France) was taken to the effect that the tank must be regarded as cylindrical, as what is dealt with here is just a cut-out section. The criteria for this type of cut-out section were formulated and will be incorporated into the standard. A decisive factor in this respect is that these sections (that are also applicable to the so-called “cabinet in tank”) must be evidenced with FEM, and that the components used for the insert must have a non-reduced wall thickness. The tank referred to by France (“Schrader Tank”) is fully in line with these criteria. There is a corresponding comment by the Convenor of EN 13094.

Further French objections

3. *We consider that this matter falls within the purview of the Joint Meeting, in that Chapter 6.8 of RID/ADR establishes relatively clear provisions on the shape of tanks.*
4. *In our opinion, this type of construction cannot comply with RID/ADR for the reasons given below.*
5. *The hybrid cross-section shown in paragraph 1 cannot be considered to be a circular or elliptical cross-section; consequently, it is of another shape for the purposes of RID/ADR.*

Comment on 3./4./5.

4. When considering tank forms, ADR works on the assumption of three basic forms as per 6.8.2.1.20: cylindrical, elliptical and “other”. “Other tank forms” means primarily the box-shaped tank. As the box-shaped tank is defined by various radii, corresponding radii are also defined here. This consideration does not apply to the section in question here, whose underlying tank form is the cylinder.

Further French objections

6. *For shells not of a circular cross-section, footnote 2 to 6.8.2.1.18 of ADR requires that the radius of convexity of the shell wall should not exceed 2,000 mm at the sides or 3,000 mm at the top and bottom. The shape proposed is bounded on its lower part by a concave radius and thus does not comply with this requirement of ADR.*

Comment on 6.

5. This footnote applies only to shells other than circular ones. However, the tank must be regarded as circular. It is completely cylindrical and only has a locally applicable variation in the front area. This is in order to provide the distance between it and the truck unit. Nevertheless, the cylinder form is retained to a large extent even in this front area. The tank is completely cylindrical, particularly in the area that is significant in terms of toppling (tank equator and 30% of the height around the middle of the tank).

The circular shape of this construction form is recognised by many countries. Independent, separately investigated design type approvals currently exist in Denmark, Norway, United Kingdom, Belgium, Luxembourg, Romania, Netherlands, Hungary, Slovenia, Lithuania, Latvia etc. According to ADR, the tank is also manufactured under license in Russia. To date, around 2000 articulated tank trailers with this construction form have been placed on the market. The tank form has developed as a safety tank from the findings of the German research projects TOPAS and THESEUS. In these studies, a roll over stability with a tilt angle of 29° has been measured. In expert circles, this tank form is regarded as the safest tank version for the transport of dangerous goods. This is also demonstrated by German accident statistics.

Further French objections

7. Moreover, under standards EN 13094 and EN 14025 on the design and construction of tanks:
- Paragraph 6.3.1 of EN 13094 requires a minimum radius of 200 mm linking the top/bottom and side convexities. There are no joints between side and bottom convexities and so this requirement of the standard is not met;
 - For the calculation for construction types not given in EN 14025, 6.3.1 of that standard refers to the provisions of EN 13445-3, meaning that the manufacturing requirements of EN 13445-3, and specifically the types of weld joint allowed for shell longitudinal and circular welds, must be met. According to tables A-1 and A-2 of EN 13445-3, fillet welds are not allowed for shell longitudinal or circular welds; hence, this requirement is not met.

Comment on 7.

6. Paragraph 6.3.1 of EN 13094 requires a transition radius of 200 mm for non-circular tanks. However, as the tank must be regarded as circular, this point is not relevant. 6.2 a) of EN 13094 also requires calculation as per EN 14025 OR a procedure as per Annex A for circular tanks, and alternative methods for non-circular tanks under 6.2 b) (e.g. FEM or calculation). So even if the tank form were not cylindrical, calculation as per EN 14025 and EN 13445-3 would not be compulsory. As such, the limitations concerning the welding seams stated in EN 13445-3 are likewise not relevant.

The construction form subject to complaint has been calculated and tested in accordance with EN 13094 Annex A Method A3 using FEM. In addition, this frequently built tank would also permit Method A4 (reference interpretation) at any time as an alternative.

Final recommendation/proposal

7. With reference to informal document INF.15 of the March 2015 Joint Meeting, we continue to recommend the interpretation of the definition of standard tank forms proposed in that document in the event of local variations in geometry. According to this interpretation, a construction as described above would clearly have to be regarded as cylindrical. We also recommend following the results and majority decision of WG2 /EN13094 as described in “comment on 2.”.

Justification

Safety: Safety tank, developed from the results of the TOPAS and THESEUS research projects. Highest tilt angle reached 29°. Approximately 2000 units built and in use all over Europe.

Feasibility: The existing regulations are complied with, which is confirmed by a number of European ADR type approvals. Therefore, no further explanation is needed as feasibility is not an issue.
