

INF. 1

23 October 2018

Original: German

RID: 16th Session of the RID Committee of Experts' working group on tank and vehicle technology
(Krakow, 19 and 20 November 2018)

Subject: Stresses caused by railway operations – RID 6.8.2.1.2

Proposal transmitted by the International Union of Private Wagons (UIP)

Current regulatory situation

1. RID 6.8.2.1.2 reads as follows:

"Tank-wagons shall be constructed so as to be capable of withstanding, under the maximum permissible load, the stresses which occur during carriage by rail. As regards these stresses, reference should be made to the tests prescribed by the competent authority."

As explained in the corresponding footnote 1):

"These requirements shall be deemed to be met if, the notified body according to TSI or UTP has successfully evaluated compliance with the provisions of RID in addition to the requirements of the TSI or UTP as mentioned above, and has confirmed this compliance by a relevant certificate."

2. In the minutes of the meeting of the 2nd session of the RID Committee of Experts' standing working group (Copenhagen, 18 to 22 November 2013), the following details were given in reply to a question from Germany (informal document INF.14) (see OTIF/RID/CE/GTP/2013-A, paragraph 74):

"It had to be ensured that, within the framework of the strength assessment of tank-wagons, the permissible stresses according to RID (standard EN 14025) and not the standard EN 12663 referred to according to TSI were applied for the tank".

3. This regulatory situation now raises the following fundamental question:

Is the above statement in the footnote and the specific decision of the standing working group to be upheld, with more detailed knowledge of all the framework conditions and effects?

Description of the problem

4. The requirements in the text of 6.8.2.1.2 refer to "tests" as they were the main evidence of wagon technical approval a few years ago. As the stresses in these tests, which in the meantime have largely been replaced by FEM calculations according to EN 12663, are based on the operational limit case, static loads (stresses), e.g. in the base material up to the yield strength ($S= 1.0$), are considered permissible in the calculation according to EN 12663.
5. RID, with the EN standard 14025 cited here and the European pressure vessel standard EN 13445 on which this is based, have a different approach – borrowed from general vessel construction. The tank is calculated under purely static aspects with safety factors which do not increase the stress (e.g. increase the calculation pressure), but reduce the permissible stresses of the tank material used. In the determination of safety factors, these factors are significantly higher than the requirements defined in EN 12663. Furthermore, a distinction is made between stresses during testing and stresses during operation.
6. Currently, following specific discussions and as far as UIP is aware, it must be stated that the decision made in 2013 was mostly not implemented in Europe, or was only implemented to a limited extent.
7. This might be explained by:
 - The lack of knowledge of RID and EN 14025 by TSI NoBos;
 - Lack of negative (or even positive) experience with historically introduced procedures for the consistent implementation of EN standard 12663.
8. The current recalculation of tank-wagon tanks in accordance with the methods of EN standard 12663, but with the characteristic values reduced by the safety factors in accordance with EN standard 14025 (e.g. factor 1.4 for the testing condition and up to 2.4 related to operational stability), results in a wall thickness increase for the tank wall of about 40%.
9. The rationale for this probably lies in the determination of the stresses. For example, while according to RID and EN standard 14025 the stress case "internal pressure equals operating pressure" represents a clear parameter for calculation with defined safety factors, EN standard 12663 translates previous tests into calculation models. This involves extreme stress assumptions, which already include certain safety factors. The two calculation systems can only be combined with each other to a very limited extent and they then lead to greatly increased tank wall thicknesses.
10. A comparable result can be obtained by examining the assumed acceleration values and the associated stresses. While the requirements for tank-wagons, derived from tests and requirements from EN standard 12663, are > 5 g in the longitudinal direction, the stresses to be assumed for tank-containers in accordance with RID Chapter 6.8 are only 2 g.
11. Implementation of the requirement "maximum stress according to RID", i.e. in the tank wall, the maximum stress according to RID may not be exceeded during testing or calculation in accordance with EN standard 12663, would cause the sector considerable problems and would clearly further discriminate against tank-wagons compared with other modes of transport, even though there has been no negative feedback in this respect.

Proposal

12. In the current situation, it must be assumed that a large portion of (the tanks of) tank-wagons currently in service are not in line with the footnote or the definition from 2013.
13. Current practice follows an integrated approach of using EN standard 12663 for calculation and assessment and can be assumed to have been tried and tested. Many such tank-wagons are in use, under construction or at the design stage.
14. In footnote 1) to 6.8.2.1.2, delete the words "*with the provisions of RID in addition to the requirements of the TSI or UTP mentioned above,*".
15. This would achieve recognition of the calculation method according to EN standard 12663, including the assigned safety values, also for the transport-specific stresses of the tank and would rectify the decision taken in 2013.

Justification

16. This approval practice has been tried and tested and has been safe to operate for years and meets the requirements of RID 6.8.2.1.2. Wagons built in this way meet the requirements of RID:

"Tank-wagons shall be constructed so as to be capable of withstanding, under the maximum permissible load, the stresses which occur during carriage by rail. As regards these stresses, reference should be made to the tests prescribed by the competent authority."

17. Under this practice, the relevant regulations are used and applied in full.
18. Compared to tank-container carriage by rail (see paragraph 10), this is a comparable or even a more stringent requirement.

Alternative solution

19. If the working group is unable to support such an extensive proposal, a working group should be established to deal with this issue and work on a future provision or mandate Technical Standards Committee TC 256 to draft a rule in EN standard 12663.
20. In this case, in view of current projects, the time-limited continuation of the procedure used in practice and described above should be agreed, i.e. full application of EN standard 12663, also in relation to the stresses on the tank that arise from railway operations.
