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NB-Rail Association

RECOMMENDATION FOR USE

NB-RAIL COORDINATION GROUP

Administrative Decision according to Interoperability Directive
(EU) 2016/797 art. 30.6



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RFU-RST-319

Issue 02
Date 13/11/2024

TITLE

LOAD CASES FOR TANK WAGONS

ORIGINATOR

Ricardo Certification B.V

SUBJECT RELATED TO

- Reg. (EU) 321/2013 WAG TSI amended by Reg. 1236/2013, Reg. 2015/924, Reg. (EU) 2019/776, Reg. (EU) 2020/387 and Reg. (EU) 2023/1694
- Guide for application of the WAG TSI (version 3.0 and version 4.0)

AMENDMENT RECORD:

ISSUE 02: ADAPTED TO TSI WAG AMENDMENT 2023/1694 INCLUDING **POINT 4.2.2.2 AND 6.2.2.1 ON STRENGTH OF UNIT**

DESCRIPTION AND BACKGROUND EXPLANATION

The aim of this recommendation is to clarify the definition of the “maximum working pressure” as required in the guide for application of the WAG TSI chapter 2.3.4 which has to be superimposed on the load cases for tank wagons.

Background:

Tank wagons have to comply to the requirements as mentioned in the RID (2021/2023) and the TSI WAG, namely:

RID section 6.8.2.1.2:

“Tank-wagons shall be constructed as to be capable of withstanding, under the maximum permissible load, the stresses which occur during carriage by rail.¹ As regards these stresses, reference should be made to the tests prescribed by the competent authority.

.¹ This requirement is deemed to be met if

– the notified body in charge of verifying compliance with the technical specification for interoperability (TSI) relating to the subsystem "rolling stock – freight wagons" of the rail system in the European Union (Commission Regulation (EU) No 321/2013 of 13 March 2013) or

- the assessing entity in charge of verifying compliance with the uniform technical prescriptions (UTP) applicable to the Rolling Stock subsystem: FREIGHT WAGONS – (Ref. A 94-02/2.2012 of 1 January 2014)

has successfully evaluated compliance with the provisions of RID, in addition to the requirements of the TSI or UTP mentioned above, and has confirmed this compliance by a relevant certificate.”



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Note: number of footnote changed from “1” to “2” in RID 2023.

TSI WAG lastly amended by (EU) 2020/387 point 4.2.2.2. Strength of unit:

“The structure of a unit body, any equipment attachments and lifting and jacking points shall be designed such that no cracks, no significant permanent deformation or ruptures occur under the load cases defined in Chapter 5 of EN 12663-2:2010.”

The demonstration of conformity is described in point 6.2.2.1.

6.2.2.1. Strength of unit

The demonstration of conformity shall be in accordance with chapters 6 and 7 of EN 12663-2:2010, or alternatively with chapter 9.2 of EN 12663-1:2010+A1:2014.”

TSI WAG lastly amended by (EU) 2023/1694 point 4.2.2.2. Strength of unit:

“The structure of a unit body, any equipment attachments and lifting and jacking points shall be designed such that no cracks, no significant permanent deformation or ruptures occur under the load cases defined in the specification referenced in Appendix D Index [1]”.

6.2.2.1. Strength of unit

“The demonstration of conformity shall be in accordance with one of the specifications referenced in Appendix D, either Index [3] or Index [1]”.

Index [1] refers to EN 12663-2:2010

Index [3] refers to EN 12663-1:2010+A1:2014

Guide for application of the WAG TSI, section 2.3.4:

“For tank wagons which fall under the scope of point 6.8.2.1.2 of RID, the following is to be taken into account in the load cases to assess the strength of the wagon:

- (1) The maximum working pressure of the tank has been superimposed on the load cases*
- (2) The operating temperature range of the shell and*
- (3) The minimum wall thickness of the shell in accordance to RID 6.8.2.1 and 6.8.2.6.”*

Description of the situation:

Tank wagon manufacturers have analysed the influence of these (new) requirements on tank wagon design for RID products. Applying pressure inside the tank leads to high stresses on the tank ends (especially on the torus area) and also in some places of the cylindrical area of the tank (i.e. interface between tank shell and manhole, tank shell and bottom flange, etc.). The requirement to superimpose maximum working pressure on the static and fatigue load cases can be a very conservative way to design tank wagons,



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especially in the areas mentioned above. Regarding this topic, the old standard ERRI B12 / Rp17, under sections 2.3.4, 2.3.4.2 and 2.3.4.3 had this requirement of superimposing working pressure on load cases, for tank wagons RID class 2 products. In chapter 2.3.5 was written that the permitted stress values were given in annex L.

The load cases that apply for a tank wagon are given in EN 12663-2:2010 chapter 5. Design validation of associated specific equipment is given in chapter 7. This standard does not explicitly require that the pressure of the tank shall be superimposed on the proof and/or fatigue load cases. The new version of the Guide for application of the WAG TSI states that the maximum working pressure shall be superimposed on the load cases, but this should be the maximum working pressure during carriage by rail, which could be less than the maximum working pressure during filling or discharge defined by RID.

Question 1: Is it the intention to superimpose the maximum working pressure of the tank on the proof load cases in sections 5.2.2 to 5.2.4 of EN 12663-2:2010 respectively sections 6.2 to 6.5 of EN 12663-1:2010+A1:2014 or also on the fatigue load cases in section 5.2.5 of EN 12663-2:2010 respectively sections 6.6 to 6.8 of EN 12663-1:2010+A1:2014?

Question 2: Which definition according to RID should be used for the term “maximum working pressure”?

RFU PROPOSAL

Solution to question 1: Superimposition of a static working pressure on proof load cases as well as fatigue load cases is applicable if they can occur during carriage by rail.

Results of the superimposition of load cases with the working pressure can be determined by:

- calculation based on test results of separately performed tests of the extraordinary load cases and the pressure or
- FEA-calculations.

Solution to question 2: The RID uses the following definition:

"Maximum working pressure (gauge pressure)" means the highest of the following three pressures that may occur at the top of the tank in the operating position:

(a) the highest effective pressure allowed in the tank during filling (maximum filling pressure allowed);



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*(b) the highest effective pressure allowed in the tank during discharge (maximum discharge pressure allowed); and
(c) the effective gauge pressure to which the tank is subjected by its contents (including such extraneous gases as it may contain) at the maximum working temperature.”*

Therefore (a) or/and (b) or/and (c) have to be chosen due to the real in service situation of the special tank wagon under assessment for the superimposition of the load cases mentioned in the standards EN 12663-1:2010+A1:2014 and EN 12663-2:2010.

THIS RFU WAS AGREED ON

PLENARY MEETING 72

THIS RFU ENTERS INTO FORCE ON

27/11/2024

FROM THIS DATE ON THIS RFU CAN BE APPLIED INSTEAD OF THE PREVIOUS MANDATORY VERSION.

RFU APPLICATION IS MANDATORY STARTING FROM

27/11/2024

AT THIS DATE ANY PREVIOUS VERSIONS (*OR, ALTERNATIVELY, VERSION XX*) OF THIS RFU WILL BE WITHDRAWN.

RFUS SHALL BE APPLIED BY ALL NOBOS. PLEASE REFER TO RFU-STR-702, CHAPTER 3 OF THE SECTION “DESCRIPTION AND BACKGROUND EXPLANATION”, FOR THE LEGAL BASIS SUPPORTING THIS OBLIGATION.

ERA COMMENTS

PLE072 – 13/11/2024: No COMMENTS - OR SPECIFY IF ANY

ERA DISCLAIMER WILL BE INCLUDED