



QUESTION / CLARIFICATION

CO-ORDINATION BETWEEN NOTIFIED BODIES

INTEROPERABILITY DIRECTIVE AND SUBSEQUENT AMENDMENTS ON THE INTEROPERABILITY OF THE RAIL SYSTEM WITHIN THE UNION

QC-RST-020

Issue 02
Date: 14/06/2018
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TITLE

INTEROPERABILITY CONSTITUENT – "RUNNING GEAR"; STRUCTURAL DESIGN OF BOGIE FRAME

ORIGINATOR

TÜV SÜD NEDERLAND B.V., ERC, TÜV RHEINLAND RAIL CERTIFICATION B.V.

SUBJECT RELATED TO

TSI WAG (REGULATION (EU) 321/2013/EU), AMENDED BY REGULATION (EU) 1236/2013 AND REGULATION (EU) 2015/924

DESCRIPTION AND BACKGROUND EXPLANATION

Scope

This Q&C addresses conformity assessment concerning structural design of bogie frame of established running gear as defined in 6.1.2.1 (b) of WAG TSI (321/2013).

Remark for clarification:

This Q&C is not about running dynamics of running gear.

For running dynamics see WAG TSI application guide [R6], EN 16235 [R7] and ERA/TD/2013/01/INT [R8]. From a running dynamics point of view, the parameters, e.g. dimensions, which must be met by a bogie in order to be classified as family Y25 bogie are mentioned in EN 16235 [R7].

Whereas from a structural strength point of view, these parameters do not seem to be sufficient to ensure the same structural strength.

References

(Quotations are written in *blue colour and in italic type*)

[R1] WAG TSI (Regulation (EU) 321/2013), amended by Regulation (EU) 1236/2013 and Regulation (EU) 2015/924 (in this document referred to as "new TSI WAG" or "currently valid TSI WAG")

[R2] EN 13749:2011

[R3] WAG TSI (2006/861/EC) and amendment (2009/107/EC), repealed (in this document referred as "old TSI WAG")

[R4] Decision 2010/713/EU (on modules)

[R5] EN 15827:2011

[R6] ERA/GUI/07-2011/INT, Guide for the application of CR WAG TSI, version 1.0, 15 April 2013

[R7] EN 16235:2013

[R8] ERA Technical Document ERA/TD/2013/01/INT, version 1.0, 11 February 2013

[R9] UIC 432:2008

[R10] EN 15085



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Introduction

Situation with “old” WAG TSI (2006/861/EC) [R3]

In WAG TSI (2006/861/EC) [R3] annex Y the following is stated for existing approved bogies of type Y25 family:

“Bogies with existing approval under former UIC/RIV-regulation are considered as IC, provided the range of applicable parameters in the new application (including those of the vehicle body) remains within the range already proved by an existing application.”

So in the past, bogies of Y25 family which already hold an existing approval under UIC-regulations and which are operated in the defined range of applicable parameters, see UIC 432 [R9], were deemed to be an IC according to WAG TSI (2006/861/EC) [R3] without further simulation or test on running dynamics or on strength. Module H1 was used for those conventional bogies. In almost all cases, those bogie frame designs are based on the official UIC drawing set, which is available from the International Union of Railways (UIC).

With amendment 2009/107/EC, no change occurred on that approach, but the open point on welding was closed by referencing the welding standard EN 15085-5:2007.

New situation with “new” WAG TSI (Reg. (EU) 321/2013) [R1]

Chapter 5.3.1 “Running gear” defines requirements as expressed in points 4.2.3.5.2 (Running dynamic behaviour) and 4.2.3.6.1 (strength), which shall be assessed at IC level.

Remark for clarification:

Chapter 4.2.3.5.2 “Running dynamic behaviour”: Conformity has to be demonstrated as described in point 6.2.2.3 (on track tests). Further it is defined that for an IC that is in accordance with point 6.1.2.1, no specific test or simulation on running dynamics will be required. That’s quite similar to the “old” TSI WAG.

Chapter 4.2.3.6.1 “Structural design of bogie frame” of TSI WAG [R1] states:

“The integrity of the structure of a bogie frame, all attached equipment and body to bogie connection shall be demonstrated based on methods as set out in point 6.2 of EN 13749:2011.

The integrity of the structure of a bogie frame is permitted to be assessed at interoperability constituent level in accordance with point 6.1.2.1. In this case a specific test or simulation at subsystem level is not required.”

In chapter 6.1.2.1 only the last sentence is related to structural design (the remaining text relates to running dynamic aspects):

“The assessment of the bogie frame strength shall be based on clause 6.2 of EN 13749:2011.”

This sentence again refers to point 6.2 of EN 13749:2011. Thus EN 13749:2011 point 6.2 is defined as a MANDATORY STANDARD for design by suppliers and Conformity Assessment by NoBos.



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Point 6.2 defines a general approach to assess the bogie structure, but also permits the use of appropriate other methods without defining these in much detail. This may be largely based on the fact that EN 13749 is predominantly focussed on 'new designs'.

This Q&C requests a uniform application of the technical provisions of the applicable TSI and the related MANDATORY STANDARD EN 13749:2011 point 6.2.

Problem for Conformity Assessment

From strength point of view: Existing and unchanged solutions holding an "old" TSI WAG (2006/861/EC + 2009/107/EC) certificate and which were not subject of a simulation and also not subject of physical tests (static and fatigue test) shall no longer be accepted as they do not satisfy the current version of EN13749, which did not exist / was not applied at the time of the "old" TSI WAG. That's the case even if the already approved bogie should be operated under the same range of existing application and without any changes in the design. Existing solutions may have to be reassessed as if they were a new design or a new concept.

It is the understanding of NB-Rail RST SG that EN 13749 was not predominately written for the evaluation of existing solutions or previously approved and unchanged design and range of application. It was created for new designs or for changes to existing design or for changes to the range of application. As a result, there is no dedicated procedure in the EN 13749 on how to deal with existing, proven in use and unchanged bogies.

SUGGESTED RESOLUTION / INTERPRETATION

Either of the two approaches below shall apply or an alternative clearly defined and unambiguous approach shall be defined.

- 1) The reference from TSI WAG to EN 13749:2011 means that at least the first 3 out of 4 tests mentioned in point 6.2.1 of EN 13749 (analysis, laboratory static tests and laboratory fatigue tests) have to be performed for each bogie design (new or established, with "old" TSI certificate or not, with national approval or not, with modifications versus original design or not) by each manufacturer/holder of a certificate. The use of a UIC reference drawing set alone does not cover the requirements of the currently valid TSI WAG.

Note: This is the solution which is most likely to treat all applicants the same and therefore creates a common market approach, but also creates effort for the applicants.



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- 2) The reference from TSI WAG to EN 13749:2011 means that the manufacturer/holder of a certificate can give other evidence as set out in EN 13749:2011 point 6.2, i.e. partial laboratory tests, Finite Element Analysis, based on a bogie from UIC reference drawing set with changes made to the design. The evidence required varies based on the impact of changes and if the range of approved use is changed.

Note: This solution leaves much room for individual judgement and interpretation by NoBos. Therefore NoBos fear that this will lead to a situation where the applicant may choose a NoBo who requires less evidence than others. This solution potentially creates less effort for the applicant but doesn't create a common market approach.

ORGANISATION(S) REQUESTED TO RESPOND (E.G. TSI GROUP, RISC, ERA ETC.)

DATE OF AGREEMENT AT NB RAIL PLENARY MEETING

PLE 053, 23/05/2018

RESPONSE FROM ORGANISATION ABOVE

ERA-ADV-2017-2 dated 21/12/2017

Disclaimer: ERA TO always supersedes NB-Rail suggested solution in case of difference.

Making the railway system
work better for society.

TECHNICAL ADVICE

ERA/ADV/2017-2

OF THE EUROPEAN UNION AGENCY FOR RAILWAYS

for

THE EUROPEAN COMMISSION

regarding

Interoperability Constituent – 'running gear' - structural design of bogie frame

Disclaimer:

The present document is a non-legally binding advice of the European Union Agency for Railways. It does not represent the view of other EU institutions and bodies, and is without prejudice to the decision-making processes foreseen by the applicable EU legislation. Furthermore, a binding interpretation of EU law is the sole competence of the Court of Justice of the European Union.

1. General context

In its letter Ares (2017)1572789 from 12th April 2017 addressed to the European Union Agency for Railways (The Agency), the European Commission — Directorate C Land — requested the Agency to prepare a technical advice regarding a question put forward by NB Rail in its document QC-RST-020.

This document requests a clarification concerning the conformity assessment of the structural design of the bogie frame of a running gear, as defined in section 6.1.2.1 (b) of TSI WAG.

2. Legal background

Article 41 of Regulation (EU) 2016/796¹ of the European Parliament and of the Council of 11 May 2016 on the European Union Agency for Railways and repealing Regulation (EC) No 881/2004² (Agency Regulation), provides the Commission with the possibility to request an advice from the Agency “*in matters requiring specific knowledge*”, such as the afore-mentioned question of NB Rail.

The NB Rail request concerns the technical specification for interoperability relating to the subsystem ‘rolling stock — freight wagons’ of the rail system in the European Union (TSI WAG). The ‘*current TSI WAG*’ was adopted by Commission Regulation (EU) No 321/2013¹ of 13 March 2013, and subsequently amended by Commission Regulation (EU) No 1236/2013² and Commission Regulation (EU) 2015/924³. The Commission Regulation (EU) No 321/2013 has repealed the ‘former TSI WAG’, adopted by the Commission Decision 2006/861/EC⁴ of 28 July 2006.

3. Technical considerations

3.1. The request QC-RST-020

The QC - RST - 020 analyses the requirements for the structural design of the bogie frame of the running gear set out in the former TSI WAG. Main points of this analysis are:

- “*Bogies with existing approval under former UIC/RIV-regulation are considered as IC, provided the range of applicable parameters in the new application (including those of the vehicle body) remains within the range already proved by an existing application.*” (Annex Y of former TSI WAG). This annex includes several tables with bogie designs for which the sentence above is applicable. In particular, the Y25 bogie family.
- The existing UIC/RIV regulations above don’t require any simulation or test on strength of the bogie frame.

In addition, the QC - RST - 020 notes that the current TSI WAG requires to assess the strength of the bogie frame in accordance with clause 6.2 of EN 13749:2011. This clause defines a general approach to assess the bogie structure based on 4 steps (analysis, laboratory static tests, laboratory fatigue tests and track tests).

¹ OJ L 104, 12.4.2013, p. 1–56.

² OJ L 322, 03.12.2013, p. 23–28

³ OJ L 150, 17.06.2015, p. 10–16

The QC - RST - 020 further states that the EN Standard “[...] also permits the use of appropriate other methods without defining these in much detail. This may be largely based on the fact that EN 13749 is predominantly focussed on ‘new designs’”

The QC - RST - 020 states that new bogies holding a certificate against the former TSI WAG and which were not subject of any simulation or test assessing the strength of its bogie frame are no longer acceptable even if these bogies are intended to be operated under the same range of parameters as set out in the former TSI WAG. At the same time, it recognises that there is no clear procedure in the EN 13749 to deal with existing and proven in use bogies.

The QC - RST - 020 proposes the following two possibilities for the conformity assessment:

- At least the analysis, laboratory static tests and laboratory fatigue tests set out in point 6.2.1 of EN 13749 have to be performed for each bogie design (new or established, with "old" TSI certificate or not, with national approval or not, with modifications versus original design or not) by each manufacturer/holder of a certificate.
- The manufacturer/holder of a certificate can give other evidence as set out in EN 13749:2011 point 6.2, i.e. partial laboratory tests, Finite Element Analysis, based on a bogie from UIC reference drawing set with changes made to the design. The evidence required varies based on the impact of changes and if the range of approved use is changed.

3.2. Requirements on strength of the bogie frame in current TSI WAG and former TSI WAG

3.2.1. Former TSI WAG

The requirements in the former TSI WAG are well reflected by the QC – RST - 020 (see point 3.1, 1st bullet point).

3.2.2. Current TSI WAG

The relevant requirements are set out in point 4.2.3.6.1 and 6.1.2.1:

“4.2.3.6.1 Structural design of bogie frame

The integrity of the structure of a bogie frame, all attached equipment and body to bogie connection shall be demonstrated based on methods as set out in point 6.2 of EN 13749:2011.

The integrity of the structure of a bogie frame is permitted to be assessed at interoperability constituent level in accordance with point 6.1.2.1. In this case a specific test or simulation at subsystem level is not required.”

6.1.2.1 Running gear

[...]

The assessment of the bogie frame strength shall be based on clause 6.2 of EN 13749:2011.”

3.3. Requirements in clause 6.2 of EN 13749:2011

Clause 6.2 of the EN 13749:2011 contains a validation plan of the structural strength of the bogie frame. The content is detailed in clause 6.2.1:

“

6.2.1 Content

[...]

The procedure for the validation of the mechanical strength of a bogie frame against the acceptance criteria shall be established on the basis of:

- *analysis;*
- *laboratory static tests;*
- *laboratory fatigue tests;*
- *track tests”*

[...]

Where the design is a development of an earlier product any previous data, or other evidence of satisfactory performance that is still applicable, can be offered as validation of the revised product.

In the case of an existing design of bogie frame intended for a new application, or a modification to an existing design, a reduced programme can be used, depending on the significance of the differences. If the differences are small, analysis, supported if necessary by measurements made during a limited test programme, will be sufficient to validate the design.”

4. Analysis

The last paragraph of point 3 above shows that EN 13749:2011 allows a simplified validation plan for:

- Bogie frames which are a development of existing ones and
- Existing bogie frames intended for new applications

Regarding the first bullet point, the standard specifies that *‘any previous data, or other evidence of satisfactory performance that is still applicable, can be offered as validation of the revised product’*.

In the case of bogies certified as ICs under the Annex Y of the former TSI WAG, data from operation and maintenance could be certainly used for the validation against the requirements of the current TSI WAG and the EN 13749:2011 of a bogie frame identical or slightly modified. These data should not substitute the validation process of the EN, but they can be used to set out a simplified validation plan.

In case of bogie designs in which a partial validation of the strength of the bogie frame has been carried out, its results can also be used to set out a simplified validation plan.

As stated in the QC - RST - 020, the simplified validation plan could consist on partial laboratory tests, finite element analysis based on a bogie from UIC reference drawing set with changes made to the design, etc.

5. The advice

The advice of the Agency applies to bogies holding an IC certificate issued according to the former TSI WAG, without assessment of the strength of the bogie frame.

For these bogies, when evaluating compliance with the requirement 'Structural design of bogie frame' set out in point 4.2.3.6.1 of the current TSI WAG, the simplified validation plan described in clause 6.2 of EN 13749:2011 for bogie frames which are a development of existing ones is applicable.

The use of the simplified validation plan can be justified on the basis of any evidence provided by the applicant and resulting from experience on maintenance and operation.

In case of bogie designs for which a partial validation of the strength of the bogie frame has been carried out, its results can also be used to set out a simplified validation plan.

Valenciennes, 21.12.2017



Josef DOPPELBAUER
Executive Director

ANNEXES

1. Request for technical advice – Question and clarification NB-Rail –QC-RST-020: move.ddg2.c.4(2017)1572789
2. QC-RST-020