EUROPEAN UNION AGENCY FOR RAILWAYS

Making the railway system work better for society.

OPINION

ERA/OPI/2018-3

OF THE EUROPEAN UNION AGENCY FOR RAILWAYS

for

THE EUROPEAN COMMISSION

regarding

Potential deficiency in LOC and PAS TSI and WAG TSI - Running Behaviour and stationary tests

Disclaimer:

The present document is a non-legally binding opinion 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

1.1.1. In its letter Ares (2018)3872689 of 20/07/2018, the European Commission asked the Agency to provide a technical opinion regarding a potential deficiency of the LOC&PAS and WAG TSIs (respectively Commission Regulation (EU) No 1302/2014[1] and Commission Regulation (EU) No 321/2013[2]).

1.1.2. The European Commission is of the opinion that EN 14363:2016 has been drafted in close cooperation with the Agency and provides solutions to practical issues of the previous version EN 14363:2005, that creates significant difficulties and excessive costs for the testing of running characteristics of railway vehicles.

1.1.3. Therefore the Agency is asked by the European Commission to provide an Opinion on the possibility and conditions for allowing the use of EN 14363:2016 instead of the EN 14363:2005 (under the conditions of the current LOC&PAS TSI[1] and WAG TSI[2]), before the related revision of the referred TSIs, as this revision intends to adopt the EN 14363:2016.

2. Legal Background

2.1. Information on the legal base:

2.1.1. According to Article 6 (2) of Directive (EU) 2016/797[3], pending the review of a TSI, the Commission may request an opinion from the Agency.

2.1.2. According to Article 19 (1)(d) of the Agency Regulation[4], the Agency shall issue opinions which constitute acceptable means of compliance concerning deficiencies in TSIs, in accordance with Article 6(4) of Directive (EU) 2016/797, and provide those opinions to the Commission..

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[1] Commission Regulation (EU) No 1302/2014 of 18 November 2014 concerning a technical specification for interoperability relating to the 'rolling stock — locomotives and passenger rolling stock' subsystem of the rail system in the European Union, OJ L 356, 12.12.2014, p. 228–393.

[2] Commission Regulation (EU) No 321/2013 of 13 March 2013 concerning the technical specification for interoperability relating to the subsystem 'rolling stock — freight wagons' of the rail system in the European Union and repealing Decision 2006/861/EC, OJ L 104, 12.4.2013, p. 1–56.

[3] Directive (EU) 2016/797 of the European Parliament and of the Council of 11 May 2016 on the interoperability of the rail system within the European Union, OJ L 138, 26.5.2016, p. 44.

[4] Regulation (EU) 2016/796 of the European Parliament and of the Council of 11 May 2016 on the European Union Agency for Railways and repealing Regulation (EC) No 881/2004, OJ L 138, 26.5.2016, p. 1.

3. Analysis

3.1. The current status of the LOC&PAS TSI

3.1.1. *In the current LOC&PAS TSI[1], the requirements related to the acceptance of running characteristics of railway vehicles are based on the EN 14363:2005.*

3.1.2. *Even if the reference for the acceptance of running characteristics is the EN 14363:2005, a technical document, part of the LOC&PAS TSI[1], **ERA/TD/2012-17/INT**[5]: Running Dynamics - Application of EN 14363:2005 – Modifications and Clarifications, provides the necessary additional specifications to perform running dynamic behaviour testing of rolling stock.*

Note: In former rolling stock TSIs (CR LOC&PAS TSI (2011/291/EU)[6] and HS RST TSI (2008/232/EC)[7] there were several open points related to dynamic behaviour. With the remit of closing these open points, when drafting the LOC&PAS TSI[1], a working group was launched by the Agency, composed by experts from both rolling stock and infrastructure side WG DYN (2011 and 2012).
*This objective was met by mean of a list of conditions, methods and track geometric quality for the running dynamic behaviour testing, described in the referred technical document (**ERA/TD/2012-17/INT**). **This document complements the TSI LOC&PAS pre-empting the publication of the appropriate EN 14363 revisions, at which point the TSI will refer to them and this technical document will be withdrawn**.*

3.2. The current status of WAG TSI

3.2.1. *In the current WAG TSI[2], the requirements related to the acceptance of running characteristics of railway vehicles are based on the EN 14363:2005.*

3.2.2. *The reference for the acceptance of running characteristics is the EN 14363:2005, however a technical document, part of the WAG TSI[2], **ERA/TD/2013-01-INT**[8]: Specific Procedures for Running Dynamics, provides complementary provisions on the verification procedure.*

3.2.3. *On the matter which is the subject of this Opinion, an open point exists in WAG TSI[2]*

In 6.2.2.3:

"The required test conditions for on-track tests, as set out in EN 14363:2005, are not always fully achievable concerning track geometric quality, and combinations of speed, curvature, and cant deficiency.

In cases this is not fully achievable the demonstration of conformity is an open point."

3.3. The revision of LOC&PAS TSI

3.3.1. *In 2014, a working party was established for a limited revision of the LOC&PAS TSI[1].*

3.3.2. *This revision resulted in a proposed amendment of the LOC&PAS TSI[1], issued in 2016: Recommendation N. ERA-REC-120-2015/REC[9] of the European Railway Agency on the Technical Specification for Interoperability relating to the subsystem 'Rolling stock — Locomotive and passenger rolling stock' — Amendment for closure of several open points, improvement of implementation rules and technical update.*

3.3.3. *The Agency's Recommendation, referred to above, covers also the inclusion of the EN 14363:2016 and the respective "adjustment" in the requirements, assessment process and specific cases set out in the LOC&PAS TSI[1], including the withdraw of the technical document **ERA/TD/2012-17/INT:** Running Dynamics - Application of EN 14363:2005 – Modifications and Clarifications.*

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[5] Source: https://www.era.europa.eu/sites/default/files/activities/docs/era_td_2012_17_int_en.pdf

3.3.4. *In summary, and in what concerns the subject, ERA proposed the adoption of the EN 14363:2016 both in replacement of EN 14363:2005 and the technical document **ERA/TD/2012-17/INT**, taking into account the necessary adjustments in the LOC&PAS TSI[1], as explained above.*

3.4. The revision of WAG TSI

3.4.1. *In 2014, a working party was established for a limited revision of the WAG TSI[2].*

3.4.2. *This revision resulted in a proposed amendment of the WAG TSI[2], issued in 2016: Recommendation N.ERA-REC-117-2016/REC[7] of the European Railway Agency on Technical Specification for Interoperability relating to the subsystem 'Rolling stock —freight wagons' — Amendments for closure of the remaining open points, improvement of implementation rules and technical update.*

3.4.3. *The Agency's Recommendation, referred to above, covers also the inclusion of the EN 14363:2016 and the respective "adjustment" in the requirements, assessment process and specific cases set out in the WAG TSI[2], including the closure of the open point referred to in 6.2.2.3 of WAG TSI[2].*
The adoption of EN 14363:2016, in the WAG TSI[2], cannot be faced as a standalone standard adoption, rather it has to be done taking into account the publication of EN 16235:2013 and the amended EN 15839:2012 (EN 15839:2012+A1:2015).
*All this allows also the withdrawal of the technical document **ERA/TD/2013-01-INT:** Specific Procedures for Running Dynamics.*

3.4.4. *In summary, and in what concerns the subject, ERA proposed the adoption of the EN 14363:2016, together with the EN 16235:2013 and EN 15839:2012+A1:2015, in replacement both of EN 14363:2005 and the technical document **ERA/TD/2013-01-INT**, taking into account the necessary adjustments in the WAG TSI[2], including the closure of the open point, as explained above.*

3.4.5. *Concerning the closure of the open point in 6.2.2.3 of WAG TSI[2], a detailed explanation is provided in the Annex 2 of this Technical Opinion.*

3.5. Return of experience from the application of EN 14363:2016

3.5.1. *In spite of the referred Recommendations not yet being adopted, a part of the sector decided to experiment with the application of the EN 14363:2016.*

3.5.2. *The problems found were reported to the Agency via the NB-Rail subgroup RST for the High Speed and Conventional Railway Systems. The issues are described in Annex 3 and Annex 4 of this Technical Opinion, and refer to equivalent conicity calculation and representative wheel profiles during testing on straight tracks, respectively.*

3.5.3. *It is also an objective of this Technical Opinion to provide the needed clarifications for the issues identified. Therefore, with the support of CEN WG10 (group in charge of EN 14363) the opinion below provides the clarifications requested.*

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[6] OJ L 139, 26.05.2011, p.1
[7] OJ L 84, 26.03.2008, p.132
[8] Source: https://www.era.europa.eu/sites/default/files/activities/docs/era_td_2013_01_int_en.pdf
[9] Source: https://www.era.europa.eu/library/era-recommendations_en **(select the year 2016 to referred RECs)**

4. The opinion

4.1.1. The Agency is of the opinion that there is no deficiency in the LOC&PAS TSI[1] and in the WAG TSI[2], in the fact that these TSIs do not refer to EN 14363:2016. This opinion takes the assumption that the existence of an open point is not a deficiency.

4.1.2. However, the Agency remarks that the adoption of the EN 14363:2016, together with the EN 16235:2013 and EN 15839:2012+A1:2015, in replacement of EN 14363:2005 plus the technical documents ERA/TD/2013-01-INT and ERA/TD/2012-17/INT, is a significant improvement in the structures of LOC&PAS TSI[1] and WAG TSI[2].
In addition, it allows the closure of the open point referred to in 6.2.2.3 of WAG TSI[2].

Therefore, the Agency included such amendments in its Recommendations ERA-REC-120-2015/REC[7] and ERA-REC-117-2016/REC[7].

4.1.3. In the scope of the LOC&PAS TSI[1] and the WAG TSI[2], the EN 14363:2016 can be used in replacement of EN 14363:2005, by strictly conforming to the relevant amendments of the Recommendations (ERA-REC-120-2015/REC[7] and ERA-REC-117-2016/REC[7]) and the provisions below in the sections 4.1.4, 4.1.5, 4.1.6 and 4.1.7 of this technical opinion.

4.1.4. In the Annex 3 of this Technical Opinion, two issues are raised concerning equivalent conicity calculation. The following points 4.1.5 and 4.1.6 provide the answers for the issue 1 and issue 2, respectively.

4.1.5. In relation to issue 1 (track clearance):

*The requirement stated in Table 2 of EN 14363:2016 related to wheel rail contact geometry for testing a vehicle, in **test zone 1**:*
"- some sections with $\tan\gamma_e < 0{,}05$ and (TG-SR) ≥ 7 mm ' shall be included in the statistical assessment to cover low frequency body motions "
is amended as follows:
"- some sections with $\tan\gamma_e < 0{,}05$ shall be included in the statistical assessment to cover low frequency body motions ".

*In addition, for **test zone 1 and stability test**, in cases where harmonic oscillations, during stability testing or in the track section with $\tan\gamma_e < 0{,}05$, below the instability limit occur during test runs with a small gauge clearance (for example (TG-SR) ≤ 4 mm), it is recommended to investigate the effect of increased gauge on this behaviour, for example for gauge clearance (TG-SR) up to 10 mm."*

4.1.6. In relation to issue 2 (complementing parameters relevant for tan γ_e, in EC certificates and/or technical file, for the purposes of maintenance):

The following parameters are required to be collected during the stability testing, and recommended to be included in the EC certificate and/or technical file, for the purposes of maintenance:

- *Maximum tan γ_e the vehicle was tested on, during stability testing;*
- *TG-SR, during stability testing;*
- *The % of the stability limit values reached by the vehicle during the stability testing.*

4.1.7. *In the Annex 4 of this Technical Opinion, clarifications are requested concerning representative wheel profiles during testing on straight tracks. The clarifications are provided below, in this section.*

To check compliance with the two requirements stated in Table 2 of EN 14363:2016, related to wheel rail contact geometry for testing a vehicle in test zones 1 and 4:

- *"- the majority of conditions shall be representative of normal service" (only test zone 1);*
- *"- avoid a narrow range of contact geometry conditions (equivalent conicities and rolling radii coefficient / radial steering index)" (test zones 1 and 4);*

It is not necessary to investigate contact conditions with measured rail profiles on the tracks used for the tests. The reason is that contact conditions have a minor influence on the results of the statistical evaluation of the assessment quantities compared to other influences.

For the choice of a suitable (representative) wheel profile, the following aspects should be taken into account:

- *"Pure" conical profiles (Example: GV 1:40 according to EN 13715) deliver a narrow range of contact geometry conditions and are therefore not suitable. An exception could be a vehicle in which the frequency of re-profiling allows a permanent conical profile (e.g. 50000kms);*
- *Any other new profile (Examples are S1002 and EPS according to EN 13715) provides a range of contact conditions in combination with the rail profiles of the test lines which generally vary along the test routes and could be generally suitable;*
- *Any worn profile that emerged during operation as a result of operation over a long distance is generally suitable (An example is the R-profile which is used in France as test profile for vehicles equipped with new GV 1:40 profiles according to EN 13715);*
- *Independently from the points above it is recommended to avoid test wheel profiles, which would not be used in normal service conditions on the network on which the tests are performed (One example that should be avoided for the purpose of testing is an S1002 profile in the UK-network) as the vehicle response could be unnecessarily unfavorable. This includes theoretical wheel profiles which might have been created to test stability under extreme conditions.*

Investigations of contact conditions (equivalent conicity) using measured rail profiles are only necessary in a few sections to:

- *demonstrate that some sections with tan γ_e < 0,05 are included in the statistical evaluation of test zone 1;*
- *"exclude possibly track sections with exceptional values of conicity outside the expected range of operation" (which is not required but could avoid unfavorable results);*
- *quantify the maximum equivalent conicity for which the stability of the vehicle was tested.*

4.1.8. *Pending the adoption of the amendments of the Recommendations ERA-REC-120-2015/REC[7] and ERA-REC-117-2016/REC[7], and pending a future revision of EN 14363:2016 covering the issues raised in Annex 3 and Annex 4 of this technical opinion, the present opinion should constitute an acceptable means of compliance to the LOC&PAS and WAG TSI (respectively Commission Regulation (EU) No 1302/2014[1] and Commission Regulation (EU) No 321/2013[2]).*

Valenciennes,

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ANNEX 1 – Commission request

ANNEX 2 – Closure of open point related to 'Running dynamic behaviour'

ANNEX 3 – Issues on Equivalent conicity calculation

ANNEX 4 – Issues on representative wheel profiles during testing on straight tracks

ANNEX 5 – Impact assessment