ADVICE N. ERA-ADV-2012-2

OF THE EUROPEAN RAILWAY AGENCY

FOR

THE EUROPEAN COMMISSION / DG MOVE

REGARDING

the application from Siemens and Bombardier for an innovative solution related to the TSI CR LOC&PAS, clause 4.2.3.5.2.1 "Mechanical and geometrical characteristics of wheelsets", point "Mechanical behaviour of axles"

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1. General Context

1. In its note dated on 30 October 2012 and referenced as MOVE/B.2/AG/as D(2012)1283014, the European Commission / DG MOVE has requested the Agency, in accordance with Article 21b(2)(b) of Regulation (EC) 881/2004 (Agency Regulation), to issue an ERA opinion regarding the application of Siemens and Bombardier for an innovative solution related to the Commission Decision 2011/291/EU concerning a technical specification for interoperability relating to the rolling stock subsystem– 'Locomotives and passenger rolling stock' of the trans-European conventional rail system ('TSI CR LOC&PAS').
2. The note with its annexes, including the application of Siemens and Bombardier (letter reference Ares(2012)875368) is attached to the present advice in Annex.
3. According to the letter of Siemens and Bombardier, Siemens is the applicant for the project of high speed trains of type ICx, for which Bombardier supplies trailer bogies with inside bearing wheelsets. TSIs to be applied for these trains are listed in the letter of Siemens and Bombardier, including the TSI CR LOC&PAS, required in case high speed trains are also intended to be operated on the conventional trans-European network (TEN), additionally to the high speed TEN.
4. The technical scope of this innovative solution and the present advice relates to the clause 4.2.3.5.2.1 of TSI CR LOC&PAS "Mechanical and geometrical characteristics of wheelsets", in particular the point on "Mechanical behaviour of axles".

   Clause 4.2.3.5.2.1 of TSI CR LOC&PAS requires standard EN13103:2009 to be used for non-powered axles for the demonstration of compliance for mechanical resistance and fatigue characteristics of the axle. However, the scope of EN13103:2009 does not cover wheelsets with inside bearing.

   Therefore, Siemens and Bombardier have submitted an application to the European Commission for the use of an innovative solution in compliance with Section 6.2.3 of TSI CR LOC&PAS to use the British Standard BS 8535 for engineering, designing and evaluating non-powered axles with inner bearings.

2. Legal Background

1. Article 21b(2)(b) of the Agency Regulation provides the European Commission with the possibility to request a technical advice from the Agency in matters requiring specific know-how. As none of the articles of the same regulation relating to opinions and technical opinions of the Agency covers the subject of examining applications for innovative solutions submitted to the European Commission under a technical specification for interoperability (TSI), the Agency delivers the present advice as a response to the note of the European Commission.

2. The concept of innovative solutions is defined in Clause 4.1.1 of the TSI CR LOC&PAS:
   "Innovative solutions, which do not fulfil the requirements specified in this TSI and/or which are not assessable as stated in this TSI, require new specifications and/or new assessment methods. In order to allow technological innovation, these specifications and assessment methods shall be developed by the process 'innovative solution' described in Section 6."
   Clause 6.2.3 of TSI CR LOC&PAS describes the process to be followed in case of innovative solution:
   "If rolling stock includes an innovative solution (as defined in clause 4.1.1), the applicant shall state the deviations from the relevant provisions of the TSI, and submit them to the Commission for analysis.
   In case the analysis results in a favourable opinion, the appropriate functional and interface specifications as well as the assessment methods which are necessary to be included in the TSI in order to allow this solution will be developed.
   The appropriate functional and interface specifications and the assessment methods so produced shall then be incorporated in the TSI by the revision process.
   By the notification of a decision of the Commission, taken in accordance with Article 29 of Directive 2008/57/EC, the innovative solution may be permitted to be used before being incorporated into the TSI by the revision process."
3. As regards the demonstration of compliance for the mechanical behaviour of axles, Section 4.2.3.5.2.1 of TSI CR LOC&PAS requires that:
   "In addition to the requirement on the assembly above, the demonstration of compliance for mechanical resistance and fatigue characteristics of the axle shall be based on EN13103:2009 clauses 4, 5 and 6 for non-powered axles, or EN13104:2009 clauses 4, 5 and 6 for powered axles.
   The decision criteria for the permissible stress is specified in EN 13103:2009 clause 7 for non-powered axles, or EN 13104:2009 clause 7 for powered axles.
   The fatigue characteristics of the axle (considering the design, the manufacturing process and the different critical axle areas) shall be verified by a fatigue type test of 10 million load cycles."
4. The scope of standard EN 13103:2009 is defined it its clause 1:
   "This standard: 1) defines the forces and moments to be taken into account with reference to masses and braking conditions; 2) gives the stress calculation method for axles with outside axle journals;".
   As follows, this standard does not cover axles with inner bearings. Neither does TSI CR LOC&PAS provide any further obligation or possibility for axles with inner bearings.
5. As follows, the application of any other standard or rule relevant for axles with inner bearing may be considered as an innovative solution.

3. Analysis

1. The application of Siemens and Bombardier for an innovative solution seems necessary in order to allow the use of axles with inner bearings.
2. In case of these axles, the stress calculation method specified in standard EN 13103:2009 is not applicable because this standard was drafted based on the experience gained in Europe on axles that are commonly used with external (outside) bearings.

3. This issue has also been identified in the Agency's working party in charge of revising the two TSIs relating to the rolling stock subsystem (TSI CR LOC&PAS and the Commission Decision 2008/232/EC concerning a technical specification for interoperability relating to the 'rolling stock' sub-system of the trans-European high-speed rail system - TSI HS RST). The revision particularly focuses on merging the two TSIs and extending the scope.
   On one hand, the analysis of the extended scope, including in particular the 1520 mm system, has shown that technical solutions outside of scope of the EN standards have been used for a long time without adverse consequence; in particular axles with inner bearings are in use not only outside the EU, but also in the EU (e.g. in UK).
   On the other hand, there has been a strong demand in the working party to make EN standards mandatory in case of safety related components in order to ease the work of the applicants and the notified bodies.
4. Therefore, the following approach has been agreed for axles and wheels in the draft TSI relating to the subsystem 'rolling stock — Locomotives and passenger rolling stock' ('TSI LOC&PAS'):
   - Functional and technical specifications are described in section 4.2, without any reference to EN standards.
   - Conformity assessment procedures are described in section 6 with:
     - Reference to EN standards when they cover the most commonly used technical solutions (similar to the current TSI CR LOC&PAS) in order to specify a detailed harmonized assessment procedure.
     - Possibility for alternative conformity assessment procedures under defined conditions.
5. In the case of axles, this approach has resulted in the following text in the draft TSI LOC&PAS:
   - Clause 4.2.3.5.2.1: *"Mechanical behaviour of axles:*
     (2) The characteristics of the axle shall ensure the transmission of forces and torque. The conformity assessment procedure is described in clause 6.2.3.7 of this TSI."
   - Clause 6.2.3.7: *"Axles:*
     (2) The demonstration of compliance for mechanical resistance and fatigue characteristics of the axle shall be in accordance with EN13103:2009+A1:2010 clauses 4, 5 and 6 for non-powered axles, or EN13104:2009+A1:2010 clauses 4, 5 and 6 for powered axles.
     The decision criteria for the permissible stress are specified in EN 13103:2009+A1:2010 clause 7 for non-powered axles, or EN 13104:2009+A1:2010 clause 7 for powered axles."
     ...
     *(7) **Other conformity assessment method applicable to wheelsets, axles and wheels where the EN standards do not cover the proposed technical solution:***
     It is permitted to use other standards where the EN standards do not cover the proposed technical solution; in that case the notified body shall verify that the alternative standards form part of a technically consistent set of standards applicable to the design, construction and testing of the wheelsets, containing specific requirements for wheelset, wheels, axles and axle bearings covering:
     - *wheelset assembly,*
     - *mechanical resistance,*
     - *fatigue characteristics,*
     - *permissible stress limits,*
     - *thermomechanical characteristics.*

     Only standards that are publicly available can be referred to in the demonstration required above.

6. The proposal made by Siemens and Bombardier to use the BS 8535 British standard for conformity assessment of axles with inner bearings would be allowed according to the draft TSI LOC&PAS under the condition that the notified body confirms that *"alternative standards form part of a technically consistent set of standards"*, as required in point (7) of clause 6.2.3.7 of the draft TSI LOC&PAS, based on a demonstration performed by the applicant.

4. The advice

1. The Agency confirms that the case reported by Siemens and Bombardier is not limited to their particular project. Similar cases have been reported in the working party in charge of revising the two TSIs relating to the rolling stock subsystem, TSI CR LOC&PAS and TSI HS RST. Therefore, in the draft TSI LOC&PAS, a proposal is already made to cover these cases.
2. As follows, the Agency advises the Commission to accept the proposal for the innovative solution of Siemens and Bombardier, and to allow by a decision of the Commission, taken in line with Clause 6.2.3 of TSI CR LOC&PAS, the use of the conformity assessment procedure as specified in clause 6.2.3.7, point (7) of the draft TSI LOC&PAS before being incorporated in the TSI by the revision process.
3. This advice does not prevent Siemens as applicant to apply the EC verification procedure and to obtain the necessary EC certificate from the appointed notified body, according to the new conformity assessment procedure subject of the decision of the Commission.

Valenciennes, 19 NOV. 2012

Marcel VERSLYPE
Executive Director

ANNEX 1

Note from the European Commission / DG MOVE to the Agency (Ref. MOVE/B.2/AG/as D(2012)1283014)

Letter from Siemens and Bombardier as annex to the note (Ref. Ares(2012)875368 – 18/07/2012.)

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