

**ACCOMPANYING REPORT TO THE RECOMMENDATION ERA-REC-120-  
2015**

**OF THE EUROPEAN RAILWAY AGENCY**

ON

*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*

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## 1. Introduction

### 1.1. Background to the assignment

The European Railway Agency has performed a limited revision of the LOC&PAS TSI (Regulation (EU) 1302/2014). according to its Work Programme 2015 - Activity 02.01 'Harmonized EU rules for vehicles (including all structural TSIs)'. The main reason for this revision is the need to review and update the TSI in order to close of several open points, improve the implementation rules and perform a technical update which takes into account developments in technology and social requirements.

The legal base for this activity is based on the following legal texts:

- Regulation (EC) No 881/2004 of the European Parliament and of the Council of 29 April 2004 establishing a European Railway Agency, hereafter referred to as the 'Agency Regulation', in particular Articles 2 and 12 thereof,
- Directive 2008/57/EC of the European Parliament and of the Council of June 2008 on the interoperability of the rail system within the Community, hereafter referred to as the 'Interoperability Directive', in particular Article 6 thereof,

In particular, this revision is an amendment (Recommendation ERA-REC-120-2015 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) and has been drafted taking into account:

- Article 12 of the Agency Regulation [1] stating that 'the Agency shall... propose to the Commission amendments to the TSIs which it considers necessary', and
- Article 7 of the Interoperability Directive [2] and Section 2.2 of the Annex of [3] indicating the way to deal with the improvements in the TSIs.

### 1.2. Scope of this document

This Accompanying Report is an annex the recommendation.

The publication of this Accompanying Report is foreseen in the Project Plan of the TSI LOC&PAS Limited revision 2015 (document ID: ERA-REC-120-2015) in its chapter 5 'Project Time Plan'. ERA is responsible for the publication with a timescale of end 2015.

This report is intended to inform the European Commission and RISC about:

- the work carried out within the working party before drafting the Recommendation ERA-REC-120-2015 of the European Railway Agency on amendments to the LOC&PAS TSI (Regulation (EU) 1302/2014)
- the main amendments which concern the closure of open points and other technical issues, and
- the justification behind each amendment.



## **2. Workgroups**

### **2.1. The working party**

In order to organise and manage the functioning of the Working Party the rules stated in the ERA document "Working methods for workgroups providing input for Agency activities" RUL\_PRM\_002 were followed.

In particular and according to the Agency Regulation, Article 3 paragraph 1:

*"For drawing up the recommendations [...] the Agency shall establish a limited number of working parties. These working parties shall take as a basis, on the one hand, the expertise built up by professionals from the railway sector [...] and, on the other hand, the expertise of the competent national authorities. The Agency shall ensure that its working parties are competent and representative and that they include adequate representation of those sectors of the industry and of those users which will be affected by measures which might be proposed by the Commission on the basis of the recommendations addressed to it by the Agency. The work of the working parties shall be transparent."*

Therefore, Members of this WP should have expertise in the field of rolling stock. Preferably the working party members have a thorough understanding of EU railway policy and regulations.

According to the Agency Regulation, Article 3: *"The Agency shall ensure that its working parties [...] include adequate representation of those sectors of the industry and of those users which will be affected by measures which might be proposed [...]."*

### **2.2. Composition and activities of the working party**

The invitation to participate to the working party TSI LOC&PAS Limited revision 2015 was sent to the representative bodies and to the safety authorities.

A representative of OTIF has been invited to participate to the WP meetings on the basis of Administrative Arrangements signed between ERA and OTIF.

NB Rail has been invited to nominate a representative to participate in the WP meetings as NB Rail became part of the representative bodies' network in June 2015.

Eight representative bodies and fourteen national safety authorities participated in the 7 WP meetings held.



### 2.3. WP meetings participation

**Table 1 : WP meetings participants**

Organisation	Kick-off meeting 03/07/2014	Meeting N°2 22/10/2015	Meeting N°3 28/01/2015	Meeting N°4 11/06/2015	Meeting N°5 09/09/2015	Meeting N°6 21/10/2015	Meeting N°7 09/12/2015
ALE					Y		
CER	Y	Y	Y	Y	Y	Y	Y
EPTTOLA	Y	Y	Y	Y	Y	Y	Y
ETF	Y	Y	Y	Y	Y	Y	Y
EIM				Y			
UITP		Y	Y				
UNIFE	Y	Y	Y	Y	Y	Y	Y
OTIF		Y					
NB Rail							Y
NSA Austria	Y		Y	Y	Y	Y	Y
NSA Belgium	Y		Y	Y			Y
NSA Croatia		Y	Y				
NSA Denmark		Y		Y	Y	Y	
NSA Spain	Y	Y	Y	Y	Y	Y	Y
NSA Finland	Y	Y	Y	Y		Y	Y
NSA Estonia							
NSA France	Y	Y	Y	Y	Y	Y	Y
NSA Germany	Y	Y	Y	Y	Y	Y	Y
NSA Hungary							
NSA Ireland							
NSA Italy							
NSA Luxembourg			Y				
NSA Norway		Y	Y	Y	Y		
NSA Poland							
NSA Romania	Y	Y		Y	Y	Y	Y
NSA Slovenia							
NSA Sweden	Y		Y	Y	Y	Y	Y
NSA Latvia				Y			
NSA UK	Y	Y	Y	Y	Y	Y	Y



### 3. Working methods

#### 3.1. ERA Extranet workspaces

A workspace is available on the extranet website of the Agency. This workspace gathers all working documents issued for the task of revising the TSI and it is accessible for members and deputy members of the WP and to all experts involved in other WPs organised by the Agency.

#### 3.2. Work stages, time plan and deadlines

The planning for the limited revision of this TSI has the following work stages and deadlines:

- Kick-off meeting to explain the objectives of the limited revision
  - 2<sup>nd</sup> to 5<sup>th</sup> working party meeting to develop and draft the amendment
  - Progress report n. 1 from 22<sup>nd</sup> September 2015 was presented by ERA representatives in RISC 74 meeting on 27<sup>th</sup> October 2015 to explain the main developments to the Commission and Member State representatives. Comments and answer from ERA are given in annex 1.
  - 6<sup>th</sup> and 7<sup>th</sup> working party meetings to review the final documents
  - Recommendation to the Commission: to be sent by ERA in December 2015
- Note: Another amendment for TSI LOC&PAS 'Unique Authorisation' (see presentation in RISC 73) is subject of another recommendation (N. 111-2015) to be adopted simultaneously.
- Open points in common with TSI INF (Eddy current track brake and flying ballast), will be addressed at the same time as the TSI INF revision (end 2016) in a separate amendment.

### 4. Main aspects covered

#### 4.1. Closure of remaining open points and review of corresponding clauses

##### Open points considered

LOC&PAS TSI contains 9 open points which are listed in the two tables below:

**Table 2: Open points that relate to technical compatibility between the vehicle and the network**

Element of the Rolling Stock sub-system	Clause of this TSI	Technical aspect not covered by this TSI
Compatibility with train detection systems	4.2.3.3.1	The open point is related to EMC compatibility with track circuits. <i>(See specification ERA/ERTMS/033281)</i>
Running dynamic behaviour for 1520 mm and 1600 mm track gauge system	4.2.3.4.2 4.2.3.4.3	Running dynamic behaviour. Equivalent conicity.
Braking system independent of adhesion conditions	4.2.4.8.3	Eddy current track brake This open point is related to limits of constraints exerted on the track and to EMC (level of emission/frequency bands).
Aerodynamic effects for 1520 mm, 1524 mm and 1668 mm track gauge systems	4.2.6.2	Limit values and conformity assessment. The main vehicle characteristic having impact is the structural gauge; for the track gauges listed the structural gauge of vehicle is usually bigger than for vehicle operating on the 1435 mm track gauge.
Aerodynamic effect on ballasted track for RST of design speed $\geq 190$ km/h	4.2.6.2.5	Limit value and conformity assessment in order to limit risks induced by the projection of ballast Operation and maintenance conditions (in particular for the ballasted track) have impact.



**Table 3: Open points that do not relate to technical compatibility between the vehicle and the network**

Element of the Rolling Stock sub-system	Clause of this TSI	Technical aspect not covered by this TSI
Passive Safety	4.2.2.5	Application of scenarios 1 and 2 to locomotives with centre couplers and traction effort higher than 300 kN.
Variable gauge system	4.2.3.5.2.3	Conformity assessment
On-board energy measurement system	4.2.8.2.8 & Appendix D	On-board to ground communication: specification related to interface protocols and transferred data format.
Fire Containment and Control Systems	4.2.10.3.4	Conformity assessment of fire containment control systems other than full partitions.  This is an alternative design.

### Closure of remaining open points

The outcome of this limited revision regarding the closure of the open points is:

#### 4.1.1. Compatibility with train detection systems

This open point covers the requirements for the rolling stock in order to grant its compatibility with the train detection systems. This open point is set out in the Interface document between LOC&PAS TSI and CCS TSI covering the interfaces between control command and signalling trackside and other subsystems (ERA/ERTMS/033281).

The relevant ERA working parties (LOC&PAS UA and CCS WPs) worked together. The outcome of EUREMCO project financed by the EU was taken into account.

The WP TSI CCS has prepared a revision of the Interface document which is under final review.

This open point will be partly closed in a separate recommendation scheduled for 2016 which may be voted as the same time as the revision of TSI CCS.

Therefore, this open point will **not be closed** in this revision.

#### 4.1.2. Running dynamic behaviour for 1520 mm and 1600 mm track gauge systems

The EN standards referred to in the TSI to cover requirements and assessment process on running dynamic behaviour are based on experience gained on the 1435 mm system.

1524 mm and 1668 mm track gauges are already considered in the current TSIs, either by direct application of the same requirements as in 1435 mm track gauge, or by means of suitable specific cases.



Due to the lack of data regarding track quality of 1520 mm and 1600 mm networks, it was not possible to raise this issue in the Working Party. The point will **not be closed** in this revision.

#### 4.1.3. Braking system independent of adhesion conditions

This open point deals with the conditions for use of eddy current track brake regarding their effect on rail heating and vertical force. There is a corresponding open point in TSI INF.

The thermal effects of the use of Eddy current track brake on the rail has been addressed by ECUC project. This project provided a Finite Element model of the rail (validated by on-track tests) and described the heating process of the rail as a function of the eddy current braking power, frequency of trains, etc.

On the other hand, ECUC project does not propose pass-fail criteria (e.g. maximum Eddy current braking force, maximum acceptable rail temperature). Therefore, ERA proposed to close the open point by defining a limitation in the TSI INF of the of the temperature increase of the rail in a single train passage using its Eddy current track brakes, thus limiting the Eddy current braking power. The accumulative effect, i.e. frequency of trains equipped with Eddy current track brakes circulating on a given line should be taken into account. In parallel, additional requirements for the design of tracks could be included in the TSI INF.

The proposal above needs to be discussed both in LOC&PAS TSI and INF TSI. Therefore, this open point will **not be closed** in this revision. It is foreseen to have both TSI INF and TSI LOC&PAS open points simultaneously closed in 2016.

The electromagnetic compatibility of Eddy current brakes with train detection system also remains an open point.

#### 4.1.4. Aerodynamic effects for track gauge systems other than 1435 mm

The aerodynamic effects covered by the TSI are slipstream effects, head pressure pulse, maximum pressure variation in tunnels, crosswind and aerodynamic effect on ballasted tracks.

The current TSI has an open point regarding the requirements of the aerodynamic effects requirements in other track gauges than 1435 mm for the first four effects; requirements for aerodynamic effects on ballasted tracks is an open point regardless the track gauge (see point 4.1.5 of this report)

Additional analysis showed that neither pressure variation on tunnels nor crosswind depend on the track gauge. Therefore, only slipstream effects and pressure variation in tunnels need to be complemented in order to close this open point. These aerodynamic effects apply to speeds higher than 160 km/h only.

For 1520 mm and 1600 mm track gauges, there are no national rules covering slipstream effects or pressure variation in tunnels because the maximum speed in these networks is lower than 160 km/h. Therefore, it has been agreed in the working party not to apply the aerodynamic effects to these networks; in case the speed in 1520 mm or 1600 mm track gauges is increased above 160 km/h, the clause on innovative solutions should be the right tool to consider aerodynamic effects for new, upgraded and renewed rolling stock projects.

For 1668 mm and 1524 mm track gauges, both slipstream effects and head pressure pulse requirements have been defined following the proposals from NSA ES and NSA FI, respectively.

Therefore, this open point **has been closed** in this revision.



Additionally, the assessment procedure of slipstream effects and head pressure pulse has been complemented with a simplified assessment procedure for rolling stock similar to a previously validated one. This procedure is defined in the EN 14067-4:2013, which is referred to in the TSI.

#### 4.1.5. Aerodynamic effect on ballasted track for rolling stock of design speed $\geq 190$ km/h

This open point concerns the requirement on the aerodynamic effect of trains on ballasted tracks, in order to limit risks induced by the projection of ballast. There is an equivalent open point in the TSI INF.

The EU-funded project AEROTRAIN measured the relevant parameters of the ballast pick-up phenomenon by means of an extensive on-track test program, and proposed a methodology to measure the risk of ballast pick-up by means of on-track test and calculations. These findings were summarised in the Annex A of EN 14067-4:2013, which has been analysed by ERA and the working party in order to close the open point. The main shortcomings being that such standard does not provide yet with clear pass/fail criteria.

NSA FR and NSA ES showed draft national rules currently under development which may be used to close the open point. CER considered that the closure of the open point should be done by means of an European standard.

CER/EIM launched a questionnaire to find out the ballast bed configurations used in the HS network that cope with the phenomenon of ballast projection with the following results:

- ✓ It is adequate to raise the limit to 250 km/h (instead of 190 km/h).
- ✓ From infrastructure side, design requirements only would not be effective and should be combined with maintenance requirements; from rolling stock side, aerodynamic characteristics of the underframe should be considered.

ERA took into account the result of this questionnaire and prepared a proposal to limit the impact of the open point, taking into account the return of experience already available:

- The results from the CER/EIM enquiry shows that the ballast pick-up is controlled at current operation speeds (up to 320 km/h) through infrastructure maintenance measures. Therefore, experience shows that current underside train geometries are valid. It is proposed to use them as a reference case: a train with an underside geometry similar to an already in service train should be allowed to operate at the same maximum speed without further checks.
- New trains whose maximum design speed is lower than or equal to 320 km/h: to be characterized by simulation (method described in EN 14067-4:2013 Annex A), and a risk parameter (the section A.4 of this Annex A) lower than the corresponding value of an existing train already circulating, with similar operational condition.
- Vehicles with a maximum speed higher than 300/320 km/h: the vehicle should fulfil additional requirements that may be covered by the application of the procedure for innovative solutions.

The proposal above needs to be discussed both in LOC&PAS TSI and INF TSI working parties. Therefore, this open point **will not be closed** in this revision.



#### 4.1.6. Passive Safety

Passive safety requirements consist of demonstrating the crashworthiness of the vehicle under assessment against 4 scenarios defined in EN 15227.

The open point is limited to the applicability of scenarios 1 and 2 (front end impact between two identical units and impact with reference wagon, respectively) of EN 15227 to heavy haul locomotives with central coupler and capable of a traction effort higher than 300 kN.

The WP analysed an advanced draft of the revised EN 15227, which proposes relaxed collision scenarios 1 and 2 for vehicles fitted with “centre couplers conforming to the Willison (e.g. SA3) or Janney (AAR standard) principles”. UNIFE and CER proposed to use these relaxed scenarios for vehicles as required by the standard. ERA considered that this wording discriminates some technical solutions (e.g. Type 10) without a clear justification. Moreover, at TSI level the revision has to keep consistency/continuity with the current TSI, and there is no justification to modify the level of requirement for a particular technical solution.

ERA proposed to adopt the relaxed scenarios of the draft standard, which are integrated in the TSI as the revised standard will not be available in 2016. These scenarios are applicable to heavy haul locomotives fitted with automatic end centre buffer couplers and capable of a traction effort at coupling level higher of 300 kN. This value is based on the strength of most frequently used automatic end centre couplers in freight locomotives. This proposal was accepted during the revision process, which allowed to **close this open point**.

In addition to the closure of the open point, it was decided to remove from the TSI an alternative, less demanding method to demonstrate compliance with the requirements of scenario 3 of EN 15227 for locomotives with single ‘central cab’.

The reason for removing this allowance is the increasing maximum speed of this type of locomotives (100 km/h in many cases). In order not to hamper projects at an advanced state of development, it is allowed to apply the relaxed method for locomotives with central cab until 31/12/2019.

#### 4.1.7. Variable gauge system

The variable gauge systems were included in the TSI (section 4.2.3.5.2.3) in order to achieve a general acceptance of vehicles equipped with such devices in all MS. The requirement was limited to the safe locking of the wheels in the intended axial position after a changeover has been performed; its assessment remained an open point.

ERA issued in 2009 a RfS on this subject. Subsequently, an EN draft standard was made available by CEN “Railway application —Systems and procedures for change of track gauge” in January 2015. This draft standard includes both requirements and a conformity assessment procedure. This conformity assessment process is composed of

- A risk analysis
- A fixed validation plan, which is composed of:
  - Design analysis
  - Laboratory tests, consisting in a bench test with 10<sup>7</sup> cycles under a predefined set of forces
  - Track tests, consisting of performing 500 passages on a changeover facility
  - In-service tests, consisting of additional on-track test of 250.000 km; the last 150.000 km of which may involve commercial operation.



The fixed validation plan is a design and conformity assessment handbook, that cannot be part of the legislative harmonisation (i.e TSI) because its concrete application to a project can only be defined on the basis of a deep knowledge of the technical solution envisaged by the applicant or the manufacturer (who takes responsibility for it). ERA sees the need for an applicant to have the freedom to define the verification procedure that fits best to his system.

Moreover, the draft EN does not provide a simplified verification procedure adaptable to the novelty/complexity of variable gauge system (including their operative conditions) and therefore it can't be mandated by the LOC&PAS TSI (once the EN is published).

ERA concluded that the TSI could be complemented with some requirements for the variable gauge system consistent with those already specified in the standard and those to be laid down in the standard. Additionally, the TSI could specify an acceptable level for the risk to be controlled, to be demonstrated by a safety analysis.

After a bilateral meeting with NSA ES, it was agreed to extend the requirements of the TSI (originally limited to the variable gauge wheelset locking system) to the complete system in order to cover interfaces with the changeover facilities. The TSI will set out requirements for the automatic variable gauge system, which is identified as an interoperability constituent, because the same system can be used on different railway vehicles and its validation can include in service tests including the module CV. Compatibility with the changeover facility is one of the parameters defining the area of use. Requirements and their corresponding assessment processes are proposed both at IC and subsystem level. The assessment process is a validation plan to be developed by the Applicant by means of a safety analysis, taking into account the novelty of the proposed system and including:

- the existing systems taken as reference.
- the analysis of failure modes of the components constituting the system and their criticality.
- the definition of design and testing measures at relevant component and subsystem level.

In accordance with the Commission implementing regulation (EU) No 402/2013, the risk analysis performed in order to determine the validation plan must be based either on an existing reference system or in existing codes of practice; the validation plan described in the draft EN could be included in the application guide as 'code of practice'. The compatibility of the unit with the intended changeover facility shall be demonstrated by functional tests in real operating conditions.

This is aligned with the draft standard and with existing standards covering similar systems, such as EN 13749, which sets out requirements for the validation of the bogie frame and EN 15827, which sets out requirements for the validation of the complete bogie. In both standards, the validation plan (design review, laboratory tests and on-track tests) is explained but its exact content has to be covered (and justified) by the applicant, taking into account the conditions and area of use of its product. Simplified assessment processes are foreseen in both ENs for products similar to an existing one. Therefore, the open point **has been closed** in this limited revision.

NSA ES considered that the draft standard and its validation plan should be referred to in the TSI, and that the open point should be kept open until the standard is available.



#### 4.1.8. On-board energy measurement system

The LOC&PAS TSI requires electric units to be equipped with a system for measurement of the electric energy in case they are intended to be operated on lines equipped with on-ground data collection system. This system must be able to communicate the measured data to the on-ground data collection system

The specification related to interface protocols and transferred data format between the electric unit and the on-ground collection system are an open point. This open point is set out in the ENE TSI as well. ERA created a task force to close the open point. This task force is following the drafting process of EN 50463, which covers the interface protocols and transferred data format.

Once this standard is published (foreseen Autumn 2016), ERA may issue a recommendation in order to close both TSI ENE and TSI LOC&PAS open points. This recommendation will be drafted in the WPs of ENE and LOC&PAS TSIs along 2016 . Therefore, the open point **was not be closed** in this revision.

#### 4.1.9. Fire Containment and Control Systems

Rolling stock holding the category B regarding the fire behaviour of its materials must be equipped with fire containment control systems in order to limit the spread of heat and fire effluents throughout the train. This requirement is deemed to be satisfied by means of cross-section partitions and fire barriers. Assessment of alternative methods complying with this requirement are an open point.

Consequently, ERA sent to CEN the RfS 45 on June 2013 in order to close this open point.

CEN will need still several years to issue a standard. Therefore, the open point was **not closed** in this revision.

## 4.2. Standards and Technical documents referred to in the TSI

### 4.2.1. Updated standards

All standards listed in Appendix J-1 of the TSI which have been updated in the revision process have been checked in order to ensure that the parts referred to in the revised TSI remain consistent.

Some standards have required to fine-tune the requirements, assessment process and specific cases set out in the TSI. That is the case of the EN 14363:2016 and prEN 13103-1.

The detailed list of updated standards is in the recommendation.

### 4.2.2. Standards under revision that will not be published on time

The following standards are under revision and at the time of the present accompanying report. The new versions are not yet approved nor published. These standards should be taken into account in the next revision of the LOC&PAS TSI:

- prEN 16404
- prEN 15663
- EN 15273-2:2013/prA1
- prEN 15227
- prEN 13103-1
- prEN 14198
- prEN 15595



- prEN 14067-6
- EN 15153-1:2013/prA1
- EN 1363-1:2012/prA1
- prEN 13979-1
- EN 13674-1:2011/prA1
- EN 13260:2009+A1:2010/prA2

#### 4.2.3. Requests for standard

The RfS 50 has been issued by ERA in order to revise the EN 14067-6:2010 (Aerodynamic effects – crosswinds).

The scope of the revision should cover vehicles designed to be operated in track gauges other than 1435 mm and characteristic wind curves as reference(s) for all vehicles in its scope should be defined.

#### 4.2.4. ERA technical documents

ERA technical document ERA/TD/2013/01/INT 'Specific procedures for running dynamics' has been deleted and its content replaced with the relevant parts of the revised EN 14363:2016.

### 4.3. Implementation (chapter 7 of the TSI)

Chapter 7 has been enlarged with additional provisions regarding the revision of EC type/design examination certificate in case of

- Design modification of a type of vehicle ,
- modification of an existing TSI compliant vehicle and
- modification of an existing non TSI compliant vehicle.

ERA approach to manage modifications in the three cases above is based on Decision 2010/713/EU on conformity assessment modules, the developments of DV29bis and the recent amendments to the Annexes V and VI of the Interoperability Directive.

The working party started an analysis of the requirements of the TSI and tried to define for every requirement impacted by the modification the different scenarios and subsequent actions. Due to practical difficulties of this approach, the working party agreed not to provide too specific provisions in the TSI. This detailed approach will be considered for the Application Guide; The general guidance provided for existing types is summarised in section 7.1.3.

The section 7.1.2 dealing in current TSI with the upgrade and renewal of existing vehicles was amended to include all modifications to an existing vehicle covered or not by an EC certificate of verification against TSIs.

In case of existing non TSI compliant Rolling stock (not covered by an EC certificate of verification):

- A new assessment against the requirements of this TSI may be only needed for the basic parameters in this TSI which may be affected by the modification(s).
- The replacement of a whole unit or a vehicle within a unit does not require a conformity assessment against this TSI, as long as the unit or the vehicle are identical to the ones they replace.



- Guidance to the Member State for those modifications that are deemed to be upgrades will be given in the Application Guide.

For existing TSI compliant Rolling stock (covered by an EC certificate of verification) the same provisions as for design modification of an existing type are applicable.

#### **4.4. Guidance on interoperability constituents impacted by a specific case**

The relevant sections of the TSI have been revised in order to provide some guidance on interoperability constituents impacted by a specific case.

Specific cases imply the application of notified national technical rules for the verification of a component instead of a TSI. On the other hand, the concept of an interoperability constituent implies an EU wide use of the component - in principle not compatible with specific national requirements.

The body responsible for conformity assessment is also unclear in case of application of the TSI and national rules to the same component.

Following a request from UK, ERA issued a technical opinion on 17/04/2015 regarding this issue (ERA/OPI/2015-2). Main points are:

- When a component defined as an interoperability constituent in the core TSI is subject to a specific case, it may not anymore correspond to the concept of interoperability constituent, so an EC type or design examination certificate should not be required and the verification has to be done at subsystem level.
- However, in case the specific case is an additional requirement that allows to keep compliance to the core TSI (chapter 4 and 5) and its specification is fully included in section 7.3 of the TSI and does not refer to a national rule, the notified body can perform the conformity assessment and issue an EC type or design examination certificate, with the area of use of the component giving the necessary information (e. g. for use also on the railway network corresponding to the specific case).
- The same rationale may be applied for interoperability constituents subject to an open point.

ERA proposed to amend clause 6.1.1 of the LOC&PAS TSI to contain legislative provisions in line with the above mentioned analysis; the specification of specific cases in section 7.3 was also improved/clarified.

ERA prepared a spreadsheet with all the specific cases having an impact on an IC. The spreadsheet further explained in which cases the NoBo is able to:

- assess the requirements of the specific case (availability of the specification either in the TSI or a EN) and
- issue an EC certificate covering the IC (availability of specification + Specific case allows compliance with the core TSI)

The spreadsheet showed the specific cases that can be assessed by a NoBo, and specific cases impacting and IC which can be covered by an EC certificate (thus allowing compliance with the core TSI)

The WP concluded that the proposed text in clause 6.1.1 and section 7.3 should be included in the TSI. The spreadsheet could be included in the Application Guide.



## 4.5. Other issues dealt with in the revision process

### 4.5.1. Interior passive safety (see clause 7.5.2.1 of TSI LOC&PAS)

The section 7.5 of TSI LOC&PAS was intended to be temporary, including the section 7.5.2.1 “Additional requirements for security reasons” which allows Member States to have national rules related to Interior passive safety (IPS). UK has a national rule (GM/RT2100 Chapter 6) and UNIFE has also produced a draft Tec Rec (in cooperation with UIC) on this subject.

NSA UK suggested the inclusion of IPS requirements in the TSI in line with the draft Tec Rec.

The outcomes of the discussion held in the WP were:

- Most of WP members (UNIFE, CER, ETF and 6 NSAs: DE, AT, ES, FI, FR, BE) were not in favour of considering the inclusion of passive safety requirements in the TSI. They considered (except UNIFE) that an EN standard should be developed following a request for standard issued by ERA to CEN.
- In any case, these measures should be economically justified (CER, UNIFE, UITP, EPTTOLA)

WP conclusion was that:

- Interior passive safety should be dealt with by application of standards on a voluntary basis (by applicants or by final users of railway vehicles in their call for tender).
- A request for standard to CEN will be supported by ERA in order to give the sector the opportunity of issuing a harmonised EN standard. ERA will prepare a RfS for CEN.

However, considering comments received in RISC 74 (see annex I), ERA is not opposed to keep the section 7.5 for the time being (the recommendation doesn't cover its deletion)

### 4.5.2. Loads induced by torsional vibrations in powered axles

NSA DE proposed to include in the TSI a concrete methodology covering the measurement and evaluation of torsional oscillations of wheelsets. NSA DE also proposed to include the procedure in the Application Guide.

After analysis, WP conclusion was as follows:

- the current requirements in the TSI, referring to the essential requirement 1.1.3 of Annex III of Interoperability Directive, is sufficient to cover wheelsets, including the consideration of relevant torsional oscillations in wheelsets.
- In accordance with DV29 bis, point (30), if the Sector considers that a harmonised procedure to assess torsional Oscillations of wheelsets is needed, this should be dealt with directly by the Sector through the revision of the EN 13104. ERA may support this revision, provided that this is specified as 'informative'.
- The relevance of amending accordingly the application guide is questionable. ERA stresses that this could lead to the interpretation that when nothing is written in TSI or its Application Guide, nothing has to be done; this is not the case, because the TSI is neither a full technical specification nor a guideline to design a railway vehicles.

The WP agreed that this issue should be addressed by CEN/CENELEC through the revision of the relevant EN.

### 4.5.3. Improving the assessment procedure for crosswinds

The evaluation of crosswinds requirements in section 4.2.6.2.4 of TSI LOC&PAS TSI contains the following limitations:



- For vehicles with a maximum speed  $140 \text{ km/h} < V < 250 \text{ km/h}$ , the TSI requests to calculate and record the characteristics wind curves (CWCs) of the vehicle, but there is not a clear pass-fail criterion. Therefore, the RU must check the route compatibility with the crosswind characteristics of the line. The procedure for performing this check is not harmonised.
- For vehicles with a maximum speed  $V \geq 250 \text{ km/h}$ , the TSI requests to calculate and record the characteristics wind curves (CWCs) and there is a clear pass-fail criterion (characteristics reference wind curves CRWCs)

The WP was also informed on the developments of the CEN working group for the next revision of the EN14067-6:

- For Class 1 high speed: to set up CRWCs in the future EN 14067-6:2010+A1:2015 in line with the HS RST TSI and based the same track configuration as in the EN.
- For Class 2 high speed and conventional RST CEN is evaluating the feasibility to define CRWCs.

In addition, the EN 14067-6:2010 is currently applicable only to the 1435 mm track gauge but, after a detailed analysis of parameters in the EN , it is considered that it would possible to extend it to other track gauges.

ERA sent a RfS to CEN (see point 4.2.3 of this report) in order to define characteristic reference wind curves for all vehicles in the scope of the LOC&PAS TSI and extend its scope to all track gauges

The WP decided that the modification of section 4.2.6.2.4 cross-winds should wait until the revised EN covering the points of the RfS above is available.

#### 4.5.4. Removal of specific cases if they are no more needed/necessary

No specific cases have been removed. Some NSAs have proposed modifications of the specific cases due to the changes brought in chapters 4 to 6 of the TSI. Most of the modified specific cases are related to running dynamic behaviour.

#### 4.5.5. Mistake correction, ERA technical opinions/advices, RfUs and feedback from incidents

All mistakes notified to ERA are corrected. The conclusions of the ERA technical opinion/advices were integrated and the RfUs have been considered.

#### 4.5.6. Review of the Application Guide

The Application Guide will be reviewed taking into account all the modifications done during the revision process.

## 5. IMPACT ASSESSMENT

An impact assessment in accordance with Article 6(3) of the Interoperability Directive was already carried out during the full revision of this TSI. The proposed amendments complement the existing TSI and are covered by that impact assessment.



## 6. CONCLUSIONS AND NEXT STEPS

### 6.1. Open points closed

#### 6.1.1. Aerodynamic effects for track gauge systems other than 1435 mm

The open point regarding the application of the aerodynamic effects requirements in other track gauges than 1435 mm is closed.

- The clause is not applicable for rolling stock intended to be operated on 1520 and 1600 mm track gauges.
- Concrete requirements are set out in 1668 mm and 1524 mm track gauges for slipstream effects and head pressure pulse.
- The revised EN 14067-4:2013 have been referred to in the TSI, including a simplified assessment procedure for slipstream effects and head pressure pulse in case of rolling stock based on an already assessed one.

#### 6.1.2. Passive safety

The open point regarding the applicability of Scenarios 1 and 2 of EN 15227 to heavy haul locomotives with central coupler is closed with the definition of suitable scenarios for heavy haul locomotives equipped with central automatic coupler and capable of a traction effort at coupling level higher than 300 kN .

Additionally, the allowance given in point (7) of section 4.2.2.5 for locomotives with central cab to use an alternative method to demonstrate compliance against the requirement of scenario 3 is removed. Nevertheless, a transition phase for projects at an advanced state of development is provided.

#### 6.1.3. Automatic variable gauge system

The open point regarding the assessment of the variable gauge wheelset is closed.

Clause 4.2.3.5.2.3 of the LOC&PAS TSI has been renamed 'automatic variable gauge system' and it has been complemented with functional requirements. This clause remains part of the wheelset. A new interoperability constituent (Automatic variable gauge system) has been created with its corresponding area of use. The assessment is defined at both IC and subsystem levels.

### 6.2. Other issues dealt with in the revision process

The recommendation includes provisions for:

- Rules to be applied in case of modification of an existing type and an existing vehicle
- Clarification in case of interoperability constituents impacted by a specific case
- Revision of EN standards referred to in the TSI in order to include the latest available version

### 6.3. Next steps

The following open points are or will be addressed in future work as follows:

- Running dynamic behaviour for 1520 mm and 1600 mm track gauge system

The Relevant data regarding track quality should be gathered in these networks in order to close the open point in future revisions.

- Fire Containment and Control Systems (FCCS)



The corresponding EN standard is currently under drafting process, following RfS issued by ERA

- Compatibility with train detection systems

These open points are in the scope of the interface document ERA/ERTMS/033281 reviewed by the CCS TSI WP

- Braking system independent of adhesion conditions

This open point will be closed together with the corresponding open point on TSI INF by defining a limitation of the Eddy current braking power and limiting in the TSI INF the increase of temperature of the rail in a single train passage.

- Aerodynamic effect on ballasted track for RST of design speed  $\geq 190$  km/h

This open point will be closed together with the corresponding open point on TSI INF.

- On-board energy measuring system

This open point is to be closed by the taskforce covering this subject for both ENE and LOC&PAS TSIs.



## 7. Annex 1: Comments from RISC 74

*Text in italic:* draft PV of RISC 74

**Text in bold:** answer from ERA

*ERA presented the reports on the revision of the LOC & PAS and WAG TSIs, that were uploaded on CIRCABC. The following comments were made:*

*UK, supported by SE, NL and EI, reminded the importance of provisions regarding interior passive safety for limiting injuries to passengers in case of accident. UK suggested the development of an EN standard and to keep for the time being point 7.5.2.1 of TSI LOC&PAS (allowing a technical rule at national level).*

**ERA answer:** the request of keeping the clause 7.5.2.1 (or the full clause 7.5) will be evaluated with DG-Move.

*FR pointed out that they don't support to cover 'ballast pick-up' by 'innovative solutions'; the technical analysis should continue in the working parties.*

**ERA answer:** the analysis will continue in the working parties; the procedure for 'innovative solutions' is envisaged only for speed higher than 300/320 km/h for which there is no return of experience.

*ES reported that there are still discussions on 'variable gauge wheelsets'. If the Spanish experience is not sufficiently taken into account, ES position will be to keep the point "open".*

**ERA answer:** ERA will continue to improve the proposed requirements, and will have bilateral exchanges with the Spanish sector.

*DE had the following comments to the reports:*

*For the modifications, self-assessment by the applicant is mentioned. DE reminded that article 20 of Interoperability Directive gives to the Member States the decision on new authorisation and application of TSIs.*

**ERA answer:** the working party has addressed the EC verification procedure in case of modifications to an existing design, according to the conformity assessment modules SB or SH1 (in particular, the applicant has to identify modifications that may affect the conformity to TSIs); this is to be applied to produce new rolling stock. The working party has not yet addressed the need for a new authorisation according to Article 20 of Interoperability Directive that covers modifications to an existing rolling stock (renewal or upgrading). In any case, it is necessary in this analysis to make a distinction between the EC verification procedure (that is applied by applicant and NoBo) and the need for a new authorisation (that may be on decision from the MS).

*Regarding the validity of certificates, the subject should not be reopened as there was already an agreement for a 7 years duration.*

**ERA answer:** the durations already specified in TSIs (e.g in TSI LOC&PAS) will not be modified; regarding rolling stock, it is proposed to specify durations in the TSI WAG, and it is questioned if the same values should be used, or if longer ones would be more relevant considering that the design of freight wagons is more stable.



## 8. Annex 2: Definitions and abbreviations

### Definitions

*Table 4: Table of definitions*

Definition	Description

### Abbreviations

*Table 5: Table of abbreviations*

Abbreviation	Definition
AT	Austria
BE	Belgium
CEN	European Committee for Standardization
CER	Community of European Railway and Infrastructure Companies
DE	Germany
DG MOVE	Directorate General for Mobility and Transport of the European Commission
EC	European Commission / European Community
EE	Estonia
EN	European Standard
ERA	European Railway Agency
ERFA	European Rail Freight Association
ES	Spain
EU	European Union
FI	Finland



FMECA	Failure modes, effects and criticality analysis
FR	France
HAZOP	Hazard and operability analysis
INF TSI	Technical specifications for interoperability relating to the 'infrastructure' subsystem of the rail system in the European Union
IT	Italy
NB-Rail	Notified Bodies Association
OTIF	Intergovernmental Organisation for International Carriage by Rail
LOC&PAS TSI	Technical specification for interoperability relating to the 'rolling stock — locomotives and passenger rolling stock' subsystem of the rail system in the European Union
LT	Lithuania
LU	Luxembourg
LV	Latvia
NSA	National Safety Authority
PPL	Project Plan
RDD	Reference Document Database
REC	Recommendation
RfU	Recommendation for Use
RID	Regulations concerning the International Carriage of Dangerous Goods by Rail
RO	Romania
SE	Sweden
TSI	Technical specification for interoperability
UIC	International Union of Railways
UIP	International Union of Wagon Keepers
UK	United Kingdom
UNIFE	European Rail Industry Association
WAG TSI	Technical specification for interoperability relating to the 'rolling stock — freight wagons'



	subsystem of the rail system in the European Union
WP	Working Party

## 9. Annex 3: Reference documents

*Table 6: Table of reference documents.*

	Title	Reference	Version
1	European Railway Agency Work Programme 2015 ERA WP 2015	ERA WP 2015	

## 10. Annex 4: Reference legislation

*Table 7: Table of reference legislation*

	Title	Reference	Version
1	Regulation of the European Parliament and of the Council establishing a European railway agency	881/2004	
2	Directive of the European Parliament and of the Council on the interoperability of the rail system within the Community	2008/57/EC	
3	Commission Regulation 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	1302/2014	

