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RECOMMENDATION N. ERA-REC-127-2017/REC OF THE EUROPEAN UNION AGENCY FOR RAILWAYS

on

Closing of Open Points and additional modifications in the Commission Regulation (EU) No. 1299/2014 of 18 November 2014 on the technical specifications for interoperability relating to the 'infrastructure' subsystem of the rail system in the European Union ('INF TSI')

THE EXECUTIVE DIRECTOR

HAVING REGARD TO 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, hereafter referred to as the 'Agency Regulation', in particular Articles 4 and 19 thereof,

HAVING REGARD TO Directive (EU) 2016/797 of the European Parliament and of the Council of 11 May 2016 on the interoperability of the rail system (Recast), hereafter referred to as the 'Interoperability Directive', in particular Article 5 thereof,

HAVING REGARD TO Commission delegated Decision (EU) 2017/1474 of 8 June 2017 supplementing Directive (EU) 2016/797 of the European Parliament and of the Council with regard to specific objectives for the drafting, adoption and review of technical specifications for interoperability, in particular Article 3 thereof

Whereas

1. According to the provisions of Article 19 of the Agency Regulation, one of the tasks of the Agency is to '*address recommendations to the Commission on the TSIs and their revision, in accordance with Article 5 of Directive (EU) 2016/797*'.
2. In accordance with its Work Programme, the Agency has examined the technical specifications for interoperability relating to the 'infrastructure' subsystem of the rail system in the European Union ('INF TSI')¹ in order to identify the most appropriate way of closing several open points.
3. In order to improve clarity of the INF TSI, additional modifications have been identified. These modifications do not introduce nor modify existing requirements.
4. The proposed amendments have been discussed with a working party established for this purpose in accordance with Article 5 of the Agency Regulation.
5. The proposed amendments have no direct impact on the social environment or working conditions of workers in the industry, nor on the rail freight customers or passengers. Therefore, no consultation of neither social partners nor rail freight customers and passengers, as provided for in Articles 6 and 7 of the Agency Regulation, correspondingly, is necessary.
6. An impact assessment in accordance with Article 5(3) of the Interoperability Directive has been carried out in respect to the amendments proposed in this Recommendation.

HAS ADOPTED the following recommendation:

1. The Annex to Commission Regulation (EU) 1299/2014 concerning the technical specification for interoperability relating to 'infrastructure' subsystem of rail system in the European Union should be amended as set out in Annex 1 to this Recommendation

¹ Commission Regulation (EU) No 1299/2014 of 18 November 2014 on the technical specifications for interoperability relating to the 'infrastructure' subsystem of the rail system in the European Union (OJ L356, 12.12.2014 p1).

This recommendation is addressed to the European Commission.

Valenciennes,



Josef DOPPELBAUER
Executive Director

Annex 1: Amendments to the Annex to Commission Regulation EU 1299/2014 concerning the technical specification for interoperability relating to 'infrastructure' subsystem of rail system in the European Union ('INF TSI').

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Annex 1: Amendments to the Annex to Commission Regulation EU 1299/2014 concerning the technical specification for interoperability relating to 'infrastructure' subsystem of rail system in the European Union ('INF TSI').

1. In Chapter 3 , Table 1 is replaced as follows:

Table 1: Basic Parameters of the infrastructure subsystem corresponding to the essential requirements

<i>TSI point</i>	<i>Title of TSI point</i>	<i>Safety</i>	<i>Reliability Availability</i>	<i>Health</i>	<i>Environmental protection</i>	<i>Technical compatibility</i>	<i>Accessibility</i>
4.2.3.1	<i>Structure gauge</i>	1.1.1, 2.1.1				1.5	
4.2.3.2	<i>Distance between track centres</i>	1.1.1, 2.1.1				1.5	
4.2.3.3	<i>Maximum gradients</i>	1.1.1				1.5	
4.2.3.4	<i>Minimum radius of horizontal curve</i>	1.1.3				1.5	
4.2.3.5	<i>Minimum radius of vertical curve</i>	1.1.3				1.5	
4.2.4.1	<i>Nominal track gauge</i>					1.5	
4.2.4.2	<i>Cant</i>	1.1.1, 2.1.1				1.5	1.6.1
4.2.4.3	<i>Cant deficiency</i>	1.1.1				1.5	
4.2.4.4	<i>Abrupt change of cant deficiency</i>	2.1.1					
4.2.4.5	<i>Equivalent conicity</i>	1.1.1, 1.1.2				1.5	
4.2.4.6	<i>Railhead profile for plain line</i>	1.1.1, 1.1.2				1.5	
4.2.4.7	<i>Rail inclination</i>	1.1.1, 1.1.2				1.5	
4.2.5.1	<i>Design geometry of switches and crossings</i>	1.1.1, 1.1.2 1.1.3				1.5	
4.2.5.2	<i>Use of swing nose crossings</i>	1.1.2, 1.1.3					

Table 1: Basic Parameters of the infrastructure subsystem corresponding to the essential requirements

TSI point	Title of TSI point	Safety	Reliability Availability	Health	Environmental protection	Technical compatibility	Accessibility
4.2.5.3	Maximum unguided length of fixed obtuse crossings	1.1.1, 1.1.2				1.5	
4.2.6.1	Track resistance to vertical loads	1.1.1, 1.1.2, 1.1.3				1.5	
4.2.6.2	Longitudinal track resistance	1.1.1, 1.1.2, 1.1.3				1.5	
4.2.6.3	Lateral track resistance	1.1.1, 1.1.2, 1.1.3				1.5	
4.2.7.1	Resistance of new bridges to traffic loads	1.1.1, 1.1.3				1.5	
4.2.7.2	Equivalent vertical loading for new earthworks and earth pressure effects imposed on new structures	1.1.1, 1.1.3				1.5	
4.2.7.3	Resistance of new structures over or adjacent to tracks	1.1.1, 1.1.3				1.5	
4.2.7.4	Resistance of existing bridges and earthworks to traffic loads	1.1.1, 1.1.3				1.5	
4.2.8.1	The immediate action limit for alignment	1.1.1, 1.1.2	1.2				
4.2.8.2	The immediate action limit for longitudinal level	1.1.1, 1.1.2	1.2				
4.2.8.3	The immediate action limit for track twist	1.1.1, 1.1.2	1.2				
4.2.8.4	The immediate action limit of track gauge as isolated defect	1.1.1, 1.1.2	1.2				

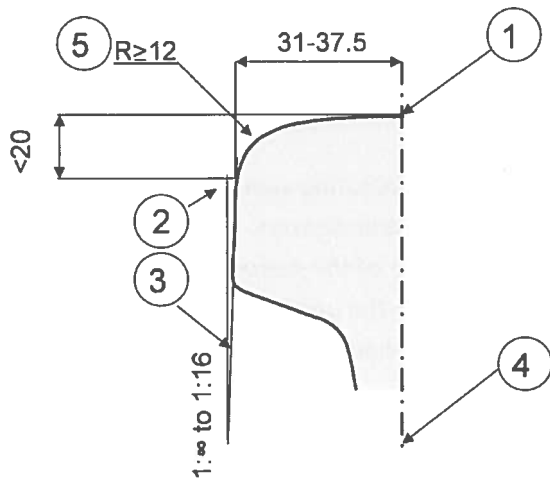
Table 1: Basic Parameters of the infrastructure subsystem corresponding to the essential requirements

TSI point	Title of TSI point	Safety	Reliability Availability	Health	Environmental protection	Technical compatibility	Accessibility
4.2.8.5	<i>The immediate action limit for cant</i>	1.1.1, 1.1.2	1.2				
4.2.8.6	<i>The immediate action limit for switches and crossings</i>	1.1.1, 1.1.2	1.2			1.5	
4.2.9.1	<i>Usable length of platforms</i>	1.1.1, 2.1.1				1.5	
4.2.9.2	<i>Platform height</i>	1.1.1, 2.1.1				1.5	1.6.1
4.2.9.3	<i>Platform offset</i>	1.1.1, 2.1.1				1.5	1.6.1
4.2.9.4	<i>Track layout alongside platforms</i>	1.1.1, 2.1.1				1.5	1.6.1
4.2.10.1	<i>Maximum pressure variations in tunnels</i>	1.1.1, 2.1.1				1.5	
4.2.10.2	<i>Effect of cross winds</i>	1.1.1, 2.1.1	1.2			1.5	
4.2.10.3	<i>Aerodynamic effect on ballasted track</i>	1.1.1	1.2			1.5	
4.2.11.1	<i>Location markers</i>	1.1.1	1.2				
4.2.11.2	<i>Equivalent conicity in service</i>	1.1.1, 1.1.2				1.5	
4.2.12.2	<i>Toilet discharge</i>	1.1.5	1.2	1.3.1		1.5	
4.2.12.3	<i>Train external cleaning facilities</i>		1.2			1.5	
4.2.12.4	<i>Water restocking</i>	1.1.5	1.2	1.3.1		1.5	
4.2.12.5	<i>Refuelling</i>	1.1.5	1.2	1.3.1		1.5	
4.2.12.6	<i>Electric shore supply</i>	1.1.5	1.2			1.5	
4.4	<i>Operating rules</i>		1.2				
4.5	<i>Maintenance rules</i>		1.2				
4.6	<i>Professional qualifications</i>	1.1.5	1.2				
4.7	<i>Health and safety conditions</i>	1.1.5	1.2	1.3	1.4.1		

2. In point 4.2.1, note (*) of Table 3 “Performance parameters for freight traffic” is replaced as below
() Axle load is based on design mass in working order for power heads and locomotives as defined in point 2.1 of EN 15663:2009+AC:2010 and design mass under normal payload for other vehicles according to point 6.3 of EN15663:2009+AC:2010.*
3. In point 4.2.2.1 ‘List of basic parameters’, aspect H ‘Health, safety and environment’, point (c) is replaced as below:

(c) Aerodynamic effect on ballasted track (4.2.10.3)
4. In point 4.2.6.2.2 ‘Compatibility with braking systems’, paragraph (2) is replaced as below:
(2) Provisions for the use of eddy current braking systems on track shall be defined at operational level by the infrastructure manager on the basis of the specific characteristics of the track, including switches and crossings. The conditions of use of this braking system are registered in accordance with Decision 2014/880 (RINF).
5. In Point 4.2.2.1 “List of basic Parameters”, the following point is added to the aspect K. Maintenance Rules:
(b) Maintenance plan (4.5.2).
6. In point 4.2.4.4 “Abrupt change of cant deficiency”, paragraph (4) is replaced as below:
(4) Instead of point (1), for the 1 668 mm track gauge system, the maximum design values of abrupt change of cant deficiency shall be:

(a) 110 mm for $v \leq 115$ km/h,
(b) $(399-v)/2,6$ [mm] for $115 \text{ km/h} < v \leq 220 \text{ km/h}$,
(c) 70 mm for $220 \text{ km/h} < v \leq 230 \text{ km/h}$,
(d) Abrupt change of cant deficiency is not allowed for speeds of more than 230 km/h.
7. In point 4.2.4.5 “Equivalent conicity”, paragraph (3) is replaced as below:
(3) Design track gauge, rail head profile and rail inclination for plain line shall be selected to ensure that the equivalent conicity limits set out in Table 10 are not exceeded.
8. In point 4.2.4.6 “Railhead profile for plain line”, figure 1 is replaced as below:



9. In point 4.2.7.1.1 , Table 11 is replaced as follows:

Table 11: Factor alpha (α) for the design of new structures

Type of traffic	Minimum factor alpha (α)
P1, P2, P3, P4	1,0
P5	0,91
P6	0,83
P1520	1
P1600	1,1
F1, F2, F3	1,0
F4	0,91
F1520	1,46
F1600	1,1

10. Title of point 4.2.10.3 “Ballast pick up” is replaced as follows:

4.2.10.3 “Aerodynamic effect on ballasted track”

11. In point 4.2.10.3 ‘Ballast Pickup’, the following paragraphs are modified as below:

- a. Paragraph 4.2.10.3.(1) is replaced by the following:
The aerodynamic interaction between rolling stock and infrastructure may cause the lifting and further blowing away of ballast stones from the track bed in plain line and switches and crossings (Ballast pick up). This risk shall be mitigated.

- b. Paragraph 4.2.10.3(2) is replaced by the following:
The requirements for the infrastructure subsystem aimed at mitigating the risk for 'ballast pick up' apply only to lines intended to be operated at speed greater than 250 km/h.
- c. Paragraph 4.2.10.3(3) is replaced by the following:
For lines as defined in point (2) above with intended operating speed lower than or equal to 300 km/h and equipped with mono-block sleepers and bearers, the level of the ballast between the rails shall be lower than the upper surface of the sleepers and the bearers. Without prejudice to Point 4.2.6, the distance between the upper surface of the sleepers and the bearers, and the level of the ballast between rails shall be at least 3 cm.
- d. Paragraph 4.2.10.3(4) is introduced and shall read as:
For speed greater than 300 km/h, the requirements of point (1) above are an open point.

12. Point 4.2.12.2 "Toilet discharge" is replaced as follows:

Fixed installations for toilet discharge shall be compatible with the characteristics of the retention toilet system specified in the LOC & PAS TSI.

13. In point 4.2.12.4 "Water restocking", paragraph (1) is replaced as follows:

(1) Fixed equipment for water restocking shall be compatible with the characteristics of the water system specified in the LOC & PAS TSI.

14. Point 4.2.12.5 "Refuelling" is replaced as follows:

Refuelling equipment shall be compatible with the characteristics of the fuel system specified in the LOC & PAS TSI.

15. Point 4.2.12.6 "Electrical shore supply" is replaced as follows:

Where provided, electrical shore supply shall be by means of one or more of the power supply systems specified in the LOC & PAS TSI.

16. In point 4.3.1 "Interfaces with the rolling stock subsystem", Table 15 "Interfaces with the rolling stock subsystem, 'Locomotives and Passenger Rolling Stock TSI' " is replaced as follows:

Table 15: Interfaces with the rolling stock subsystem, 'Locomotives and Passenger Rolling Stock TSI'

Interface	Reference Infrastructure TSI	Reference Locomotives and Passenger Rolling Stock TSI
<i>Track gauge</i>	<p>4.2.4.1 Nominal track gauge</p> <p>4.2.5.1 Design geometry of switches and crossings</p> <p>4.2.8.6 The immediate action limits for switches and crossings</p>	<p>4.2.3.5.2.1 Mechanical and geometrical characteristics of wheelset</p> <p>4.2.3.5.2.3 Variable gauge wheelsets</p>
<i>Gauge</i>	<p>4.2.3.1 Structure gauge</p> <p>4.2.3.2 Distance between track centres</p> <p>4.2.3.5 Minimum radius of vertical curve</p> <p>4.2.9.3 Platform offset</p>	4.2.3.1. Gauging
<i>Axle load and axle spacing</i>	<p>4.2.6.1 Track resistance to vertical loads</p> <p>4.2.6.3 Lateral track resistance</p> <p>4.2.7.1 Resistance of new bridges to traffic loads</p> <p>4.2.7.2 Equivalent vertical loading for new earthworks and earth pressure effects imposed on new structures</p> <p>4.2.7.4 Resistance of existing bridges and earthworks to traffic loads</p>	<p>4.2.2.10 Load conditions and weighed mass</p> <p>4.2.3.2.1 Axle load parameter</p>
<i>Running characteristics</i>	<p>4.2.6.1 Track resistance to vertical loads</p> <p>4.2.6.3 Lateral track resistance</p> <p>4.2.7.1.4 Nosing forces</p>	<p>4.2.3.4.2.1 Limit values for running safely</p> <p>4.2.3.4.2.2 Track loading limit values</p>
<i>Ride stability</i>	<p>4.2.4.4 Equivalent conicity</p> <p>4.2.4.6 Railhead profile for plain line</p> <p>4.2.11.2 Equivalent conicity in service</p>	<p>4.2.3.4.3 Equivalent conicity</p> <p>4.2.3.5.2.2 Mechanical and geometrical characteristics of wheels</p>

Table 15: Interfaces with the rolling stock subsystem, 'Locomotives and Passenger Rolling Stock TSI'

<i>Interface</i>	<i>Reference Infrastructure TSI</i>	<i>Reference Locomotives and Passenger Rolling Stock TSI</i>
<i>Longitudinal actions</i>	4.2.6.2 Longitudinal track resistance 4.2.7.1.5 Actions due to traction and braking (longitudinal loads)	4.2.4.5 Braking performance
<i>Minimum horizontal curve radius</i>	4.2.3.4 Minimum radius of horizontal curve	4.2.3.6 Minimum curve radius Annex A, A.1 Buffers
<i>Running dynamic behaviour</i>	4.2.4.3 Cant deficiency	4.2.3.4.2. Running dynamic behaviour
<i>Maximum deceleration</i>	4.2.6.2 Longitudinal track resistance 4.2.7.1.5 Actions due to traction and braking	4.2.4.5 Braking performance
<i>Aerodynamic effect</i>	4.2.3.2 Distance between track centres 4.2.7.3 Resistance of new structures over or adjacent to tracks 4.2.10.1 Maximum pressure variations in tunnels 4.2.10.3 Aerodynamic effect on ballasted track	4.2.6.2.1 Slipstream effects on passengers on platforms and on trackside workers 4.2.6.2.2 Head pressure pulse 4.2.6.2.3 Maximum pressure variations in tunnels 4.2.6.2.5 Aerodynamic effect on ballasted tracks
<i>Crosswind</i>	4.2.10.2 Effect of crosswinds	4.2.6.2.4 Crosswind
<i>Installations for servicing trains</i>	4.2.12.2 Toilet discharge 4.2.12.3 Train external cleaning facilities 4.2.12.4 Water restocking 4.2.12.5 Refuelling 4.2.12.6 Electric shore supply	4.2.11.3 Toilet discharge system 4.2.11.2.2 Exterior cleaning through a washing plant 4.2.11.4 Water refilling equipment 4.2.11.5 Interface for water refilling 4.2.11.7 Refuelling equipment 4.2.11.6 Special requirements for stabling of trains

17. In point 4.3.1 "Interfaces with the rolling stock subsystem", Table 16 "Interfaces with the rolling stock subsystem, 'Freight Wagons TSI' " is replaced as follows:

Table 16: Interfaces with the rolling stock subsystem, 'Freight Wagons TSI'

Interface	Reference Infrastructure TSI	Reference Freight wagons TSI
Track gauge	4.2.4.1 Nominal track gauge 4.2.4.6 Railhead profile for plain line 4.2.5.1 Design geometry of switches and crossings 4.2.8.6 The immediate action limits for switches and crossings	4.2.3.6.2 Characteristics of wheelsets 4.2.3.6.3 Characteristics of wheels
Gauge	4.2.3.1 Structure gauge 4.2.3.2 Distance between track centres 4.2.3.5 Minimum radius of vertical curve 4.2.9.3 Platform offset	4.2.3.1 Gauging
Axle load and axle spacing	4.2.6.1 Track resistance to vertical loads 4.2.6.3 Lateral track resistance 4.2.7.1 Resistance of new bridges to traffic loads 4.2.7.2 Equivalent vertical loading for new earthworks and earth pressure effects imposed on new structures 4.2.7.4 Resistance of existing bridges and earthworks to traffic loads	4.2.3.2 Compatibility with load carrying capacity of lines
Running dynamic behaviour	4.2.8 Immediate action limits on track geometry defects	4.2.3.5.2 Running dynamic behaviour
Longitudinal actions	4.2.6.2 Longitudinal track resistance 4.2.7.1.5 Actions due to traction and braking (longitudinal loads)	4.2.4.3.2 Brake performance
Minimum curve radius	4.2.3.4 Minimum radius of horizontal curve	4.2.2.1. Mechanical interface
Vertical curve	4.2.3.5 Minimum radius of vertical curve	4.2.3.1 Gauging

18. In point 4.3.4, Table 19 “Interfaces with the operation and traffic management subsystem” is replaced as follows:

Table 19 “Interfaces with the operation and traffic management subsystem”

<i>Interface</i>	<i>Reference Infrastructure TSI</i>	<i>Reference Operation and Traffic Management TSI</i>
<i>Ride stability</i>	<i>4.2.11.2 Equivalent conicity in service</i>	<i>4.2.3.4.4 Operational quality</i>
<i>Use of eddy current brakes</i>	<i>4.2.6.2 Longitudinal track resistance</i>	<i>4.2.2.6.2 Braking performance</i>
<i>Crosswinds</i>	<i>4.2.10.2 Effect of crosswinds</i>	<i>4.2.3.6.3 Contingency arrangements</i>
<i>Operating rules</i>	<i>4.4 Operating rules</i>	<i>4.2.1.2.2.2 Modifications to information contained in the route book 4.2.3.6 Degraded operation</i>
<i>Staff competences</i>	<i>4.6 Professional competences</i>	<i>2.2.1 Staff and trains</i>

19. Point 4.5.2 ‘Maintenance Plan’ is replaced by the following:

The infrastructure manager shall have a maintenance plan containing the items listed in point 4.5.1 together with at least the following:

- (a) a set of values for intervention limits and alert limits,*
- (b) a statement about the methods, professional competences of staff and personal protective safety equipment necessary to be used,*
- (c) the rules to be applied for the protection of people working on or near the track,*
- (d) the means used to check that in-service values are respected,*
- (e) the measures taken, for speed greater than 250 km/h, to mitigate the risk of ballast pick up.*

20. In point 4.7 “ Health and safety conditions”, paragraph (1) is replaced as follows:

(1) The health and safety conditions of staff required for the operation and maintenance of the infrastructure subsystem shall be compliant with the relevant European and national legislation.

21. In point 5.3.2 ‘The rail fastening systems’, point 2(b) is replaced as follows:

(b) the rail fastening shall resist application of 3 000 000 cycles of the typical load applied in a sharp curve, such that the change in performance of the fastening system shall not exceed:

- 20 % in terms of clamping force,*
- 25 % in terms of vertical stiffness,*
- a reduction of more than 20% in terms of longitudinal restraint.*

The typical load shall be appropriate to:

- the maximum axle load the rail fastening system is designed to accommodate,*
- the combination of rail, rail inclination, rail pad and type of sleepers with which the fastening system may be used.*

22. In point 6.2.4 “Particular assessment procedures for infrastructure subsystem”, the following point is added:

6.2.4.15 ‘Assessment of compatibility with braking systems’

The assessment of the requirements laid down in point 4.2.6.2.2(2) is not required.

23. In point 6.2.5 “Technical solutions giving presumption of conformity at design stage”, the following point is added:

6.2.5.3 ‘Assessment of aerodynamic effect on ballasted track’

- (1) The demonstration of conformity of the track to the requirements to mitigate the risk of ballast pick-up as laid down in point 4.2.10.3(1) may be done, alternatively to paragraph 4.2.10.3(3), by referring to an existing track design, including switches and crossings, on which rolling stock compliant with point 7.1.1.8 of the LOC&PAS TSI is or has been in normal operation with the same or higher speed.*
- (2) Points 6.2.5.1(2), (3), (4), (5) and (6) apply. For switches and crossings, technical characteristics as set out in Appendix C.2 and conditions of use as set out in Appendix D.2 apply.*
- (3) When reference is made to Appendix D.1 and Appendix D.2, the only conditions of use to be assessed are the maximum line speed on plain track and the maximum line speed on through route on switches.*
- (4) The assessment of the requirements of paragraph 6.2.5.3(1) shall be based on a written declaration of the infrastructure manager.*

24. In point 7.3.3 “Substitution in the framework of maintenance”, paragraph (4) is replaced as follows:

(4) In such cases, it is noted that each of the above elements taken separately cannot ensure compliance of the whole subsystem. The conformity of a subsystem can only be stated when all the elements are compliant with the TSI.

25. In point 7.7.2 “Particular features on the Belgian network”, the first paragraph is replaced as follows:

For platform heights of 550 mm and 760 mm, the conventional value b_{q0} of platform offset shall be calculated according to the following formulas:

26. In point 7.7.11 “Particular features on the Latvian network”, paragraph (2) of point 7.7.11.1 shall be deleted.

27. In point 7.6 ‘Ascertain Compatibility of infrastructure and rolling stock after authorisation of rolling stock’, point (2) is replaced as follows:

(2) *The design of the TSI categories of line as defined in section 4 is generally compatible with the operation of vehicles categorised in accordance with EN 15528:2015 at up to the maximum speed as shown in Appendix E. However there may be a risk of excessive dynamic effects including resonance in certain bridges which may further impact the compatibility of vehicles and infrastructure.*

28. In point 7.7.8.1, the title “Platform height (4.2.9.3)” is replaced as follows:

“Platform height (4.2.9.2)”

29. In Appendix A, table 36 “Assessment of interoperability constituents for the EC declaration of conformity” is replaced as follows:

<i>Characteristics to be assessed</i>	<i>Assessment in the following phase</i>			
	<i>Design and development phase</i>			<i>Production phase</i>
	<i>Design review</i>	<i>Review of manufacturing process</i>	<i>Type test</i>	<i>Manufacturing process + product test</i>
				<i>Product quality (series)</i>
<i>5.3.1 The rail</i>				
<i>5.3.1.1 Railhead profile</i>	X	n.a.	X	X
<i>5.3.1.2 Rail steel</i>	X	X	X	X
<i>5.3.2 The rail fastening systems</i>	n.a.	n.a.	X	X
<i>5.3.3 Track sleepers</i>	X	X	n.a.	X

30. In Appendix B, Table 37 shall be complemented by adding the following row:

<i>Characteristics to be assessed</i>	<i>Design review</i>	<i>Assembly before putting into service</i>	<i>Particular assessment procedures</i>
<i>Aerodynamic effect on ballasted track (4.2.10.3)</i>	X	n.a	6.2.5.3

31. In Appendix B, the row in Table 37 relative to ‘Longitudinal track resistance’ shall be replaced as below:

<i>Characteristics to be assessed</i>	<i>Design review</i>	<i>Assembly before putting into service</i>	<i>Particular assessment procedures</i>
<i>Longitudinal track resistance (4.2.6.2)</i>	X	n.a	6.2.5 6.2.4.15

32. In Appendix C2 “Technical characteristics of switches and crossings design”, point “(c) Sleeper” is replaced as follows:

(c) Bearer

33. In Appendix E:

- second paragraph is replaced as follows:

EN line category is a function of axle load and geometrical aspects relating to the spacing of axles. EN line categories are set out in Annex A of EN 15528:2015.

- Table 38 ‘Capability requirements for structures according to traffic code’ is replaced as follows:

Table 38: EN Line Category –Associated Speed ⁽¹⁾⁽⁶⁾ [km/h] – Passenger traffic

Traffic code	Passenger Carriages (including Coaches, Vans and Car Carriers) and Light Freight Wagons ⁽²⁾⁽³⁾	Locomotives and Power Heads ⁽²⁾⁽⁴⁾	Electric or Diesel Multiple Units, Power Units and Railcars ⁽²⁾⁽³⁾
P1	n.a. ⁽¹¹⁾	n.a. ⁽¹¹⁾	Open Point
P2	n.a. ⁽¹¹⁾	n.a. ⁽¹¹⁾	Open Point
P3a (> 160 km/h)	A – 200 B1 - 160	D2 – 200 ⁽¹⁰⁾	Open point
P3b (≤ 160 km/h)	B1 – 160	D2 – 160	C2 ⁽⁸⁾ – 160 D2 ⁽⁹⁾ - 120
P4a (> 160 km/h)	A – 200 B1 - 160	D2 – 200 ⁽¹⁰⁾	Open point
P4b (≤ 160 km/h)	A – 160 B1 - 140	D2 - 160	B1 ⁽⁷⁾ – 160 C2 ⁽⁸⁾ – 140 D2 ⁽⁹⁾ - 120
P5	B1 - 120	C2 - 120 ⁽⁵⁾	B1 ⁽⁷⁾ - 120
P6	a12		
P1520	Open point		
P1600	Open point		

- note (1) is replaced as follows:

(1) The indicated speed value in the table represents the maximum requirement for the line and may be lower in accordance with the requirements in point 4.2.1(12). When checking individual structures on the line, it is acceptable to take account of the type of vehicle and local allowed speed.

- note (2) is replaced as follows:

(2) Passenger Carriages (including Coaches, Vans, Car Carriers), Other Vehicles, Locomotives, Power Heads, Diesel and Electric Multiple Units, Power Units and Railcars are defined in the LOC & PAS TSI. Light Freight Wagons are defined as vans except that they are allowed to be conveyed in formations which are not intended to convey passengers.

- note (10) shall be deleted;
- note (11) as follows shall be added:

(11) Taking into account the state of art of operation there is no need to define harmonized requirements to deliver an adequate level of interoperability for this type of vehicles for P1 and P2 traffic codes.

34. In Appendix F:

- Table 40 'Capability requirements for structures according to traffic code in United Kingdom of Great Britain and Northern Ireland' is replaced by the following:

Table 40: Route Availability number –Associated Speed ^{(1) (5)} [miles per hour] – Passenger traffic

Traffic code	Passenger Carriages (including Coaches, Vans and Car Carriers) and Light Freight Wagons ^{(2) (3) (6)}	Locomotives and Power Heads ^{(2) (4)}	Electric or Diesel Multiple Units, Power Units and Railcars ^{(2) (3) (6)}
P1	n.a. ⁽¹¹⁾	n.a. ⁽¹¹⁾	Open Point
P2	n.a. ⁽¹¹⁾	n.a. ⁽¹¹⁾	Open Point
P3a (> 160 km/h)	RA1 – 125 RA2 – 90	RA7 – 125 ⁽⁷⁾ RA8 – 110 ⁽⁷⁾ RA8 – 100 ⁽⁸⁾ RA5 – 125 ⁽⁹⁾	Open point
P3b (≤ 160 km/h)	RA1 – 100	RA8 – 100 ⁽⁸⁾	RA3 – 100

	RA2 – 90	RA5 – 100 ⁽⁹⁾	
P4a (> 160 km/h)	RA1 – 125 RA2 – 90	RA7 – 125 ⁽⁷⁾ RA7 – 100 ⁽⁸⁾ RA4 – 125 ⁽⁹⁾	Open point
P4b (≤ 160 km/h)	RA1 – 100 RA2 – 90	RA7 – 100 ⁽⁸⁾ RA4 – 100 ⁽⁹⁾	RA3 – 100
P5	RA1 – 75	RA5 – 75 ^{(8) (10)} RA4 – 75 ^{(9) (10)}	RA3 – 75
P6	RA1		
P1600	Open point		

- note (1) is replaced as follows:

(1) *The indicated speed value in the table represents the maximum requirement for the line and may be lower in accordance with the requirements in point 4.2.1(12). When checking individual structures on the line, it is acceptable to take account of the type of vehicle and local allowed speed.*

- note (2) is replaced as follows;

(2) *Passenger Carriages (including Coaches, Vans, Car Carriers), Other Vehicles, Locomotives, Power Heads, Diesel and Electric Multiple Units, Power Units and Railcars are defined in the LOC & PAS TSI. Light Freight Wagons are defined as vans except that they are allowed to be conveyed in formations which are not intended to convey passengers.*

- Note (11) shall be added as follows:

(11) *Taking into account the state of art of operation there is no need to define harmonized requirements to deliver an adequate level of interoperability for this type of vehicles for P1 and P2 traffic codes.*

35. In Appendix K, fourth paragraph: *‘It is anticipated that the next revision of EN15528+A1:2012 will specify that these mass definitions shall be used when checking the compatibility of infrastructure and rolling stock.’* shall be deleted;

36. Appendix L *‘Definition of EN line category a12 for traffic code P6’* shall be deleted;

37. In Appendix P, point P3 “Vertical lowering”, the second paragraph is modified as follows (normal font):

The vertical curve radius R_v is limited to 500m. Heights not exceeding 80 mm shall be considered as zero within a radius R_v between 500 m and 625 m.

38. In Appendix Q, table 47 is modified as follows

Table 47: Notified national technical rules for UK-GB Specific Cases

Specific Case	TSI Point	Requirement	NTR Ref	NTR Title
7.7.17.1	4.2.1: Table 2 & Table 3	Categories of line: Gauge	GI/RT7073	Requirements for the Position of Infrastructure and for Defining and Maintaining Clearances
			GE/RT8073	Requirements for the Application of Standard Vehicle Gauges
			GI/RT7016	Interface between Station Platforms, Track and Trains
7.7.17.2 & 7.7.17.9	4.2.3.1 & 6.2.4.1	Structure gauge	GI/RT7073	Requirements for the Position of Infrastructure and for Defining and Maintaining Clearances
			GE/RT8073	Requirements for the Application of Standard Vehicle Gauges
			GI/RT7016	Interface between Station Platforms, Track and Trains
7.7.17.3 & 7.7.17.10	4.2.3.2: Table 4 & 6.2.4.2	Distance between track centres	GI/RT7073	Requirements for the Position of Infrastructure and for Defining and Maintaining Clearances
7.7.17.4	4.2.5.3 & Appendix J	Maximum unguided length of fixed obtuse crossings	GC/RT5021	Track System Requirements
			GM/RT2466	Railway Wheelsets
7.7.17.6	4.2.9.2	Platform height	GI/RT7016	Interface between Station Platforms, Track and Trains
7.7.17.7 & 7.7.17.11	4.2.9.3 & 6.2.4.11	Platform offset	GI/RT7016	Interface between Station Platforms, Track and Trains
			GI/RT7073	Requirements for the Position of Infrastructure

				<i>and for Defining and Maintaining Clearances</i>
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39. Appendix R 'List of open points' is replaced as follows:

List of open points

- (1) *Immediate action limits for isolated defects in alignment for speeds of more than 300 km/h (4.2.8.1).*
- (2) *Immediate action limits for isolated defects in longitudinal level for speeds of more than 300 km/h (4.2.8.2).*
- (3) *The minimum allowed value of distance between track centres for the uniform structure gauge IRL3 is an open point (7.7.18.2).*
- (4) *EN Line Category –Associated Speed [km/h] for Traffic codes P1 (multiple units), P2 (multiple units), P3a (multiple units), P4a (multiple units), P1520 (all vehicles), P1600 (all vehicles), F1520 (all vehicles) and F1600 (all vehicles) in Appendix E, Tables 38 and 39.*
- (5) *Route Availability Number –Associated Speed [miles/h] for Traffic codes P1 (multiple units), P2 (multiple units), P3a (multiple units), P4a (multiple units), P1600 (all vehicles) and F1600 (all vehicles) in Appendix F, Tables 40 and 41.*
- (6) *Rules and drawings related to gauges IRL1, IRL2 and IRL3 are an open point (Appendix O).*
- (7) *The requirements for mitigating the risk for ballast pick up for speed greater than 300 km/h.*

40. In Appendix S "Glossary", Table 48 is replaced by the following:

Table 48: Terms

Defined term	TSI point	Definition
Actual point (RP) / Praktischer Herzpunkt / Pointe de coeur	4.2.8.6	Physical end of a crossing vee. See Figure 2, which shows the relationship between the actual point (RP) and the intersection point (IP).
Alert limit / Auslösewert / Limite d'alerte	4.5.2	Refers to the value which, if exceeded, requires that the track geometry condition is analysed and considered in the regularly planned maintenance operations.
Axle load/ Achsfahrmasse/ Charge à l'essieu	4.2.1, 4.2.6.1	Sum of the static vertical wheel forces exerted on the track through a wheelset or a pair of independent wheels divided by acceleration of gravity.
Braking systems independent of wheel-rail adhesion conditions"	4.2.6.2.2	"Braking systems independent of wheel – rail adhesion conditions" refers to all brake systems of the rolling stock capable to develop a brake force applied to the rails independently of the wheel – rail adhesion conditions (e.g. magnetic braking systems and eddy current braking systems)

Table 48: Terms

Defined term	TSI point	Definition
Cant / Überhöhung / Dévers de la voie	4.2.4.2 4.2.8.5	Difference in height, relative to the horizontal, of the two rails of one track at a particular location, measured at the centrelines of the heads of the rails.
Cant deficiency / Überhöhungsfehlbetrag / Insuffisance de devers	4.2.4.3	Difference between the applied cant and a higher equilibrium cant.
Common crossing / Starres Herzstück / Coeur de croisement	4.2.8.6	Arrangement ensuring intersection of two opposite running edges of turnouts or diamond crossings and having one crossing vee and two wing rails.
Crosswind / Seitenwind / Vents traversiers	4.2.10.2	Strong wind blowing laterally to a line which may adversely affect the safety of trains running.
Design value / Planungswert / Valeur de conception	4.2.3.4, 4.2.4.2, 4.2.4.5, 4.2.5.1, 4.2.5.3	Theoretical value without manufacturing, construction or maintenance tolerances.
Design track gauge / Konstruktionsspurweite / Ecartement de conception de la voie	5.3.3	A single value which is obtained when all the components of the track conform precisely to their design dimensions or their median design dimension when there is a range.
Distance between track centres / Gleisabstand / Entraxe de voies	4.2.3.2	The distance between points of the centre lines of the two tracks under consideration, measured parallel to the running surface of the reference track namely the less canted track.
Dynamic lateral force / Dynamische Querkraft / Effort dynamique transversal	4.2.6.3	The sum of dynamic forces exerted by a wheelset on the track in lateral direction.
Earthworks/ Erdbauwerke/ Ouvrages en terre	4.2.7.2, 4.2.7.4	Soil structures and soil-retaining structures that are subject to railway traffic loading.
EN Line Category / EN Streckenklasse / EN Catégorie de ligne	4.2.7.4, Appendix E	The result of the classification process set out in EN 15528:2015 Annex A and referred to in that standard as 'Line Category'. It represents the ability of the infrastructure to withstand the vertical loads imposed by

Table 48: Terms

Defined term	TSI point	Definition
		vehicles on the line or section of line for regular (“normal”) service.
Equivalent conicity / Äquivalente Konizität / Conicité équivalente	4.2.4.5, 4.2.11.2	The tangent of the cone angle of a wheelset with coned wheels whose lateral movement has the same kinematic wavelength as the given wheelset on straight track and large-radius curves. !!
Fixed nose protection / Leitweite / Cote de protection de pointe	4.2.5.3, Appendix J	Dimension between the crossing nose and check rail (see dimension No. 2 on Figure 10 below).
Flangeway depth / Rillentiefe / Profondeur d’ornière	4.2.8.6.	Dimension between the running surface and the bottom of flangeway (see dimension No. 6 on Figure 10 below).
Flangeway width / Rillenweite / Largeur d’ornière	4.2.8.6.	Dimension between a running rail and an adjacent check or wing rail (see dimension No. 5 on Figure 10 below).
Free wheel passage at check rail/wing rail entry/ Freier Raddurchlauf im Radlenker-Einlauf /Flügelschienen-Einlauf/ Côte d’équilibrage du contre-rail	4.2.8.6.	Dimension between the working face of the crossing check rail or wing rail and the gauge face of the running rail opposite across the gauge measured at entry to check rail or wing rail respectively. (see dimensions No.4 on Figure 10 below). The entry to the check rail or wing rail is the point at which the wheel is allowed to contact the check rail or wing rail.
Free wheel passage at crossing nose/ Freier Raddurchlauf im Bereich der Herzspitze/ Cote de libre passage dans le croisement	4.2.8.6.	Dimension between the working face of the crossing wing rail and check rail opposite across the gauge (see dimension No.3 on Figure 10 below).
Free wheel passage in switches/ Freier Raddurchlauf im Bereich der Zungen-vorrichtung / Côte de libre passage de l’aiguillage	4.2.8.6.	Dimension from the gauge face of one switch rail to the back edge of the opposite switch rail (see dimension No.1 on Figure 10 below).
Gauge / Begrenzungslinie / Gabarit	4.2.1, 4.2.3.1	Set of rules including a reference contour and its associated calculation rules allowing definition of the outer dimensions of the vehicle and the space to be cleared by the infrastructure.

Table 48: Terms

Defined term	TSI point	Definition
HBW/HBW/HBW	5.3.1.2	The non SI unit for steel hardness defined in EN ISO 6506-1:2005 Metallic materials – Brinell hardness test. Test method.
Height of check rail / Radlenkerüberhöhung / Surélévation du contre rail	4.2.8.6, Appendix J	Height of the check rail above the running surface (see dimension 7 on Figure 14 below).
Immediate Action Limit / Soforteingriffsschwelle / Limite d'intervention immédiate	4.2.8, 4.5	The value which, if exceeded, requires taking measures to reduce the risk of derailment to an acceptable level.
Infrastructure Manager/ Betreiber der Infrastruktur/ Gestionnaire de l'Infrastructure	4.2.5.1, 4.2.8.3, 4.2.8.6, 4.2.11.2 4.4, 4.5.2, 4.6, 4.7, 6.2.2.1, 6.2.4, 6.4	As defined in Article 2h) of Directive 2001/14/EC of 26 February 2001 on the allocation of railway infrastructure capacity and the levying of charges for the use of railway infrastructure and safety certification (OJ L 75, 15.3.2001, p.29)
In service value / Wert im Betriebszustand / Valeur en exploitation	4.2.8.5, 4.2.11.2	Value measured at any time after the infrastructure has been placed into service.
Intersection point (IP) / Theoretischer Herzpunkt / Point d'intersection théorique	4.2.8.6	Theoretical intersection point of the running edges at the centre of the crossing (see figure 2).
Intervention Limit / Eingriffsschwelle / Valeur d'intervention	4.5.2	The value, which, if exceeded, requires corrective maintenance in order that the immediate action limit shall not be reached before the next inspection;
Isolated defect / Einzelfehler / Défaut isolé	4.2.8	A discrete track geometry fault.
Line speed / Streckengeschwindigkeit / Vitesse de la ligne	4.2.1	Maximum speed for which a line has been designed.
Maintenance file / Instandhaltungsdossier / Dossier de maintenance	4.5.1	Elements of the technical file relating to conditions and limits of use and instructions for maintenance.

Table 48: Terms

Defined term	TSI point	Definition
Maintenance plan / Instandhaltungsplan / Plan de maintenance	4.5.2	A series of documents setting out the infrastructure maintenance procedures adopted by an Infrastructure Manager.
Multi-rail track/ Mehrschienengleis/ Voie à multi écartement	4.2.2.2	Track with more than two rails, where at least two pairs of respective rails are designed to be operated as separate single tracks, with or without different track gauges.
Nominal track gauge / Nennspurweite / Ecartement nominal de la voie	4.2.4.1	A single value which identifies the track gauge but may differ from the design track gauge.
Normal service / Regelbetrieb / Service régulier	4.2.2.2 4.2.9	The railway operating to a planned timetable service.
Passive provision / Vorsorge für künftige Erweiterungen / Réserve pour extension future	4.2.9	Provision for the future construction of a physical extension to a structure (for example: increased platform length).
Performance Parameter/ Leistungskennwert/ Paramètre de performance	4.2.1	Parameter describing a TSI Category of Line used as the basis for the design of infrastructure subsystem elements and as the indication of the performance level of a line.
Plain line / Freie Strecke / Voie courante	4.2.4.5 4.2.4.6 4.2.4.7	Section of track without switches and crossings.
Point retraction / Spitzenbeihobelung / Dénivellation de la pointe de cœur	4.2.8.6	The reference line in a fixed common crossing can deviate from the theoretical reference line. From a certain distance to the crossing point, the reference line of the vee can, depending on the design, be retracted from this theoretical line away from the wheel flange in order to avoid contact between both elements. This situation is described in Figure 2.
Rail inclination / Schienenneigung / Inclinaison du rail	4.2.4.5 4.2.4.7	An angle defining the inclination of the head of a rail when installed in the track relative to the plane of the rails (running surface), equal to the angle between the axis of symmetry of the rail (or of an equivalent symmetrical rail having the same rail head profile) and the perpendicular to the plane of the rails.
Rail pad /	5.3.2	A resilient layer fitted between a rail and the supporting sleeper or baseplate.

Table 48: Terms

Defined term	TSI point	Definition
Schienezwischenlage / Semelle sous rail		
Reverse curve / Gegenbogen / Courbes et contre-courbes	4.2.3.4	Two abutting curves of opposite flexure or hand
Structure gauge / Lichtraum / Gabarit des obstacles	4.2.3.1	Defines the space in relation to the reference track that shall be cleared of all objects or structures and of the traffic on the adjacent tracks, in order to allow safe operation on the reference track. It is defined on the basis of the reference contour by application of the associated rules.
Swing nose	4.2.5.2	Within the domain of “common crossing with movable point”, the term “swing nose” identifies the part of the crossing which forms the vee and that it is moved to form a continuous running edge for either the main or the branch line.
Switch / Zungenvorrichtung / aiguillage	4.2.8.6	A unit of track comprising two fixed rails (stock rails) and two movable rails (switch rails) used to direct vehicles from one track to another track.
Switches and crossings / Weichen und Kreuzungen / Appareil de voie	4.2.4.5, 4.2.4.7, 4.2.5, 4.2.6, 4.2.8.6, 5.2, 6.2.4.4, 6.2.4.8, 6.2.5.2, 7.3.3, Appendix C and D,	Track constructed from sets of switches and individual crossings and the rails connecting them.
Through route / Stammgleis / Voie directe	Appendix D	In the context of switches and crossings a route which perpetuate the general alignment of the track.
Track design	4.2.6, 6.2.5, Appendix C and D	The track design consists of cross-section defining basic dimensions and track components (for example rail, rail fastenings, sleepers, ballast) used together with operating conditions with an impact on forces related to 4.2.6., such as axle load, speed and radius of horizontal curvature.
Track gauge / Spurweite /	4.2.4.1, 4.2.4.5, 4.2.8.4, 5.3.3,	The smallest distance between lines perpendicular to the running surface intersecting each rail head profile in a range from 0 to 14 mm below the running surface.

Table 48: Terms

Defined term	TSI point	Definition
Ecartement de la voie	6.1.5.2, 6.2.4.3, Appendix H	
Track twist / Gleisverwindung / Gauche	4.2.7.1.6 4.2.8.3, 6.2.4.9,	Track twist is defined as the algebraic difference between two cross levels taken at a defined distance apart, usually expressed as a gradient between the two points at which the cross level is measured.
Train length/ Zuglänge/ Longueur du train	4.2.1	The length of a train, which can run on a certain line in normal operation.
Unguided length of an obtuse crossing / Führungslose Stelle / Lacune dans la traversée	4.2.5.3, Appendix J	Portion of obtuse crossing where there is no guidance of the wheel described as “unguided distance” in EN 13232-3:2003.
Usable length of a platform / Bahnsteignutzlänge / Longueur utile de quai	4.2.1, 4.2.9.1	The maximum continuous length of that part of platform in front of which a train is intended to remain stationary in normal operating conditions for passengers to board and alight from the train, making appropriate allowance for stopping tolerances. Normal operating conditions means that railway is operating in a non-degraded mode (e.g. rail adhesion is normal, signals are working, everything is working as planned).

41. In Appendix T ‘List of referenced standards’, index n.4 of Table 49 is replaced as follows:

4	EN 13848-1	Track geometry quality – Part 1: Characterisation of track geometry (with Amendment A1:2008)	2003	The immediate action limit for track twist (4.2.8.3)
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42. In Appendix T ‘List of referenced standards’, index n.9 of Table 49 is replaced as follows:

9	EN 15528	Railway applications – Line categories for managing the interface between load limits of	2015	Ascertain compatibility of infrastructure and rolling stock after authorisation of rolling stock (7.6), Capability requirements for structures according to traffic code (Appendix E), Basis of minimum requirements for structures for
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		<i>vehicles and infrastructure</i>		<i>passenger coaches and multiple units (Appendix K)</i>
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