

Annex I: Amendments to Technical specification for interoperability relating to the subsystem ‘Rolling stock – freight wagons’ (Annex to Commission Regulation (EU) No 321/2013, amended by Commission Regulation (EU) No 1236/2013 and Commission Regulation (EU) 2015/924)

1. In ‘TABLE OF CONTENTS’, the following rows are added below chapter 2:
 - ‘2.1. Scope
 - 2.2. Definitions’
2. In ‘TABLE OF CONTENTS’, the text in point 4.2.3.6.6 ‘Variable gauge wheelsets’ is replaced by ‘Automatic variable gauge systems’
3. In ‘TABLE OF CONTENTS’, a new row is added below point 5.3.4a: ‘5.3.4b. Automatic variable gauge system’
4. In ‘TABLE OF CONTENTS’, a new row is added below point 6.1.2.5: ‘6.1.2.6. Automatic variable gauge system’
5. In ‘TABLE OF CONTENTS’, a new row is added below point 6.2.2.4: ‘6.2.2.4a. Automatic variable gauge systems’
6. In ‘TABLE OF CONTENTS’, the text in section 7.2 ‘Substitution, renewal and upgrading’ is replaced by ‘General rules for implementation’
7. In ‘TABLE OF CONTENTS’, the following rows are added below section 7.2:
 - ‘7.2.1. Substitution of constituents
 - 7.2.2. Modifications to an existing unit
 - 7.2.2.1. Introduction
 - 7.2.2.2. Modifications to an existing unit not covered by an EC certificate of verification against TSIs
 - 7.2.2.3. Modifications to an existing unit covered by an EC certificate of verification against TSIs
 - 7.2.3. Rules related to the EC type or design examination certificates
 - 7.2.3.1. Rolling stock subsystem
 - 7.2.3.1.1. Phase A
 - 7.2.3.1.2. Phase B
 - 7.2.3.1.3. Modifications to a type or design already bearing an EC examination certificate
 - 7.2.3.2. Interoperability constituents’
8. The chapter 2 ‘SCOPE AND DEFINITION OF SUBSYSTEM’ is replaced by the following:
 - ‘2. SCOPE AND DEFINITION OF SUBSYSTEM
 - 2.1. Scope

This TSI is applicable to ‘freight wagons including vehicles designed to carry lorries’ as referred to in Annex I Section 1.2 to Directive 2008/57/EC taking into account the limitations as set out in Article 2. In the following this part of the subsystem rolling stock is called ‘freight wagon’ and belongs to the subsystem ‘rolling stock’ as set out in Annex II to Directive 2008/57/EC.

The other vehicles listed in point 1.2 of Annex I to Directive 2008/57/EC are excluded from the scope of this TSI; this is especially the case for:

- (a) mobile railway infrastructure construction and maintenance equipment
- (b) vehicles designed to carry:
 - motor vehicles with their passengers on board, or
 - motor vehicles without passengers on board but intended to be integrated in passenger trains (car carriers)
- (c) vehicles which
 - increase their length in loaded configuration, and
 - their payload itself is part of the vehicle structure.

Note: See also section 7.1 for particular cases.

2.2. Definitions

In the present TSI the following definitions are used:

- (a) A 'unit' is the generic term used to name the rolling stock. It is subject to the application of this TSI, and therefore subject to the EC verification procedure.

A unit can consist of:

- a 'wagon' that can be operated separately, featuring an individual frame mounted on its own set of wheels, or
 - a rake of permanently connected 'elements', those elements cannot be operated separately, or
 - 'separate rail bogies connected to compatible road vehicle(s)' the combination of which forms a rake of a rail compatible system.
- (b) A 'train' is an operational formation consisting of several units.
 - (c) The 'design operating state' covers all conditions under which the unit is intended to operate and its technical boundaries. This design operating state may go beyond the specifications of this TSI in order that units may be used together in a train on the network under the safety management system of a railway undertaking.'

9. In chapter 3, the row 4.2.3.6.6 of Table 1 is replaced by the following:

4.2.3.6.6	Automatic variable gauge systems	1.1.1, 1.1.2, 1.1.3				
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10. In chapter 4 'CHARACTERISATION OF THE SUBSYSTEM', the point 4.2.2.2 'Strength of unit' is replaced by the following:

'The structure of a unit body, any equipment attachments and lifting and jacking points shall be designed such that no cracks, no significant permanent deformation or ruptures occur under the load cases defined in Chapter 5 of EN 12663-2:2010.

In case of a rake of a rail compatible system composed of separate rail bogies connected to compatible road vehicles, the load cases may differ from those mentioned above, due to their bi-modal specification; in such a case, the load cases considered shall be described by the applicant based on a consistent set of specifications with consideration of the specific conditions of use related to train composition, shunting and operation.

The demonstration of conformity is described in point 6.2.2.1.

The lifting and jacking positions shall be marked on the unit. The marking shall comply with point 4.5.14 of EN 15877-1:2012.

Note: Joining techniques are deemed to be covered as well by the demonstration of conformity in accordance to point 6.2.2.1.'

11. In chapter 4 'CHARACTERISATION OF THE SUBSYSTEM', the text 'EN 15273-2:2009' in the second and third paragraph of point 4.2.3.1 'Gauging' is replaced by 'EN 15273-2:2013'
12. In chapter 4 'CHARACTERISATION OF THE SUBSYSTEM', the text 'GIC1 and GIC2' in point 4.2.3.1 'Gauging' is replaced by 'GI1 and GI2'
13. In chapter 4 'CHARACTERISATION OF THE SUBSYSTEM', the text 'EN 15528:2008' in point 4.2.3.2 'Compatibility with load carrying capacity of lines' is replaced by 'EN 15528:2015'
14. In chapter 4 'CHARACTERISATION OF THE SUBSYSTEM', the text 'Commission Decision 2012/88/EU (1)' in point 4.2.3.3 'Compatibility with train detection systems' is replaced by 'ERA/ERTMS/033281 rev. 3.0'
15. In chapter 4 'CHARACTERISATION OF THE SUBSYSTEM', the footnote '(1) OJ L 51, 23.2.2012, p. 1.' in point 4.2.3.3 'Compatibility with train detection systems' is deleted.
16. In chapter 4 'CHARACTERISATION OF THE SUBSYSTEM', the text 'The specifications of the design and the conformity assessment of on-board equipment is an open point in this TSI.' in point 4.2.3.4 'Axle bearing condition monitoring' is replaced by the following:

'If the unit is intended to be capable of being monitored by on-board equipment, the following requirements shall apply:
 - This equipment shall be able to detect a deterioration of any of the axle box bearings of the unit.
 - The bearing condition shall be evaluated either by monitoring its temperature, or its dynamic frequencies or some other suitable bearing condition characteristic.
 - The detection system shall be located entirely on board the unit, and diagnosis messages shall be available on board the unit.
 - The diagnosis messages delivered and how they are made available shall be described in the operating documentation set out in section 4.4 of this TSI, and in the maintenance rules described in section 4.5 of this TSI.'
17. In chapter 4 'CHARACTERISATION OF THE SUBSYSTEM', the text 'Chapter 5 of EN 14363:2005' in point 4.2.3.5.2 'Running dynamic behaviour' is replaced by 'chapters 4, 5 and 7 of EN 14363:2016'

18. In chapter 4 'CHARACTERISATION OF THE SUBSYSTEM', the point 4.2.3.6.6 'Variable gauge wheelsets' is replaced by the following:

'4.2.3.6.6. Automatic variable gauge systems

This requirement is applicable to units equipped with an automatic variable gauge system with changeover mechanism of the axial position of the wheels allowing the unit to be compatible with 1 435 mm track gauge and other track gauge(s) within the scope of this TSI by means of passage through a gauge changeover facility.

The changeover mechanism shall ensure the locking in the correct intended axial position of the wheel.

After passage through the changeover facility, the verification of the state of the locking system (locked or unlocked) and of the position of the wheels shall be performed by one or more of the following means: visual control, on-board control system or infrastructure/facility control system. In case of on-board control system, a continuous monitoring shall be possible.

If a wheelset is equipped with brake equipment subject to a change in position during the gauge change operation, the automatic variable gauge system shall ensure the position and safe locking in the correct position of this equipment simultaneously to those of the wheels.

The failure of the locking of the position of the wheels and braking equipment (if relevant) during operation has typical credible potential to lead directly to a catastrophic accident (resulting in multiple fatalities); considering this severity of the failure consequence, it shall be demonstrated that the risk is controlled to an acceptable level by means of a demonstration of compliance in accordance with the Annex I of Commission Implementing Regulation (EU) No 402/2013 ⁽¹⁾, using the harmonized criterion defined in point 2.5.5 of the same annex.

The automatic variable gauge system is defined as an interoperability constituent (point 5.3.4b) and is part of the interoperability constituent wheelset (point 5.3.2). The conformity assessment procedure is specified in point 6.1.2.6 (interoperability constituent level), point 6.1.2.2 (integration in the interoperability constituent wheelset) and in point 6.2.2.4a (subsystem level) of this TSI.

The track gauges the unit is compatible with shall be recorded in the technical documentation.

A description of the changeover operation in normal mode, including the type(s) of gauge changeover facility(ies) the unit is compatible with, shall be part of the technical documentation (see also section 4.4 of this TSI).

The requirements and conformity assessments required in other sections of this TSI apply independently for each wheel position corresponding to one track gauge and have to be documented accordingly.'

19. In chapter 4 'CHARACTERISATION OF THE SUBSYSTEM', a new footnote '⁽¹⁾ OJ L 121, 3.5.2013, p. 8.' is added in the same page as text 'Commission Implementing Regulation (EU) No 402/2013 ⁽¹⁾' in point 4.2.3.6.6 'Automatic variable gauge systems'

20. In chapter 4 'CHARACTERISATION OF THE SUBSYSTEM', the text 'Commission Regulation (EC) No 352/2009 ⁽¹⁾' in point 4.2.4.2 'Safety requirements' is replaced by the text 'Commission Implementing Regulation (EU) No 402/2013 ⁽¹⁾'
21. In chapter 4 'CHARACTERISATION OF THE SUBSYSTEM', the footnote '⁽¹⁾ OJ L 108, 29.4.2009, p. 4.' in point 4.2.4.2 'Safety requirements' is replaced by the footnote '⁽¹⁾ OJ L 121, 3.5.2013, p. 8.'
22. In chapter 4 'CHARACTERISATION OF THE SUBSYSTEM', the text 'UIC leaflet 544-1:2013' in point 4.2.4.3.2.1 'Service brake' is replaced by the text 'UIC 544-1:2014'
23. In chapter 4 'CHARACTERISATION OF THE SUBSYSTEM', the text 'UIC 544-1:2013' in point 4.2.4.3.2.1 'Service brake' is replaced by the text 'UIC 544-1:2014'
24. In chapter 4 'CHARACTERISATION OF THE SUBSYSTEM', the text 'the minimum parking brake performance' in point 4.2.4.3.2.2 'Parking brake' is replaced by the text 'the minimum parking brake force'
25. In chapter 4 'CHARACTERISATION OF THE SUBSYSTEM', the text 'the minimum performance of the parking brake shall be marked on the unit. The marking shall comply with clause 4.5.25 of EN 15877-1:2012.' in point 4.2.4.3.2.2 'Parking brake' is deleted
26. In chapter 4 'CHARACTERISATION OF THE SUBSYSTEM', the text 'EN 50125-1:1999' in point 4.2.5 'Environmental conditions' is replaced by 'EN 50125-1:2014'
27. In chapter 4 'CHARACTERISATION OF THE SUBSYSTEM', the text 'EN 50153:2002' in point 4.2.6.2.1 'Protective measures against indirect contact (protective bonding)' is replaced by 'EN 50153:2014'
28. In chapter 4 'CHARACTERISATION OF THE SUBSYSTEM', the text 'EN 50153:2002' in point 4.2.6.2.2 'Protective measures against direct contact' is replaced by 'EN 50153:2014'
29. In chapter 4 'CHARACTERISATION OF THE SUBSYSTEM', the text 'chapter 1 of ERA technical document ERA/TD/2012-04/INT version 1.2 of 18.1.2013 published on the ERA website (<http://www.era.europa.eu>)' in point 4.2.6.3 'Attachment devices for rear-end signal' is replaced by 'Figure 11 of EN 16116-2:2013'
30. In chapter 4 'CHARACTERISATION OF THE SUBSYSTEM', the text 'Reference Commission Decision 2012/88/EU Annex A, Table A2, index 77' in Table 7 of point 4.3.3 'Interface with the subsystem 'control, command and signalling'' is replaced by 'Reference ERA/ERTMS/033281 rev. 3.0'
31. In chapter 4 'CHARACTERISATION OF THE SUBSYSTEM', the text 'GIC1 and GIC2' in section 4.8 'Parameters to be recorded in the technical file and European register of authorised types of vehicles' is replaced by 'GI1 and GI2'
32. In chapter 5 'INTEROPERABILITY CONSTITUENTS', the text 'The running gear shall be designed for an application range, the area of use, as defined by the following parameters:' in point 5.3.1 'Running gear' is replaced by the following text:

'The running gear shall be designed for all application ranges, the areas of use, as defined by the following parameters:

- Track gauge’

33. In chapter 5 ‘INTEROPERABILITY CONSTITUENTS’, the text ‘The wheelset shall be assessed and designed for the area of use as defined by’ in point 5.3.2 ‘Wheelset’ is replaced by the following text:

‘For the purpose of this TSI, wheelsets include the main parts ensuring the mechanical interface with the track (wheels and connecting elements: e.g. transverse axle, independent wheel axle). Accessories parts (axle bearings, axle boxes and brake discs) are assessed at subsystem level. The wheelset shall be assessed and designed for the area of use as defined by:

- track gauge,’

34. In chapter 5 ‘INTEROPERABILITY CONSTITUENTS’, the following text:

‘— maximum speed and service life, and’

in point 5.3.3 ‘Wheel’ is replaced by the following text:

- ‘— maximum speed,
- in-service limits, and’

35. In chapter 5 ‘INTEROPERABILITY CONSTITUENTS’, a new point is added below point 5.3.4a ‘Friction element for wheel tread brakes’:

‘5.3.4b. Automatic variable gauge system

An automatic variable gauge system shall be designed and assessed for an area of use defined by:

- the track gauges the system is designed for,
- the range of maximum static axle loads,
- the range of nominal wheel tread diameters,
- the maximum design speed of the unit, and
- the types of gauge changeover facility(ies) the system is designed for, including the nominal speed through the changeover facility(ies) and the maximum axial forces during the automatic gauge changeover process.

An automatic variable gauge system shall comply with the requirements set out in point 4.2.3.6.6; these requirements shall be assessed at IC level as set out in point 6.1.2.6.’

36. In chapter 6 ‘CONFORMITY ASSESSMENT AND EC VERIFICATION’, a new row is added below the row ‘4.2.3.6.4 Axle’ in Table 9 of point 6.1.2 ‘Conformity assessment procedures’:

4.2.3.6.6	Automatic variable gauge system	X (*)	X	X	X (*)	X	X (**)
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37. In chapter 6 ‘CONFORMITY ASSESSMENT AND EC VERIFICATION’, the following text is added after the last paragraph of point 6.1.2 ‘Conformity assessment procedures’:

‘In case of a specific case applicable to a component defined as interoperability constituent in section 5.3 of this TSI, the corresponding requirement can be part of the verification at interoperability constituent level only in the case where the component remains compliant to the chapters 4 and 5 of this TSI and where the specific case does not refer to a national rule (i.e. additional requirement compatible with the core TSI and fully specified in the TSI).

In other cases, the verification shall be made at subsystem level; when a national rule applies to a component, the concerned Member State may define relevant applicable conformity assessment procedures.’

38. In chapter 6 ‘CONFORMITY ASSESSMENT AND EC VERIFICATION’, the point 6.1.2.1 ‘Running gear’ is replaced by the following point:

‘6.1.2.1. Running gear

The demonstration of conformity for running dynamic behaviour is set out in EN 16235:2013.

Units equipped with an established running gear as described in chapter 6 of EN 16235:2013 are presumed to be in conformity with the relevant requirement provided that the running gears are operated within their established area of use.

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

39. In chapter 6 ‘CONFORMITY ASSESSMENT AND EC VERIFICATION’, the last paragraph of point 6.1.2.2 ‘Wheelset’ is replaced by the following text:

‘A verification procedure shall exist to ensure at the assembly phase that no defects may detrimentally affect safety due to any change in the mechanical characteristics of the fitted parts of the axle. This procedure shall contain the determination of the interference values and, in case of press-fitted wheelsets, the corresponding press-fitting diagram.’

40. In chapter 6 ‘CONFORMITY ASSESSMENT AND EC VERIFICATION’, the four instances of text ‘ERA/TD/2013-02/INT version 2.0 of XX.XX.2014’ in point 6.1.2.5 ‘Friction element for wheel tread brakes’ are replaced by the text ‘ERA/TD/2013-02/INT version 3.0 of 27.11.2015’.

41. In chapter 6 ‘CONFORMITY ASSESSMENT AND EC VERIFICATION’, a new point is added below the point 6.1.2.5 ‘Friction element for wheel tread brakes’:

‘6.1.2.6. Automatic variable gauge system

The assessment procedure shall be based on a validation plan covering all aspects mentioned in points 4.2.3.6.6 and 5.3.4b.

The validation plan shall consider assessment on all the following different phases:

- Design review
- Static tests (bench tests and integration-in-the-wheelset/unit tests)
- Test on gauge changeover facility(ies)
- On-track tests.

Regarding the demonstration of compliance to the safety level required in point 4.2.3.6.6, the assumptions considered for the safety analysis related to the unit the system is intended to be integrated in, and related to the mission profile of that unit, shall be clearly documented.

In case the manufacturer has no sufficient return of experience, the automatic variable gauge system shall be subject to an assessment of suitability for use by in-service experience procedure (module CV). Before commencing in-service tests, a suitable module (CB or CH1) shall be used to certify the design of the interoperability constituent. The in-service tests shall be organised on request from the manufacturer, who must obtain an agreement from a railway undertaking for its contribution to such assessment.

The certificate delivered by the notified body in charge of the conformity assessment shall include the type(s) and operating conditions of the gauge changeover facility(ies) the automatic variable gauge system has been assessed for.'

42. In chapter 6 'CONFORMITY ASSESSMENT AND EC VERIFICATION', the text 'The demonstration of conformity shall be in accordance with Chapters 6 and 7 of EN 12663-2:2010.' of point 6.2.2.1 'Strength of unit' is replaced by 'The demonstration of conformity shall be in accordance with chapters 6 and 7 of EN 12663-2:2010, or alternatively with chapter 9.2 of EN 12663-1:2010+A1:2014.'

43. In chapter 6 'CONFORMITY ASSESSMENT AND EC VERIFICATION', the point 6.2.2.2 'Safety against derailment running on twisted track' is replaced by the following point:

'6.2.2.2. Safety against derailment running on twisted track

The demonstration of conformity shall be carried out in accordance with chapters 4, 5 and 6.1 of EN 14363:2016.'

44. In chapter 6 'CONFORMITY ASSESSMENT AND EC VERIFICATION', the point 6.2.2.3 'Running dynamic behaviour' is replaced by the following point:

'6.2.2.3. Running dynamic behaviour

On-track tests

The demonstration of conformity shall be carried out in accordance with chapters 4, 5 and 7 of EN 14363:2016.

For units operated on the 1 668 mm track gauge network, the evaluation of the estimated value for the guiding force normalized to the radius $R_m = 350$ m according to EN 14363:2016, clause 7.6.3.2.6 (2), shall be calculated according to the following formula: $Y_{a,nf,qst} = Y_{a,f,qst} - (11\ 550\ \text{m} / R_m - 33)$ kN.

The limit value of the quasi-static guiding force $Y_{j,a,qst}$ shall be 66 kN.

Values of cant deficiency can be adapted to 1 668 mm track gauge by multiplying the corresponding 1 435 mm parameter values by the following conversion factor: 1 733/1 500.

The combination of the highest equivalent conicity and speed for which the unit meets the stability criterion in chapters 4, 5 and 7 of EN 14363:2016 shall be recorded in the report.'

45. In chapter 6 'CONFORMITY ASSESSMENT AND EC VERIFICATION', the following text is added below the text in point 6.2.2.4 'Axle box/bearing':

'It is permitted to use other standards for the above demonstration of conformity 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 bearings.

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

In the case of bearings manufactured according to a design developed and already used to place products on the market before the entry into force of relevant TSIs applicable to those products, the applicant is allowed to deviate from the demonstration of conformity above and refer to design review and type examination performed for previous applications under comparable conditions instead; this demonstration shall be documented and is considered as providing the same level of proof as type examination 'according to module SB or design examination according to module SH1.'

46. In chapter 6 'CONFORMITY ASSESSMENT AND EC VERIFICATION', a new point is added below point 6.2.2.4 'Running dynamic behaviour':

'6.2.2.4a. Automatic variable gauge systems

The safety analysis required in point 4.2.3.6.6, and performed at IC level, shall be consolidated at the level of the unit; in particular, the assumptions made in accordance with point 6.1.2.6 may need to be reviewed to take into account the unit and its mission profile.'

47. In chapter 6 'CONFORMITY ASSESSMENT AND EC VERIFICATION', the text 'for bogie units: Figure 18 of Annex H of Annex I of UIC leaflet 430-1:2012.' of point 6.2.2.5 'Running gear for manual change of wheelsets' is replaced by 'for bogie units: Figure 18 of Annex H and Figures 19 and 20 of Annex I of UIC leaflet 430-1:2012.'

48. In chapter 6 'CONFORMITY ASSESSMENT AND EC VERIFICATION', the text 'EN 1363-1:1999' in point 6.2.2.8.1 'Barriers' is replaced by 'EN 1363-1:2012'

49. In chapter 6 'CONFORMITY ASSESSMENT AND EC VERIFICATION', the text:

'Testing of the materials ignitability and flame spread properties shall be performed in accordance with ISO 5658-2:2006/Am1:2011 for which the limit value shall be $CFE \geq 18 \text{ kW/m}^2$.

For the following materials and components the fire safety requirements are deemed to comply with the required ignitability and flame spread properties:'

in point 6.2.2.8.2 'Materials' is replaced by the text:

'Testing of the materials ignitability and flame spread properties shall be performed in accordance with ISO 5658-2:2006/Am1:2011 for which the limit value shall be $CFE \geq 18 \text{ kW/m}^2$.

For rubber parts of bogies, the testing shall be performed in accordance with ISO 5660-1:2015 for which the limit value shall be $MARHE \leq 90 \text{ kW/m}^2$ under the test conditions specified in reference T03.02 of Table 6 of EN 45545-2:2013+A1:2015.

For the following materials and components the fire safety requirements are deemed to comply with the required ignitability and flame spread properties:

- wheelsets, coated or uncoated,'

50. In chapter 6 'CONFORMITY ASSESSMENT AND EC VERIFICATION', the text 'EN 50355:2003' in point 6.2.2.8.3 'Cables' is replaced by 'EN 50355:2013'
51. In chapter 6 'CONFORMITY ASSESSMENT AND EC VERIFICATION', the text 'EN 50343:2003' in point 6.2.2.8.3 'Cables' is replaced by 'EN 50343:2014'
52. In chapter 6 'CONFORMITY ASSESSMENT AND EC VERIFICATION', the text 'TS 45545-7:2009' in point 6.2.2.8.4 'Flammable liquids' is replaced by 'EN 45545-7:2013'
53. In chapter 7 'IMPLEMENTATION', the section 7.1 'Authorisation for placing into service' is replaced by the following section:

'7.1. Authorisation for placing in service

This TSI is applicable to the subsystem 'rolling stock — freight wagons' within the scope set out in its Sections 1.1, 1.2 and 2.1, which are placed in service after the date of application of this TSI.

This TSI is also applicable on a voluntary basis to:

- units referred to in section 2.1 point (a) in transport (running) configuration, in case they correspond to a 'unit' as defined in this TSI, and
- units as defined in section 2.1 point (c), in case they are in empty configuration.

In case the applicant chooses to apply this TSI, the corresponding EC declaration of verification shall be recognised as such by Member States.'

54. In chapter 7 'IMPLEMENTATION', the point 7.1.2 'Mutual recognition of the first authorisation of placing in service' is replaced by the following point:

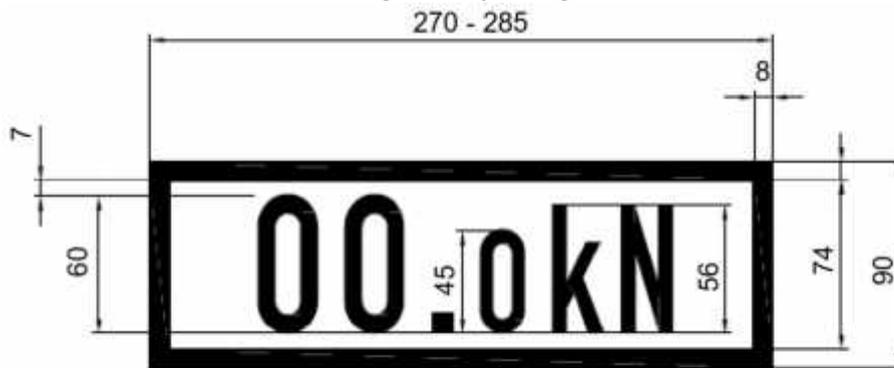
'7.1.2 Mutual recognition of the first authorisation of placing in service

In accordance with Article 23(1) of Directive 2008/57/EC the following list lays out the conditions under which a unit, once authorised for placing in service in one Member State, shall not be subject to any additional authorisation for placing in service. These conditions shall be seen as complementary to the requirements in Section 4.2. These following conditions must be fulfilled in their entirety:

- (a) The unit must be equipped with forged and rolled wheels assessed according to point 6.1.2.3(a).
- (b) The compliance/non-compliance with the requirements regarding the axle bearing condition monitoring by line side equipment as set out in point 7.3.2.2.(a) must be recorded in the technical file.
- (c) Units intended to operate on the 1 668 mm track gauge network must comply with the requirements regarding the axle bearing condition monitoring by line side equipment as set out in point 7.3.2.2.(b).

- (d) The reference profile established for the unit as per point 4.2.3.1 must be allocated to one of the target reference profile(s) G1, GA, GB and GC including those used for the lower part GI1 and GI2.
- (e) The unit must be compatible with the train detection systems based on track circuits, on axle counters and on loop equipment as specified in clauses 4.2.3.3(a), 4.2.3.3(b) and 4.2.3.3(c).
- (f) The unit must be equipped with the manual coupling system in accordance with the prescriptions set out in Appendix C, Section 1, including the fulfilment of Section 8 or with any semi-automatic or automatic standardised coupling system.
- (g) The brake system must be in accordance with the conditions of Appendix C, Sections 9, 14 and 15 when applying the reference case set out in point 4.2.4.2.
- (h) The unit must be marked with all applicable markings in accordance with EN 15877-1:2012, except the marking defined in its clause 4.5.25(b).
- (i) The parking brake force shall be marked as set out in Figure 1, 30 mm below the marking defined in clause 4.5.3 of EN 15877-1:

Figure 1
Marking of the parking brake force



55. In chapter 7 'IMPLEMENTATION', the section 7.2 'Substitution, renewal and upgrading' is replaced by the following section:

'7.2 General rules for implementation

7.2.1 Substitution of constituents

This Section deals with substitutions of constituents as referred to in Article 2(p) of Directive 2008/57/EC.

The following categories have to be considered:

- Certified ICs: Components which correspond to an IC in Chapter 5 and which are holding a certificate of conformity.
- Other components: Any component, which is not corresponding to an IC in Chapter 5.
- Non-certified ICs: Components which correspond to an IC in Chapter 5 but are not holding a certificate of conformity and which are produced before the expiry of the transitional period referred to in Section 6.3.

Table 11 shows the possible permutations.

Table 11
Substitution permutation table

	... substituted by...		
	... certified ICs	... other components	... non-certified ICs
Certified ICs ...	Check	not possible	check
Other components ...	not possible	Check	not possible
Non-certified ICs ...	Check	not possible	check

The word ‘check’ in Table 11 means that the entity in charge of maintenance (ECM) may under its responsibility substitute a component by another one utilising the same function and performance in accordance with the relevant TSI requirements considering these components are:

- suitable, i.e. conform to the relevant TSI(s),
- used within its area of use,
- enabling interoperability,
- meeting the essential requirements, and
- in line with restrictions eventually stated in the technical file.

7.2.2 Modifications to an existing unit

7.2.2.1 Introduction

This point applies in case of modification, including renewal or upgrade, to an existing unit. It does not apply in case of substitution in the framework of maintenance.

This point defines the principles to be applied by the applicants and Member States in line with the EC verification procedure described in Annexes V and VI of Directive 2008/57/EC, and in Decision 2010/713/EU, and considering Article 20 of Directive 2008/57/EC.

These principles depend on the status against TSIs of the existing unit and are specified in clauses 7.2.2.2 and 7.2.2.3.

7.2.2.2 Modifications to an existing unit not covered by an EC certificate of verification against TSIs

This point applies in case of modification of an existing unit that was not assessed against TSIs; therefore it is not covered by an EC certificate of verification against TSIs (existing non-TSI compliant unit).

Parts and basic parameters of the unit that are not affected by the modification works are exempted from conformity assessment against the provisions in this TSI.

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).

When it is not economically feasible to fulfil the TSI requirement, the modification could be accepted if it is evident that a basic parameter is improved in the direction of the TSI defined performance.

For requirements specified in TSI Noise (Commission Regulation (EU) No 1304/2014 ⁽¹⁾) see also clause 7.2 of that TSI.

National migration strategies related to the implementation of other TSIs (e.g. TSIs covering fixed installations) may have an impact to what extent the TSIs covering the unit needs to be applied.

The applicant shall identify and document the requirements of this TSI that are proposed to be applied.

If an EC certificate is to be issued by the notified body, it is limited to the parts corresponding to the paragraph above.

The replacement of a whole element within a rake of permanently connected elements (e.g. a replacement after a severe damage) does not require a conformity assessment against this TSI, as long as the element is identical to the one it replaces. Such element must be traceable and certified in accordance with any national or international rule, or any code of practice widely acknowledged in the railway domain.

7.2.2.3 Modifications to an existing unit covered by an EC certificate of verification against TSIs

This point applies in case of modification of an existing unit that was assessed against TSIs; therefore it is covered by an EC certificate of verification against TSIs (existing TSI compliant unit).

Any modification to such existing unit shall be addressed as a modification to a type or design already bearing an EC examination certificate as specified in clause 7.2.3.1.3.

For requirements specified in TSI Noise (Commission Regulation (EU) No 1304/2014 ⁽¹⁾) see also clause 7.2 of that TSI.

7.2.3 Rules related to the EC type or design examination certificates

7.2.3.1 Rolling stock subsystem

This clause concerns a rolling stock type (unit type in the context of this TSI), as defined in Article 2(w) of Directive 2008/57/EC, which is subject to an EC type or design verification procedure in accordance with section 6.2 of this TSI. It also applies to the EC type or design verification procedure in accordance with the TSI Noise (Commission Regulation (EU) No 1304/2014 ⁽¹⁾), which refers to this TSI for its scope of application to freight wagons.

The TSI assessment basis for an EC type or design examination is defined in columns 'Design review' and 'Type test' of Appendix F of this TSI and of Appendix C of the TSI Noise.

7.2.3.1.1 Phase A

Phase A starts once a notified body, which is responsible for EC verification, is appointed by the applicant and ends when the EC type or design examination certificate is issued.

The TSI assessment basis for a type is defined for a phase A period, with a duration of maximum four years. During the phase A period the assessment basis for EC verification to be used by the notified body is considered to be fixed.

When a revised version of this TSI or of the TSI Noise come into force during the phase A period, it is permissible (but not mandatory) to use the revised version(s), either totally or for particular sections, unless explicitly otherwise specified in the revision of these TSIs. In case of application limited to particular sections, the applicant has to justify and document that applicable requirements remain consistent, and this has to be approved by the notified body.

7.2.3.1.2 Phase B

The phase B period defines the period of validity of the EC type or design examination certificate once it is issued by the notified body. During this time, units may be EC certified on the basis of conformity to type.

The EC type or design examination certificate of EC verification for the subsystem is valid for a ten-year phase B period after its issue date, even if a revision of this TSI or of the TSI Noise come into force, unless explicitly otherwise specified in the revision of these TSIs. During this period of validity, new rolling stock of the same type is permitted to be placed in service on the basis of an EC declaration of verification referring to the type certificate of verification.

7.2.3.1.3 Modifications to a type or design already bearing an EC examination certificate

For modifications to a rolling stock type already bearing an EC type or design examination certificate of verification, the following rules apply:

- In accordance with Decision 2010/713/EU and by application of modules SB or SH1 for the EC verification, the applicant shall inform a notified body of all modifications to the approved type or design that may affect the conformity of the subsystem with the requirements of the relevant TSI(s) or the conditions for validity of the certificate. This information shall be provided by the applicant with corresponding references to the technical documentation relating to the existing EC type or design examination certificate. The modifications may require additional approval in the form of an addition to the original EC type or design examination certificate.
- The changes are permitted to be dealt with by only re-assessing those modifications that affect the conformity of the subsystem with the latest revision of the TSIs in force at that time. The applicant has to justify and document that applicable requirements remain consistent at subsystem level, and this has to be approved by the notified body.
- In case of modification that do not affect the provisions of the relevant TSI(s), the applicant may define a new version to the type. This new version to the type is fully covered by the original EC type or design examination certificate (however, the technical documentation referred to in the certificate may need to be updated).
- In order to establish the EC examination certificate, the notified body is permitted to refer to:
 - The original EC type or design examination certificate for parts of the design that are unchanged or those that are changed but do not affect the conformity of the subsystem, as far as it is still valid (during 10-year phase B period).

- Additional EC type or design examination certificate (amending the original certificate) for modified parts of the design that affect the conformity of the subsystem with the latest revision of this TSI in force at that time.
- In any case, the applicant shall ensure that the technical documentation which is relating to the EC type or design examination certificate is updated accordingly.

The updated technical documentation related to the EC type or design examination certificate is referred to in the technical file accompanying the EC declaration of verification issued by the applicant for rolling stock declared as conformant to the modified type.

7.2.3.2 Interoperability constituents

This clause concerns interoperability constituents which are subject to type examination (module CB), design examination (module CH1) or to suitability for use (module CV) in accordance with the section 6.1 of this TSI.

The EC type or design examination or suitability for use certificate is valid for a ten-year period. During this time, new constituents of the same type are permitted to be placed into service without a new type assessment, unless explicitly otherwise specified in the revision of these TSIs. Before the end of the ten-year period, the constituent shall be assessed according to the latest revision of this TSI in force at that time, for those requirements that have changed or are new in comparison to the certification basis.

56. In chapter 7 'IMPLEMENTATION', a new footnote '(¹) OJ L 356, 12.12.2014, p. 421.' is added in the same page as text 'Commission Regulation (EU) No 1304/2014 (¹)' in point 7.2.2.2 'Modifications to an existing unit not covered by an EC certificate of verification against TSIs'
57. In chapter 7 'IMPLEMENTATION', a new footnote '(¹) OJ L 356, 12.12.2014, p. 421.' is added in the same page as text 'Commission Regulation (EU) No 1304/2014 (¹)' in point 7.2.2.3 'Modifications to an existing unit covered by an EC certificate of verification against TSIs'
58. In chapter 7 'IMPLEMENTATION', a new footnote '(¹) OJ L 356, 12.12.2014, p. 421.' is added in the same page as text 'Commission Regulation (EU) No 1304/2014 (¹)' in point 7.2.3.1 'Rolling stock subsystem'
59. In chapter 7 'IMPLEMENTATION', the following text is added below the text in point 7.3.1 'Introduction':

'In case of a specific case applicable to a component defined as interoperability constituent in section 5.3 of this TSI, the conformity assessment has to be performed according to point 6.1.2.'
60. In chapter 7 'IMPLEMENTATION', the text 'EN 14363:2005 point 4.1.3.4.1' in point 7.3.2.3 'Safety against derailment running on twisted track (point 4.2.3.5.1)' is replaced by 'EN 14363:2016 clause 6.1.5.3.1'
61. In chapter 7 'IMPLEMENTATION', the point 7.3.2.4 'Running dynamic behaviour (point 4.2.3.5.2)' is replaced by:

'Specific case UK for Great Britain

(‘P’) Base condition for use of simplified measuring method specified in EN 14363:2016 clause 7.2.2 should be extended to nominal static vertical wheelset forces (P_{F0}) up to 250 kN.’

62. In Appendix A, the complete text is replaced by ‘Not used’
63. In Appendix C, condition C.1 ‘Manual coupling system’, the text ‘The clearance for the draw hook shall be in accordance with chapter 2 of ERA technical document ERA/TD/2012-04/INT version 1.2 of 18.1.2013 published on the Agency website (<http://www.era.europa.eu>).’ is replaced by ‘The clearance for the draw hook shall be in accordance with clause 6.3.2 of EN 16116-2:2013.’
64. In Appendix C, condition C.1 ‘Manual coupling system’, the text ‘The space for shunting staff operation shall be in accordance with chapter 3 of ERA technical document ERA/TD/2012-04/INT version 1.2 of 18.1.2013 published on the Agency website (<http://www.era.europa.eu>).’ is replaced by ‘The space for shunting staff operation shall be in accordance with clause 6.2.1 of EN 16116-2:2013. For manual coupling systems equipped with 550 mm wide buffers the calculation of the free space may be done considering that the coupling gear components are lateral centrally positioned ($D = 0$ mm as defined in Annex A of EN 16116-2:2013).’
65. In Appendix C, condition C.2 ‘UIC footsteps and handrails’ is replaced by the following condition:
- ‘2. UIC footsteps and handrails
- The unit shall be equipped with footsteps and handrails in accordance with chapters 4 and 5 of EN 16116-2:2013 and with clearances in accordance with clause 6.2.2 of EN 16116-2:2013.’
66. In Appendix C, condition C.5 ‘Marking of units’, the following text is deleted:
- ‘Markings of EN 15877-1:2012 are required where applicable. The following are always applicable:
- 4.5.2 Gauge marking
 - 4.5.3 Vehicle Tare Weight
 - 4.5.4 Vehicle load table
 - 4.5.5 Sign for length over buffers
 - 4.5.12 Table of Maintenance dates
 - 4.5.14 Lifting and re-railing signs
 - 4.5.23 Distances between end axles and bogie centres
 - 4.5.29 Brake weight.’
67. In Appendix C, condition C.6 ‘G1 gauge’, the text ‘G1C1’ is replaced by ‘G11’
68. In Appendix C, condition C.8 ‘Tests concerning longitudinal compressive forces’, the text ‘EN 15839:2012’ is replaced by ‘EN 15839:2012+A1:2015’
69. In Appendix C, condition C.9 ‘UIC brake’, the text ‘(i) The pneumatic half coupling’ is replaced by ‘(i) The pneumatic half coupling and its hose’
70. In Appendix C, condition C.9 ‘UIC brake’, the text ‘(k) Brake block holders shall be in accordance with UIC leaflet 542:2010’ is replaced by ‘(k) Brake block holders shall be in accordance with UIC 542:2013.’
71. In Appendix C, condition C.9 ‘UIC brake’, the point (m) is replaced by the following point:

‘(m) Slack adjusters shall be in accordance with chapters 4 and 5 of EN 16241:2014. The assessment of conformity shall be carried out in accordance with clauses 6.3.2 to 6.3.5 of EN 16241:2014. Additionally, a life test shall be performed to demonstrate the suitability of the slack adjuster for service on the unit and to verify the maintenance requirements for the operational design life. This shall be carried out at the maximum rated load cycling through the full range of adjustment.’

72. In Appendix C, condition C.9 ‘UIC brake’, the text ‘UIC 544-1:2013’ in row ‘Braking mode ‘G’’ of Table C.3 is replaced by the text ‘UIC 544-1:2014’

73. In Appendix C, condition C.9 ‘UIC brake’, the text ‘EN 14531-1:2005 section 5.11’ of the footnote ⁽¹⁾ of Table C.3 is replaced by the text ‘EN 14531-1:2015 section 4’

74. In Appendix C, condition C.11 ‘Temperature ranges for air reservoirs, hoses and grease’ is replaced by the following condition:

‘11. Temperature ranges for air reservoirs, hoses and grease

The following requirements are deemed to comply with any temperature range indicated in point 4.2.5:

- Air reservoirs shall be designed for the temperature range of – 40 °C to + 70 °C.
- Brake cylinders and brake couplings shall be designed for the temperature range of – 40 °C to + 70 °C.
- Hoses for air brakes and air supply shall be specified for the temperature range of – 40 °C to + 70 °C.

The following requirement is deemed to comply with the range T1 indicated in point 4.2.5:

- The grease for the lubrication of roller bearing shall be specified for ambient temperatures down to – 20 °C.’

75. In Appendix C, condition C.12 ‘Welding’ is replaced by the following condition:

‘Welding shall be carried out in accordance with EN 15085-1:2007+A1:2013, EN 15085-2:2007, EN 15085-3:2007, EN 15085-4:2007 and EN 15085-5:2007.’

76. In Appendix C, the following text is added below the text in condition C.16 ‘Tow hooks’:

‘Alternative technical solutions are allowed as far as conditions 1.4.2 to 1.4.9 of UIC 535-2:2006 are respected. If the alternative solution is a cable eye bracket, it shall in addition have a minimum diameter of 85 mm.’

77. In Appendix C, the following condition C.19 is added:

‘19. Axle bearing condition monitoring

It shall be possible to monitor the axle bearing condition of the unit by means of line side detection equipment.’

78. Appendix D is replaced by the following:

Appendix D

Mandatory standards or normative documents referred to in this TSI

TSI		Standard/document	
Characteristics to be assessed		References to Standard or document	Clauses
Structure and mechanical part	4.2.2		
Strength of unit	4.2.2.2	EN 12663-2:2010	5
		EN 15877-1:2012	4.5.14
	6.2.2.1	EN 12663-1:2010+A1:2014	9.2
		EN 12663-2:2010	6, 7
Gauging and track interaction	4.2.3		
Gauging	4.2.3.1	EN 15273-2:2013	all
Compatibility with load carrying capacity of lines	4.2.3.2	EN 15528:2015	6.1, 6.2
Compatibility with train detection systems	4.2.3.3	ERA/ERTMS/033281 rev. 3.0	See table 7 of this TSI
Axle bearing condition monitoring	4.2.3.4	EN 15437-1:2009	5.1, 5.2
Safety against derailment running on twisted track	4.2.3.5.1	—	—
	6.2.2.2	EN 14363:2016	4, 5, 6.1
Running dynamic behaviour	4.2.3.5.2	EN 14363:2016	4, 5, 7
	6.1.2.1	EN 14363:2016	4, 5, 7
	6.2.2.3	EN 16235:2013	all
	6.1.2.1	EN 13749:2011	6.2
Structural design of bogie frame	4.2.3.6.1	EN 13749:2011	6.2
	6.1.2.1	EN 13749:2011	6.2
Characteristics of wheelsets	4.2.3.6.2	—	—
	6.1.2.2	EN 13260:2009+A1:2010	3.2.1
Characteristics of wheels	4.2.3.6.3	—	—
	6.1.2.3	EN 13979-1:2003+A1:2009 +A2:2011	7, 6.2
Characteristics of axles	4.2.3.6.4	—	—
	6.1.2.4	EN 13103:2009 + A2:2012	4, 5, 6, 7
Axle boxes/bearings	4.2.3.6.5	—	—

TSI		Standard/document	
Characteristics to be assessed		References to Standard or document	Clauses
	6.2.2.4	EN 12082:2007+A1:2010	6
Running gear for manual change of wheelsets	4.2.3.6.7	—	—
	6.2.2.5	UIC leaflet 430-1:2012	Annexes B, H, I
		UIC 430-3:1995	Annex 7
Brake	4.2.4		
Service brake	4.2.4.3.2.1	EN 14531-6:2009	all
		UIC 544-1:2014	all
Parking brake	4.2.4.3.2.2	EN 14531-6:2009	6
Friction element for wheel tread brakes	4.2.4.3.5	—	—
	6.1.2.5	ERA technical document ERA/TD/2013-02/INT version 3.0 of 27.11.2015	All
Environmental conditions	4.2.5		
Environmental conditions	4.2.5	EN 50125-1:2014	4.7
	6.2.2.7	—	—
System protection	4.2.6		
Barriers	4.2.6.1.2.1	—	—
	6.2.2.8.1	EN 1363-1:2012	all
Materials	4.2.6.1.2.2	—	—
	6.2.2.8.2	ISO 5658-2:2006/Am1:2011	all
		EN 13501-1:2007+A1:2009	all
		EN 45545-2:2013+A1:2015	Table 6
	ISO 5660-1:2015	all	
Cables	6.2.2.8.3	EN 50355:2013	all
		EN 50343:2014	all
Flammable liquids	6.2.2.8.4	EN 45545-7:2013	all
Protective measures against indirect contact (protective bonding)	4.2.6.2.2.1	EN 50153:2014	6.4
Protective measures against direct contact	4.2.6.2.2.2	EN 50153:2014	5

TSI		Standard/document	
Characteristics to be assessed		References to Standard or document	Clauses
Attachment devices for rear-end signal	4.2.6.3	EN 16116-2:2013	Figure 11

Standards or documents referred to in the additional optional conditions set out in Appendix C

Additional optional conditions for units	App. C	Standard / UIC leaflet / document	
Manual coupling system	C.1	EN 15566:2009+A1:2010	all (except 4.4)
		EN 15551:2009+A1:2010	all
		EN 16116-2:2013	6.2.1, 6.3.2
		EN 15877-1:2012	Figure 75
UIC footsteps and handrails	C.2	EN 16116-2:2013	4, 5, 6.2.2
Ability to be hump shunted	C.3	EN 12663-2:2010	5, 8
Tests concerning longitudinal compressive forces	C.8	EN 15839:2012+A1:2015	all
UIC brake	C.9	EN 15355:2008+A1:2010	all
		EN 15611:2008+A1:2010	all
		UIC 540:2006	all
		EN 14531-1:2015	4
		EN 15624:2008+A1:2010	all
		EN 15625:2008+A1:2010	all
		EN 286-3:1994	all
		EN 286-4:1994	all
		EN 15807:2011	all
		EN 14601:2005+A1:2010	all
		UIC 544-1:2014	all
		UIC 542:2013	all
UIC 541-4:2010	all		

		EN 16241:2014	4, 5, 6.3.2 to 6.3.5
		EN 15595:2009+A1:2011	all
Welding	C.12	EN 15085-1:2007+A1:2013 EN 15085-2:2007 EN 15085-3:2007 EN 15085-4:2007 EN 15085-5:2007	all
Specific product properties concerning the wheel	C.15	EN 13262:2004 +A1:2008+A2:2011	all
		EN 13979-1:2003 +A1:2009+A2:2011	all
Tow hooks	C.16	UIC 535-2:2006	1.4
Protective devices on protruding parts	C.17	UIC 535-2:2006	1.3
Label holders and attachment devices for rear end signal	C.18	UIC 575:1995	1

79. In Appendix E, the text ‘The lamp shall display a luminous area of at least 170 mm diameter.’ is deleted

80. In Appendix F, the row ‘Variable gauge wheelsets’ of Table F.1 is replaced by:

Automatic variable gauge system	4.2.3.6.6	X	X	X	6.1.2.6/6.2.2.4a
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