TSI LOC & PAS
Technical specification for interoperability relating to the 'rolling stock - locomotives and passenger rolling stock' subsystem of the rail system in the European Union
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2.3. Rolling stock in the scope of this TSI

Types of rolling stock
› Self-propelling thermal and/or electric trains
› Thermal and/or electric traction units
› Passenger carriages and other related cars
› Mobile railway infrastructure construction and maintenance equipment

Track gauge
› Rolling stock intended to be operated on networks of track gauge 1435 mm, 1520 mm, 1524 mm, 1600 mm and 1668 mm.

Maximum speed
› Maximum design speed lower or equal to 350 km/h.
› In case of maximum design speed higher than 350 km/h, TSI complemented by the procedure for innovative solutions
Categories identified by the party asking for assessment, used by the NoBo and stated in the certificate of "EC" verification.

- Unit designed to carry passengers
- Unit designed to carry passenger-related load (luggage, cars, etc.)
- Unit designed to carry other payload (mail, freight, etc.) in self-propelling trains
- Unit fitted with a driver’s cab
- Unit fitted with traction equipment
- Electric unit (supplied with electric energy)
- Thermal traction unit
- Freight locomotive: Unit designed to haul freight wagons
- Passenger locomotive: Unit designed to haul passenger carriages
- OTMs, Infrastructure inspection vehicles.

Distinction shall also be made between:

- A unit that can be operated as a train.
- A unit that has to be coupled with other unit(s) to be operated as a train.

Categorisation according to the fire safety: cat. A or B.
4.2. Functional and technical specification of the sub-system

- Structures and mechanical parts
- Track interaction and gauging
- Braking
- Passenger related items
- Environmental conditions
- External lights & audible and visible warning devices
- Traction and electrical equipment
- Driver’s cab and driver-machine interface
- Fire safety and evacuation
- Servicing
- Documentation for operation and maintenance
Where end couplings are provided, they shall incorporate a resilient system capable of withstanding the forces due to the operational and rescue conditions.

High Speed Units shall be equipped with an automatic centre buffer coupler compatible with a “Type 10 latch system automatic centre buffer coupler”; the height above rail of its coupling centre line shall be 1025 mm + 15 mm /- 5 mm.

An automatic coupler shall be designed and assessed for an area of use defined by the type of end coupling and the tensile and compressive forces it is capable of withstanding. Type 10 coupler shall be compliant with EN 16019. Other automatic couplers are not I.C.

The type of mechanical end coupling together with values of tensile and compressive forces and the height above rail level of its centre line shall be recorded in the technical documentation.

Example of IC: 4.2.2.2.3 End coupling and 5.3.1 Automatic centre buffer coupler
Example of IC: 4.2.2.2.3 End coupling and 5.3.1 Automatic centre buffer coupler

<table>
<thead>
<tr>
<th>Examples</th>
<th>Regional DMU</th>
<th>Regional DMU Type 10</th>
<th>HS train Type 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment of resilient system</td>
<td>On the train acc. To operational conditions</td>
<td>On the I.C -&gt; Area of use OR On the train (*)</td>
<td>On the I.C -&gt; Area of use</td>
</tr>
<tr>
<td>Compatibility I.C with subsystem</td>
<td>N.A</td>
<td>If applicable, verify area of use vs operational conditions</td>
<td>Verify area of use vs operational conditions</td>
</tr>
<tr>
<td>Position of the coupler centreline</td>
<td>Not checked</td>
<td>Not checked</td>
<td>Verified on the train</td>
</tr>
<tr>
<td>Documentation of the unit</td>
<td>Type of coupler</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(*) possible but does not bring the benefits of the I.C principle
Technical requirements
The unit shall run safely and produce an acceptable level of track loading, verification according to EN 14363:2005

Additional requirements when an active system is used
The functional failure has typical credible potential to lead directly to “fatalities” for both of the following scenarios:
› 1/ failure in the active system leading to a non-compliance with limit values for running safety.
› 2/ failure in the active system leading to a vehicle outside of the kinematic reference contour of the carbody and pantograph,

Considering this severity of the failure consequence it shall be demonstrated that the risk is controlled to an acceptable level. Use of CSM-RA (Regulation 402/2013) with a failure rate of $10^{-9}$
TECHNICAL OPEN POINT

4.2.4.8.3 Eddy current track brake
› The conditions for use of eddy current track brake are not harmonised (regarding their effect on rail heating and vertical force).
› Therefore, requirements to be met by eddy current track brake are an open point.

OPEN POINT RELATIVE TO THE ASSESSMENT OF A PARAMETER

4.2.10.3.4 Fire containment and control systems for passenger rolling stock of cat. B
› FCCS shall ensure that fire and smoke will not extend in dangerous concentrations over a length of more than 30m within the passenger/staff areas inside the unit, for at least 15 minutes after the start of a fire. The assessment of this parameter is an open point.
Describes the documentation requested in Annex VI of Directive 2008/57/EC (compiled by the notified body, it accompanies the EC declaration of verification)

It gives the conditions of use of the subsystem and includes:

- General documentation
- Documentation related to Maintenance
- Operating documentation
- Lifting diagram and instructions
- Rescue related descriptions
4.2.12. Documentation for operation and maintenance

General documentation
› General drawings. Electrical, pneumatic and hydraulic diagrams, Control-circuit diagrams, Description of computerised systems
› Reference profile, Weight balance Axle load and spacing of axles,
› Test report concerning running dynamic behaviour, Characteristic wind curve (CWC)
› Braking performance, Traction performance,

Documentation related to Maintenance
› The maintenance design justification file and Maintenance description file

Operating documentation
› A description of operation in normal mode,
› A description of the various reasonably foreseeable degraded modes.
› A description of the control and monitoring systems
7.1.3. Rules related to the type or design examination certificates

- **Rolling Stock**
  - Phase A
    - « Development »
    - Max 7 years
  - Phase B
    - « Production »
    - 7 years
  - NoBo appointed
  - « EC » type exam. certif.

- **Interoperability Constituent**
  - 5 years
  - type or design examination
  - or suitability for use certificate
TSI WAG

Technical specification for interoperability relating to the ‘rolling stock – freight wagons’ subsystem of the rail system in the European Union
1. Introduction
2. Scope and definition of subsystem
3. Essential requirements
4. Characterisation of the subsystem
   › 4.1. Introduction
   › 4.2. Functional and technical specifications of the subsystem
   › 4.3. Functional and technical specification of the interfaces
   › 4.4. Operating rules
   › 4.5. Maintenance rules
   › 4.6. Professional competencies
   › 4.7. Health and safety conditions
   › 4.8. Parameters to be recorded in the technical file
5. Interoperability constituents

6. Conformity assessment and EC verification

7. Implementation
   › 7.1. Authorisation for placing in service
      › 7.1.2. Mutual recognition of the first authorisation of placing in service
   › 7.2. Substitution, renewal and upgrading
   › 7.3. Specific cases
   › 7.4. Specific environmental conditions
   › 7.5. Freight wagons operating under national, bilateral, multilateral or international agreements

Appendix C
2. Scope and definition of subsystem

The TSI shall apply to freight wagons

- with a maximum operating speed lower than or equal to 160 km/h
- with a maximum axle load lower than or equal to 25 t.
- intended to be operated on one or more of the following nominal track gauges: 1435 mm, 1524 mm, 1600 mm, and 1668 mm.

The TSI shall not apply to freight wagons operating mainly on the 1520 mm track gauge, which may occasionally be operated on 1524 mm track gauge.
4.2. Functional and technical specifications of the subsystem

› 4.2.1. General
› 4.2.2. Structures and mechanical part
› 4.2.3. Gauging and track interaction
› 4.2.4. Brake
› 4.2.5. Environmental conditions
› 4.2.6. System protection
<table>
<thead>
<tr>
<th><strong>Core TSI for first APS</strong> (art. 22(2) and 23(2) of 2008/57/EC)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intention:</strong> Authorisation in one MS</td>
</tr>
<tr>
<td><strong>Status:</strong> Mandatory</td>
</tr>
<tr>
<td><strong>Content:</strong> Requirements to achieve <strong>interoperability</strong>, definition of all parameters related to the <strong>technical compatibility with network</strong> and the way how to determine them (section 4.2)</td>
</tr>
<tr>
<td>Requirements linked with the <strong>safe integration</strong></td>
</tr>
<tr>
<td>4 open points</td>
</tr>
<tr>
<td><strong>Remarks:</strong> All information must be recorded in technical file which has to be transmitted to the RUs</td>
</tr>
<tr>
<td><strong>Clause 7.1.2</strong> for mutual recognition of first APS  (art. 22 and 23 of 2008/57/EC)</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td><strong>Intention:</strong></td>
</tr>
<tr>
<td><strong>Status:</strong></td>
</tr>
<tr>
<td><strong>Content:</strong></td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
</tr>
</tbody>
</table>
Appendix C (art. 22(2), 23(1) and 6(9) of 2008/57/EC)

**Intention:** Transition from “old world” to “new world”, support of sector

**Status:** Optional (compliance with core TSI and clause 7.1.2 is precondition)

**Content:** Technical solutions and conditions coming from the former UIC/RIV world (e.g. UIC footsteps and handrails)

**Remarks:** The NoBo assesses the fulfilment of Appendix C. How the Appendix C wagons can be operated is completely with the responsibility of the RUs. It is intended to transfer Appendix C into a standard, the GCU or other appropriate locations.
TSI NOI

Technical specification for interoperability relating to the subsystem ‘rolling stock - noise’
Interaction between NOI TSI and other EU legislation


- applies to environmental noise to which humans are exposed.
- Sets out common assessment methods and common noise indicators at EU level. It does not set out limit values.

The Member States must
- create maps of noise for major railways (>30,000 train passages/year)
- draw up action plans, including noise reduction if needed

The measures within the plans are at the discretion of the competent authorities, but should address priorities which may be identified by the exceeding of any relevant limit value.

→ 19 MS have already defined limit values, 3 MS are currently revising these values and 4 MS have guidelines values in place
Interaction between NOI TSI and other EU legislation

Environmental Noise (EU)

Attenuation measures

- Home acoustic insulation
- Noise barriers

Railway Noise

- INF
- OPE
- Track Access

Vehicle noise (TSI)

- Pass by
- Starting
- Stationary

END: Noise perceived by user
Directive 2003/10/EC

- Applies to activities in which workers exposed to noise as a result of their work.
- Sets out exact limit values and exposure action values for both peak sound pressure and daily noise exposure values as summarized in table below:

<table>
<thead>
<tr>
<th>Exposure Limit Values</th>
<th>Peak sound pressure ( (p_{\text{peak}}) )</th>
<th>Daily noise exposure level ( L_{\text{EX, 8h}} )</th>
<th>Associated action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower exposure action values</td>
<td>112 Pa (135 dB(C))</td>
<td>80 dB(A)</td>
<td>the employer shall make individual hearing protectors available to workers</td>
</tr>
<tr>
<td>Upper exposure action values</td>
<td>140 Pa (137 dB(C))</td>
<td>85 dB(A)</td>
<td>Individual hearing protectors shall be used</td>
</tr>
<tr>
<td>Exposure limit values</td>
<td>200 Pa (140 dB(C))</td>
<td>87 dB(A)</td>
<td>Must not be trespassed under any circumstance</td>
</tr>
</tbody>
</table>
Interaction between NOI TSI and other EU legislation

**Directive 2003/10/EC**

- Define limit values:
  1. Daily limit values (8 hours working time)
  2. Peak limit values

**Interoperability Directive + NOISE TSI**

- NOI TSI: limit values for Cab Interior Noise
  1. At maximum speed + at standstill with horn.
  2. Assessment not needed. No noise emission in RST is loud enough to trespass the peak values defined in the Directive

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- RU is responsible to ensure that a TSI compliant vehicle do not trespass the lower exposure action daily values.
- RST do not trespass the lower exposure peak limit values at any time. No assessment is needed.
Technical scope

- Applies to all rolling stock within the scope of LOC&PAS TSI and WAG TSI.

Functional and technical specifications of the subsystems

The following parameters have been identified as critical for the interoperability (basic parameters)

- (a) “stationary noise”,
- (b) “starting noise”,
- (c) “pass-by noise”,
- (d) “driver’s cab interior noise”.

Assessment by tests or by a Simplified evaluation
TSI SRT

Technical specification for interoperability relating to "safety in railway tunnels" of the rail system of the European Union
Scope related to tunnels

- This TSI applies to new, renewed and upgraded tunnels which are located on the European Union rail network.
- “Tunnel” comprises elements of the subsystems:
  - INFRASTRUCTURE
  - ENERGY

Scope related to rolling stock

- This TSI applies to rolling stock which is in the scope of the LOC&PAS TSI.
- It defines two categories of passenger rolling stock:
  - Cat A
  - Cat B
Subsystem Rolling Stock – Passenger RST requirements

**Cat. A**
- Fire detection systems
- Material requirements
  - Operation Category 2 as per EN 45545
- Portable fire extinguishers, smoke control, emergency lighting & exits
- Running Capability
  - Brake function, 4 minutes as per EN 50553
- Measures aimed at specific risks
  - Leakage of flammable liquids

**Cat. B = Cat. A +...**
- Running Capability
- Material requirements
  - Operation Category 3 as per EN 45545
- Fire Containment Control Systems
  - Brake and traction functions, 15 minutes as per EN 50553
- Fire Barriers
  - Equivalent solution e.g. watermist. The assessment is an open Point
Subsystem Rolling Stock – Freight Locomotives requirements

**Rolling Stock Requirements**

- **No category defined**
  - **Fire detection systems**
    - Automatic system capable of detecting a fuel fire and shutting down all relevant equipment and cutting of fuel supply for diesel freight locomotives
  - **Fire spreading protection measures**
  - **Material requirements**
    - Portable fire extinguishers, smoke control, emergency lighting & exit for driver’s cab
  - **Leakage of flammable liquids**
  - Measures aimed at specific risks
  - **Fire barrier to protect driver’s cab**
  - Operation Category 2 as per EN 45545
<table>
<thead>
<tr>
<th>Tunnel length</th>
<th>Passenger Rolling stock category</th>
<th>Maximum distance from the portals to a fire fighting point and between fire fighting points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 5 km</td>
<td>Category A or B</td>
<td>No fire fighting point required</td>
</tr>
<tr>
<td>5 to 20 km</td>
<td>Category A</td>
<td>5 km</td>
</tr>
<tr>
<td></td>
<td>Category B</td>
<td>No fire fighting point required</td>
</tr>
<tr>
<td>&gt;20 km</td>
<td>Category A</td>
<td>5 km</td>
</tr>
<tr>
<td></td>
<td>Category B</td>
<td>20 km</td>
</tr>
</tbody>
</table>
Compatibility between freight trains and tunnels

• Freight trains are authorized to circulate through any tunnel irrespective of its length.
• Only in the case of tunnels longer than 20 km, Infrastructure Managers are permitted to require locomotives with a running capability equivalent to that of category B passenger rolling stock
• This requirement shall be clearly stated in the Register of Infrastructure and in the IM’s Network Statement
TSI PRM

Technical specifications for interoperability relating to accessibility of the Union's rail system for persons with disabilities and persons with reduced mobility
Scope related to Infrastructure subsystem

- This TSI applies to all the public areas of stations dedicated to the transport of passengers that are controlled by the Railway Undertaking, Infrastructure Manager or Station Manager. This includes the provision of information, the purchase of a ticket and its validation if needed, and the possibility to wait for the train.

Scope related to Rolling Stock subsystem

- This TSI applies to Rolling Stock which is in the scope of the LOC&PAS TSI and which is intended to carry passengers.
Station requirements: why should London stations look different than other London buildings?

Where details are not necessary, the TSI contains only functional requirements.

Requirements for which technical details need to be specified (access to platforms, customer information, boarding aids…) in the TSI with sufficient details to enable assessment.
1 - Identification of obstacles

2 - Elimination of obstacles

Implementation: a TSI that mandates to move to the target system

Inventories of assets

National Implementation Plan
Thank you!