Railway Interoperability – The Railways (Interoperability) Regulations 2011

Notice to all:
- Manufacturers and distributors of railway equipment
- Infrastructure managers and railway undertakings
- Railway infrastructure and train: builders, designers, operators, owners and managers
- Certifying authorities, approved bodies and notified bodies, recognised organisations and railway consultants

This Notice should be read with the Railways (Interoperability) Regulations 2011 and other relevant National Technical Specifications Notices (NTSNs). Unless otherwise defined, expressions used in this NTSN have the same meaning as in the Railways (Interoperability) Regulations 2011.

Summary
This Notice has been published by the Secretary of State for Transport pursuant to regulation 3B of the Railways (Interoperability) Regulations 2011 and comes into force on exit day.

The objective of the Railways (Interoperability) Regulations 2011 is to enhance the interoperability of the rail system through the uniform application of technical standards relating to railway equipment to be placed into service in the UK.

This Notice provides technical information on the required level of specification in relation to rolling stock subsystem (for both locomotives and passenger rolling stock, and freight wagons) in order to limit the noise emission of the rail system.

This Notice replaces and substantially reproduces the provisions of Commission Regulation (EU) No 1304/2014 of 26 November 2014 on the technical specifications for interoperability relating to the subsystem ‘rolling stock – noise’ amending Decision 2008/232/EC and repealing Decision 2011/229/EU (NOI TSI), as it had effect immediately before exit day.

The specific cases that were included in the NOI TSI that are relevant to the UK have been retained as UK specific cases. The specific cases for EU Member States have not been included as they are not relevant to this Notice.
Rolling Stock – Noise
National Technical Specification Notice

Article 1

This National Technical Specification Notice (NTSN) concerns the ‘rolling stock — noise’ subsystem of the rail system, as set out in the Annex.

Article 2

The NTSN shall apply to the rolling stock which falls within the scope of the LOC&PAS NTSN and WAG NTSN.

Article 3

This provision has been left intentionally blank

Article 4

The procedures for assessment of conformity, suitability for use and UK verification set out in section 6 of the Annex to this NTSN shall be based on the modules established in the NTSN concerning modules for the procedures for assessment of conformity or suitability for use and UK verification (“Modules NTSN”).

Article 5

1. With regard to UK specific cases listed in point 7.3.2 of the Annex, the conditions to be met for the verification of the essential requirements set out in Schedule 2 to the Railways (Interoperability) Regulations 2011 shall be those laid down in point 7.3.2 of the Annex or by national technical rules.

Article 5a

From 8 December 2024, wagons within the scope of the Wagon NTSN which are not covered by point 7.2.2.2 of the Annex to this NTSN shall not be operated on the quieter routes.

Article 5b

A ‘quieter route’ means a part of the railway infrastructure with a minimum length of 20 km on which the average number of daily operated freight trains during the night-time as defined in national legislation transposing Directive 2002/49/EC of the European Parliament and of the Council1 (*) was higher than 12. The freight traffic in the years

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2015, 2016 and 2017 shall be the basis for the calculation of that average number. In case the freight traffic due to exceptional circumstances diverges in a given year from that average number by more than 25%, the Competent Authority concerned can calculate the average number on the basis of the remaining two years.

**Article 5c**

1. The Competent Authority shall designate quieter routes in accordance with Article 5b and the procedure set out in Appendix D.1 of the Annex. The Competent Authority shall publish those lists on its website by no later than 27 February 2020.

2. The Competent Authority shall update the list of quieter routes at least every five years after 8 December 2024, following the procedure set out in Appendix D.2 of the Annex.

**Article 6**

Compliance with the lower exposure action values set out in Article 3 of Directive 2003/10/EC of the European Parliament and of the Council shall be ensured by compliance with the driver's cabin interior noise level, as set out in point 4.2.4 of the Annex to this NTSN as well as by appropriate operational conditions to be defined by the railway undertaking.

**Article 7**

1. In order to adapt to technological progress, innovative solutions may be proposed by the manufacturer or its authorised representative which do not comply with the specifications set out in the Annex and/or for which the assessment methods set out in the Annex cannot be applied.

2. Innovative solutions may be related to the rolling stock subsystem, its parts and its interoperability constituents.

3. Where an innovative solution is proposed, the manufacturer or his authorised representative shall apply for an exemption in accordance with regulation 14 and 14A of the Railways (Interoperability) Regulations 2011.

4. The Competent Authority shall publish a determination on the proposed innovative solution in accordance with regulation 14A of the Railways (Interoperability) Regulations 2011. If this determination is positive, an exemption will be granted in accordance with regulations 14 and 14A of the Railways (Interoperability) Regulations 2011.

Implemented by the Environmental Noise (England) Regulations 2006, the Environmental Noise Regulations (Northern Ireland) 2006, the Environmental Noise (Scotland) Regulations 2006 and the Environmental Noise (Wales) Regulations 2006. This EU legislation is EU derived domestic legislation under section 2 of the European Union (Withdrawal) Act 2018.

Article 8

The declaration of verification and/or conformity to type of a new vehicle established in accordance with Decision 2011/229/EU³ shall be considered valid:

— for locomotives, EMUs, DMUs and coaches until the type or design certificate needs to be renewed as stated in Decision 2011/291/EU⁴ for cases where the latter decision was applied, or until 31 May 2017 for other cases,

— for wagons until 13 April 2016.

The declaration of verification and/or conformity to type of a new vehicle established in accordance with Decision 2008/232/EC⁵ shall be considered valid until the type or design certificate needs to be renewed as stated in this Decision.

Article 9

This NTSN, published by the Secretary of State on 31 October 2019 in accordance with regulation 3B of the Railways (Interoperability) Regulations 2011, replaces Regulation 1304/2014/EU⁶ as the relevant standard to be complied with in relation to the technical specifications for interoperability relating to the ‘rolling stock — noise’ subsystem of the rail system.

1. Decision 2011/229/EU was repealed with effect from 1 January 2015.

2. In the Annex to Decision 2008/232/EC, points 4.2.6.5, 4.2.7.6 and 7.3.2.15 are deleted with effect from 1 January 2015.

3. The provisions referred to in paragraphs 1 and 2 shall however continue to apply in relation to projects authorised in accordance with the TSI annexed to those Decisions and, unless the applicant requests to apply this NTSN, to projects relating to new vehicles and to the renewal or upgrading of existing vehicles which are at an advanced stage of development, are the subject of a contract in force on the 12 December 2014 or cases referred to in Article 8 of this NTSN.

Article 10

This provision has been left intentionally blank

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⁶ Regulation (EC) No 1301/2014 of the European Commission on the technical specifications for interoperability relating to the ‘energy’ subsystem of the rail system in the Union. This EU legislation is retained EU law under section 3 of the European Union (Withdrawal) Act 2018.
ANNEX

TABLE OF CONTENTS

1. INTRODUCTION

1.1. Technical scope

1.1.1. Scope related to rolling stock

1.1.2. Scope related to operational aspects

1.2. Geographical scope

2. DEFINITION OF THE SUBSYSTEM

3. ESSENTIAL REQUIREMENTS

4. CHARACTERISATION OF THE SUBSYSTEM

4.1. Introduction

4.2. Functional and technical specifications of the subsystems

4.2.1. Limits for stationary noise

4.2.2. Limits for starting noise

4.2.3. Limits for pass-by noise

4.2.4. Limits for the driver's cab interior noise

4.3. Functional and technical specifications of the interfaces

4.4. Operating rules

4.4.1. Specific rules for the operation of wagons on quieter routes in case of degraded operation

4.4.2. Specific rules for the operation of wagons on quieter routes in case of infrastructure works and wagons maintenance

4.5. Maintenance rules
4.6. Professional qualifications

4.7. Health and safety conditions

4.8. List of determinations of types for vehicles

5. INTEROPERABILITY CONSTITUENTS

6. CONFORMITY ASSESSMENT AND UK VERIFICATION

6.1. Interoperability constituents

6.2. Subsystem rolling stock regarding noise emitted by rolling stock

6.2.1. Modules

6.2.2. UK verification procedures

6.2.3. Simplified evaluation

7. IMPLEMENTATION

7.1. Application of this NTSN to new subsystems

7.2. Application of this NTSN to existing subsystems

7.2.1. Provisions in case of changes to existing rolling stock or rolling stock type

7.2.2. Additional provisions for the application of this NTSN to existing wagons

7.3. UK Specific cases

7.3.1. Introduction

7.3.2. List of UK specific cases
1. INTRODUCTION

A National Technical Specification Notice (NTSN) is a specification that covers a subsystem (or part of it) as described in regulation 2 of the Railways (Interoperability) Regulations 2011 in order:

— to ensure the interoperability of the rail system, and
— to meet the essential requirements.

1.1. Technical scope

1.1.1 Scope related to rolling stock

This NTSN applies to all rolling stock within the scope of the LOC&PAS NTSN and the WAG NTSN.

1.1.2. Scope related to operational aspects

Alongside with the OPE NTSN, this NTSN applies to the operation of freight wagons which are used on railway infrastructure designated as 'quieter routes'.

1.2. Geographical scope

The geographical scope of this NTSN is the network of the whole rail system.

2. DEFINITION OF THE SUBSYSTEM

A ‘unit’ means the rolling stock which is subject to the application of this NTSN, and therefore subject to the ‘UK’ verification procedure. Chapter 2 in the annex to the LOC&PAS NTSN and chapter 2 in the annex to the WAG NTSN describe what a unit can consist of.

The requirements of this NTSN apply to the following categories of rolling stock:

(a) Locomotives and passenger rolling stock including thermal or electric traction units, self-propelling thermal or electric passenger trains, and passenger coaches. This category is further defined in chapter 2 in the annex to the LOC&PAS NTSN and shall be referred to in this NTSN as locomotives, electric multiple units (EMU), diesel multiple units (DMU) and coaches;

(b) Freight wagons, including low-deck vehicles designed for the entire network and vehicles designed to carry lorries. This category is further defined in chapter 2 in the annex to the WAG NTSN and shall be referred to in this NTSN as wagons;
(c) Special vehicles, such as on-track machines. This category is further defined in chapter 2 in the annex to the LOC&PAS NTSN and consists of on-track machines (referred to in this NTSN as OTMs) and infrastructure inspection vehicles, which belong to the categories in points (a) or (b) depending on their design.

3. ESSENTIAL REQUIREMENTS

All basic parameters set out in this NTSN shall be linked to at least one of the essential requirements as set out in Schedule 2 to the Railways (Interoperability) Regulations 2011. Table 1 indicates the allocation.
Table 1
Basic parameters and their link to the essential requirements

<table>
<thead>
<tr>
<th>Point</th>
<th>Basic parameter</th>
<th>Essential requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Safety</td>
<td>Reliability and availability</td>
</tr>
<tr>
<td>4.2.1</td>
<td>Limits for stationary noise</td>
<td></td>
</tr>
<tr>
<td>4.2.2</td>
<td>Limits for starting noise</td>
<td></td>
</tr>
<tr>
<td>4.2.3</td>
<td>Limits for pass-by noise</td>
<td></td>
</tr>
<tr>
<td>4.2.4</td>
<td>Limits for driver’s cab interior noise</td>
<td></td>
</tr>
</tbody>
</table>
4. CHARACTERISATION OF THE SUBSYSTEM

4.1. Introduction

This Chapter sets out the optimal level of harmonisation related to specifications on the rolling stock subsystem intended to limit the noise emission of the rail system and to achieve interoperability.

4.2. 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’.

The corresponding functional and technical specifications allocated to the different categories of rolling stock are set out in this section. In case of units equipped with both thermal and electric power the relevant limit values under all normal operation modes shall be respected. If one of these operation modes foresees the use of both thermal and electric power at the same time the less restrictive limit value applies. There are UK specific cases indicated in Section 7.3.

The assessment procedures for the requirements in this section are defined in the indicated points and sub points of Chapter 6.

4.2.1. Limits for stationary noise

The limit values for the following sound pressure levels under normal vehicle conditions concerning the stationary noise allocated to the categories of the rolling stock subsystem are set out in Table 2:

(a) the A-weighted equivalent continuous sound pressure level of the unit \(L_{p\text{Aeq,T[unit]}}\);

(b) the A-weighted equivalent continuous sound pressure level at the nearest measuring position \(i\) considering the main air compressor \(L_{i\text{pAeq,T}}\); and

(c) the AF-weighted sound pressure level at the nearest measuring position \(i\) considering impulsive noise of the exhaust valve of the air dryer \(L_{i\text{pAFmax}}\).

The limit values are defined at a distance of 7,5 m from the centre of the track and 1,2 m above top of rail.
Table 2
Limit values for stationary noise

<table>
<thead>
<tr>
<th>Category of the rolling stock subsystem</th>
<th>$L_{pAeq,T}$ [unit] [dB]</th>
<th>$L_{pAeq,T}^1$ [dB]</th>
<th>$L_{pAFmax}^1$ [dB]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric locomotives and OTMs with electric traction</td>
<td>70</td>
<td>75</td>
<td>85</td>
</tr>
<tr>
<td>Diesel locomotives and OTMs with diesel traction</td>
<td>71</td>
<td>78</td>
<td></td>
</tr>
<tr>
<td>EMUs</td>
<td>65</td>
<td>68</td>
<td></td>
</tr>
<tr>
<td>DMUs</td>
<td>72</td>
<td>76</td>
<td></td>
</tr>
<tr>
<td>Coaches</td>
<td>64</td>
<td>68</td>
<td></td>
</tr>
<tr>
<td>Wagons</td>
<td>65</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
</tbody>
</table>

The demonstration of conformity is described in point 6.2.2.1.

4.2.2. Limits for starting noise

The limit values for the AF-weighted maximum sound pressure level ($L_{pAF,max}$) concerning the starting noise allocated to the categories of the rolling stock subsystem are set out in Table 3. The limit values are defined at a distance of 7,5 m from the centre of the track and 1,2 m above top of rail.

Table 3
Limit values for starting noise

<table>
<thead>
<tr>
<th>Category of the rolling stock subsystem</th>
<th>$L_{pAF,max}$ [dB]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric locomotives with total tractive power $P &lt; 4500$ kW</td>
<td>81</td>
</tr>
<tr>
<td>Electric locomotives with total tractive power $P \geq 4500$ kW OTMs with electric traction</td>
<td>84</td>
</tr>
<tr>
<td>Diesel locomotives $P &lt; 2000$ kW at the engine output shaft</td>
<td>85</td>
</tr>
<tr>
<td>Diesel locomotives $P \geq 2000$ kW at the engine output shaft OTMs with diesel traction</td>
<td>87</td>
</tr>
<tr>
<td>EMUs with a maximum speed $v_{max} &lt; 250$ km/h</td>
<td>80</td>
</tr>
<tr>
<td>EMUs with a maximum speed $v_{max} \geq 250$ km/h</td>
<td>83</td>
</tr>
</tbody>
</table>
The demonstration of conformity is described in point 6.2.2.2.

### 4.2.3. Limits for pass-by noise

The limit values for the A-weighted equivalent continuous sound pressure level at a speed of 80 km/h \( (L_{\text{pAeq,Tp}(80 \text{ km/h})}) \) and, if applicable, at 250 km/h \( (L_{\text{pAeq,Tp}(250 \text{ km/h})}) \) concerning the pass-by noise allocated to the categories of the rolling stock subsystem are set out in Table 4. The limit values are defined at a distance of 7.5 m from the centre of the track and 1.2 m above top of rail.

Measurements at speeds higher than or equal to 250 km/h shall also be made at the ‘additional measurement position’ with a height of 3.5 m above top of rail in accordance with Chapter 6 of EN ISO 3095:2013 and assessed against the applicable limit values of Table 4.

<table>
<thead>
<tr>
<th>Category of the rolling stock subsystem</th>
<th>( L_{\text{pAeq,Tp}(80 \text{ km/h})} ) [dB]</th>
<th>( L_{\text{pAeq,Tp}(250 \text{ km/h})} ) [dB]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric locomotives and OTMs with electric traction</td>
<td>84</td>
<td>99</td>
</tr>
<tr>
<td>Diesel locomotives and OTMs with diesel traction</td>
<td>85</td>
<td>n.a.</td>
</tr>
<tr>
<td>EMUs</td>
<td>80</td>
<td>95</td>
</tr>
<tr>
<td>DMUs</td>
<td>81</td>
<td>96</td>
</tr>
<tr>
<td>Coaches</td>
<td>79</td>
<td>n.a.</td>
</tr>
<tr>
<td>Wagons (normalised to APL = 0.225)(^{1})</td>
<td>83</td>
<td>n.a.</td>
</tr>
</tbody>
</table>

The demonstration of conformity is described in point 6.2.2.3.

### 4.2.4. Limits for the driver’s cab interior noise

The limit values for the A-weighted equivalent continuous sound pressure level \( (L_{\text{pAeq,T}}) \) concerning the noise within the driver’s cab of electric and diesel locomotives, OTMs, EMUs, DMUs and coaches fitted with a cab are set out in Table 5. The limit values are defined in the vicinity of the driver's ear.
Table 5
Limit values for driver’s cab interior noise

<table>
<thead>
<tr>
<th>Noise within the driver's cab</th>
<th>L_{pAeq,T} [dB]</th>
</tr>
</thead>
<tbody>
<tr>
<td>At standstill with horns sounding</td>
<td>95</td>
</tr>
<tr>
<td>At maximum speed ( v_{\text{max}} ) if ( v_{\text{max}} &lt; 250 \text{ km/h} )</td>
<td>78</td>
</tr>
<tr>
<td>At maximum speed ( v_{\text{max}} ) if ( 250 \text{ km/h} \leq v_{\text{max}} &lt; 350 \text{ km/h} )</td>
<td>80</td>
</tr>
</tbody>
</table>

The demonstration of conformity is described in point 6.2.2.4.

4.3. **Functional and technical specifications of the interfaces**

This NTSN has the following interfaces with the rolling stock subsystem:

- Interface with subsystems of points (a), (b), (c) and (e) of chapter 2 (dealt with in the LOC&PAS NTSN) with regard to:
  - stationary noise,
  - starting noise (not applicable to coaches),
  - pass-by noise,
  - interior noise within the driver’s cab, where applicable.

- Interface with subsystems of point (d) of chapter 2 (dealt with in the WAG NTSN) with regard to:
  - pass-by noise,
  - stationary noise.

4.4. **Operating rules**

Requirements concerning the operating rules for the subsystem rolling stock are set out in the LOC&PAS NTSN and in section 4.4 of the WAG NTSN.

4.4.1 **Specific rules for the operation of wagons on quieter routes in case of degraded operation**

The contingency arrangements as defined in point 4.2.3.6.3 of the Annex of the OPE NTSN include the operation of wagons not compliant with point 7.2.2.2 on quieter routes.

This measure can be applied to address capacity restrictions or operational constraints caused by rolling stock failures, extreme weather conditions, accidents or incidents and infrastructure failures.
4.4.2 Specific rules for the operation of wagons on quieter routes in case of infrastructure works and wagons maintenance

The operation of wagons not compliant with point 7.2.2.2 on quieter routes shall be possible in case of wagons maintenance activities where only a quieter route is available in order to access the maintenance workshop.

Contingency arrangements set out in point 4.4.1 are applicable in case of infrastructure works where a quieter route is the only suitable alternative.

4.5. Maintenance rules

Requirements concerning the maintenance rules for the subsystem rolling stock are set out in section 4.5 of the LOC&PAS NTSN and in section 4.5 of the Annex of the WAG NTSN.

4.6. Professional qualifications

Not applicable.

4.7. Health and safety conditions

See Article 6 of this Regulation.

4.8. List of determinations of types for vehicles

The data of the rolling stock must be recorded in the list of determinations of types for vehicles authorised by the Safety Authority under regulation 8 of the Railways (Interoperability) Regulations 2011.

5. INTEROPERABILITY CONSTITUENTS

There is no interoperability constituent specified in this NTSN.

6. CONFORMITY ASSESSMENT AND UK VERIFICATION

6.1. Interoperability constituents

Not applicable.

6.2. Subsystem rolling stock regarding noise emitted by rolling stock

6.2.1. Modules

The UK verification shall be performed in accordance with the module(s) described in Table 6.
### Table 6  
**Modules for UK verification of subsystems**

<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SB</td>
<td>UK-Type Examination</td>
</tr>
<tr>
<td>SD</td>
<td>UK verification based on quality management system of the production process</td>
</tr>
<tr>
<td>SF</td>
<td>UK verification based on product verification</td>
</tr>
<tr>
<td>SH1</td>
<td>UK verification based on full quality management system plus design examination</td>
</tr>
</tbody>
</table>

These modules are specified in detail in the Modules NTSN.

### 6.2.2. UK verification procedures

The applicant shall choose one of the following assessment procedures consisting of one or more modules for the UK verification of the subsystem:

- (SB+SD),
- (SB+SF),
- (SH1).

Within the application of the chosen module or module combination the subsystem shall be assessed against the requirements defined in Section 4.2. If necessary, additional requirements concerning the assessment are given in the following points.

#### 6.2.2.1. Stationary noise

The demonstration of conformity with the limit values on stationary noise as set out in point 4.2.1 shall be carried out in accordance with Sections 5.1, 5.2, 5.3, 5.4, 5.5 (without clause 5.5.2), 5.7 and clause 5.8.1 of EN ISO 3095:2013.

For the assessment of the main air compressor noise at the nearest measuring position i, the \( L_{pAeq,T} \) indicator shall be used with \( T \) representative of one operating cycle as defined in Section 5.7 of EN ISO 3095:2013. Only the train systems that are required for the air compressor to run under normal operating conditions shall be used for this. The train systems which are not needed for the operation of the compressor may be switched off to prevent contribution to the noise measurement. The demonstration of conformity with the limit values shall be carried out under the conditions solely necessary for operation of the main air compressor at the lowest rpm.

For the assessment of the impulsive noise sources at the nearest measuring position i, the \( L_{pAFmax} \) indicator shall be used. The relevant noise source is the exhaust from the valves of the air dryer.

#### 6.2.2.2. Starting noise

The demonstration of conformity with the limit values on starting noise as set out in point 4.2.2 shall be carried out in accordance with Chapter 7 (without clause
7.5.1.2) of EN ISO 3095:2013. The maximum level method referring to Section 7.5 of EN ISO 3095:2013 shall apply. Deviating from clause 7.5.3 of EN ISO 3095:2013 the train shall accelerate from standstill up to 30 km/h and then maintain the speed.

In addition the noise shall be measured at a distance of 7,5 m from the centre of the track and a height of 1,2 m above top of rail. The ‘averaged level method’ and the ‘maximum level method’ in accordance with Section 7.6 and 7.5 respectively of EN ISO 3095:2013 shall apply and the train shall accelerate from standstill up to 40 km/h and then maintain the speed. The measured values are not assessed against any limit value and shall be recorded in the technical file.

For OTMs the starting procedure shall be performed without additional trailer loads.

6.2.2.3. Pass-by noise

The demonstration of conformity with the limit values on pass-by noise as set out in point 4.2.3 shall be carried out in accordance with points 6.2.2.3.1 and 6.2.2.3.2.

6.2.2.3.1. Test track conditions

The tests shall be performed on a reference track as defined in Section 6.2 of EN ISO 3095:2013.

However, it is permitted to carry out the test on a track that does not comply with the reference track conditions in terms of acoustic rail roughness level and track decay rates as long as the noise levels measured in accordance with point 6.2.2.3.2 do not exceed the limit values set out in point 4.2.3.

The acoustic rail roughness and the decay rates of the test track shall be determined in any case. If the track on which the tests are performed does meet the reference track conditions, the measured noise levels shall be marked ‘comparable’, otherwise they shall be marked ‘non-comparable’. It shall be recorded in the technical file whether the measured noise levels are ‘comparable’ or ‘non-comparable’.

The measured acoustic rail roughness values of the test track remain valid during a period starting 3 months before and ending 3 months after this measurement, provided that during this period no track maintenance has been performed which influences the rail acoustic roughness.

The measured track decay rate values of the test track shall remain valid during a period starting 1 year before and ending 1 year after this measurement, provided that during this period no track maintenance has been performed which influences the track decay rates.

Confirmation shall be provided in the technical file that the track data related to the type’s pass-by noise measurement were valid during the day(s) of testing, e.g. by providing the date of last maintenance having an impact on noise.

Furthermore, it is permitted to carry out tests at speeds equal to or higher than 250 km/h on slab tracks. In this case the limit values shall be 2 dB higher than those set out in point 4.2.3.
6.2.2.3.2. Procedure

The tests shall be carried out in accordance with the provision in Sections 6.1, 6.3, 6.4, 6.5, 6.6 and 6.7 (without 6.7.2) of EN ISO 3095:2013. Any comparison against limit values shall be carried out with results rounded to the nearest integer decibel. Any normalisation shall be performed before rounding. The detailed assessment procedure is set out in points 6.2.2.3.2.1, 6.2.2.3.2.2 and 6.2.2.3.2.3.

6.2.2.3.2.1. EMU, DMUs, locomotives and coaches

For EMU, DMUs, locomotives and coaches three classes of maximum operational speed are distinguished:

1. If the maximum operational speed of the unit is lower than or equal to 80 km/h, the pass-by noise shall be measured at its maximum speed \( v_{\text{max}} \). This value shall not exceed the limit value \( L_{\text{pAeq,Tp}}(80 \text{ km/h}) \) as set out in point 4.2.3.

2. If the maximum operational speed \( v_{\text{max}} \) of the unit is higher than 80 km/h and lower than 250 km/h, the pass-by noise shall be measured at 80 km/h and at its maximum speed. Both measured pass-by noise values \( L_{\text{pAeq,Tp}}(v_{\text{test}}) \) shall be normalised to the reference speed of 80 km/h \( L_{\text{pAeq,Tp}}(80 \text{ km/h}) \) using formula (1). The normalised value shall not exceed the limit value \( L_{\text{pAeq,Tp}}(80 \text{ km/h}) \) as set out in point 4.2.3.

   \[
   L_{\text{pAeq,Tp}}(80 \text{ km/h}) = L_{\text{pAeq,Tp}}(v_{\text{test}}) - 30 \times \log \left( \frac{v_{\text{test}}}{80 \text{ km/h}} \right)
   \]

   \( v_{\text{test}} \) = Actual speed during the measurement

3. If the maximum operational speed \( v_{\text{max}} \) of the unit is equal to or higher than 250 km/h, the pass-by noise shall be measured at 80 km/h and at its maximum speed with an upper test speed limit of 320 km/h. The measured pass-by noise value \( L_{\text{pAeq,Tp}}(v_{\text{test}}) \) at 80 km/h shall be normalised to the reference speed of 80 km/h \( L_{\text{pAeq,Tp}}(80 \text{ km/h}) \) using formula (1). The normalised value shall not exceed the limit value \( L_{\text{pAeq,Tp}}(80 \text{ km/h}) \) as set out in point 4.2.3. The measured pass-by noise value at maximum speed \( L_{\text{pAeq,Tp}}(v_{\text{test}}) \) shall be normalised to the reference speed of 250 km/h \( L_{\text{pAeq,Tp}}(250 \text{ km/h}) \) using formula (2). The normalised value shall not exceed the limit value \( L_{\text{pAeq,Tp}}(250 \text{ km/h}) \) as set out in point 4.2.3.

   \[
   L_{\text{pAeq,Tp}}(250 \text{ km/h}) = L_{\text{pAeq,Tp}}(v_{\text{test}}) - 50 \times \log \left( \frac{v_{\text{test}}}{250 \text{ km/h}} \right)
   \]

   \( v_{\text{test}} \) = Actual speed during the measurement

6.2.2.3.2.2. Wagons

For wagons two classes of maximum operational speed are distinguished:

1. If the maximum operational speed \( v_{\text{max}} \) of the unit is lower than or equal to 80 km/h, the pass-by noise shall be measured at its maximum speed. The measured pass-by noise value \( L_{\text{pAeq,Tp}}(v_{\text{test}}) \) shall be normalised to a reference APL of 0,225 m\(^{-1}\) \( L_{\text{pAeq,Tp}}(\text{APL}_{\text{ref}}) \) using formula (3). This value shall not exceed the limit value \( L_{\text{pAeq,Tp}}(80 \text{ km/h}) \) as set out in point 4.2.3.

   \[
   L_{\text{pAeq,Tp}}(\text{APL}_{\text{ref}}) = L_{\text{pAeq,Tp}}(v_{\text{test}}) - 10 \times \log (\text{APL}_{\text{wag}}/0,225 \text{ m}^{-1})
   \]

   \( \text{APL}_{\text{wag}} = \text{Number of axles divided by the length over the buffers} \ [\text{m}^{-1}] \)
\( v_{test} = \) Actual speed during the measurement

If the maximum operational speed \( v_{max} \) of the unit is higher than 80 km/h, the pass-by noise shall be measured at 80 km/h and at its maximum speed. Both measured pass-by noise values \( L_{pAeq,Tp(v_{test})} \) shall be normalised to the reference speed of 80 km/h and to a reference APL of 0.225 m\(^{-1}\) \( L_{pAeq,Tp(APL\_{ref},\ 80\ km/h)} \) using formula (4). The normalised value shall not exceed the limit value \( L_{pAeq,Tp(80\ km/h)} \) as set out in point 4.2.3.

**Formula (4):**

\[
L_{pAeq,Tp \ (APL\_{ref},\ 80\ km/h)} = L_{pAeq,Tp(v_{test})} - 10 * \log(\frac{APL_{wag}}{0.225\ m^{-1}}) - 30 * \log(\frac{v_{test}}{80\ km/h})
\]

\( APL_{wag} = \) Number of axles divided by the length over the buffers \([m^{-1}]\)

\( v_{test} = \) Actual speed during the measurement

### 6.2.2.3.2.3. OTMs

For OTMs the same assessment procedure as set out in 6.2.2.3.2.1 applies. The measuring procedure shall be performed without additional trailer loads.

OTMs are deemed to comply with the pass-by noise level requirements in point 4.2.3 without measuring when they are:

- solely braked by either composite brake blocks or disc brakes, and
- equipped with composite scrubbers, if scrubber blocks are fitted.

### 6.2.2.4. Driver's cab interior noise

The demonstration of conformity with the limit values on the driver's cab interior noise as set out in point 4.2.4 shall be carried out in accordance with EN 15892:2011. For OTMs the measuring procedure shall be performed without additional trailer loads.

### 6.2.3. Simplified evaluation

Instead of the test procedures as set out in point 6.2.2, it is permitted to substitute some or all of the tests by a simplified evaluation. The simplified evaluation consists of acoustically comparing the unit under assessment to an existing type (further referred to as the reference type) with documented noise characteristics.

The simplified evaluation may be used for each of the applicable basic parameters 'stationary noise', 'starting noise', 'pass-by noise' and 'driver's cab interior noise' autonomously and shall consist of providing evidence that the effects of the differences of the unit under assessment do not result in exceeding the limit values set out in Section 4.2.

For the units under simplified evaluation, the proof of conformity shall include a detailed description of the noise relevant changes compared to the reference type. From this description, a simplified evaluation shall be performed. The estimated noise values shall include the uncertainties of the applied evaluation method. The simplified evaluation can either be a calculation and/or simplified measurement.

A unit certified on the basis of the simplified evaluation method shall not be used as a reference unit for a further evaluation.
If the simplified evaluation is applied for pass-by noise, the reference-type shall comply with at least one of the following:

— Chapter 4 and for which the pass-by noise results are marked ‘comparable’

— Chapter 4 of Decision 2011/229/EU and for which the pass-by noise results are marked ‘comparable’

— Chapter 4 of Decision 2006/66/EC

— Chapter 4 of Decision 2008/232/EC.

In case of a wagon whose parameters remain, compared to the reference type, within the permitted range of Table 7 it is deemed without further verification that the unit complies with the limit values on pass-by noise as set out in point 4.2.3.

Table 7
Permitted variation of wagons for the exemption from verification

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Permitted variation (compared to the reference unit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. unit speed</td>
<td>Any speed up to 160 km/h</td>
</tr>
<tr>
<td>Type of wheel</td>
<td>Only if equally or less noisy (acoustic characterisation i. a. w. Annex E of EN 13979-1:2011)</td>
</tr>
<tr>
<td>Tare weight</td>
<td>Only within the range of +20%/- 5%</td>
</tr>
<tr>
<td>Brake block</td>
<td>Only if variation does not result in higher noise emission.</td>
</tr>
</tbody>
</table>

7. IMPLEMENTATION
7.1. Application of this NTSN to new subsystems
See Article 8 of this NTSN.

7.2 Application of this NTSN to existing subsystems
The principles to be applied by the applicants and Safety Authority in case of change(s) to an existing rolling stock or rolling stock type are defined in point 7.1.2 of the Annex to the LOC&PAS NTSN and section 7.2 of the Annex to the WAG NTSN.

7.2.1 Provisions in case of changes to existing rolling stock or rolling stock type

---

The applicant shall ensure that the noise levels of rolling stock subject to change(s) remain below the limits set out in the NTSN or TSI, which was applicable when the rolling stock in question was first authorised. If no TSI existed at the time of the first authorisation, the applicant shall ensure that the noise levels of the rolling stock subject to change(s) are either not increased or remain below the limits set out in Decision 2006/66/EC8 or Decision 2002/735/EC9.

If an assessment is required, it shall be limited to the basic parameters affected by the change(s).

If the simplified evaluation is applied, the original unit may represent the reference unit in accordance with the provisions of point 6.2.3.

The replacement of a whole unit or (a) vehicle(s) within a unit (e.g. a replacement after a severe damage) does not require a conformity assessment against this NTSN, as long as the unit or the vehicle(s) are identical to the ones they replace.

7.2.2 Additional provisions for the application of this NTSN to existing wagons

The restriction of the operation set out in Article 5a of this Regulation shall not apply to wagons mostly operated on lines with a gradient of more than 40 ‰, wagons with a maximum operating speed higher than 120 km/h, wagons with a maximum axle load higher than 22.5 t, wagons exclusively operated for infrastructure works and wagons used in rescue trains.

If a wagon is being equipped with quieter brake blocks as defined in point 7.2.2.1 and no noise sources are added to the wagon, then it shall be assumed that the requirements of point 4.2.3 are met without further testing.

7.2.2.1 Quieter brake blocks

A quieter brake block is a brake block belonging to one of the following categories:

— Brake block listed in Appendix G of the WAG NTSN;

— Brake block assessed in accordance with the procedure set out in Appendix F of this NTSN.

7.2.2.2 Wagons operated on quieter routes

Wagons belonging to one of the categories below can be operated on the quieter routes:


- Wagons holding an EC declaration of verification against Commission Decision 2006/66/EC concerning the technical specification for interoperability relating to the subsystem ‘rolling stock — noise’ of the trans-European conventional rail system;

- Wagons holding an EC declaration of verification against Commission Decision 2011/229/EU concerning the technical specifications of interoperability relating to the subsystem ‘rolling stock – noise’ of the trans-European conventional rail system;

- Wagons holding a UK declaration of verification against this NTSN

- Wagons holding an EC declaration of verification against Commission Implementing Regulation (EU) 2019/774 and used in the UK before 31 October 2019;

- Wagons fitted with quieter brake blocks as defined in point 7.2.2.1 or brake discs for the service brake function;

- Wagons fitted with composite brake blocks listed in Appendix E for the service brake function. The operation of these wagons on the quieter routes shall be limited in accordance with the conditions described in this appendix.

7.3. UK Specific cases

7.3.1. Introduction

The UK specific cases, as listed in point 7.3.2, are classified as

(a) ‘P’ cases: ‘permanent’ cases;

(b) ‘T’ cases: ‘temporary’ cases.

7.3.2. List of UK specific cases

7.3.2.1. This provision has been left intentionally blank.

7.3.2.2. Limits for stationary noise (point 4.2.1)

(a) This provision has been left intentionally blank

(b) UK Specific case for Great Britain

‘(P)’ For DMUs intended to operate solely on the railway network of Great Britain the limit value for stationary noise $L_{pAeq,T[\text{unit}]}$ in Table 2 may be raised up to 77 dB.

This specific case does not apply to DMUs intended to operate solely on the High Speed 1 railway network.

(c) UK Specific case for Great Britain
(‘T’) For units intended to operate solely on the railway network of Great Britain the limit values $L^T_{pAeq,T}$ in Table 2 considering the main air compressor do not apply. The measured values shall be submitted to the Safety Authority. This specific case does not apply to units intended to operate solely on the High Speed 1 railway network.

### 7.3.2.3. Limits for starting noise (point 4.2.2)

(a) *This provision has been left intentionally blank*

(b) UK Specific case for Great Britain

(‘P’) For units specified in Table 8 intended to operate solely on the railway network of Great Britain the limit value for starting noise $L_{pAF,max}$ in Table 3 may be raised up to the values set out in Table 8.

#### Table 8

**Limit values for starting noise regarding a UK specific case for Great Britain**

<table>
<thead>
<tr>
<th>Category of the rolling stock subsystem</th>
<th>$L_{pAF,max}$ [dB]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric locomotives with total tractive power $P &lt; 4500$ kW</td>
<td>83</td>
</tr>
<tr>
<td>Diesel locomotives $P &lt; 2000$ kW at the engine output shaft</td>
<td>89</td>
</tr>
<tr>
<td>DMUs</td>
<td>85</td>
</tr>
</tbody>
</table>

This specific case does not apply to units intended to operate solely on the High Speed 1 railway network.

### 7.3.2.4. Limits for pass-by noise (point 4.2.3)

(a) UK Specific case Channel Tunnel

(‘P’) For the Channel Tunnel, the limits for pass-by noise shall not apply to wagons dedicated to the transport of heavy goods vehicles between Coquelles (France) and Folkestone (United Kingdom).

### 7.4 Particular implementation rules

#### 7.4.1. Particular implementation rules for the application of this NTSN to existing wagons (point 7.2.2)
(a) Particular implementation rules for the application of this NTSN to existing wagons in the Channel Tunnel

('P') For the calculation of the annual average daily operated freight trains during night-time the freight trains composed of wagons dedicated to the transport of heavy goods vehicles confined in the Coquelles (France) - Folkestone (United Kingdom) line shall not be taken into account.

7.4.2. Particular rules for wagons operated on quieter routes (point 7.2.2.2)

(a) This provision has been left intentionally blank

(b) Particular implementation rules for wagons operated on quieter routes of Channel Tunnel

('P') On top of the wagons listed in point 7.2.2.2, the following existing wagons can be operated on quieter routes in the Channel Tunnel concession:

Wagons dedicated to the transport of heavy goods vehicles between Coquelles (France) and Folkestone (United Kingdom)

(c) This provision has been left intentionally blank

(d) This provision has been left intentionally blank

(e) This provision has been left intentionally blank

(f) This provision has been left intentionally blank

(g) This provision has been left intentionally blank

(h) Particular rules for wagons operated on quieter routes of Great Britain

('P') For units intended to operate solely on the GB Network, where existing wagons are equipped with composite brake blocks published in GMGN 2688 it shall be permitted to operate on quieter routes

('T') The following types of existing wagons equipped with cast iron brake blocks intended to operate on the GB Network shall be permitted to operate on quieter routes:

— Wagons equipped with a non-UIC braking system for which there are no compatible silent brake blocks available for retrofitting until 31 December 2030.

— Wagons with a designed braking distance of 810m or less from 60 mph in brake mode G (goods timing)/75 mph in brake mode P (passenger
timing), where those wagons are operated in trains with other wagons which have stopping distances in accordance with the relevant UK(GB) national technical rules, until 31 December 2030.

— Wagons used exclusively for the transport of nuclear products until 31 December 2050.

### Appendix A

**Open points**

<table>
<thead>
<tr>
<th>'Element of the rolling stock subsystem'</th>
<th>Clause of this NTSN</th>
<th>Technical aspect not covered by this NTSN</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quieter brake block</td>
<td>7.2.2.1 and Appendix F</td>
<td>Assessment of the acoustic properties of the brake blocks</td>
<td>Alternative technical solutions available (see point 7.2.2)'</td>
</tr>
</tbody>
</table>

### Appendix B

**Standards referred to in this NTSN**

<table>
<thead>
<tr>
<th>Characteristics to be assessed</th>
<th>References to mandatory standards</th>
<th>Chapter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stationary noise</td>
<td>4.2.1</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>6.2.2.1 EN ISO 3095:2013</td>
<td>5</td>
</tr>
<tr>
<td>Starting noise</td>
<td>4.2.2</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>6.2.2.2 EN ISO 3095:2013</td>
<td>7</td>
</tr>
<tr>
<td>Pass-by noise</td>
<td>4.2.3</td>
<td>EN ISO 3095:2013</td>
</tr>
<tr>
<td></td>
<td>6.2.2.3 EN ISO 3095:2013</td>
<td>6</td>
</tr>
<tr>
<td>Driver's cab interior noise</td>
<td>4.2.4</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>6.2.2.4 EN 15892:2011</td>
<td>all</td>
</tr>
<tr>
<td>Simplified evaluation</td>
<td>6.2.3</td>
<td>EN 13979-1:2011</td>
</tr>
</tbody>
</table>
Appendix C

Assessment of the rolling stock subsystem

<table>
<thead>
<tr>
<th>Characteristics to be assessed, as specified in Section 4.2</th>
<th>Design review</th>
<th>Type Test</th>
<th>Routine Test</th>
<th>Particular assessment procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Element of the rolling stock subsystem</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Point</td>
<td>4.2.1</td>
<td>X (*)</td>
<td>X</td>
<td>n.a.</td>
</tr>
<tr>
<td>Stationary noise</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Starting noise</td>
<td>4.2.2</td>
<td>X (*)</td>
<td>X</td>
<td>n.a.</td>
</tr>
<tr>
<td>Pass-by noise</td>
<td>4.2.3</td>
<td>X (*)</td>
<td>X</td>
<td>n.a.</td>
</tr>
<tr>
<td>Driver's cab interior noise</td>
<td>4.2.4</td>
<td>X (*)</td>
<td>X</td>
<td>n.a.</td>
</tr>
</tbody>
</table>

(*) Only if the simplified evaluation in accordance with point 6.2.3 is applied.

Appendix D

Quieter routes

D.1 Identification of quieter routes

The Competent Authority shall publish a list of quieter routes. The list shall contain at least the following information:

— Start and end points of the quieter routes and their corresponding sections, using geographical code location as defined in the register set out in Commission Implementing Decision 2014/880/EU (RINF). If one of these points is at the border with an EU Member State, it shall be reflected.

— Identification of the sections making up the quieter route

---

The list shall be provided using the template below:

<table>
<thead>
<tr>
<th>Quieter route</th>
<th>Sections in the route</th>
<th>Unique section ID</th>
<th>Quieter route starts/finishes at the border</th>
</tr>
</thead>
<tbody>
<tr>
<td>Point A — Point E</td>
<td>Point A — Point B</td>
<td>201</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Point B — Point C</td>
<td>202</td>
<td>POINT E (Country Y)</td>
</tr>
<tr>
<td></td>
<td>Point C — Point D</td>
<td>203</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Point D — Point E</td>
<td>204</td>
<td></td>
</tr>
<tr>
<td>Point F — Point I</td>
<td>Point F — Point G</td>
<td>501</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Point G — Point H</td>
<td>502</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Point H — Point I</td>
<td>503</td>
<td></td>
</tr>
</tbody>
</table>

In addition, the Competent Authority may provide maps illustrating the quieter routes on a voluntary basis. All lists and maps shall be published by the Competent Authority no later than 9 months after 27.5.2019.

### D.2 Update of quieter routes

The freight traffic data used for the update of quieter routes in accordance with Article 5c(2) of this Regulation shall refer to the last three years preceding the update for which the data is available. In case the freight traffic due to exceptional circumstances diverges in a given year from that average number by more than 25 %, the Competent Authority can calculate the average number on the basis of the remaining two years.

The routes designated as quieter routes shall remain as such following the update unless during the period concerned the volume of traffic has decreased by more than 50 % and the average number of daily operated freight trains during the night-time is lower than 12.

In case of new and upgraded lines, the expected volume of traffic shall be used for the designation of those lines as quieter routes.

The Competent Authority shall publish the updated quieter routes.
Appendix E

Historic composite brake blocks

E.1 Historic composite brake blocks for international use

Existing wagons equipped with the brake blocks listed below are allowed to be used on the quieter routes, until the relevant date set out in Appendix N of UIC 541-4.

<table>
<thead>
<tr>
<th>Manufacturer/name of product</th>
<th>Designation/type of block</th>
<th>Type of friction coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valeo/Hersot</td>
<td>693</td>
<td>K</td>
</tr>
<tr>
<td>Wabco/Cobra</td>
<td>W554</td>
<td>K</td>
</tr>
<tr>
<td>Ferodo</td>
<td>I/B436</td>
<td>K</td>
</tr>
<tr>
<td>Abex</td>
<td>229</td>
<td>K (Fe — sintered)</td>
</tr>
<tr>
<td>Jurid</td>
<td>738</td>
<td>K (Fe — sintered)</td>
</tr>
</tbody>
</table>

Wagons equipped with historic composite brake blocks not listed in the table above but already authorised for international traffic in conformity with the provisions of Decision 2004/446/EC or Decision 2006/861/EC can still be used without any deadline within the area of use covered by their authorisation.

Appendix F

This appendix has been left intentionally blank