



<b>European Railway Agency</b>	
 <b>Guide for the application of the CR NOI TSI</b>  <b>According to Framework Mandate C(2007)3371 final of 13/07/2007</b>	
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## 0. DOCUMENT INFORMATION

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## 0.2. Table of contents

<b>0. DOCUMENT INFORMATION.....</b>	<b>2</b>
0.1. Amendment record.....	2
0.2. Table of contents.....	3
0.3. List of tables .....	4
<b>1. SCOPE OF THIS GUIDE .....</b>	<b>5</b>
1.1. Scope .....	5
1.2. Content of the guide.....	5
1.3. Reference documents.....	5
1.4. Definitions and abbreviations.....	5
<b>2. GUIDANCE ON THE APPLICATION OF THE CR NOI TSI.....</b>	<b>6</b>
2.1. Foreword .....	6
2.2. Scope of the TSI.....	6
2.3. Characteristics of the rolling stock subsystem.....	6
2.4. Assessment of conformity.....	7
2.5. Implementation.....	8
2.6. Some practical cases .....	10
<b>3. APPLICABLE SPECIFICATIONS AND STANDARDS.....</b>	<b>11</b>
3.1. Explanation of the use of the specifications and standards .....	11
<b>ANNEX 1: LIST OF STANDARDS .....</b>	<b>12</b>
<b>0. DOCUMENT INFORMATION.....</b>	<b>2</b>
0.1. Amendment record.....	2
0.2. Table of contents.....	3
0.3. List of tables .....	4
<b>1. SCOPE OF THIS GUIDE .....</b>	<b>5</b>
1.1. Scope .....	5
1.2. Content of the guide.....	5
1.3. Reference documents.....	5
1.4. Definitions and abbreviations.....	5
<b>2. GUIDANCE ON THE APPLICATION OF THE CR NOI TSI.....</b>	<b>6</b>
2.1. Foreword .....	6
2.2. Scope of the TSI.....	6
2.3. Characteristics of the rolling stock subsystem.....	6
2.4. Assessment of conformity.....	7
2.5. Implementation.....	8
2.6. Some practical cases .....	10
<b>3. APPLICABLE SPECIFICATIONS AND STANDARDS.....</b>	<b>11</b>
3.1. Explanation of the use of the specifications and standards .....	11
<b>ANNEX 1: LIST OF STANDARDS .....</b>	<b>12</b>





### 0.3. List of tables

Table 1: Status of the document .....2

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## 1. SCOPE OF THIS GUIDE

### 1.1. Scope

1.1.1. This document is an annex to the 'Guide for the application of TSIs'. It provides information on the application of the Technical Specifications for Interoperability for the 'Conventional Rolling Stock – Noise' subsystem adopted by Commission Decision 2011/229/EU of 4 April 2011 ('CR NOI TSI').

1.1.2. The guide should be read and used only in conjunction with the CR NOI TSI. It is intended to facilitate its application, but does not replace it.  
The general part of the 'Guide for the application of TSIs' should also be considered.

### 1.2. Content of the guide

1.2.1. In section 2 of this document, extracts of the original text of the CR NOI TSI are provided, in a shaded text box and followed by a text that gives guidance.

1.2.2. Guidance is not provided for clauses where the original CR NOI TSI requires no further explanation.

1.2.3. Guidance is of voluntary application. It does not mandate any requirement in addition to those set out in the CR NOI TSI.

1.2.4. Guidance is given by means of further explanatory text and, where relevant, by reference to standards that demonstrate compliance with the CR NOI TSI; relevant standards are listed in section 4 of this document, and their purpose is indicated in the column 'purpose' of the table.

### 1.3. Reference documents

Reference documents are listed in the general part of the 'Guide for the application of TSIs'.

### 1.4. Definitions and abbreviations

Definitions and abbreviations are given in section 2.2 of the CR NOI TSI and in the general part of the 'Guide for the application of TSIs'.

## 2. GUIDANCE ON THE APPLICATION OF THE CR NOI TSI

### 2.1. Foreword

The structure of this section of the application guide contains the following subsections:

- Scope of the TSI
- Characteristics of the rolling stock subsystem
- Assessment of conformity
- Implementation
- Some practical cases

### 2.2. Scope of the TSI

#### ***NOI TSI, section 1.2 – Geographical scope***

*‘The geographical scope of this TSI is the trans-European conventional rail system as described in Annex I to Directive 2008/57/EC.’*

Any rolling stock running on the CR TEN lines fall within the geographical scope of this TSI. This also applies for high-speed RST, which by default should comply with the requirements of the CR NOI TSI. Nevertheless, if an HS train is compliant with the provisions of the HS RST TSI:2008, it is deemed to comply with the CR NOI TSI requirements without further testing. See section 6.2.4 of the CR NOI TSI.

#### ***NOI TSI, section 2.1 – Definition of subsystem/scope***

*‘The rolling stock that is the subject of this TSI comprises the units defined in this clause which are likely to travel on all or part of the trans-European conventional rail network. The present TSI includes limits for stationary noise, starting noise, pass-by noise and driver’s cab interior noise.’*

Unlike the HS RST TSI, there is no definition of speed limits in the CR NOI TSI. Where an RST has a maximum speed higher than or equal to 190 km/h and is intended to operate on the CR TEN lines, it falls within the scope of the CR NOI TSI.

### 2.3 Characteristics of the rolling stock subsystem

#### ***NOI TSI, section 4.2.3 – Interior noise of locomotives, multiple units and coaches fitted with a cab***

*‘Measurements shall be made in accordance with Appendix F.’*

Even though there was an EN standard available to cover the measurement of cabin noise, it was decided to retain the CR NOI TSI requirements relating to this parameter as before the revision. This was decided in order not to change the legal aspects relating to working conditions. It is therefore compulsory to use Appendix F instead of EN 15892 which is also related to this parameter.

The main differences between the EN standard and the CR NOI TSI are:

- the minimum measurement time at maximum speed of 20s (EN) and 60s (TSI) respectively.
- the microphone position relating to the external acoustic warning (horn) emission for testing, when the external acoustic warning is used (EN 15892 refers to standard EN 15153-2).

The sections of EN 15892 that do not contradict the TSI may be used as a voluntary standard.

## 2.4 Assessment of conformity

### ***NOI TSI, section 6.2.3 – Verification methods specific to noise aspects of rolling stock***

#### ***NOI TSI, section 6.2.3.1 – Introduction***

*‘The simplified evaluation method consists of acoustically comparing the type under assessment to an existing type with documented noise characteristics compliant with the noise TSI, the latter is further referred to as the reference type.*

*It is permitted to substitute noise testing by a simplified evaluation, if the type under assessment is comparable to a reference type which has been tested in compliance with one of the following:*

- (a) Section 4 of this TSI and for which the pass-by noise results are marked ‘comparable’, or*
- (b) in compliance with section 4 of the TSI CR ‘rolling stock– noise’ adopted by Commission Decision 2006/66/EC .’*

In order for an RST type under assessment to be considered ‘comparable’ to a reference type, the type under assessment should share significant noise sources with the reference type, and in such a way that it is possible to predict compliance with the noise values for at least one parameter specified in the TSI. This may be fulfilled when the acoustically relevant characteristics of the RST type under assessment are to a large extent identical to those of the reference type.

It may or may not be possible to base the full TSI noise conformity assessment on a simplified evaluation. For example, it may be clear for a NoBo that a unit under assessment will have a lower pass-by noise than the reference type, but that for the stationary noise and start-up noise it is not possible to rely on simplified evaluation. In such case, the stationary noise and the start-up noise must be measured in accordance with the relevant clauses in section 4 of the TSI.

The units for which the noise values are not marked ‘comparable’ (because of the track conditions on which they were tested) are not allowed to be used as reference units.

*‘The following units are eligible for a simplified evaluation:*

- (a) Different formations of multiple units,*
- (b) Renewed or upgraded units in accordance with point 7.6 of this TSI,*

(c) *New units which are largely based on an existing design (same vehicle family).'*

Point (a) is intended to allow for testing of the worst-case configuration of multiple units, which prevents the testing of all possible formations.

Point (c): 'vehicle family' is intended to cover units which share properties insofar as they are 'comparable' for noise-related characteristics. For wagons, this comparability is set out in Table 7. For passenger rolling stock and locomotives, it was impossible to draw up a similar table within the framework of the limited revision.

### **NOI TSI, section 6.2.3.2 – Simplified evaluation for locomotives, multiple units, coaches and OTMs**

*'The simplified evaluation on a unit shall consist of providing evidence to show that the acoustically relevant systems and characteristics are either identical to those of the reference type, or such that they will not result in higher noise emission of the unit under assessment. The simplified evaluation can either be a calculation, or simplified measurement (e.g. sound power of noise sources), or a combination of both. Noise relevant systems which differ from the reference type shall be identified in the technical file.'*

Evidence should be robust and verifiable. The analysis should be repeatable with equal results. Calculations should be described in detail to enable the NoBo to assess the quality of the calculation process. Assumptions should be made conservatively.

The TSI does not allow the simplified evaluation to be used when the noise level of the type under assessment is higher than the noise level of the reference type, even if the higher noise level of the type under assessment is expected to remain within the TSI limits. In such case, a full TSI assessment in accordance with section 4 of the TSI has to be carried out.

### **NOI TSI, section 6.2.3.2 – Simplified evaluation for freight wagons**

*'Number of axles per unit length (related to either the length of the wagon or the number of wheel sets'*

The simplified evaluation may be applied on wagons of which both the number of axles and the length are changed, when compared to the reference type; however this is unlikely to stay within the permitted 5% weight variation, and therefore probably only a theoretical case.

## **2.5 Implementation**

### **NOI TSI, section 7.6 – Application of the TSI to existing rolling stock**



*'If a wagon during renewal or upgrading is being equipped (or is already equipped) with composite blocks and without adding additional noise sources to the wagon, it shall be assumed without testing that the values of point 4.2.1.1 are fulfilled.'*

Please refer to the CR WAG TSI for further details relating to composite brake blocks. ERA keeps a list of approved composite brake blocks (k-blocks) which is published on its website. The pass-by noise level of wagons which have been retrofitted with k-blocks does not have to be tested to prove TSI compliance. The pass-by noise level of these wagons is assumed to be within the TSI limit.

*'An upgrading for noise emission reduction only is not mandatory, but if upgrading is done for another reason it shall be demonstrated that renewal or upgrading does either not increase pass-by noise levels, or when increased remain within the limits which are specified in this TSI.'*

*'For stationary noise, it shall be demonstrated that the stationary noise levels do either not increase, or when increased remain within the limits which are specified in this TSI.'*

When noise levels before upgrade/renewal exceed the TSI limits, these noise levels may not be increased. When the noise levels before upgrade are below the TSI limits, they may be increased to the level defined in the TSI. The reason for allowing this increase is to enable the retrofitting of additional equipment such as air-conditioning systems and to allow for an equal treatment of existing vehicles.

### **NOI TSI, section 7.7 – Specific cases**

*'Specific cases belong to two categories: the provisions apply either permanently (case P), or temporarily (case T). In temporary cases, it is recommended that the Member States concerned should conform with the relevant subsystem either by 2010 (case T1), an objective set out in Decision 1692/96/EC of the European Parliament and of the Council of 23 July 1996 on Community guidelines for the development of the trans-European transport network, or by 2020 (case T2).'*

The revised noise TSI is adopted after the expiry of period T1. For this reason, Member States are advised to no longer use the specific cases marked T1.



## 2.6 Some practical cases

*[to be completed after return of experience]*



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### 3. APPLICABLE SPECIFICATIONS AND STANDARDS

#### 3.1. Explanation of the use of the specifications and standards

Standards of voluntary use which have been identified during the drafting process of the TSI are listed in Annex 1, column 'Voluntary ref to clause(s) of Standard No'; as far as possible, the clause of the standard which is relevant for the conformity assessment of the TSI requirement should be identified. In addition, the column 'Voluntary ref – Purpose' should give a written explanation regarding the purpose of the reference to the standard. Where relevant, an additional explanation is given in section 2 above.

The list in Annex 1 does not contain any reference to mandatory standards, since these are referred to in the TSI. If the TSI refers to a specific clause in the mandatory standards, additional clauses to those identified as mandatory in the TSI may in general be used on a voluntary basis, except where this would entail a contradiction with the TSI.

Annex 1 should be completed after a review with the Standardisation Bodies, and on a regular basis, in order to take into account new or revised harmonised standards.

## Annex 1: List of standards

No voluntary standards have been identified which relate to the basic parameters or testing conditions as set out in the CR NOI TSI.

The TSI compulsorily refers to standards for the indicated TSI characteristics.

TSI		Standard		To be drafted
Characteristics to be assessed		Voluntary ref. to clause(s) of Standard No	Purpose of the voluntary ref.	
		EN 60942	<i>Electroacoustics – Sound calibrators (IEC 60942:2003)</i>	
		EN 61260	<i>Electroacoustics – Octave-band and fractional-octave-band filters (IEC 61260:1995)</i>	
		EN 61672-1	<i>Electroacoustics – Sound level meters – Part 1: Specifications (IEC 61672-1:2002)</i>	
		EN 61672-2	<i>Electroacoustics – Sound level meters – Part 2: Pattern evaluation tests (IEC 61672-2:2003)</i>	
		EN ISO 266	<i>Acoustics – Preferred frequencies (ISO 266:1997)</i>	
		EN ISO 12001	<i>Acoustics – Noise emitted by machinery and equipment – Rules for the drafting and presentation of a noise test code</i>	
		EN 13452-1	<i>Railway applications – Braking – Mass transit brake systems – Part 1: Performance requirements</i>	
		EN 15461	<i>Railway applications – Noise emission – Characterisation of the dynamic properties of track sections for pass by noise measurements</i>	



TSI		Standard		
Characteristics to be assessed		Voluntary ref. to clause(s) of Standard No	Purpose of the voluntary ref.	To be drafted
		EN 15610	<i>Railway applications – Noise emission – Rail roughness measurement related to noise generation</i>	
		EN13129-1	<i>Railway applications – Air conditioning for main line rolling stock – Part 1: Comfort parameters</i>	
		EN14750-1	<i>Railway applications – Air conditioning for urban and suburban rolling stock – Part 1: Comfort parameters</i>	
		EN14813-1	<i>Railway applications – Air conditioning for driving cabs – Part 1: Comfort parameters</i>	
		EN ISO 3381	<i>Railway applications -- Acoustics -- Measurement of noise inside railbound vehicles</i>	
		EN 15892 for the clauses that do not contradict the TSI.	<i>Railway applications – Noise emission – Measurement of noise inside driver's cabs</i>	
		EN ISO 3095 for the clauses that do not contradict the TSI.	<i>Railway applications -- Acoustics -- Measurement of noise emitted by railbound vehicles</i>	

