EUROPEAN UNION AGENCY FOR RAILWAYS

Moving Europe towards a sustainable and safe railway system without frontiers.

Guide for the application of the NOI TSI

In accordance with Article 19(3) of Regulation (EU) 2016/796 of the European Parliament and of the Council of 11 May 2016

Released by European Union Agency for Railways

This guide does not contain any legally binding advice. It may serve as a clarification tool without however dictating in any manner compulsory procedures to be followed and without establishing any legally binding practice. The guide provides explanations on the provisions contained in the TSIs and should be helpful for understanding the approaches and rules described therein. However, it does not substitute for them.
The guide is publicly available and it will be regularly updated to reflect progress with European standards and changes to the TSIs.
The reader should refer to the website of the European Union Agency for Railways for information about its latest available edition.

Document History

Version date	*Section number*	*Modification description*
1.0	All	Transfer of the application guide from the previous template to the current one Update of the text based on Regulation (EU) 2019/774
2.0 – 8/12/2023	All	Version 2023 updated based on the Commission Implementing Regulation (EU) 2023/1694 of 10 August 2023

Table of Contents

1. SCOPE OF THIS GUIDE

This document is an annex to the 'Guide for the application of TSIs'. It provides information on the application of Commission Regulation (EU) No 1304/2014 of 26 November 2014 on the technical specification for interoperability relating to the subsystem 'rolling stock — noise' (NOI TSI).

This version 2023 of the guide is updated based on the Commission Implementing Regulation (EU) 2023/1694 of 10 August 2023 amending Regulations (EU) No 321/2013, (EU) No 1299/2014, (EU) No 1300/2014, (EU) No 1301/2014, (EU) No 1302/2014, (EU) No 1304/2014 and Implementing Regulation (EU) 2019/777.

The guide should be read and used only in conjunction with the NOI TSI. It is intended to facilitate its application, but does not replace it.

1.1. Content of the guide

In the following chapters of this document, extracts of the text of the NOI TSI are provided in shaded text boxes, which are followed by a text that gives guidance.

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

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

Guidance is given by means of further explanatory text and, where relevant, by reference to standards that demonstrate compliance with the NOI TSI. Relevant standards are listed in appendix 1 of this document, and their purpose is indicated in the column 'Purpose' of the table.

1.2. Document reference/s

General document references can be found in the general part of the guide for the application of TSI.

1.3. Definitions and abbreviations

Definitions and abbreviations are given in the general part of the guide for the application of TSI.

2. GUIDANCE ON THE APPLICATION OF THE NOI TSI

2.1. Introduction

Point 1.1.1: Scope related to rolling stock

> *This TSI applies to all rolling stock within the scope of the Annex to Regulation (EU) No 1302/2014 ('TSI LOC&PAS') and the Annex to Regulation (EU) No 321/2013 ('TSI WAG').*

The NOI TSI does not apply to wagons designed to operate only on the 1 520 mm network.

Point 1.2: Geographical scope

> *The geographical scope of this TSI corresponds to the scopes defined in point 1.2 of LOC&PAS TSI and in point 1.2 of WAG TSI, each for their rolling stock (RST) concerned.*

The geographical scope of the NOI TSI includes the entire European Union's rail system as set out in Annex I of Directive (EU) 2016/797. The reference to the LOC&PAS TSI and the WAG TSI makes sure that the same restrictions affecting the rolling stock are taken over by the NOI TSI.

2.2. Essential requirements

> *All basic parameters set out in this TSI shall be linked to at least one of the essential requirements as set out in Annex III of Directive (EU) 2016/797. Table 1 indicates the allocation.*

The basic parameters harmonised in TSIs must be critical to interoperability and linked with at least one of the essential requirements set out in Annex III of Directive (EU) 2016/797. The basic parameters of the NOI TSI are all linked with the essential requirement 1.4.4.

Additional rolling stock measures are not needed in order to comply with neither Directive 2002/49/EC nor Directive 2003/10/EC.

2.3. Characterisation of the subsystem

Point 4.2.3: Limits for pass-by noise

> *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 the specification referenced in Appendix B, Index [1] and assessed against the applicable limit values of Table 4.*

The distance from the centre of the track of the 'additional measurement position' is 7,5 m.

Table 4: Limit values for pass-by noise

Category of the rolling stock subsystem	$L_{pAeq,Tp\ (80\ km/h)}$ *[dB]*	$L_{pAeq,Tp\ (250\ km/h)}$ *[dB]*
Wagons (normalised to APL = 0,225) (*)	*83*	*n.a.*

The pass-by noise limit values set out in the NOI TSI assume certain conditions to guarantee that the noise emitted by the rolling stock under assessment is higher than the noise emitted by the track (e.g. roughness of the wheel, roughness of the rail, vertical and lateral track decay rates of the track). Considering the track, these conditions are not always found in daily operation. Therefore, it may be that e.g. wagons compliant with the pass-by noise requirements of the TSI (new or retrofitted with composite brake blocks) slightly exceed the pass-by noise limit values set out in the TSI in operation.

Point 4.2.3a: Friction elements for wheel tread brakes

> *[…]*
> *The demonstration of conformity of brake blocks for freight wagons is described in point 6.1.2.1 of this TSI. Conformity of its brake blocks to that point does not exempt the unit under assessment from the requirements set out in point 4.2.3 and the demonstration of conformity set out in point 6.2.2.3.*

The conformity to the pass-by noise limits set out in point 4.2.3 is performed at rolling stock subsystem level, either by means of a full pass-by noise test or by means of the simplified evaluation set out in point 6.2.3 of this TSI.

However, retrofitting of wagons as specified in second paragraph of 7.2.2 does not require a simplified evaluation.

Point 4.4: Operating rules

> *Requirements concerning the operating rules for the subsystem rolling stock are set out in point 4.4 of LOC&PAS TSI and in point 4.4 of WAG TSI.*

The applicant has the obligation to add in the technical file operating rules and requirements which ensure that during operation the noise emission remains within the permitted range of limit values of the NOI TSI under the conditions in which these limit values were assessed.

Point 4.5: Maintenance rules

> *Requirements concerning the maintenance rules for the subsystem rolling stock are set out in point 4.5 of LOC&PAS TSI and in point 4.5 of WAG TSI.*

The applicant has the obligation to add in the technical file maintenance rules and requirements which ensure that the noise emission remains within the permitted range of limit values of the NOI TSI throughout the life cycle of the rolling stock under the conditions in which these limit values were assessed.

It is not required to repeat the assessment procedure as set out in chapter 6 of this TSI as part of the maintenance rules.

2.4. Interoperability constituents

Point 5.2.1.: Friction element for wheel tread brakes

> *This interoperability constituent is only applicable to the 'rolling stock - freight wagons' subsystem.*
> *A friction element for wheel tread brakes shall comply with the requirements set out in point 4.2.3.a. Those requirements shall be assessed at IC level.*

The friction element for wheel tread brakes of freight wagons is an Interoperability Constituent both in the TSI Noise (for acoustical aspects) and in the TSI WAG (for braking performance aspects).

Unless specifically exempted in this TSI or in the TSI WAG, the 'EC' declaration of conformity or suitability for use needs to attest compliance against the relevant requirements in both TSIs.

2.5. Conformity assessment and EC verification

Point 6.1.2.1: Friction element for wheel tread brakes of freight wagons

> *A friction element for wheel tread brakes of freight wagons shall comply with the requirements set out in Appendix F.*
> *[…]*

The friction element for wheel tread brakes (i.e. brake block) generates brake forces by friction when engaged with the wheel tread. The requirements related to brake performed at interoperability constituent level are set out in point 4.2.4.3.5 of the TSI WAG.

Where applicable, brake blocks should be used taking into consideration the 'Usage guidelines for composite (LL) brake blocks' available on :

https://uic.org/IMG/pdf/uic_usage_guidelines_for_composite_brake_blocks_ll_not-updated.pdf

and 'Design rules for composite brake blocks (K)' available on :

https://uic.org/IMG/pdf/uic_design_rules_for_composite_brake_blocks_k_en_not-updated.pdf

Point 6.2.2.1: Stationary noise

> *For the assessment of the main air compressor noise at the nearest measuring position i, the $L^{i}_{pAeq,T}$ indicator shall be used with T representative of one operating cycle as defined in the specification referenced in Appendix B, Index [1]. Only the train systems that are required for the air compressor to run under normal operating conditions shall be used for that purpose. 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.*

During this assessment process it is not mandatory to switch on any system powered by the compressor (e.g. toilet, secondary suspension, pneumatic door step, intercirculation pneumatic doors).

The cycle as defined in the last paragraph of section 5.7 of the EN ISO 3095:2013 does not include the silent period between the shut-down of the compressor and the successive start-up.

When measuring the noise emitted by the main air compressor and the exhaust valve of the air dryer the 'nearest position' of the mesh set out in clause 5.5.1.1 of EN ISO 3095:2013 is assumed to be the noisiest one. In case of doubt it may be necessary to measure more than one position in the mesh e.g. on both sides of the rolling stock.

Point 6.2.2.2: Starting noise

> *In addition the noise shall be measured at the same distance from the centre of the track and the same height above top of rail as set out in point 4.2.2. The 'averaged level method' and the 'maximum level method' in accordance with the specification referenced in Appendix B, Index [1] 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 and communicated to the Agency.*

The positions alongside the vehicle should be those set out in point 7.5 of EN ISO 3095 for both the 'averaged level method' and the 'maximum level method'.

Point 6.2.2.3.2: Procedure

> *The tests shall be carried out in accordance with the specification referenced in Appendix B, Index [1].*

If the unit under assessment is a locomotive, it is allowed to carry out the measurements at all test speeds with a tractive effort equal to at least two thirds of the maximum available value at maximum speed. This value can be deduced from calculated tractive effort versus speed curves.

Point 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.*

Before the simplified evaluation method can be applied, it should be established that the unit under assessment and the reference type are comparable in terms of design, operation and acoustic behaviour.

'Documented noise characteristics' means that the total sound emission as well as the acoustic behaviour of the single components that are contributing to it should be known and listed.

It should be explicitly declared whether a modification of one component has an impact on other noise sources.

> *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 point 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. On the basis of that 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.*

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

Additional guidance on the application of simplified evaluation methods is available in the deliverable 1.1 of the EU project ACOUTRAIN (contract n° FP7 – 284877) '*Clarification of the simplified method in the partial revision of the TSI*' (ref. ACT-WP1-D-SNC-004-04 dated 10/10/2012). This document covers the following aspects:

- Certified tools/calculation of uncertainties
- Validation strategy
- Definition of representative operating conditions (ROC)

- Additional guidance to apply modifications related to:
  - Number of axles
  - Unit maximum speed
  - Type of the wheels
  - Braking system (that does not influence anything else, but the acoustic roughness of the wheel)
  - Composition of the unit (stationary noise case)
  - Composition of the unit (pass-by noise case)
  - Selection of the noisiest configuration of different single vehicles
  - Equipment configuration on board the vehicle (stationary/pass-by/starting noise cases)his section s

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.

If e.g. a wagon under assessment is equipped with brake blocks listed in appendix G of this TSI or brake blocks holding an EC declaration of conformity against this TSI, it is assumed without further verification that such blocks do not result in higher pass-by noise emissions.

2.6. Implementation

Point 7.2.2: Additional provisions for the application of this TSI to existing wagons

The restriction of the operation set out in Article 5a 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.

Wagons exclusively operated for infrastructure works may refer to freight wagons or any hauled vehicle, part of an on-track machine or not, exclusively operated for infrastructure works.

If a wagon is being equipped with either friction elements for wheel tread brakes covered by an EC Declaration of Conformity in accordance with this TSI or with friction elements for wheel tread brakes listed in Appendix G 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.

Without further testing means also without simplified evaluation. The reason for this is to facilitate the retrofitting of existing freight wagons fitted with cast iron wheel tread brakes. Therefore, this possibility is limited to existing freight wagons already in operation.

2.7. Appendices of the NOI TSI

Appendix C: Assessment of the rolling stock subsystem

The table in Appendix C 'Assessment of the rolling stock subsystem' is to be understood as follows: during the application of the assessment procedures of point 6.2.2 only the type test shall be carried out. If the simplified evaluation in point 6.2.3 is applied the design review has to be done based on a type test of the reference unit.

Appendix D: Quieter routes

- *In accordance with Article 5c(1), the Member States shall provide the Agency with a list of quieter routes and ensure that the infrastructure managers identify them in the RINF (application) as set out in Commission Implementing Decision (EU) 2019/777 (RINF). 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 in the register set out in RINF. If one of those points is at the border of the Member State, it shall be reflected.*
- *Identification of the sections making up the quieter route*

The list shall be provided using the template below:

Quieter route	*Sections in the route*	*Unique section ID*	*Quieter route starts/finishes at the border of the Member State*
Point A — Point E	*Point A — Point B*	*201*	*Yes POINT E (Country Y)*
	Point B — Point C	*202*	
	Point C — Point D	*203*	
	Point D — Point E	*204*	
Point F — Point I	*Point F — Point G*	*501*	*No*
	Point G — Point H	*502*	
	Point H — Point I	*503*	

All freight trains passing a certain point on the considered route should be taken into account regardless of direction of travel. It is allowed to combine sections of different lines which are side by side for the application of the threshold of 12 freight trains during night time.

Appendix E: historic composite brake blocks

E.1 Historic composite brake blocks for international use

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

Manufacturer/name of product	*Designation/type of block*	*Type of friction coefficient*
Valeo/Hersot	*693*	*K*

Wabco/Cobra	*W554*	
Ferodo	*I/B 436*	*K*
Abex	*229*	*K* *(Fe — sintered)*
Jurid	*738*	*K* *(Fe — sintered)*

The blocks listed in table under E.1 are identified both by its designation and type of friction coefficient which in some cases further specify its composition. When the composition is specified (e.g, Fe - sintered), then other compositions are not allowed.

Further definition on mechanical, physical and chemical features of the blocks is available in point 1.2.5 of UIC 540-1.

Appendix F: Assessment of acoustic performance of a brake block

Additional guidance is available in the link below:

https://www.dzsf.bund.de/SharedDocs/Textbausteine/DZSF/Forschungsberichte/Forschungsbericht_2022-17.html?nn=2208196

3. APPLICABLE SPECIFICATIONS AND STANDARDS

This application guide contains no voluntary standards.