
Značilnosti cestnih in vzletnih površin - Karakterizacija akustičnih lastnosti cestnih površin

Road and airfield surface characteristics - Characterisation of the acoustic properties of road surfaces

Oberflächeneigenschaften von Straßen und Flugplätzen - Charakterisierung der akustischen Eigenschaften der Fahrbahnoberfläche

Caractéristiques de surface des routes et des aérodromes — Caractérisation acoustique de chaussées

Ta slovenski standard je istoveten z: **CEN/TS 18194:2025**

ICS:

93.080.20	Materiali za gradnjo cest	Road construction materials
93.120	Gradnja letališč	Construction of airports

SIST-TS CEN/TS 18194:2026**en,fr,de**

Sample Document

get full document from standards.iteh.ai

TECHNICAL SPECIFICATION
SPÉCIFICATION TECHNIQUE
TECHNISCHE SPEZIFIKATION

CEN/TS 18194

December 2025

ICS 93.080.20; 93.120

English Version

**Road and airfield surface characteristics - Characterisation
of the acoustic properties of road surfaces**

Caractéristiques de surface des routes et des
aérodromes - Caractérisation acoustique des
revêtements de chaussée

Oberflächeneigenschaften von Straßen und
Flugplätzen - Charakterisierung der akustischen
Eigenschaften der Fahrbahnoberfläche

This Technical Specification (CEN/TS) was approved by CEN on 12 October 2025 for provisional application.

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

CEN members are required to announce the existence of this CEN/TS in the same way as for an EN and to make the CEN/TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the CEN/TS) until the final decision about the possible conversion of the CEN/TS into an EN is reached.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and United Kingdom.

get full document from standards.iteh.ai



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

© 2025 CEN All rights of exploitation in any form and by any means reserved
worldwide for CEN national Members.

Ref. No. CEN/TS 18194:2025 E

Contents	Page
European foreword	4
Introduction	5
1 Scope	6
2 Normative references	6
3 Terms and definitions	7
3.1 Noise sources and noise measurement method.....	7
3.2 Acoustic quantities and symbols.....	7
3.3 Road related definitions	8
3.4 Reference variables and parameters.....	9
4 Symbols and abbreviations	9
5 Basic principles of the procedure for characterization of noise properties of road surfaces	11
5.1 Test method to be used for characterization procedure.....	11
5.2 Test vehicle	11
5.3 Road speed categories and associated reference speeds	11
5.4 Reporting acoustic performance.....	12
5.5 Guideline for the practical use of <i>RSNL</i> levels	12
6 Procedure for characterizing the acoustic properties of a road surface type (acoustic labelling)	13
6.1 General.....	13
6.2 Description of road surface type.....	13
6.3 Selection of test sections and sampling principles.....	13
6.3.1 Selection of test sections	13
6.3.2 Minimum number of test sections for noise labelling.....	13
6.3.3 Age of test sections	13
6.3.4 Length of test sections and homogeneity requirement.....	13
6.3.5 Number of repetitions	13
6.4 Test tyres	14
6.5 Reference speeds.....	14
6.6 Results.....	14
7 Procedure for the <i>in situ</i> conformity-of-production (COP) acoustic assessment of a newly laid road surface	14
7.1 General.....	14
7.2 Description of road surface type.....	14
7.3 Selection of road section and sampling principles.....	15
7.3.1 Selection of road section.....	15
7.3.2 Age of road section.....	15
7.3.3 Length of road section.....	15
7.3.4 Number of repetitions	15
7.3.5 Reference speed.....	15
7.4 Test tyres	15
7.5 Results.....	15
8 Procedure for monitoring the acoustic properties of road sections	16
8.1 General.....	16
8.2 Description of road surface type.....	16
8.3 Selection of road section and sampling principles.....	16
8.3.1 Selection of test sections	16
8.3.2 Age of road section and frequency of acoustic monitoring.....	16
8.3.3 Number of repetitions	17

8.3.4	Reference speed	17
8.4	Test tyres.....	17
8.5	Output results	17
8.5.1	General.....	17
8.5.2	Comparisons with previous results	17
9	Procedure for the determination of the road correction terms $\Delta L_{WR,road}$ for use in the CNOSSOS-EU noise mapping.....	17
9.1	General.....	17
9.2	Frequency range of the measurements.....	18
9.3	Reference conditions.....	18
9.3.1	Reference CPX noise levels	18
9.3.2	Generic speed coefficients	19
9.4	Direct determination of the road surface corrections $\Delta L_{WR,road}$ on a road network.....	19
9.4.1	Measuring procedure.....	19
9.4.2	Test tyre.....	20
9.4.3	Reference speed.....	20
9.4.4	Measurement results	20
9.4.5	Calculation of road surface correction.....	20
9.5	The collection of spectral input data $\alpha_{i,m}$ and β_m	22
9.5.1	Measuring procedure.....	22
9.5.2	Age of test sections.....	22
9.5.3	Test tyre.....	22
9.5.4	Reference speed.....	22
9.5.5	Measurement results	22
9.5.6	Determination of spectral coefficients $\alpha_{i,m}$	23
9.5.7	Determination of speed coefficient β_m	23
10	Uncertainty assessment according to ISO/IEC Guide 98-3.....	24
11	Test report.....	25
Annex A (informative)	Proposed standard notation for road surface types.....	27
Annex B (normative)	Basic information on CNOSSOS-EU road traffic noise model	31
Annex C (normative)	Reference data.....	33
C.1	General.....	33
C.2	For tyre P1	34
C.3	For tyre H1.....	35
Annex D (normative)	Sources of uncertainty	36
D.1	General.....	36
D.2	Uncertainty in the CPX method	36
D.3	Variance in the test specimen.....	36
D.4	Variance in the relation between CPX and sound emission of road vehicle.....	37
D.5	Summary	38
D.6	Data from ROSANNE report D2.6 [5]	38
Bibliography	39

CEN/TS 18194:2025 (E)**European foreword**

This document (CEN/TS 18194:2025) has been prepared by Technical Committee CEN/TC 227 “Road materials”, the secretariat of which is held by BSI.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN/CENELEC Internal Regulations, the national standards organisations of the following countries are bound to announce this Technical Specification: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

Sample Document

get full document from standards.iteh.ai

Introduction

Road surface characteristics have a significant influence on the emission and propagation of road traffic noise. The generation of tyre/road noise is dependent on pavement texture and pavement porosity. Additionally, porosity leads to sound absorption properties of the pavement that also reduce the sound propagation of the overall vehicle noise. In certain cases, also the elasticity of the pavement can play a role. Pavement influence can lead to substantial differences in sound levels, associated with a given traffic flow and composition, from different road surfaces.

In order to successfully use low-noise pavements as noise abatement measures it is essential to accurately evaluate the acoustic performance of such pavements using a standardized procedure. Within the European FP5 project SILVIA, a first proposal for such a common European noise characterization methodology was proposed [1]. The project however ended before any validation of the characterization methodology was performed and there has only been, at best, a very limited adoption of the principles of the methodology. It was then felt necessary to reconsider the features in the SILVIA procedure, in particular the combined use of two measurement standards with the basic SPB (Statistical Pass-By) method [2] and the CPX (Close-Proximity) method in order to increase the accuracy of the whole system and to facilitate its implementation.

Currently standardized measurement methods exist, such as those detailed in the ISO 11819 series (the Statistical Pass-By (SPB) and the Close Proximity (CPX) method) [3]. In some countries, national road surface characterization procedures exist and make use of one or both measurement methods; however, the methods are not uniformly and consistently applied across Europe and there is little commonality in the characterization procedures, which prevents a consistent comparison of products and performances.

Furthermore, there are many different national methods for calculating or predicting environmental noise from road traffic that are linked to these acoustic pavement characterization procedures. With the common noise calculation method required by the European Noise Directive 2002/49/EC and described in the so-called “CNOSSOS-EU” Directive 2015/996/EC [4], it is possible to determine road surface effect on environmental noise based on a consistent set of input parameters for any type of road surface. As such, road surface performance is part of the input parameters of this common European environmental noise calculation method (CNOSSOS-EU). Obviously, a common acoustic pavement characterization procedure could be used to enable road planners, road administrators, contractors, and manufacturers of “low-noise” and other pavements to assess in a consistent way the acoustic performance of road pavements.

Finally, a correct and uniform assessment of the acoustic properties of low noise pavements can help to reduce trade barriers between the Member States and stimulate research and technical development in this field.

CEN/TS 18194:2025 (E)

1 Scope

This document describes an assessment procedure for characterizing the effect of different pavement types on road traffic noise emission.

The procedure relies on the application of an established measurement method and specifies the detailed conditions for its use to enable the determination of characteristic values for the acoustic performance of road surface types with a given accuracy. Performance is characterized in absolute terms rather than with respect to a reference surface, as specifications for the latter differ from country to country and could contribute to additional uncertainty.

The procedure is intended to be suitable for the following applications:

- for the acoustic labelling (i.e. the determination of initial acoustic properties) of generic or proprietary road surface products;
- for the conformity-of-production (COP) assessment of newly laid surfaces, e.g. to assess compliance with acoustic labels and/or contract specifications, or to assess the homogeneity of the surface over its length;
- for the monitoring of the acoustic properties of road surfaces over the course of their working lifetime, so as to help inform surface maintenance/replacement policies and increase understanding of the acoustic durability of road surfaces.

The values derived from this procedure are intended to be used for the following purposes:

- to characterise the initial acoustic properties of a road surface type (the acoustic label) using a common procedure across Europe. Such an acoustic label can serve as a baseline for setting performance requirements in public procurements, COP assessments and monitoring over the working lifetime of the surface. The label enables the comparison of different road surface types in an unbiased manner;
- to verify the acoustic quality and homogeneity of a newly laid road surface;
- to determine the acoustic quality and homogeneity of a road surface at a given point during its working lifetime; the collation of sufficient data on the same surface over time enables the prediction of acoustic behaviour and can help to drive surface design/development.

In addition, the procedure described within this document also makes possible:

- the establishment of reference values for wider road surface types;
- the derivation of input parameters for road surface corrections within environmental noise calculation methods (in particular, the harmonised CNOSSOS-EU method).

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies:

ISO 11819-2:2017, *Acoustics — Measurement of the influence of road surfaces on traffic noise — Part 2: The close-proximity method*

ISO/TS 11819-3, *Acoustics — Measurement of the influence of road surfaces on traffic noise — Part 3: Reference tyres*

3 Terms and definitions

For the purposes of this part of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1 Noise sources and noise measurement method

3.1.1

traffic noise

overall noise emitted by the road traffic

3.1.2

vehicle noise

total noise emitted by an individual vehicle

Note 1 to entry: The two major components are tyre/road noise and power unit noise, but aerodynamic noise can play a role as well (e.g. for heavy vehicles).

3.1.3

tyre/road noise

noise generated by the tyre/road interaction

3.1.4

power unit noise

noise generated by the vehicle engine, exhaust system, air intake, fans, transmission, etc.

3.1.5

close-proximity (CPX) method

measurement method as defined in ISO 11819-2

3.2 Acoustic quantities and symbols

3.2.1

CPX level, L_{CPX}

time-averaged A-weighted sound pressure level of the tyre/road noise as determined by the CPX method defined in ISO 11819-2

Note 1 to entry: This can be either a broadband level or spectral levels, as required.

Note 2 to entry: The CPX level is expressed in decibels. In order to provide more information, additional suffixes are used; see Table 1.

3.2.2

road surface noise label, $RSNL_{cat}$

label given to a certain road surface for a specific road category, where 'cat' denotes the road speed category (defined as 'High', 'Medium' or 'Low')

Note 1 to entry: A surface can have RSNL values for multiple road speed categories, each value being determined from measurements at the appropriate reference speed. These values are not transferrable from one category to another.

CEN/TS 18194:2025 (E)

3.2.3

standard deviation related to the measurement uncertainty, σ_m

standard deviation related to the measurement uncertainty in the context of CPX measurements

3.2.4

standard deviation of the product, σ_p

standard deviation related to the product variation, based on labelling results and used e.g. in the context of conformity of production test (COP)

3.2.5

acoustic variability, s_t

acoustic variability due to road surface inhomogeneities, as defined in ISO 11819-2

Note 1 to entry: It corresponds to the standard deviation of the A-weighted sound pressure levels over all segments, when using reference tyre t .

3.3 Road related definitions

3.3.1

road surface

durable surface material laid down as the top layer of a road structure in contact with the vehicular traffic

3.3.2

road surface type

specific combination of mix-design and laying procedure that leads to road surface with similar physical and mechanical properties, e.g. SMA 11

Note 1 to entry: This includes in particular specific maximum aggregate size, void content and layer thickness. Although basic acoustic behaviour is rather similar within a type, there are certain differences in detailed noise properties depending on age and manufacturing. See also Annex A.

3.3.3

road section

total stretch of the road lane subject to testing

3.3.4

road segment

part of a road section, being 20 m long and intended for normalization of sound pressure levels from the actual speed on that segment to a certain reference speed

3.3.5

road speed categories

type of roads defined with respect to the range of speeds at which the traffic flows

Note 1 to entry: Three categories are defined, usually associated with certain areas (urban, suburban, rural, etc.). Each road speed category has an associated reference speed (a preferred speed) at which CPX measurements are undertaken. The categories and reference speeds are defined in 3.3.6 to 3.3.8.

3.3.6

“low” road speed category

conditions which relate to traffic operating at an average speed less than 65 km/h

Note 1 to entry: These conditions are usually associated with urban traffic.

3.3.7**“medium” road speed category**

conditions which relate to traffic operating at an average speed of 65 km/h to 109 km/h

3.3.8**“high” road speed category**

conditions which relate to traffic operating at an average speed of 110 km/h or more

Note 1 to entry: These conditions are usually associated with motorway traffic in rural or suburban areas. It can happen that heavy vehicles operate at lower average speeds due to speed restrictions.

3.4 Reference variables and parameters**3.4.1****reference speed, v_{ref}**

speed value at which the noise levels are expressed

Note 1 to entry: The reference speed is expressed in kilometres per hour. Depending upon the road speed category, the reference speed is 50 km/h, 80 km/h or 110 km/h.

3.4.2**reference tyres**

tyres specified for the purpose of representing certain features related to tyre/road sound emission and which have specified and reproducible standard properties

Note 1 to entry: The method described in this document comprises the use of two reference tyres: one representing passenger tyres denoted by P, and one representing heavy vehicle tyres denoted by H.

Note 2 to entry: The reference tyres are specified in ISO/TS 11819-3.

4 Symbols and abbreviations

For the purposes of this part of this document, the following symbols and abbreviations apply.

Table 1 — Symbols and abbreviated terms used in this document and their value or unit

Symbol	Value/unit	Explanation
$RSNL_{cat}$	dB	Road Surface Noise Label for each road speed category indicated by the subscript “cat”
$W_{P,cat}$	-	Coefficient between 0 and 1 representing the noise effect of the passenger cars in the traffic mix for each road speed category
$W_{H,cat}$	-	Coefficient between 0 and 1 representing the noise effect of the heavy vehicles in the traffic mix for each road speed category
$L_{CPX:P,v_{ref}}$	dB	Measure of the acoustic properties of the tested road section, for tyre(s) representing light vehicles, at the reference speed, v_{ref}
$L_{CPX:H,v_{ref}}$	dB	Measure of the acoustic properties of the tested road section, for tyre(s) representing heavy vehicles, at the reference speed, v_{ref}

CEN/TS 18194:2025 (E)

Symbol	Value/unit	Explanation
σ_m	dB	Standard deviation related to the measurement uncertainty
σ_p	dB	Standard deviation related to the product variation
T	P or H	Tyre type defined for testing passenger car tyres (P) and heavy vehicle tyres (H)
s_t	dB	Acoustic variability due to surface inhomogeneities
v_{ref}	km/h	Reference speed for CPX measurement, which varies depending on the road speed category
$\Delta L_{WR,road}$	dB	Road surface correction term for the calculation of sound power emission of vehicles
$\Delta L_{WR,road,i,m}$	dB	Road surface correction term for the calculation of sound power emission of vehicles in the i^{th} octave band and for the category of vehicle m
i	-	Index of octave band ranging from 63 Hz ($i = 1$) to 8 kHz ($i = 8$)
m	1, 2 or 3	Index representing the category of vehicles in the European Noise Directive 2002/49/EC ($m = 1$ for passenger cars, $m = 2$ for medium heavy vehicles and $m = 3$ for heavy vehicles)
$L_{CPX:P,i,v}$	dB	CPX noise level for test tyre P at speed v in octave band i
$L_{CPX:H,i,v}$	dB	CPX noise level for test tyre H at speed v in octave band i
$L_{CPX:P,i,80(ref)}$	dB	Reference CPX noise level for test tyre P at 80 km/h in octave band i
$L_{CPX:H,i,80(ref)}$	dB	Reference CPX noise level for test tyre H at 80 km/h in octave band i
B_{ref}	-	Speed coefficient on the reference road surface
v_m	km/h	Maximum legal speed for the vehicle category m
$\alpha_{i,m}$	dB	Spectral correction for the calculation of sound power emission of vehicles at the reference speed $v_{ref} = 70$ km/h for vehicle category m and octave band i
β_m	-	Speed effect on the rolling noise for the calculation of sound power emission of vehicles from category m
$V_{refCNOSSOS-EU}$	70 km/h	Reference speed in [4]
$L_{CPX:P,i,v_{refCNOSSOSEU}}$	dB	CPX noise level in octave band i , measured with tyre P at the speed $v_{refCNOSSOS-EU} = 70$ km/h
$L_{CPX:H,i,v_{refCNOSSOSEU}}$	dB	CPX noise level in octave band i , measured with tyre H at the speed $v_{refCNOSSOS-EU} = 70$ km/h