



SLOVENSKI STANDARD
kSIST-TS FprCEN/TS 17812:2022
01-april-2022

Določanje akustičnih lastnosti oznak - Merilna metoda CPX

Determination of the acoustic properties of markings - The CPX measurement method

Messung der akustischen Eigenschaften von Markierungen - Das Nahfeldmessverfahren

Détermination des propriétés acoustiques de marquages - La méthode CPX

Ta slovenski standard je istoveten z: **FprCEN/TS 17812**

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ICS:

17.140.30	Emisija hrupa transportnih sredstev	Noise emitted by means of transport
93.080.30	Cestna oprema in pomožne naprave	Road equipment and installations

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English Version

**Determination of the acoustic properties of markings - The
CPX measurement method**

Détermination des propriétés acoustiques de
marquages - La méthode CPX

Messung der akustischen Eigenschaften von
Markierungen - Das Nahfeldmessverfahren

This draft Technical Specification is submitted to CEN members for Vote. It has been drawn up by the Technical Committee CEN/TC 226.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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European foreword

This document (FprCEN/TS 17812:2022) has been prepared by Technical Committee CEN/TC 226 “Road equipment”, the secretariat of which is held by UNE.

This document is currently submitted to the Formal Vote.

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FprCEN/TS 17812:2022 (E)**Introduction**

Structured road markings present one of several options to obtain an enhanced night time visibility during rain or wetness. It is for this reason that they underwent a growing popularity in the last years. Structured road markings can however also produce an increased noise emission during wheel passages, which may be observed in the vehicle but also in the vicinity of the road. The sound increase inside the car can be considered as a positive side effect, as it alarms the driver and may be very helpful for the prevention of “doze off” traffic accidents. The sound increase perceived outside the car however, may have a positive aspect as it can warn people on the emergency lane about the approaching vehicle, but it may as well annoy people living around.

It is desirable that a measurement method exists to assess the noise production of those road markings during wheel passages which is representative, reproducible and generally applicable throughout Europe. This document deals with a dedicated method which has been developed by the expert panel “noise” of the CEN/TC 226/WG 2.

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1 Scope

This document outlines a method to measure the typical external noise emission produced when tyres of passenger car roll over a structured road marking. The result is a measure for the noise perceived in the surroundings of the road, hence not for interior noise in the car.

This method can be used for three purposes:

- determination of initial acoustic properties of a road marking, yielding a noise label for a given system;
- testing of the acoustic conformity of a particular marking to the noise label determined during the determination of initial acoustic properties;
- monitoring of the acoustic properties in the course of its lifetime.

The test result allows the road owner to make an assessment of the risk of nuisance when s/he considers a particular road marking system for application on a road in a noise sensitive area, e.g. built up areas. The method is also applicable to measurements on milled rumble strips.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

ISO/TS 11819-3:2021, *Acoustics — Measurement of the influence of road surfaces on traffic noise — Part 3: Reference tyres*

EN ISO 13473-1:2019, *Characterization of pavement texture by use of surface profiles - Part 1: Determination of mean profile depth (ISO 13473-1:2019, Corrected version 2021-06)*

EN 13036-1:2010, *Road and airfield surface characteristics - Test methods - Part 1: Measurement of pavement surface macrotexture depth using a volumetric patch technique*

IEC 61672-1, *Electroacoustics — Sound level meters — Part 1: Specifications*

3 Terms and definitions

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

ISO and IEC maintain terminological 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>

FprCEN/TS 17812:2022 (E)**3.1** **L_{eq}** **equivalent continuous sound level**

sound level in decibels, having the same total sound energy as a fluctuating level, measured over the same time interval, see IEC 61672-1

3.2 **L_{Aeq}**

equivalent continuous sound level calculated over the audible frequency range for humans (20 Hz – 20 kHz) with frequency weighting “A”, see IEC 61672-1

3.3**tyre P1**

normalised tyre P1, representative for the average noise emission of car tyres, as defined in ISO/TS 11819-3:2021

3.4 **$L_{CPX P, v}$**

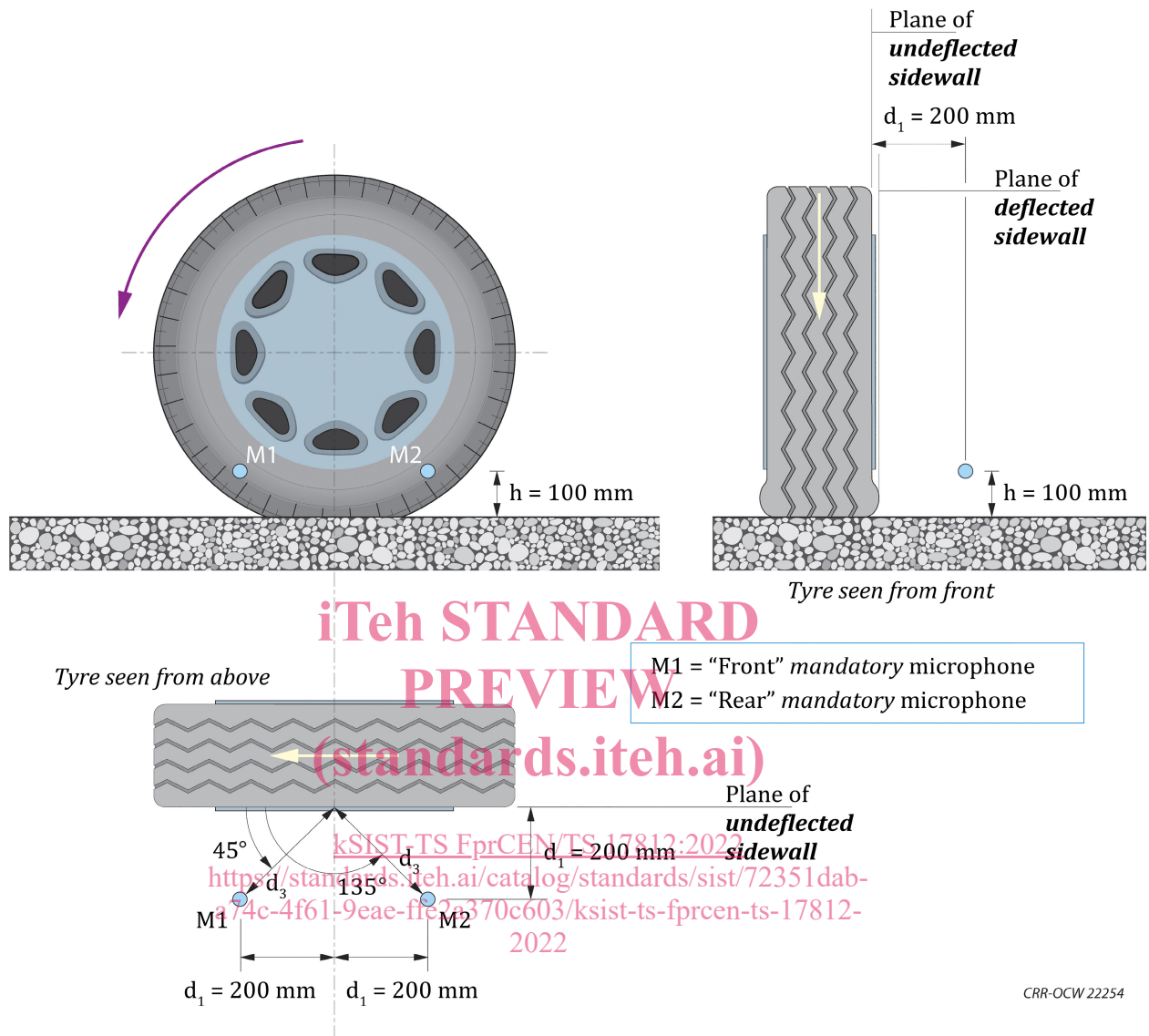
sound level characterising the road surface under test, which is based on the tyre/road sound pressure levels produced with tyre P1 at measurement speed v

4 The measurement method**4.1 Test site**

An uninterrupted and straight road marking section should be selected with a length of at least 100 m and a sufficient width. A visual inspection should ensure that the test section is homogeneous (both in the direction parallel to the road axis as in the direction perpendicular to it), clean and dry. A measured section does not contain transitions from one pavement to another. A width of 0,30 m or more is recommended. Minimum width is 20 cm.

4.2 Measurement**4.2.1 The Close Proximity (CPX) Method (EN ISO 11819-2:2017)**

The Close Proximity method is a standardized and commonly used method for the evaluation of the noisiness of pavements. The method is described in full detail in EN ISO 11819-2:2017. The method consists basically in letting a standard tyre roll over the pavement and measuring the tyre/road noise with two microphones at two standard positions (Figure 1).



Key

- M1 = "Front" mandatory microphone
- M2 = "Rear" mandatory microphone

Figure 1 — Microphone positions for the CPX method

4.2.2 Measuring on the marking

A CPX measurement shall be carried out with at least one of the test tyres rolling on the marking and further complying with EN ISO 11819-2:2017. However, the following exceptions, limitations and specifications to EN ISO 11819-2:2017 apply:

- One should only use the SRTT tyre P1 of ISO/TS 11819-3:2021.
- The test section shall be located within a road section without sharp curves.

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- The operator should ensure that the test tyre rolls at least 80 % [1] on the marking; to ensure this, one can equip the vehicle with an auxiliary device, such as a camera filming the rolling test tyre and – in case of a closed CPX trailer – an appropriate illumination under the trailer cover. Another possibility is that the trailer (“two-tyred” system) vehicle is equipped with an eye-catching coloured plastic sheet as auxiliary device. This plastic sheet with a width just like the width of the road marking can be mounted on the front of the right half of the enclosure and shall be centred with the tyre track. Via the right mirror of the towing vehicle the position of the trailer and with it the position of the rolling test tyre inside the enclosure can be easily aligned with the road marking. For non-enclosed trailers (“two-tyred” systems) this can be done by aligning the tyre with the road marking directly. For a “single-tyred” system (with and without enclosure) the camera mentioned should be used.

NOTE The uncertainty on the measurement result can be improved if the operator can ensure that the tyre is running 100 % on the marking during the measurement. See Annex A.

- One should carry out at least two runs on the same test section until one has two successive results which differ not more than 0,5 dB.
- The operator shall ensure that s/he starts/stops the measurement on the same spots.
- One should measure the L_{Aeq} over the whole section length, as well as the 1/3rd octave band spectrum in terms of L_{eq} .
- Air temperature shall be measured according to EN ISO 11819-2:2017 and measurements should be carried out strictly in the temperature range [15 °C; 25 °C]. No temperature correction shall be applied on the $L_{CPX P,V}$ level.

Complying with EN ISO 11819-2:2017, the reference speeds are 50, 80 and 110 km/h. The actual measuring speed(s) shall always be noted and the tolerances on the deviations of the measuring speed and the reference speed shall comply with EN ISO 11819-2:2017.

4.2.3 Goal of the measurement

Initial type testing can be done on an especially for this test applied piece of road marking on an untrafficked area (but also complying with the requirements of paragraph 4.1) or on a trafficked road. No degradation may be visible and in the case of a trafficked road the test shall be carried out when the marking is at least two weeks old, but younger than 6 months.

Conformity of production measurements shall be carried out when the marking is at least two weeks old but younger than 6 months and without any visible degradation.

Measurements for the sake of monitoring can be carried out at any age or condition of the road marking.

NOTE Initial Type Testing (ITT) can be defined as the test to determine the acoustic performance of samples of products representative of the product type. Conformity of Production (CoP) testing is the test to assess if a given work carried out by a contractor meets the performance as determined during the ITT.

4.2.4 Pavement properties and condition

The measurement shall be carried out on markings applied on asphaltic or concrete road surfaces, which are in good condition and not in need of repair and are not damaged by the presence of wheel tracks, fissures, cracks or similar, except if the test concerns monitoring.

The Estimated Texture Depth (ETD) as meant in EN ISO 13473-1:2019 or the Mean Texture Depth (MTD) as meant in EN 13036-1:2010 shall be measured in a representative way on the pavement not covered with road marking. The standard deviation of the MTD/ETD shall be less than 0,15 mm.