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Acoustics — Specification of test tracks for measuring sound emitted by road vehicles and their tyres

Acoustique — Spécification des surfaces d'essai pour le mesurage du son émis par les véhicules routiers et leurs pneumatiques

Reference number
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Contents

Page

Foreword ... **iv**

Introduction ... **v**

1 Scope ... **1**

2 Normative references ... **1**

3 Terms and definitions ... **1**

4 Requirements of the test track ... **3**
4.1 Size and geometry ... 3
4.1.1 Size ... 3
4.1.2 Slope and step ... 4
4.2 Surface properties ... 6
4.2.1 Irregularity ... 6
4.2.2 Sound absorption ... 6
4.2.3 Texture ... 7
4.3 Material properties of the drive lane ... 7
4.4 Conformity tests ... 8
4.5 Break-in of the test track ... 9
4.6 Stability with time and maintenance ... 9

5 Measurement methods and data processing ... **10**
5.1 Measurement points ... 10
5.1.1 Drive lane ... 10
5.1.2 Propagation area ... 11
5.2 Irregularity measurement method ... 12
5.3 Texture measurement methods ... 12
5.3.1 Texture profile measurement and MPD calculations ... 12
5.3.2 Texture skewness and shape factor (g-factor) calculations (optional) ... 12
5.3.3 Texture spectrum calculations (optional) ... 13
5.4 Sound absorption measurement method ... 13
5.5 Slope and step measurement methods ... 13
5.5.1 Gradient measurement ... 13
5.5.2 Cross fall measurement ... 13
5.5.3 Step measurement ... 14
5.6 Aggregate grading measurement method ... 14
5.7 Bitumen modification elastic material measurement method ... 15
5.8 Surface course thickness measurement method ... 15

6 Conformity report ... **15**

7 Summary of improvements on the 2014 edition ... **17**

Annex A (informative) **Maintenance and stability of acoustic performance of test surface over time** ... **18**

Annex B (informative) **Method of calculation of shape factor (g-factor)** ... **19**

Annex C (informative) **Improvements to this version compared to ISO 10844:2014** ... **23**

Bibliography ... **24**

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 43, *Acoustics*, Subcommittee SC 1, *Noise*.

This fourth edition cancels and replaces the third edition (ISO 10844:2014), which has been technically revised.

The main changes compared to the previous edition are as follows:

— various revisions to improve track reproducibility;

— reduce ambiguity in the document.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

In general, the road surface parameters affecting the sound emission of vehicles are the texture and sound absorption characteristics. In addition, the mechanical impedance and the skid resistance properties of the surface layer can influence measured sound levels.

In order to minimize the variation in rolling sound emission and vehicle sound emission measurements made at different testing locations, it is therefore necessary to specify the relevant surface properties and recommend carefully the properties of the materials, design, and construction of the test surface.

The principal objective of this document is to provide a specification of the surface which improves the reproducibility of measurement.

This document is designed in a way that test tracks conforming to this document are compatible with previous editions, but in addition the variability of properties is reduced.

It is important that the test provides a high degree of reproducibility between different test sites and that the surface design should not only minimize the inter-site variation of tyre or road sound, but should also ensure that the propagation of sound is unaffected by the surface used. This latter consideration precludes the use of road surfaces which have open textures and which have the property of absorbing sound from the power unit and other related sources.

In relation to the previous editions, this document includes more restrictive specifications of the surface and recommendations for the test track construction process and maintenance. The basic properties of the surface remain unchanged.

Furthermore, this document recommends a non-destructive test method for periodic checking of the surface characteristics.

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Acoustics — Specification of test tracks for measuring sound emitted by road vehicles and their tyres

1 Scope

This document specifies the essential characteristics of a test track surface intended to be used for measuring rolling sound emission of vehicles and their tyres.

The surface design given in this document

— produces consistent levels of tyre or road sound emission under a wide range of operating conditions including those appropriate to vehicle sound testing,

— minimizes inter-site variation,

— limits absorption of the vehicle sound sources, and

— is consistent with road-building practice.

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.

ISO 362-1, *Measurement of noise emitted by accelerating road vehicles — Engineering method — Part 1: M and N categories*

ISO 13472-2, *Acoustics — Measurement of sound absorption properties of road surfaces in situ — Part 2: Spot method for reflective surfaces*

ISO 13473-1, *Characterization of pavement texture by use of surface profiles — Part 1: Determination of mean profile depth*

ISO 13473-3, *Characterization of pavement texture by use of surface profiles — Part 3: Specification and classification of profilometers*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 362-1, ISO 13473-1 and the following apply.

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
sound absorption
fraction of the sound power incident on the test object that is absorbed within the test object for a plane wave at normal incidence, expressed as a percentage

3.2 Surface profile

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3.2.1
irregularity
maximum variation of a surface from the measurement edge of a straightedge of minimum 3 m, measured between two contact points of the straightedge when placed perpendicular to the surface

3.2.1.1
longitudinal irregularity
irregularity (3.2.1) in the direction parallel to the longitudinal axis of the track

3.2.1.2
transverse irregularity
irregularity (3.2.1) in the direction parallel to the transverse axis of the track

3.2.2
texture profile
surface profile of a cross-section through a pavement limited to the texture range

Note 1 to entry: The surface profile is as defined in ISO 13473-1.

3.3 Slope and step

3.3.1
gradient
ratio of the height difference to the length measured parallel to the longitudinal axis of the track

Note 1 to entry: The gradient is expressed as a percentage.

3.3.2
cross fall
ratio of the height difference to the length measured parallel to the transverse axis of the track

Note 1 to entry: The cross fall is expressed as a percentage.

3.3.3
step
height difference between the edge of the drive lane and the propagation area

3.4
propagation area
part of the test track on each side of the drive lane

Note 1 to entry: See Figure 1.

3.5
drive lane
part of the test track where the vehicle operates

3.6
dense asphalt concrete
asphalt in which the aggregate particles are essentially continuously graded to form an interlocking structure

3.7
mean profile depth
average value of the *texture profile* (3.2.2) depth

Note 1 to entry: The mean profile depth is as defined in ISO 13473-1, expressed in millimetres.

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3.8
heavy vehicle
vehicle category M2 above 3,5 t, M3, N2, and N3

Note 1 to entry: Vehicle categories are as defined in ISO 362-1.

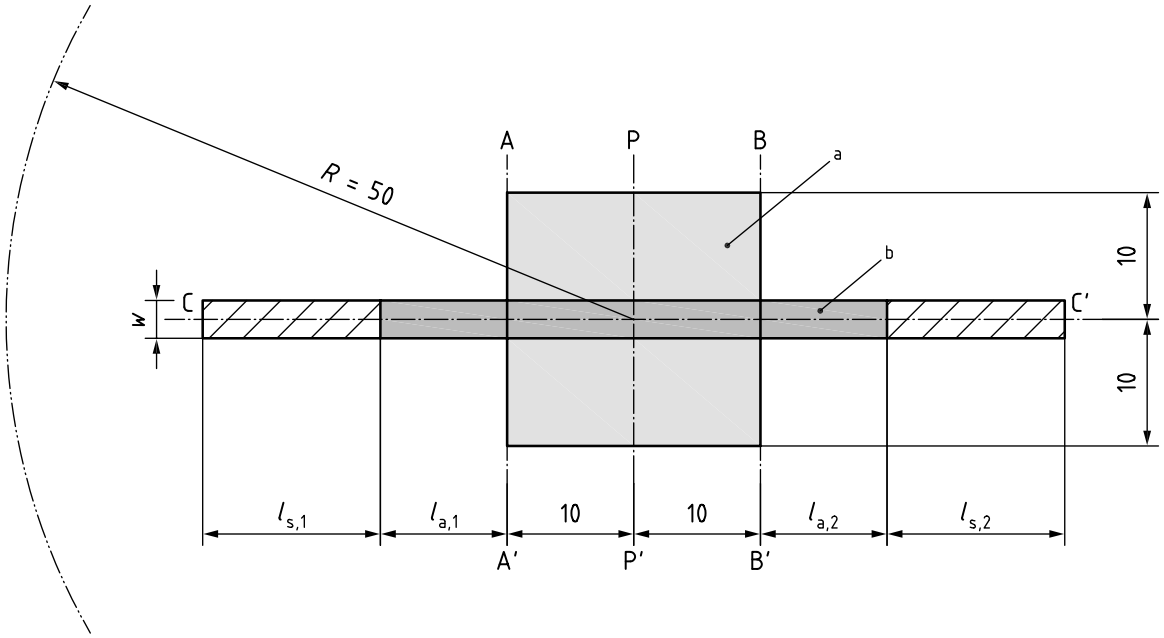
4 Requirements of the test track

4.1 Size and geometry

4.1.1 Size

The test track shall consist of two areas, a drive lane and a propagation area. The dimensions of the drive lane and propagation areas to be tested in this standard shall comply with Figure 1 and Table 1.

Dimensions in metres



Key

$l_{s,1}$	entrance construction run-up section (diagonal hatch area), in metres
$l_{s,2}$	exit construction run-up section (diagonal hatch area), in metres (length of entrance and exit construction run-up sections can differ)
$l_{a,1}$	entrance drive lane extension beyond propagation area, in metres
$l_{a,2}$	exit drive lane extension beyond propagation area, in metres (length of entrance and exit drive lane extensions can differ)
w	drive lane width, in metres
AA'	entrance to propagation area 10 m before line PP'
BB'	exit from propagation area 10 m after line PP'
CC'	drive lane centre line (longitudinal axis)
PP'	microphone line (transverse axis)
a	Propagation area.
b	Drive lane.

Figure 1 — Size of the test track

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