



SLOVENSKI STANDARD
SIST EN ISO 11819-1:2002
01-september-2002

**Acoustics - Measurement of the influence of road surfaces on traffic noise - Part 1:
Statistical Pass-By method (ISO 11819-1:1997)**

Acoustics - Measurement of the influence of road surfaces on traffic noise - Part 1:
Statistical Pass-By method (ISO 11819-1:1997)

Akustik - Messung des Einflusses von Straßenoberflächen auf Verkehrsgeräusche - Teil
1: Statistisches Vorbeifahrungsverfahren (ISO 11819-1:1997)

Acoustique - Mesurage de l'influence des revêtements chaussées sur le bruit émis par la
circulation - Partie 1: Méthode statistique au passage (ISO 11819-1:1997)

[https://standards.iteh.ai/catalog/standards/sist/3d9f082c-e145-4cdb-8ce0-](https://standards.iteh.ai/catalog/standards/sist/3d9f082c-e145-4cdb-8ce0-c2f104038a67/sist-en-iso-11819-1-2002)

Ta slovenski standard je istoveten z: EN ISO 11819-1:2001

ICS:

17.140.30	Emisija hrupa transportnih sredstev	Noise emitted by means of transport
93.080.20	Materiali za gradnjo cest	Road construction materials

SIST EN ISO 11819-1:2002 en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN ISO 11819-1:2002](#)

<https://standards.iteh.ai/catalog/standards/sist/3d9f082c-e145-4cdb-8ce0-c2f104038a67/sist-en-iso-11819-1-2002>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN ISO 11819-1

August 2001

ICS 17.140.30

English version

**Acoustics - Measurement of the influence of road surfaces on
traffic noise - Part 1: Statistical Pass-By method (ISO 11819-
1:1997)**

Acoustique - Mesurage de l'influence des revêtements
chaussées sur le bruit émis par la circulation - Partie 1:
Méthode statistique au passage (ISO 11819-1:1997)

Akustik - Messung des Einflusses von Straßenoberflächen
auf Verkehrsgläusche - Teil 1: Statistisches
Vorbeifahrtverfahren (ISO 11819-1:1997)

This European Standard was approved by CEN on 11 June 2001.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

<https://standards.iteh.ai/catalog/standards/sist/3d9f082c-e145-4cdb-8ce0-c2f104038a67/sist-en-iso-11819-1-2002>



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

Management Centre: rue de Stassart, 36 B-1050 Brussels

EN ISO 11819-1:2001 (E)**Foreword**

The text of the International Standard from Technical Committee ISO/TC 43 "Acoustics" of the International Organization for Standardization (ISO) has been taken over as an European Standard by Technical Committee CEN/TC 227 "Road materials", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2002, and conflicting national standards shall be withdrawn at the latest by February 2002.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

NOTE FROM CMC The foreword is susceptible to be amended on reception of the German language version. The confirmed or amended foreword, and when appropriate, the normative annex ZA for the references to international publications with their relevant European publications will be circulated with the German version.

Endorsement notice

The text of the International Standard ISO 11819-1:1997 has been approved by CEN as a European Standard without any modification.

(standards.iteh.ai)

[SIST EN ISO 11819-1:2002](https://standards.iteh.ai/catalog/standards/sist/3d9f082c-e145-4cdb-8ce0-c2f104038a67/sist-en-iso-11819-1-2002)

<https://standards.iteh.ai/catalog/standards/sist/3d9f082c-e145-4cdb-8ce0-c2f104038a67/sist-en-iso-11819-1-2002>

INTERNATIONAL
STANDARD

ISO
11819-1

First edition
1997-09-15

**Acoustics — Measurement of the influence
of road surfaces on traffic noise —**

**Part 1:
Statistical Pass-By method**

*Acoustique — Mesurage de l'influence des revêtements de chaussées sur
le bruit émis par la circulation —*

(Partie 1: Méthode statistique au passage)

SIST EN ISO 11819-1:2002

<https://standards.iteh.ai/catalog/standards/sist/3d9f082c-e145-4cdb-8ce0-c2f104038a67/sist-en-iso-11819-1-2002>



Reference number
ISO 11819-1:1997(E)

ISO 11819-1:1997(E)

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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 11819-1 was prepared by Technical Committee ISO/TC 43, *Acoustics*, Subcommittee SC 1, *Noise*.

ISO 11819 consists of the following parts, under the general title *Acoustics — Measurement of the influence of road surfaces on traffic noise*:

- *Part 1: Statistical Pass-By method*
- *Part 2: Close-proximity method*

Annexes A to F of this part of ISO 11819 are for information only.

© ISO 1997

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Organization for Standardization
Case postale 56 • CH-1211 Genève 20 • Switzerland
Internet central@iso.ch
X.400 c=ch; a=400net; p=iso; o=isos; s=central

Printed in Switzerland

Introduction

The emission and propagation of road traffic noise greatly depend on road surface characteristics, notably on texture and porosity. Both these characteristics influence the generation of tyre/road noise and, in addition, the porosity can influence the propagation of sound, particularly when the propagation takes place close to the surface. Power unit noise, which is usually generated at a greater height above the road surface than tyre/road noise, may also be affected during propagation by the porosity characteristics of the road surface. These effects lead to differences in sound levels, associated with a given traffic flow and composition, from different road surfaces of up to 15 dB, which can have a substantial impact on the environmental quality alongside a road.

It is therefore important to be able to measure this influence by a standardized method and to arrive at a quantitative ranking of road surfaces with respect to traffic noise. This part of ISO 11819 offers such a method, the objective of which is to satisfy a need expressed by road planners, road administrators, contractors, manufacturers of so-called "low-noise surfaces" and by other parties concerned with the prediction and control of road traffic noise.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN ISO 11819-1:2002](https://standards.iteh.ai/catalog/standards/sist/3d9f082c-e145-4cdb-8ce0-c2f104038a67/sist-en-iso-11819-1-2002)

<https://standards.iteh.ai/catalog/standards/sist/3d9f082c-e145-4cdb-8ce0-c2f104038a67/sist-en-iso-11819-1-2002>

iTeh STANDARD PREVIEW
This page intentionally left blank
(standards.iteh.ai)

[SIST EN ISO 11819-1:2002](https://standards.iteh.ai/catalog/standards/sist/3d9f082c-e145-4cdb-8ce0-c2f104038a67/sist-en-iso-11819-1-2002)

<https://standards.iteh.ai/catalog/standards/sist/3d9f082c-e145-4cdb-8ce0-c2f104038a67/sist-en-iso-11819-1-2002>

Acoustics — Measurement of the influence of road surfaces on traffic noise —

Part 1: Statistical Pass-By method

1 Scope

This part of ISO 11819 describes a method of comparing traffic noise on different road surfaces for various compositions of road traffic for the purpose of evaluating different road surface types. Sound levels representing either light or heavy vehicles at selected speeds are assigned to a certain road surface. The method is applicable to traffic travelling at constant speed, i.e. free-flowing conditions at posted speeds of 50 km/h and upwards. For other driving conditions where traffic is not free-flowing, such as at junctions and where the traffic is congested, the road surface is of less importance.

A standard method for comparing noise characteristics of road surfaces gives road and environment authorities a tool for establishing common practices or limits as to the use of surfacings meeting certain noise criteria. However, it is not within the scope of ISO 11819 to suggest such criteria.

The Statistical Pass-By (SPB) method is intended to be used essentially for two main purposes. First it may be used to classify surfaces in typical and good condition as a type according to their influence on traffic noise (surface classification) and, secondly, it may be used to evaluate the influence on traffic noise of different surfaces at particular sites irrespective of condition and age. This latter type of application may be useful for example where a road is to be resurfaced and "before" and "after" measurements are required in order to assess the differences in traffic noise following resurfacing. However, due to severe requirements on the acoustical environment at the site, the method cannot generally be used for approval of works at any given site.

Clause 4 gives a general description of the SPB method.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 11819. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 11819 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 10844:1994, *Acoustics — Test surface for road vehicle noise measurement.*

ISO 13473-1:1997, *Acoustics — Characterization of pavement texture using surface profiles — Part 1: Determination of mean profile depth.*

IEC 60651:1979, *Sound level meters.*

IEC 60942:1988, *Sound calibrators.*

IEC 61260:1995, *Electroacoustics — Octave-band and fractional-octave-band filters.*

3 Definitions

For the purposes of this part of ISO 11819, the following definitions apply.

3.1 Traffic noise, vehicle noise, tyre/road noise and power unit noise

3.1.1 traffic noise

overall noise emitted by the traffic running on the road under study

3.1.2 vehicle noise

total noise from an individual vehicle, the two major components of which are power unit noise (3.1.4) and tyre/road noise (3.1.3)

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.

3.2 Statistical Pass-By (SPB) method

measurement procedure designed to evaluate vehicle and traffic noise generated on different sections of road surface under specific traffic conditions

NOTE — The measurements are taken from a great number of vehicles operating normally on the road. Results obtained using this procedure are normalized to standard speeds according to the category or type of road being considered.

3.3 Road speed categories

Three categories of roads are defined with respect to the range of speeds at which the traffic flows and these are usually associated with certain areas (urban, suburban, rural, etc.).

3.3.1 “low” road speed category

conditions which relate to traffic operating at an average speed of 45 km/h to 64 km/h

NOTE — These conditions are usually associated with urban traffic.

3.3.2 “medium” road speed category

conditions which relate to traffic operating at an average speed of 65 km/h to 99 km/h

NOTE — These conditions are mostly found in suburban areas or on rural highways.

3.3.3 “high” road speed category

conditions which relate to cars operating at an average speed of 100 km/h or more; heavy vehicles may operate at lower average speed due to speed restrictions

NOTE — These conditions are usually associated with motorway traffic in rural or suburban areas.

3.4 Vehicle categories

A *vehicle category* consists of vehicles which have certain common features easy to identify in the traffic stream, such as the number of axles and the size. The common features are assumed to correspond to similarities in their sound emission when driven under the same operating conditions. The following vehicle categories are considered to be sufficient for description of the noise characteristics of road surfaces and are used in this part of ISO 11819 (see also annex A).

3.4.1 Category No. 1 — cars

passenger cars excluding other light vehicles

3.4.2 Category No. 2 — heavy vehicles

all trucks, buses and coaches with at least two axles and more than four wheels

NOTE — This category consists of Categories 2a and 2b together.

3.4.2.1 Category No. 2a — dual-axle heavy vehicles

trucks, buses and coaches with two axles and more than four wheels

3.4.2.2 Category No. 2b — multi-axle heavy vehicles

trucks, buses and coaches with more than two axles

3.5 maximum sound level

highest sound pressure level recorded by the measuring instrument during a vehicle pass-by, using the appropriate frequency weighting and time weighting F, for vehicles which are acoustically identifiable, i.e. are not significantly disturbed by other vehicles (see also 7.2)

3.6 Vehicle Sound Level, L_{veh}

maximum A-weighted sound pressure level determined at a reference speed from a regression line of the maximum A-weighted sound pressure level versus the logarithm of speed, calculated for each vehicle category

3.7 Statistical Pass-By Index (SPBI)

noise index for comparison of road surfaces, that is based on the Vehicle Sound Levels and takes into account the mix and speeds of vehicles

3.8 reference surface

surface selected according to the purpose of the measurement, following certain rules listed in this part of ISO 11819; levels on the reference surface are normalized to zero level (0 dB) and levels on all other surfaces are presented as differences from this reference level

NOTE — The main purpose of this method is to compare road surfaces with respect to traffic noise emission. Sound levels measured on a certain surface may, therefore, be presented in comparison to sound levels measured on another surface which is then considered as a reference surface.

3.9 absorptive surfaces

1) For road or ground surfaces: surface for which a substantial part of the incident acoustical energy is absorbed

EXAMPLES — Typical absorptive surfaces are loose gravel, sand, some porous pavements and ground covered by grass, ivy, or other low-growing vegetation.

2) For noise barriers: type of surface with which some noise barriers are equipped on the source side with the intention of reducing sound reflections.

4 Measuring principle

In the Statistical Pass-By (SPB) method, the maximum A-weighted sound pressure levels of a statistically significant number of individual vehicle pass-bys are measured at a specified road-side location together with the vehicle speeds. Each measured vehicle is classified into one of three vehicle categories: "cars", "dual-axle heavy vehicles" and "multi-axle heavy vehicles". Other vehicle categories are not used for this evaluation, since they do not provide any additional information regarding road surface influence.

For each of three speed ranges defined in 3.3, as well as for each of the three vehicle categories, a nominated reference speed is given. Each individual pass-by level together with its vehicle speed is recorded, and a regression line of the maximum A-weighted sound pressure level versus the logarithm of speed is calculated for each vehicle category. From this line, the average maximum A-weighted sound pressure level is determined at the reference speed. This level is called the Vehicle Sound Level, L_{veh} .

For the purpose of reporting the acoustic performance of road surfaces the Vehicle Sound Levels for cars, dual-axle heavy vehicles and multi-axle heavy vehicles are added on a power basis, assuming certain proportions of these vehicle categories, to give a single "index" which constitutes the final result. This index is called the Statistical Pass-By Index (SPBI) and can be used for comparison of road surfaces so that their influence on sound level of a mixed traffic flow can be determined. It is not suitable for determining actual traffic noise levels.

STANDARD PREVIEW
(standards.iteh.ai)

5 Measuring instruments

5.1 Sound level instrumentation

[SIST EN ISO 11819-1:2002](#)

[standards.iteh.ai/catalog/standards/sist/3d9f082c-e145-4cdb-8ce0-c2f104038a67/sist-en-iso-11819-1-2002](#)

The sound level meter (or the equivalent measuring system) shall meet the requirements of a Type 1 instrument according to IEC 60651.

A windscreen shall be used and should be of a type specified by the microphone manufacturer as suitable for the particular microphone. It should be ascertained from the manufacturer that the windscreen does not detectably influence the performance of the sound level meter under the ambient conditions of the test.

5.2 Frequency analysis instrumentation

Frequency analysis of the measured sound using one-third-octave band resolution is recommended, but not mandatory. The frequency range of 50 Hz to 10 000 Hz (centre frequencies of one-third-octave bands) shall be covered. The one-third-octave-band filters shall conform to IEC 61260.

5.3 Calibration

At the beginning of the measurements, and following any warm-up time specified by the manufacturer, the overall sensitivity of the sound level meter or the equivalent measuring system (including the microphone) shall be checked. If necessary, it shall be adjusted according to the manufacturer's instructions. This may require use of a sound calibrator. These checks shall be repeated at the end of the measurements and the values obtained recorded. Any deviations shall be recorded in the test report. If the calibration readings on the sound level meter differ by more than 0,5 dB during a series of measurements, the test shall be considered invalid. The same procedure shall be followed if a frequency analyser is used.