SLOVENSKI STANDARD
SIST EN ISO 17201-3:2019

01-maj-2019

Nadomešča:
SIST EN ISO 17201-3:2010

Akustika - Hrup s strelišč - 3. del: Izračun širjenja zvoka (ISO 17201-3:2019)

Acoustics - Noise from shooting ranges - Part 3: Sound propagation calculations (ISO 17201-3:2019)

Akustik - Geräusche von Schießplätzen - Teil 3: Berechnung der Schallausbreitung (ISO 17201-3:2019)

Acoustique - Bruit des stands de tir - Partie 3: Calcul de la propagation du son (ISO 17201-3:2019)

Ta slovenski standard je istoveten z: **EN ISO 17201-3:2019**

ICS:

17.140.20	Emisija hrupa naprav in opreme	Noise emitted by machines and equipment
95.020	Vojaštvo na splošno	Military in general
97.220.10	Športni objekti	Sports facilities

SIST EN ISO 17201-3:2019 **en**

EUROPEAN STANDARD

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English Version

Acoustics - Noise from shooting ranges - Part 3: Sound propagation calculations (ISO 17201-3:2019)

Acoustique - Bruit des stands de tir - Partie 3: Calcul de la propagation du son (ISO 17201-3:2019)

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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

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European foreword

This document (EN ISO 17201-3:2019) has been prepared by Technical Committee ISO/TC 43 "Acoustics" in collaboration with Technical Committee CEN/TC 211 “Acoustics” 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of an identical text or by endorsement, at the latest by August 2019, and conflicting national standards shall be withdrawn at the latest by August 2019.

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.

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The text of ISO 17201-3:2019 has been approved by CEN as EN ISO 17201-3:2019 without any modification.

INTERNATIONAL STANDARD

ISO 17201-3

Second edition
2019-01

Acoustics — Noise from shooting ranges —

Part 3: Sound propagation calculations

Acoustique — Bruit des stands de tir —

Partie 3: Calcul de la propagation du son

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

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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).

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on 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 the following URL: www.iso.org/iso/foreword.html.

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

This second edition cancels and replaces the first edition (ISO 17201-3:2010), of which it constitutes a minor revision. The changes compared to the previous edition are as follows:

— Formulae (B.1) and (B.3) have been corrected by insertion of F_0.

— Minor corrections have been made in Annex C.

A list of all parts in the ISO 17201 series can be found on the ISO website.

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.

Introduction

The initiative to prepare a standard on impulse noise from shooting ranges was taken by AFEMS, the Association of European Manufacturers of Sporting Ammunition, in April 1996 by the submission of a formal proposal to CEN. After consultation in CEN in 1998, CEN/TC 211, *Acoustics* asked ISO/TC 43, *Acoustics*, Subcommittee SC 1, *Noise* to prepare ISO 17201 (all parts).

This document provides guidance for sound propagation calculation of shooting sound from shooting ranges. If calculation procedures are not implied or specified by local or national guidelines, rules and regulations, and if a more sophisticated propagation model is not available, then ISO 9613-2 may be applied, provided that the recommendations in this document are observed.

The source energy of muzzle blast is typically measured or calculated for free-field conditions and often exhibits strong directivity. In many cases, firearms are fired within a shooting range which has structures such as firing sheds, walls or safety barriers. Guns, particularly shotguns, are sometimes fired in many directions, e.g. in trap and skeet where the shooting direction is dictated by the flight path of the clay target. This document recommends ways in which source data can be adapted for use with ISO 9613-2 to obtain a general survey for the sound exposure levels to be expected in the neighbourhood around shooting ranges.

Acoustics — Noise from shooting ranges —

Part 3: Sound propagation calculations

1 Scope

This document specifies methods of predicting the sound exposure level of shooting sound for a single shot at a given reception point. Guidelines are given to calculate other acoustic indices from the sound exposure level. The prediction is based on the angular source energy distribution of the muzzle blast as defined in ISO 17201-1 or calculated using values from ISO 17201-2.

This document applies to weapons with calibres of less than 20 mm or explosive charges of less than 50 g TNT equivalent, at distances where peak pressures, including the contribution from projectile sound, are less than 1 kPa (154 dB).

NOTE National or other regulations, which could be more stringent, can apply.

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 9613-2:1996, *Acoustics — Attenuation of sound during propagation outdoors — Part 2: General method of calculation*

ISO 17201-1:2018, *Acoustics — Noise from shooting ranges — Part 1: Determination of muzzle blast by measurement*

ISO/IEC Guide 98-3[1)], *Uncertainty of measurement — Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)*

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:

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

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

3.1
substitute source
substitute for a sound source and its *firing shed* (3.4) by a model source without a firing shed positioned in the centre of the opening of the firing shed to represent the emission in the direction of a reception point

3.2
safety barrier
<shooting ranges> barrier that is intended to stop projectiles leaving the range

1) ISO/IEC Guide 98-3 is published as a reissue of the Guide to the expression of uncertainty in measurement (GUM), 1995.

3.3
safety baffle
<shooting ranges> overhead barrier that is intended to stop projectiles leaving the range

3.4
firing shed
structure constructed to protect the shooters and their equipment from precipitation and wind, having an opening that allows shooting at a target located on open ground

3.5
shooting range
enclosed arrangement of *firing positions* (3.7) and matching targets which, depending on the design, may include such features as a *firing shed* (3.4), *safety barriers* (3.2), *safety baffles* (3.3), and unsafe areas

3.6
shooting facility
organizational entity consisting of one or more *shooting ranges* (3.5), and associated buildings and infrastructure

3.7
firing position
position of the shooter within a *shooting range* (3.5)

3.8
impact sound
sound produced by the projectile hitting the target

3.9
diffraction point
point on top of a barrier which provides the shortest path length for the sound travelling over the barrier to the reception point

4 Source modelling

4.1 General

The basic quantities to be used are the angular source energy distribution, $S_q(\alpha)$, and angular source energy distribution level, $L_q(\alpha)$, as defined in ISO 17201-1. The angle between the line of fire and the line from the muzzle to the reception point is designated by α. If the gun is fired in a free-field situation, $S_q(\alpha)$ can be used to describe the muzzle blast. For rifle shots, projectile sound has to be included (see 4.3). Substitute sources can be used for shed situations and for the incorporation of reflection and diffraction to calculate the reception levels as if it was a free-field situation. Impact sound caused by the projectile hitting the target can usually be neglected. This document does not apply to projectiles containing a charge which is detonated at the target.

4.2 Muzzle blast

4.2.1 Background

For the non-free-field situation (such as a shed with one opening), the propagation model of ISO 9613-2 is insufficient, and more complex propagation models and calculation procedures are needed. Annex A provides a benchmark case and a demonstration of how sophisticated sound propagation approximations (see Annex B) may be used to describe the sound emitted from such a range, based on the free-field data of the angular source energy distribution levels. The sound emission is then expressed by the angular source energy distribution level of a substitute source positioned at a representative position in front or above the firing shed. All further calculations of the sound pressure level are carried out as specified in Clause 5 by a point source with directivity independent from the range, which may be formed by a shed, baffles and side walls, etc.

4.2.2 Free-field situation

If the weapon under consideration is used outside a firing shed or similar structure, use the angular source energy distribution level, $L_q(\alpha)$, of the specific weapon/ammunition combination directly. If a shot is fired with a reflecting surface near the shooter, take the reflection into account. The directivity has to be adjusted accordingly. If the gun can be fired in varying horizontal and vertical directions, account for these directions separately. Examples of free-field situations are described in Annex C.

4.2.3 Non-free-field situation

4.2.3.1 Shooting shed

In this case, the shot is fired in a shed (see for example Annex B). Part of the energy radiated due to the muzzle blast is absorbed by the walls and the ground. If baffles and side walls are present, take the reflections from the ground, side walls and baffles into account (see Annex A). An absorbing ceiling within the shed can be considered to be state of the art. The remaining energy is emitted through the opening of the shed. Therefore, free-field data shall not be used directly. If no absorption occurs within the shed and at the baffles, the benchmark case is not a suitable model to describe the emitted sound energy.

Figure 1 depicts a shed with the side walls and safety overhead baffles.