

This document is a preview generated by EVS

Acoustics - Noise from shooting ranges - Part 2:  
Calculation of muzzle blast (ISO 17201-2:2025)

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

<p>See Eesti standard EVS-EN ISO 17201-2:2025 sisaldab Euroopa standardi EN ISO 17201-2:2025 ingliskeelset teksti.</p> <p>Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.</p> <p>Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 23.07.2025.</p> <p>Standard on kättesaadav Eesti Standardimis- ja Akrediteerimiskeskusest.</p>	<p>This Estonian standard EVS-EN ISO 17201-2:2025 consists of the English text of the European standard EN ISO 17201-2:2025.</p> <p>This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.</p> <p>Date of Availability of the European standard is 23.07.2025.</p> <p>The standard is available from the Estonian Centre for Standardisation and Accreditation.</p>
--	---

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile [standardiosakond@evs.ee](mailto:standardiosakond@evs.ee).

ICS 17.140.20, 97.220.10

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardimis- ja Akrediteerimiskeskusele. Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardimis- ja Akrediteerimiskeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardimis- ja Akrediteerimiskeskusega: Koduleht [www.evs.ee](http://www.evs.ee); telefon 605 5050; e-post [info@evs.ee](mailto:info@evs.ee)

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation and Accreditation. No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation and Accreditation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation and Accreditation: Homepage [www.evs.ee](http://www.evs.ee); phone +372 605 5050; e-mail [info@evs.ee](mailto:info@evs.ee)

EUROPEAN STANDARD

EN ISO 17201-2

NORME EUROPÉENNE

EUROPÄISCHE NORM

July 2025

ICS 17.140.20; 97.220.10

Supersedes EN ISO 17201-2:2006

English Version

## Acoustics - Noise from shooting ranges - Part 2: Calculation of muzzle blast (ISO 17201-2:2025)

Acoustique - Bruit des stands de tir - Partie 2: Calcul de  
la détonation à la bouche (ISO 17201-2:2025)

Akustik - Geräusche von Schießplätzen - Teil 2:  
Berechnung des Mündungsknalls (ISO 17201-2:2025)

This European Standard was approved by CEN on 7 July 2025.

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 CEN-CENELEC 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 CEN-CENELEC Management Centre has the same status as the official versions.

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.



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

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

## European foreword

This document (EN ISO 17201-2:2025) 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 January 2026, and conflicting national standards shall be withdrawn at the latest by January 2026.

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.

This document supersedes EN ISO 17201-2:2006.

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

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: 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.

## Endorsement notice

The text of ISO 17201-2:2025 has been approved by CEN as EN ISO 17201-2:2025 without any modification.

# Contents

	Page
<b>Foreword</b> .....	<b>iv</b>
<b>Introduction</b> .....	<b>v</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>1</b>
3.1 General.....	1
3.2 Directivity.....	3
3.3 Energy.....	3
3.4 Fraction.....	4
3.5 Projectile.....	5
<b>4 Estimation model for source data of the muzzle blast</b> .....	<b>5</b>
4.1 General.....	5
4.2 Estimation of chemical energy.....	5
4.3 Estimation of acoustic energy.....	6
4.4 Estimation of the Weber energy.....	6
4.5 Estimation of directivity.....	6
4.6 Estimation of the spectrum.....	6
<b>5 Uncertainty of estimation</b> .....	<b>7</b>
<b>6 Report</b> .....	<b>8</b>
<b>Annex A (informative) Simple blast model for estimation of sound energy and its spectrum</b> .....	<b>9</b>
<b>Annex B (informative) Quality of input data</b> .....	<b>11</b>
<b>Annex C (informative) Comparison between measurements and prediction of muzzle blast</b> .....	<b>14</b>
<b>Bibliography</b> .....	<b>21</b>

## 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 document 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](http://www.iso.org/directives)).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at [www.iso.org/patents](http://www.iso.org/patents). ISO shall not be held responsible for identifying any or all such patent rights.

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

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](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 43, *Acoustics*, Subcommittee SC 1, *Noise*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 211, *Acoustics*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 17201-2:2006), which has been technically revised.

The main changes are as follows:

- deletion of former Clauses 5 and 6, and Annex D which were moved to ISO 17201-4;
- revision of former Clause 7 (now [Clause 5](#)) and [Annex C](#);
- addition of a new [Clause 6](#);
- editorial revision of the document.

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

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/SC 1, *Noise*, to prepare the ISO 17201 series.

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](http://www.iso.org/members.html).

## Introduction

There are two basic sources that dominate the shooting sound from firearms: the muzzle blast and the projectile sound. These two sources are basically different. The explosion blast from devices can be treated as muzzle blast. This document describes the calculation of muzzle blast. The calculation of projectile sound is described in ISO 17201-4.

The muzzle blast is caused by the expanding gases of the propellant at the muzzle. The muzzle blast can be modelled approximately based on a spherical volume of these gases at the moment when the expansion speed becomes subsonic.

In general, the procedures for estimating the muzzle blast rely on the estimation of energies that are involved in the related processes. The procedures give estimates for the fraction of these energies that transforms into acoustic energy. The results of the estimation are acoustical source data with respect to energy, direction and frequency content.

# Acoustics — Noise from shooting ranges —

## Part 2: Calculation of muzzle blast

### 1 Scope

This document specifies a computational method (in line with ISO 17201-4) for estimating the acoustic source data of muzzle blast and explosions on the basis of non-acoustic data for firearms with calibres less than 20 mm and explosions less than 50 g TNT equivalent.

This document addresses those cases where no source measurements exist. This document can also be used as an interpolation method between measurements of muzzle blast.

Source data are given in terms of spectral angular source energy covering the frequency range from 12,5 Hz to 10 kHz and can be used as data input for sound propagation calculation.

This document does not apply to the prediction of sound levels for the assessment of hearing damage; nor can it be used to predict sound pressure levels or sound exposure levels at distances where linear acoustics do not 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 17201-1, *Acoustics — Noise from shooting ranges — Part 1: Determination of muzzle blast by measurement*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 17201-1 and the following apply.

ISO and IEC maintain terminology 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 General

##### 3.1.1

##### air density

$\rho$

density of air for the estimation conditions

Note 1 to entry: The air density is expressed in kilograms per cubic metre (kg/m<sup>3</sup>).