BS EN ISO 22868:2021

BSI Standards Publication

Forestry and gardening machinery — Noise test code for portable hand-held machines with internal combustion engine — Engineering method (Grade 2 accuracy)

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National foreword

This British Standard is the UK implementation of EN ISO 22868:2021. It is identical to ISO 22868:2021. It supersedes BS EN ISO 22868:2011, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee AGE/29, Forestry machinery.

A list of organizations represented on this committee can be obtained on request to its committee manager.

This publication has been prepared under a mandate given to the European Standards Organizations by the European Commission and the European Free Trade Association and is intended to support essential requirements of the EU legislation detailed in the European foreword. Annex ZA/ZZ describes how the publication relates to the legislation.

For the Great Britain market (England, Scotland and Wales), if the UK Government has designated this publication for conformity with UKCA marking legislation and has not amended the essential requirements of that legislation, Annex ZA/ZZ and any references to EU law in the publication should be read in accordance with the designation as applying to UK legislation in the same way as to EU law. Further information on designated standards can be found at www.bsigroup.com/standardsandregulation.

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EUROPEAN STANDARD

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March 2021

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Supersedes EN ISO 22868:2011

English Version

Forestry and gardening machinery - Noise test code for portable hand-held machines with internal combustion engine - Engineering method (Grade 2 accuracy) (ISO 22868:2021)

Machines forestières et machines de jardin - Code d'essai acoustique pour machines portatives tenues à la main à moteur à combustion interne - Méthode d'expertise (classe de précision 2) (ISO 22868:2021)

Forst- und Gartenmaschinen - Geräuschmessnorm für handgehaltene Maschinen mit Verbrennungsmotor - Verfahren der Genauigkeitsklasse 2 (ISO 22868:2021)

This European Standard was approved by CEN on 23 August 2020.

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European foreword

This document (EN ISO 22868:2021) has been prepared by Technical Committee ISO/TC 23 "Tractors and machinery for agriculture and forestry" in collaboration with Technical Committee CEN/TC 144 “Tractors and machinery for agriculture and forestry” the secretariat of which is held by AFNOR.

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 September 2021, and conflicting national standards shall be withdrawn at the latest by September 2021.

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 22868:2011.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For the relationship with EU Directive(s) see informative Annex ZA, which is an integral part of this document.

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, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 22868:2021 has been approved by CEN as EN ISO 22868:2021 without any modification.

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Annex ZA
(informative)

Relationship between this European Standard and the requirements of EU Directive 2006/42/EC aimed to be covered

This European Standard has been prepared under a Commission's standardization request "M/396 Mandate to CEN and CENELEC for Standardisation in the field of machinery" to provide one voluntary means of conforming to essential requirements of Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC (recast).

Once this standard is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of this standard given in Table ZA.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding Essential Requirements of that Directive, and associated EFTA regulations.

Table ZA.1 — Correspondence between this European Standard and Annex I of Directive 2006/42/EC

The relevant Essential Requirements of Directive 2006/42/EC	Clause(s)/sub-clause(s) of this EN	Remarks/Notes
1.5.8 Noise	4, 5, 6, 7, 8, 9 and Annexes A to E	
1.7.4.2(u) Contents of the instructions — information on airborne noise emissions	4, 5, 6, 7, 8, 9 and Annexes A to E	Annexes A, B, D and E do not provide presumption of conformity regarding the determination of the A-weighted sound power level

WARNING 1 — Presumption of conformity stays valid only as long as a reference to this European Standard is maintained in the list published in the Official Journal of the European Union. Users of this standard should consult frequently the latest list published in the Official Journal of the European Union.

WARNING 2 — Other Union legislation may be applicable to the product(s) falling within the scope of this standard.

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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).

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.

This document was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 17, *Manually portable forest machinery*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 144, *Tractors and machinery for agriculture and forestry*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 22868:2011), which has been technically revised. The main changes compared to the previous edition are as follows:

— inclusion of edgers and knapsack mist blowers in the scope;

— correction of the calculation of microphone positions for the hemisphere (Figure 1) according to ISO 3744:2010;

— alignment of the operation conditions for the determination of the sound power level with those for the determination of the emission sound pressure level;

— lateral width of the test timber for chain-saw testing reduced to 150 mm to account for small machines with short guide bars;

— inclusion of edgers in the specific conditions described in Annex B;

— amendments in Annex E to include knapsack mist blowers and better describe the set-up of the machines with different blower tubes;

— editorial corrections and update of all figures as well as addition of new figures for edgers and mist blowers;

— several text changes have been made for better understanding.

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

This document is a type-C standard as stated in ISO 12100.

This document is of relevance, in particular, for the following stakeholder groups representing the market players with regard to machinery safety:

— machine manufacturers (small, medium and large enterprises);

— health and safety bodies (regulators, accident prevention organisations, market surveillance, etc.)

Others can be affected by the level of machinery safety achieved with the means of the document by the above-mentioned stakeholder groups:

— machine users/employers (small, medium and large enterprises);

— machine users/employees (e.g. trade unions, organizations for people with special needs);

— service providers, e.g. for maintenance (small, medium and large enterprises);

— consumers (in case of machinery intended for use by consumers).

The above-mentioned stakeholder groups have been given the possibility to participate at the drafting process of this document.

The machinery concerned and the extent to which hazards, hazardous situations or hazardous events are covered are indicated in the Scope of this document.

When requirements of this type-C standard are different from those which are stated in type-A or B standards, the requirements of this type-C standard take precedence over the requirements of the other standards for machines that have been designed and built according to the requirements of this type-C standard.

During the first steps in the preparation of this document, it became obvious that the repeatability of the test results could become better if the operator were to be replaced by a simulation process, representing the normal operating modes with chain-saws and grass-trimmers/brush-cutters. Furthermore, it was found that the cutting process performed with chain-saws causes considerable deviations, which are not related to the measured object but to the test procedure itself.

Based on these observations, it was concluded that the operators in both test procedures, i.e. for chain-saws and grass-trimmers/brush-cutters, ought to be replaced by a defined fixture and the cutting process with chain-saws by a brake simulating the load. In this manner, the operating conditions during measurement would simulate normal operating conditions.

The determination of noise emission characteristics is primarily intended for

— the manufacturers' declarations of noise emitted,

— comparing the noise emitted by machines in the family concerned, and

— purposes of noise control at source at the design stage.

The use of this noise test code will ensure reproducibility of the determination of the noise emission characteristics within specified limits determined by the grade of accuracy of the basic noise measurement method used. Noise measurement methods allowed by this document give results with Grade 2 accuracy.

The operating modes specified for the tests are consistent with those involved in the assessment of the exposure sound pressure levels, for example, over a typical working day.

NOTE Exposure sound pressure levels are the mean sound pressure levels experienced by the operator over a defined period of time.

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The work cycles chosen for this test code are based on the following considerations of application:

a) chain-saws with an engine of < 80 cm^3 are used for various operations, including felling, bucking and delimbing;

b) chain-saws with an engine of ≥ 80 cm^3 are normally used for felling and bucking.

Delimbing will cause the chain-saw to run at racing speed; therefore, racing is included only for chain-saws with a < 80 cm^3 engine.

For brush-cutters, grass-trimmers, edgers, hedge-trimmers and pole-mounted powered pruners, the cutting mode (full load) is estimated to be valid only for short periods, while racing and idling are the two dominant modes. Moreover, it has also been found to be diverse and not able to be performed under repeatable conditions.

For grass-trimmers, the full load and the racing modes are integrated in one single mode due to the loading effect of the flexible line.

For brush-cutters, edgers, hedge-trimmers and pole-mounted powered pruners, it is not possible to simulate the full load mode in a feasible way since there are no constant load conditions comparable to chain-saws. Since the operating mode "racing" is anyhow the worst case, it is used as representative.

For garden blowers and knapsack mist blowers, full load and idling are the two dominant modes.

In either case, transport and other tasks between operations will cause the machine to run at idling. Experience has led to the conclusion that, except for hedge-trimmers and blowers/knapsack mist blowers, equal duration for the different working modes is a good estimation of daily exposure.

For hedge-trimmers, experience has shown that the machine is used 1/5 at idling and 4/5 at racing, while for garden blowers/knapsack mist blowers it is used 1/7 at idling and 6/7 at racing.

A summary of results from "round-robin" tests, carried out between 2007 and 2008 in up to eight test laboratories on a single chain-saw, brush-cutter and grass-trimmer, is given in Annex G.

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Forestry and gardening machinery — Noise test code for portable hand-held machines with internal combustion engine — Engineering method (Grade 2 accuracy)

CAUTION — Some of the test procedures specified in this document involve processes which could lead to a hazardous situation. Any person performing tests in accordance with this document shall be appropriately trained in the type of work to be carried out.

1 Scope

This document specifies a noise test code for determining, efficiently and under standardized conditions, the common noise emission characteristics of portable, hand-held, combustion engine powered forest and garden machines, and specific requirements for chain-saws, brush-cutters, grass-trimmers, edgers, pole-mounted powered pruners, hedge-trimmers and garden blowers/vacuums/knapsack mist blowers. Noise emission characteristics include the A-weighted emission sound pressure level at the operator position and the A-weighted sound power level.

Noise test codes as described in this document enable the manufacturer to verify the effort regarding low noise design.

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 354:2003, *Acoustics — Measurement of sound absorption in a reverberation room*

ISO 3744:2010, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for an essentially free field over a reflecting plane*

ISO 4871:1996, *Acoustics — Declaration and verification of noise emission values of machinery and equipment*

ISO 6531:2017, *Machinery for forestry — Portable chain-saws — Vocabulary*

ISO 7112:2018, *Machinery for forestry — Portable brush-cutters and grass-trimmers — Vocabulary*

ISO 7293:1997, *Forestry machinery — Portable chain saws — Engine performance and fuel consumption*

ISO 8893:1997, *Forestry machinery — Portable brush-cutters and grass-trimmers — Engine performance and fuel consumption*

ISO 10517:2019, *Powered hand-held hedge trimmers — Safety*

ISO 11201:2010, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions in an essentially free field over a reflecting plane with negligible environmental corrections*

ISO 11680-1:2011, *Machinery for forestry — Safety requirements and testing for pole-mounted powered pruners — Part 1: Machines fitted with an integral combustion engine*

ISO 11680-2:2011, *Machinery for forestry — Safety requirements and testing for pole-mounted powered pruners — Part 2: Machines for use with back-pack power source*

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ISO 11789:1999, *Powered edgers with rigid cutting means — Definitions, safety requirements and test procedures*

ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction*

ISO 19932-1:2013, *Equipment for crop protection — Knapsack sprayers — Part 1: Safety and environmental requirements*

ISO 28139:2019, *Agricultural and forestry machinery — Knapsack combustion-engine-driven airblast sprayers — Safety and environmental requirements and test methods*

IEC 61672-1:2013, *Electroacoustics — Sound level meters — Part 1: Specifications*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12100, ISO 6531, ISO 7112, ISO 11789, ISO 11680-1, ISO 11680-2, ISO 10517, ISO 19932-1 and ISO 28139 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/

4 Quantities to be measured and quantities to be determined

The quantities to be measured are the time averaged sound pressure levels defined in the relevant basic noise measurement standards (ISO 3744, ISO 11201), A-weighted and — if required — in frequency bands.

The quantities to be determined are the sound power levels and the emission sound pressure levels, A-weighted and — if required — in frequency bands.

5 A-weighted sound power level determination

For the determination of the A-weighted sound power level, ISO 3744 shall be used, subject to the following modifications or additions.

a) The microphone array shall be six microphone positions, in accordance with Figure 1 and the coordinates described by Tables 1 and 2.

NOTE 1 The six microphone array is permitted because experimental data have shown that use of this array does not yield results that differ significantly from those obtained with the 10 microphone array specified in ISO 3744.

b) The measurement surface shall be a hemisphere with a radius, r, of ≥ 2 d_0, preferably 4 m; d_0 is determined by the reference box and its defined location above ground, see Figure 1. If a bigger radius is needed it shall be chosen from 6 m, 8 m and 10 m. A smaller radius is permitted if it is demonstrated that the results are within 0,5 dB compared with measurements with a hemisphere of r = 4 m.

NOTE 2 The smaller radius can be necessary in an anechoic room where a radius of 4 m cannot be provided.

c) The conditions for the particular type of machine to be tested and its mounting and orientation shall be according to the corresponding annex of this document.

d) Environmental conditions shall be within the limits specified by the manufacturer of the measuring equipment. The ambient air temperature shall be in the range –10 °C to 30 °C and the wind speed shall be less than 5 m/s. A microphone windscreen shall be used for all outdoor testing, and for indoor testing whenever the speed of ventilation air over the microphone exceeds 1 m/s.

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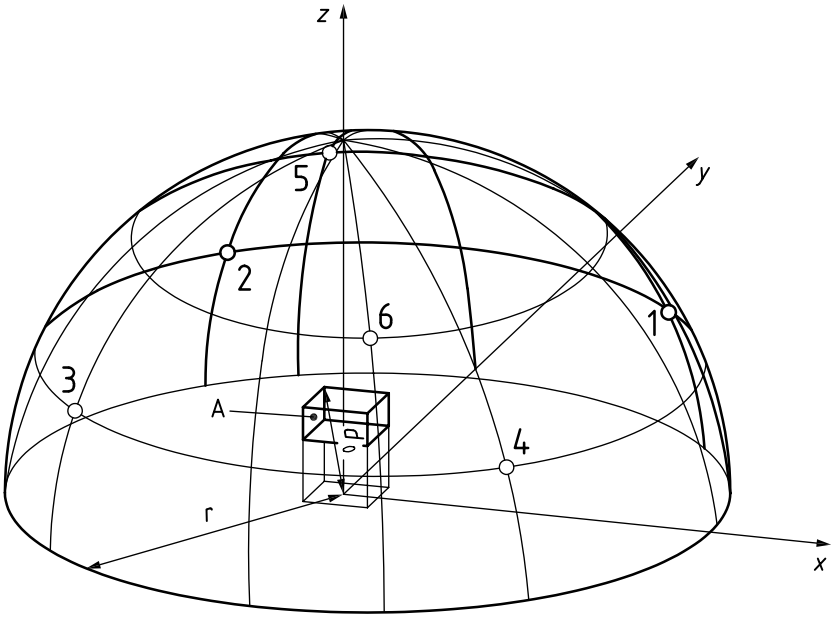
e) Measurements shall be made using an integrating averaging sound level meter as defined in IEC 61672-1; alternatively, instruments with the time weighting characteristics “slow”, as defined in IEC 61672-1, may be used.

f) The value of K_{2A}, determined in accordance with ISO 3744:2010, Annex A, shall at maximum be 2 dB, in which case K_{2A} shall be disregarded.



Key

A reference box

d_0 characteristic source dimension

r hemisphere radius ≥ 2 d_0

1 to 6 microphone positions

Figure 1 — Microphone positions on hemisphere

Table 1 — Coordinates of microphone positions

Microphone position No. (Figure 1)	Coordinates			
	x/r[a]	y/r[a]	z/r	z
1	+0,707 a	+0,707 a	—	1,5 m
2	−0,707 a	+0,707 a	—	1,5 m
3	−0,707 a	−0,707 a	—	1,5 m
4	+0,707 a	−0,707 a	—	1,5 m
5	−0,27	+0,65	0,71	—
6	+0,27	−0,65	0,71	—

[a] The constant a depends on the hemisphere radius and is taken from Table 2.

Table 2 — Values of the constant, a

r [m]	a
4	0,927
6	0,968

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