AKUSTIKA
Katsetuseeskiri mootorajamiga muruniidukite, murutraktorite, muru- ja aiatraktorite, professionaalsete niidukite ning niiduklisaseadmetega muru-ja aiatraktorite poolt tekitatud õhumüra mõõtmiseks

Acoustics
Test code for the measurement of airborne noise emitted by power lawn mowers, lawn tractors, lawn and garden tractors, professional mowers, and lawn and garden tractors with mowing attachments

EESTI STANDARDIKESKUS
ESTONIAN CENTRE FOR STANDARDISATION

EESTI STANDARDI EESSÕNA

Käesolev Eesti standard EVS-ISO 11094:2005 "Akustika. Katsetuseeskiri mootorajamiga muruniidukite, murutraktorite, muru- ja aiatraktorite, professionaalsete niidukite ning niiduklisaseadmetega muru-ja aiatraktorite poolt tekitatud õhumüra mõõtmiseks" sisaldab rahvusvahelise standardi ISO 11094:1991 "Acoustics - Test code for the measurement of airborne noise emitted by power lawn mowers, lawn tractors, lawn and garden tractors, professional mowers, and lawn and garden tractors with mowing attachments" identset ingliskeelset teksti.

Standardi avaldamise korraldas Eesti Standardikeskus.

Standard EVS-ISO 11094:2005 on kinnitatud Eesti Standardikeskuse 16.12.2005 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teataja 2006. aasta jaanuarikuu numbris.

Standard on kättesaadav Eesti Standardikeskusest.

NATIONAL FOREWORD

This Estonian Standard EVS-ISO 11094:2005 consists of the identical English text of the International Standard ISO 11094:1991 "Acoustics - Test code for the measurement of airborne noise emitted by power lawn mowers, lawn tractors, lawn and garden tractors, professional mowers, and lawn and garden tractors with mowing attachments".

Estonian standard is published by the Estonian Centre for Standardisation.

This standard is ratified with the order of Estonian Centre for Standardisation dated 16.12.2005 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.

The standard is available from Estonian Centre for Standardisation.

Käsitlusala

Käesolev rahvusvaheline standard kirjeldab üksikasjalikult A-korrigeeritud helirõhu tasemete mõõtmise meetodeid mikrofonide kindlaksmääratud asukohtade korral nii masina statsionaarses kui ka liikuvas olekus. Nende väärtuste põhjal arvutatakse välja masina A-korrigeeritud helivõimsuse tase.

Käesolev standard määratleb mõõtmiste akustilised nõuded vabas väljas osalisel peegeltasapinnal, mis on kaetud teatud kindla heli neelava materjali või loodusliku rohuga (vt jaotis 4.1). Detailselt kirjeldatakse katsetatava masina töö- ja paigaldustingimusi.

Märkus 1. Müra vähendamise puhul (nt vaiksemate masinate väljatöötamiseks) rakendatakse meetodeid, mis kasutavad sagedusanalüüsi.

Käesolevat rahvusvahelist standardit rakendatakse järgmist tüüpi isiklikuks või professionaalseks (äriotstarbeliseks) kasutuseks mõeldud niidukite puhul, mis on projekteeritud puhke-, dekoratiiv- või kodumurude hooldamiseks:

- mootorajamiga muruniidukid: eeslükatavad niidukid, liikurniidukid ja sõidukniidukid, nt rootor- ja rullniiduksüsteemidega niidukid ning niidukid viitega jõuallikale nagu näiteks võrgutoitega elektriniidukid, akutoitega elektriniidukid ja sisepõlemismootoriga niidukid;

- muru- ja aiatraktorid või teised mitmeotstarbelised aiapidamismasinad niitmise lisaseadmetega ning muruniidukitega sarnase niitmissüsteemiga, mida käitatakse elektriakudega ja/või sisepõlemismootoriga, professionaalsed (äriotstarbelised) niidukid ja muruhooldusseadmed.

Käesolev standard ei rakendu:

- niiduksüsteemide haakemasinate puhul, mis ei tööta oma jõul, vaid masina

ratastelt toimiva ülekandemehhanismiga;

- rohu lõikamiseks või heina niitmiseks ette nähtud põllumajandus- ja metsamasinate

puhul;

Käesolev rahvusvaheline standard ei kirjelda:

- helirõhu taseme mõõtmist operaatori kohal (st operaatori kõrvade läheduses);

- tekitatud müra ja impulssmüra suuna-karakteristikute määramist, kuna need suurused on tähtsusetud;

- sageduskarakteristikute määramist, nt müra vähendamise eesmärgil vaiksemate masinate väljatöötamiseks, kus tavaliselt kasutatakse sagedusanalüüsi oktaavriba või ühe kolmandiku oktaavriba ulatuses.

Märkus 2. A-korrigeeritud helivõimsuse tasemetel, mida määratakse vastavalt käesolevale rahvusvahelisele standardile, on kalduvus tekitada mõõtmistel standardhälvet 1 dB ulatuses eeldusel, et müraspekter ei sisalda ilmseid diskreetsagedusi. Kui diskreetsagedused esinevad, võib korduvuse standardhälve olla suurem kui 1 dB. Korduvuse standardhälve 1 dB peegeldab kõikide mõõtemääramatuste koosmõju, v.a tekitatava müra varieerumised masinate vahel mass- või seeriatoodangus ning katsekohtade vahel.

Märkus 3. Erinevate katsekohtade kasutamise korral võib korratavuse standardhälve olla 2 dB. Kunstkattega testimiskoht põhjustab tõenäoliselt kõige väiksema korratavuse standardhälbe.

ICS 17.140.20 Masinate ja seadmete müra; **65.060.70** Aiatööriistad

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 11094 was prepared jointly by Technical Committees ISO/TC 43, *Acoustics*, Sub-Committee SC 1, *Noise* and ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Sub-Committee SC 13, *Powered lawn and garden equipment*.

Annex A of this International Standard is for information only.

International Organization for Standardization
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Introduction

This International Standard describes a method for measuring the airborne noise emitted by powered grass-cutting machines essentially in accordance with ISO 4872. The method specifies the determination of the acoustical characteristics of a machine in terms of the A-weighted sound power level. The values obtained are the fundamental quantities for characterizing the sound output of the machine under test. The A-weighted sound power level of the machine is calculated from measured values of the A-weighted sound pressure level at several microphone positions located on a hypothetical hemispherical surface which envelops the machine. It has, however, been considered appropriate to specify fewer microphone positions than those in ISO 4872.

Acoustics — Test code for the measurement of airborne noise emitted by power lawn mowers, lawn tractors, lawn and garden tractors, professional mowers, and lawn and garden tractors with mowing attachments

1 Scope

This International Standard specifies methods for measuring the A-weighted sound pressure levels at prescribed microphone positions in the proximity of the machine under test while the machine is stationary or in motion. From these values the A-weighted sound power level of the machine may be calculated.

It defines acoustical requirements for measurements in an essentially free field over a partially reflecting plane, covered with a specified official absorbing material or natural grass (see 4.1). The operating and mounting conditions of the machine under test are described in detail.

NOTE 1 For noise control purposes, for example in the development of quieter machines, other methods employing frequency analysis are usually applied.

This International Standard applies to the following types of mower designed for private or professional (commercial) use in recreational, decorative and domestic areas:

— powered lawn mowers: walk-behind mowers, self-propelled mowers and riding mowers with, for example, rotary- and reel-mowing systems, and with reference to the power source such as mains-powered electric mowers, battery-powered electric mowers and internal combustion engine-powered mowers;

— lawn and garden tractors or other multi-purpose gardening machines with attachments for mowing, with mowing systems as for powered lawn mowers being powered by electric batteries and/or internal combustion engines;

— professional (commercial) mowers and turf-care equipment.

It does not apply to the following:

— towed machines with mowing systems which are not powered by the machine but powered by a gearing mechanism from the wheels of the machine;

— agricultural and forestry machines for grass-cutting or grass-harvesting.

This International Standard does not describe the following:

— measurement of sound pressure levels at the operator's position (i.e. at the ears of the operator);

— determination of the directivity characteristics of the emitted noise and of the content of impulsive noise since these quantities are irrelevant;

— determination of frequency characteristics, for example, for noise control purposes in the development of quieter machines, where frequency analysis in octave bands or one-third octave bands is usually applied.

NOTES

2 A-weighted sound power levels determined in accordance with this International Standard tend to result in repeatability standard deviations of approximately 1 dB, provided that the noise spectrum does not contain pronounced discrete frequencies. If it does, the magnitude of the repeatability standard deviations may be larger than 1 dB. The repeatability standard deviation of 1 dB reflects the cumulative effects of all causes of measurement uncertainty, excluding variations in the noise emission from machine to machine in mass or quantity production and from test site to test site.

3 For different test sites, the reproducibility standard deviation may be 2 dB. Artificial test site surfaces will

probably give the smallest reproducibility standard deviations.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard 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 354:1985, *Acoustics — Measurement of sound absorption in a reverberation room.*

ISO 4046:1978, *Paper, board, pulp and related terms — Vocabulary.*

ISO 4872:1978, *Acoustics — Measurement of airborne noise emitted by construction equipment intended for outdoor use — Method for determining compliance with noise limits.*

ISO 5395:1990, *Power lawn-mowers, lawn tractors, lawn and garden tractors, professional mowers, and lawn and garden tractors with mowing attachments — Definitions, safety requirements and test procedures.*

IEC 651:1979, *Sound level meters.*

IEC 804:1985, *Integrating-averaging sound level meters.*

IEC 942:1988, *Sound calibrators.*

3 Definitions

For the purposes of this International Standard, the definitions given in ISO 5395 and the following definitions apply. For the convenience of users, some definitions from ISO 5395 are repeated.

3.1 sound pressure level, L_p: Ten times the logarithm to the base 10 of the ratio of the square of the sound pressure to the square of the reference sound pressure. It is expressed in decibels. The reference sound pressure is 20 µPa $(2 \times 10^{-5}$ Pa). The symbol for the A-weighted sound pressure level is L_{pA}.

3.2 A-weighted surface sound pressure level, $\overline{L_{pA}}$: Mean sound pressure level weighted over the measurement surface. (See clause 8.) It is expressed in decibels.

3.3 sound power level, L_W: Ten times the logarithm to the base 10 of the ratio of a given sound power to the reference sound power. It is expressed in decibels. The reference sound power is 1 pW$(10^{-12}$ W). The symbol for the A-weighted sound power level is L_{WA}.

3.4 measurement surface: A hypothetical surface of area S which envelops the machine under test and on which the microphone positions are located.

3.5 background noise: At the microphone positions on the measurement surface, the A-weighted sound pressure levels of any noise which is not generated by the machine under test.

3.6 maximum operating engine [motor] speed: Highest engine/motor speed obtainable when adjusted in accordance with mower manufacturer's specifications and/or instructions with the cutting means engaged, taking into account all tolerances.

[ISO 5395:1990, 1.3.23]

3.7 grass catcher: Part or combination of parts which provides a means for collecting grass clippings or debris.

[ISO 5395:1990, 1.3.17]

3.8 cutting width: Width of cut measured across the cutting means at right-angles to the direction of travel and calculated from the dimensions of the cutting means or the diameter(s) of the blade tip circle(s).

[ISO 5395:1990, 1.3.9]

3.9 directional designation: Those designations, such as front, forward, rear, right, right-hand, left-hand, which refer to the direction of travel or orientation of the vehicle, mower or parts thereof when the operator is in the normal operating position.

3.10 machine: Term used for any kind of grass-cutting machinery, e.g. lawn mower tractor with attachments for mowing.

4 Acoustic environment

4.1 Criteria for adequacy of the test environment

4.1.1 General

The test environment shall be a flat open space (a slope, if any, not exceeding 5/100), visibly free of sound-reflecting objects (building, trees, poles, sign boards, etc.) within a circular area with a radius equal to approximately three times the radius of the hemispherical measurement surface used. Two alternatives for the surface of the test environment are given in 4.1.2 and 4.1.3.