

**PÕLLUMAJANDUS- JA METSATÖÖMASINAD.
MURUNIIDUKID. OHUTUS**

**Agricultural and forestry machinery - Pedestrian
controlled motor mowers - Safety**

EESTI STANDARDI EESSÕNA**NATIONAL FOREWORD**

See Eesti standard EVS-EN 12733:2018 sisaldab Euroopa standardi EN 12733:2018 ingliskeelset teksti.	This Estonian standard EVS-EN 12733:2018 consists of the English text of the European standard EN 12733:2018.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 03.10.2018.	Date of Availability of the European standard is 03.10.2018.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

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

ICS 65.060.50

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardikeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardikeskusega:
Koduleht www.evs.ee; telefon 605 5050; e-post info@evs.ee

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation

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.

If you have any questions about copyright, please contact Estonian Centre for Standardisation:

Homepage www.evs.ee; phone +372 605 5050; e-mail info@evs.ee

EUROPEAN STANDARD

EN 12733

NORME EUROPÉENNE

EUROPÄISCHE NORM

October 2018

ICS 65.060.50

Supersedes EN 12733:2001+A1:2009

English Version

Agricultural and forestry machinery - Pedestrian controlled motor mowers - Safety

Matériel agricole et forestier - Motofaucheuses à
conducteur à pied - Sécurité

Land- und forstwirtschaftliche Maschinen -
Handgeführte Motormäher - Sicherheit

This European Standard was approved by CEN on 22 January 2018.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey 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

Contents	Page
European foreword.....	7
Introduction.....	8
1 Scope.....	9
2 Normative references.....	9
3 Terms and definitions.....	11
4 List of hazards.....	12
5 Safety requirements and/or protective/risk reduction measures.....	13
5.1 General.....	13
5.2 Engine starting and stopping devices.....	13
5.2.1 General.....	13
5.2.2 Primary engine starting.....	13
5.2.3 Secondary engine starting.....	13
5.2.4 Stopping.....	14
5.3 Location of controls.....	14
5.3.1 Controls in the hand reach zone.....	14
5.3.2 Controls in the hand reach zone or foot reach zone.....	14
5.3.3 Further controls.....	14
5.3.4 Hand reach zone.....	14
5.3.5 Foot reach zone.....	15
5.4 Identification of controls.....	15
5.5 Controls of the movement of the machine and of the cutting means.....	16
5.6 Reverse traction drive.....	17
5.7 Handlebars.....	18
5.8 Pressurized components.....	18
5.9 Liquid spillage.....	18
5.10 Exhaust system.....	18
5.10.1 Protection against exhaust gases.....	18
5.10.2 Protection against hot surfaces.....	18
5.11 Steering mechanism.....	20
5.11.1 General.....	20
5.11.2 Measurement of the steering force.....	20
5.12 Brakes.....	21
5.12.1 General.....	21
5.12.2 Service brake.....	22
5.12.3 Parking brake.....	22
5.13 Maximum travel speed.....	23
5.14 Electrical installations.....	23
5.15 Noise.....	23
5.15.1 Reduction by design and protective measures.....	23
5.15.2 Reduction by information.....	23
5.15.3 Noise emission measurement.....	23
5.16 Vibration.....	24
5.16.1 Reduction by design and protective measures.....	24
5.16.2 Reduction by information.....	24
5.16.3 Vibration measurement.....	24
6 Specific requirements.....	24

6.1	Sickle bar mowers	24
6.2	Grassland mowers	25
6.2.1	Protection against contact with cutting blades	25
6.2.2	Verification of the safety requirements and/or measures for grassland mowers	27
6.2.3	Cutting blades	35
6.2.4	Cutting blade stopping	35
6.3	Flail mowers	37
6.3.1	Protection against contact with cutting blades	37
6.3.2	Protection against thrown objects	38
6.3.3	Cutting blade stopping time	38
6.4	Scrub clearing machines	40
6.4.1	Protection against contact with cutting means	40
6.4.2	Protection against thrown objects	41
6.4.3	Structural integrity of the casing	41
6.4.4	Cutting blades	41
6.4.5	Cutting blade stopping time	41
7	Information for use	43
7.1	Instruction handbook	43
7.1.1	General	43
7.1.2	Additional information for scrub clearing machines	44
7.2	Marking	45
7.3	Warnings	45
Annex A (normative) List of hazards		46
Annex B (normative) Noise test code for motor mowers - Engineering method (grade 2)		50
B.1	Scope	50
B.2	A-weighted sound power level determination	50
B.3	A-weighted emission sound pressure level determination	52
B.4	Requirements for test floor	52
B.5	Installation, mounting and operating conditions	52
B.6	Measurement uncertainties and declaration of noise emission values	53
B.7	Information to be recorded and reported	53
Annex C (normative) Vibration measurement of motor mowers		54
C.1	Quantities to be measured	54
C.2	Instrumentation	54
C.2.1	General	54
C.2.2	Fastening of transducer	54
C.2.3	Calibration	54
C.3	Measurement direction and measurement location	54
C.3.1	Measurement direction	54
C.3.2	Measurement location	54
C.4	Test procedure	55
C.4.1	General	55
C.4.2	Test procedure for machine with rotary cutting blade(s)	55
C.4.2.1	Test condition	55

C.4.2.2 Test procedure for reciprocating machine	55
C.4.2.2.1 Driving speed	55
C.4.2.2.2 Cutting blade	55
C.4.2.2.3 Machine centre of gravity	55
C.4.2.2.4 Test conditions	55
C.5 Measurement procedure	56
C.6 Determination of the measurement result	56
Annex D (normative) Foot probe test	58
D.1 Test equipment	58
D.2 Test method	58
D.3 Test acceptance	58
Annex E (normative) Testing of protective skirts	60
E.1 General	60
E.2 Tensile resistance test	60
E.2.1 Procedure	60
E.2.2 Preparation of the samples	60
E.2.3 Clamping	60
E.2.4 Acceptance criteria	61
E.3 Perforation resistance test	61
E.3.1 Procedure	61
E.3.2 Acceptance criteria	62
E.4 Wear resistance test	62
E.4.1 Procedure	62
E.4.2 Acceptance criteria	63
Annex F (normative) Corrugated fibreboard penetration tests on grassland mowers - Test enclosure wall panels (see 6.2.2.2.4.2)	64
F.1 Purpose	64
F.2 Test fixture	64
F.3 Fibreboard samples	64
F.4 Procedure	64
F.5 Acceptance criteria	64
Annex G (normative) Target elevation areas	66
G.1 Lower elevation target	66
G.2 Middle elevation target	66
G.3 Top elevation target	66
G.4 Operator target area	66
Annex H (normative) Test enclosure	67
H.1 Base	67

H.2	Target composition	67
Annex I	(normative) Thrown object test for flail mower	70
I.1	Principle	70
I.2	Testing conditions	70
I.2.1	Mower used for test	70
I.2.1.1	General	70
I.2.1.2	Thrown-object guard adjustment	70
I.2.1.3	Cutting height	70
I.2.2	Test surface area	70
I.2.2.1	Ground conditions	70
I.2.2.2	Coconut matting	70
I.2.2.3	Sand layer (natural, crushed or uncrushed)	70
I.2.2.4	Moisture	70
I.3	Target	71
I.3.1	General	71
I.3.2	Target construction	71
I.3.2.1	General	71
I.3.2.2	Panels	71
I.3.2.3	Target material attachment	71
I.3.3	Reference lines	72
I.4	Test material	74
I.4.1	Test material preparation	74
I.4.2	Moisture for test material	75
I.4.3	Test material configuration	75
I.5	Test run conditions	76
I.6	Test procedure	76
I.7	Test result and report	77
I.8	Acceptance criteria	77
I.9	Thrown object test report for flail mower machine	78
I.9.1	Specifications	78
I.9.2	Primary tests report	79
I.9.3	Additional test report	81
Annex J	(normative) Thrown object test for scrub clearing machines	83
J.1	Test equipment	83
J.1.1	Test surface	83
J.1.2	Target	83
J.1.3	Balls	83

J.1.4	Injection point	83
J.1.5	Injection tube	83
J.1.6	Preliminary adjustments of the velocity	83
J.2	Test method	83
J.2.1	General	83
J.2.2	Balls velocity	83
J.2.3	Test procedure	84
J.2.4	Test result and acceptance	84
J.3	Data sheet - Thrown object test for scrub clearing machine	85
Annex K	(informative) Example of a material and construction fulfilling the requirements for an artificial surface	86
K.1	Material	86
K.2	Construction	86
Annex L	(informative) Examples of machines	89
Annex ZA	(informative) Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC amended by Directive 2009/127/EC aimed to be covered	91
Bibliography	92

European foreword

This document (EN 12733:2018) has been prepared by 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 April 2019 and conflicting national standards shall be withdrawn at the latest by January 2020.

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 12733:2001+A1:2009.

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 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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This document is a type-C standard as specified in EN 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 organizations, 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 and events are covered are indicated in the scope of this document.

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

The requirements of this document concern designers, manufacturers and their authorized representatives of pedestrian controlled motor mowers. This document also includes information to be provided by the manufacturer to the user.

1 Scope

This European Standard specifies safety requirements and their verification for design and construction of pedestrian controlled motor mowers with rotary or reciprocating cutting means used in agricultural, forestry and landscaping to cut and/or mulch grass or similar plants or scrub and woody vegetation.

For the purposes of this standard the following types of pedestrian controlled machines are considered to be motor mowers:

- flail mowers;
- grassland mowers;
- scrub clearing machines;
- sickle bar mowers.

This standard applies also to multipurpose machines when used for cutting or mulching grass or scrub.

NOTE When they are used for other operations (e.g. soil working) other standards can apply.

This standard does not cover lawn mowers (see EN ISO 5395-1, EN ISO 5395-2), engine driven brush cutters and grass trimmers (see EN ISO 11806) or other lawn maintenance equipment.

This document deals with significant hazards, hazardous situations and events, as listed in Annex A, relevant to pedestrian controlled motor mowers when used as intended and under conditions of misuse foreseeable by the manufacturer during normal operation and service. Additionally, it specifies the type of information to be provided by the manufacturer on safe working practices.

Environmental aspects (except noise) have not been considered in this standard.

This document is not applicable to motor mowers manufactured before the date of its publication.

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.

CR 1030-1:1995, *Hand-arm vibration - Guidelines for vibration hazards reduction - Part 1: Engineering methods by design of machinery*

EN 709:1997+A4:2009, *Agricultural and forestry machinery - Pedestrian controlled tractors with mounted rotary cultivators, motor hoes, motor hoes with drive wheel(s) - Safety*

EN 12096, *Mechanical vibration - Declaration and verification of vibration emission values*

EN 61672-1:2013, *Electroacoustics - Sound level meters - Part 1: Specifications (IEC 61672-1:2013)*

EN 61672-2:2013, *Electroacoustics - Sound level meters - Part 2: Pattern evaluation tests (IEC 61672-2:2013)*

EN 61672-3:2013, *Electroacoustics - Sound level meters - Part 3: Periodic tests (IEC 61672-3:2013)*

EN ISO 354:2003, *Acoustics - Measurement of sound absorption in a reverberation room (ISO 354:2003)*

EN ISO 845:2009, *Cellular plastics and rubbers - Determination of apparent density (ISO 845)*

EN ISO 2758:2014, *Paper - Determination of bursting strength (ISO 2758)*

EN ISO 3744, *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 3744)*

EN ISO 4413:2010, *Hydraulic fluid power - General rules and safety requirements for systems and their components (ISO 4413:2010)*

EN ISO 4871, *Acoustics - Declaration and verification of noise emission values of machinery and equipment (ISO 4871)*

EN ISO 5395-1:2013, *Garden equipment - Safety requirements for combustion-engine-powered lawnmowers - Part 1: Terminology and common tests (ISO 5395-1:2013)*

EN ISO 5395-2:2013, *Garden equipment - Safety requirements for combustion-engine-powered lawnmowers - Part 2: Pedestrian-controlled lawnmowers (ISO 5395-2:2013)*

EN ISO 11102-1:2009, *Reciprocating internal combustion engines - Handle starting equipment - Part 1: Safety requirements and tests (ISO 11102-1:1997)*

EN ISO 11102-2:2009, *Reciprocating internal combustion engines - Handle starting equipment - Part 2: Method of testing the angle of disengagement (ISO 11102-2:1997)*

EN ISO 11201, *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 11201)*

EN ISO 11688-1:2009, *Acoustics - Recommended practice for the design of low-noise machinery and equipment - Part 1: Planning (ISO/TR 11688-1:1995)*

EN ISO 11688-2:2000, *Acoustics - Recommended practice for the design of low-noise machinery and equipment - Part 2: Introduction to the physics of low-noise design (ISO/TR 11688-2:1998)*

EN ISO 12100:2010, *Safety of machinery - General principles for design - Risk assessment and risk reduction (ISO 12100:2010)*

EN ISO 13857:2008, *Safety of machinery - Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13857:2008)*

EN ISO 20643:2008, *Mechanical vibration - Hand-held and hand-guided machinery - Principles for evaluation of vibration emission (ISO 20643:2005)*

ISO 3767-1, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment - Symbols for operator controls and other displays - Part 1: Common symbols*

ISO 3767-3, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment - Symbols for operator controls and other displays - Part 3: Symbols for powered lawn and garden equipment*

ISO 3864-1:2011, *Graphical symbols - Safety colours and safety signs - Part 1: Design principles for safety signs and safety markings*

ISO 5718:2013, *Harvesting equipment - Blades for agricultural rotary mowers - Requirements*