

**MAJAPIDAMIS- JA MUUDE TAOLISTE ELEKTRISEADMETE
OHUTUS. OSA 2-107: ERINÕUDED AKUTOITEGA
ELEKTRILISTELE ROBOTMURUNIIDUKITELE**

**Safety of household and similar appliances - Part 2-107:
Particular requirements for robotic battery powered
electrical lawnmowers (IEC 60335-2-107:2012,
modified)**

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 50636-2-107:2015+A1+A2+A3:2021 sisaldab Euroopa standardi EN 50636-2-107:2015 ja selle muudatuste A1:2018, A2:2020 ja A3:2021 ingliskeelset teksti.	This Estonian standard EVS-EN 50636-2-107:2015+A1+A2+A3:2021 consists of the English text of the European standard EN 50636-2-107:2015 and its amendments A1:2018, A2:2020 and A3:2021.
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 and Accreditation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 23.01.2015, muudatused A1 12.01.2018, A2 10.01.2020 ja A3 16.04.2021.	Date of Availability of the European standard is 23.01.2015, for A1 12.01.2018, A2 10.01.2018 and A3 16.04.2021.
Muudatusega A1 lisatud või muudetud teksti algus ja lõpp on tekstis tähistatud sümbolitega A1 A1 .	The start and finish of text introduced or altered by amendment A1 is indicated in the text by tags A1 A1 .
Muudatusega A2 lisatud või muudetud teksti algus ja lõpp on tekstis tähistatud sümbolitega A2 A2 .	The start and finish of text introduced or altered by amendment A2 is indicated in the text by tags A2 A2 .
Muudatusega A3 lisatud või muudetud teksti algus ja lõpp on tekstis tähistatud sümbolitega A3 A3 .	The start and finish of text introduced or altered by amendment A3 is indicated in the text by tags A3 A3 .
Standard on kättesaadav Eesti Standardimis- ja Akrediteerimiskeskusest.	The standard is available from the Estonian Centre for Standardisation and Accreditation.

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

ICS 65.060.70

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; telefon 605 5050; e-post 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; phone +372 605 5050; e-mail info@evs.ee

English Version

**Safety of household and similar appliances - Part 2-107:
Particular requirements for robotic battery powered electrical
lawnmowers (IEC 60335-2-107:2012 , modified)**

Appareils électrodomestiques et analogues - Partie 2-107:
Exigences particulières relatives aux tondeuses à gazon
électriques robotisées alimentées par batteries

Sicherheit elektrischer Geräte für den Hausgebrauch und
ähnliche Zwecke - Teil 2-107: Besondere Anforderungen für
batteriebetriebene Roboter-Rasenmäher

This European Standard was approved by CENELEC on 2014-12-01. Amendment A1 was approved by CENELEC on 2017-08-09. Amendment A2 was approved by CENELEC on 2019-09-27. Amendment A3 was approved by CENELEC on 2021-03-22. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard and its amendments 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 CENELEC member.

This European Standard and its Amendments A1, A2 and A3 exist in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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

Contents

Foreword	5
▣ _{A1} Amendment A1 European foreword ▣ _{A1}	7
▣ _{A2} Amendment A2 European foreword ▣ _{A2}	8
▣ _{A3} Amendment A3 European foreword ▣ _{A3}	9
Introduction.....	10
1 Scope.....	11
2 Normative references	11
3 Definitions	13
4 General requirement.....	16
5 General conditions for the tests	16
6 Classification.....	16
7 Marking and instructions.....	17
8 Protection against access to live parts.....	21
9 Starting of motor-operated appliances	21
10 Power input and current	21
11 Heating	21
12 Void.....	21
13 Leakage current and electric strength at operating temperature.....	21
14 Transient overvoltages	21
15 Moisture resistance	21
16 Leakage current and electric strength.....	22
17 Overload protection of transformers and associated circuits	22
18 Endurance.....	22
19 Abnormal operation	22
20 Stability and mechanical hazards	23
21 Mechanical strength	34
22 Construction.....	38
23 Internal wiring.....	47
24 Components.....	47
25 Supply connection and external flexible cords	48
26 Terminals for external conductors.....	48
27 Provision for earthing	48
28 Screws and connections	48
29 Clearances, creepage distances and solid insulation	48
30 Resistance to heat and fire	48
31 Resistance to rusting.....	48
32 Radiation, toxicity and similar hazards.....	49
Annexes	60
Annex B (normative) Appliances powered by rechargeable batteries.....	61
Annex R (normative) Software evaluation	63
Annex AA (normative) Calculation of kinetic energy of pivoting cutting elements.....	64

Annex BB (normative) Test enclosure construction	66
Annex CC (normative) Base for thrown object test enclosure	71
Annex DD (normative) Target panel elevation zones and recommended test report for thrown object test	73
Annex EE (normative) Safety signs	75
Annex FF (normative) Noise test code – Engineering method (grade 2)	78
Annex GG (informative) Example of a material and construction fulfilling the requirements for an artificial surface	83
Annex HH (informative) Safety instructions	85
Annex ZZ (informative) Relationship between this European Standard and the essential requirements of Directive 2006/42/EC [2006 OJ L157] aimed to be covered	87
Bibliography	90

Figures

Figure 101 – Example of test cycles (see Clause 20.102.2)	49
Figure 102 — Foot probe test (see 20.102.4.1.2)	50
Figure 103 – Impact test fixture (see Clause 21.101.1)	51
Figure 104 – Example of structural integrity test fixtures (see Clause 21.101.3.1.1)	53
Figure 105 - Finger probe test - Illustrations showing application of probe, insertion depth limited according to the geometry of the enclosure	54
Figure 106 — Obstruction sensor test — Illustration showing typical arrangement (see 22.105.2)	55
Figure 107 — Foot probe for standing child	56
Figure 108 — Foot probe for kneeling child	57
Figure 109 — Foot probe for kneeling child test positions	59
Figure AA.1 – Measurement of the reckonable length L	65
Figure BB.1 – Thrown object test enclosure – General layout	67
Figure BB.2 – Thrown object test enclosure	68
Figure BB.3 – Test enclosure walls and base	69
Figure BB.4 – Test fixture for corrugated fibreboard penetration test	70
Figure CC.1 – Thrown object test enclosure – Base detail	71
Figure CC.2 – Nail plan of test enclosure base	72
Figure DD.1 – Recommended test data sheet	74
Figure EE.1 – Safety sign illustrating – "WARNING – Read user instructions before operating the machine "	75
Figure EE.2 – Alternative safety sign for the supplementary safety information panel of Figure EE.1 (safety sign 1641 of ISO 7000:2014)	75
Figure EE.3 – Alternative safety sign for the supplementary safety information panel of Figure EE.1 (safety sign M002 of EN ISO 7010:2012)	75
Figure EE.4 – Safety sign illustrating – "WARNING – Keep a safe distance from the machine when operating"	76
Figure EE.5 – Safety sign illustrating – "WARNING – Remove the disabling device before working on or lifting the machine"	76
Figure EE.6 – Safety sign illustrating – "WARNING – Operate the disabling device before working on or lifting the machine"	77
Figure EE.7 – Safety sign illustrating – "WARNING – Do not ride on the machine"	77

Figure FF.1 — Microphone positions on the hemisphere (see Table FF.1)	79
Figure GG.1 – Sketch of the measurement surface covered with an artificial surface (not to scale)	84

Tables

Table 1 – Sizing of test fixture air inlet holes	36
Table FF.1 — Coordinates of microphone positions	79
Table FF.2 — Values of the constant a	79
Table FF.2 – Absorption coefficients	80
Table ZZ.1 — Correspondence between this European Standard and Annex I of Directive 2006/42/EC	87

This document is a preview generated by EVS

Foreword

This document (EN 50636-2-107:2015) has been prepared by CLC/TC 116, "Safety of hand-held motor-operated electric tools".

The following dates are fixed:

- latest date by which the standard has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2015-12-01
- latest date by which the national standards conflicting with the standard have to be withdrawn (dow) 2017-12-01

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directives.

For the relationship with EU Directive 2006/42/EC, see informative Annex ZZ, which is an integral part of this document.

The text of IEC 60335-2-107:2012 has been revised by CLC/TC 116/WG 5, "Garden appliances", to bring this European Standard in line with the European Machinery Directive 2006/42/EC.

This document was submitted to the UAP under the reference FprEN 60335-2-107:2013. CLC/TC 116 confirmed that EN 60335-1:2012 is Part 1 of this document.

This European Standard is to be used in conjunction with EN 60335-1:2012 "*Household and similar electrical appliances - Safety – Part 1: General requirements*" and its amendments.

When "Part 1" is mentioned in this standard, it refers to EN 60335-1:2012.

This European Standard supplements or modifies the corresponding clauses in Part 1, so as to convert that publication into the European Standard "*Particular requirements for robotic battery powered electrical lawnmowers*".

Where a particular subclause of Part 1 is not mentioned in this European Standard, that subclause applies as far as is relevant. Where this standard states "addition", "modification" or "replacement", the relevant text in Part 1 is to be adapted accordingly.

Compliance with the relevant clauses of Part 1 together with this European Standard provides one means of conforming to the specified essential health and safety requirements of the Directive concerned.

This European Standard follows the overall requirements of EN ISO 12100:2010.

Warning: Other requirements arising from other EU Directives can be applicable to the products falling within the scope of this European Standard.

The following numbering system is used:

- subclauses that are numbered starting from 101 are additional to those in Part 1;

- additional annexes are lettered AA, BB, etc.

NOTE In this European Standard the following print types are used:

- requirements proper: in Roman type;
- *test specifications: in italic type;*
- explanatory matter: in smaller Roman type.

Words in **bold** in the text are defined in Clause 3. When a definition concerns an adjective, the adjective and the associated noun are also in bold.

A1 Amendment A1 European foreword

This document (EN 50636-2-107:2015/A1:2018) has been prepared by CLC/TC 116 "Safety of motor-operated electric tools".

The following dates are fixed:

- latest date by which this document has (dop) 2018-10-12
to be implemented at national level by
publication of an identical national
standard or by endorsement
- latest date by which the national (dow) 2020-01-12
standards conflicting with this document
have to be withdrawn

This amendment was developed to implement an extra foot probe test for children.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CENELEC 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 ZZ, which is an integral part of EN 50636-2-107:2015. **A1**

A2 Amendment A2 European foreword

This document [EN 50636-2-107:2015/A2:2020] has been prepared by CLC/TC 116 “Safety of motor-operated electric tools”.

The following dates are fixed:

- latest date by which this document has (dop) 2020-09-27
to be implemented at national level by
publication of an identical national
standard or by endorsement
- latest date by which the national (dow) 2022-09-27
standards conflicting with this document
have to be withdrawn

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

This amendment was developed to implement an extra test with a kneeling child foot test probe.

This document has been prepared under a mandate given to CENELEC 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 ZZ, which is an integral part of this document. **A2**

A3 Amendment A3 European foreword

This document (EN 50636-2-107:2015/A3:2021) has been prepared by CLC/TC 116 “Safety and environmental aspects of motor-operated electric tools”.

The following dates are fixed:

- latest date by which this document has to be (dop) 2022–03–22
implemented at national level by publication of
an identical national standard or by
endorsement
- latest date by which the national standards (dow) 2024–03–22
conflicting with this document have to be
withdrawn

This document has been prepared under a mandate given to CENELEC 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 ZZ, which is an integral part of EN 50636-2-107:2015/A2:2020.

This amendment was developed to align the current standard EN 50636-2-107:2015¹ with the major changes from IEC 60335-2-107:2017+A1:2020. **A3**

¹ As amended by EN 50636-2-107:2015/A1:2018 and EN 50636-2-107:2015/A2:2020.

Introduction

This document is a type C standard as stated in EN ISO 12100:2010.

The machinery concerned and the extent to which hazards, hazardous situations and events are covered is as 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 other standards, for machines which have been built and designed to the provisions of this type C standard.

1 Scope

This clause of Part 1 is replaced by the following:

This European Standard specifies safety requirements and their verification for the design and construction of **robotic** battery powered electrical **rotary lawnmowers** and their **peripherals** with the **rated voltage** of the battery being not more than 75 V d.c. charged by mains electrical and/or alternative energies, e.g. solar power.

This European Standard does not apply to non-robotic machines such as **lawn trimmers, lawn edge trimmers, lawn edgers, ride-on lawnmowers or pedestrian controlled lawnmowers**.

This European Standard is not applicable to EMC and environmental hazards (except noise).

This European Standard does not apply to internal combustion engine(s), hybrid and fuel cell powered machines and associated charging systems.

This European Standard deals with all the significant hazards presented by battery powered **robotic lawnmowers** and their **peripherals** when they are used as intended and under conditions of misuse which are reasonably foreseeable.

This European Standard is not applicable to machines, which are manufactured before the date of publication of this document by CENELEC.

NOTE This European Standard does not apply to battery chargers (EN 60335-2-29:2004).

A2 This standard covers all significant hazards, hazardous situations or hazardous events relevant for tools covered by this standard.

NOTE 101 Essential requirements not mentioned in Table ZZ.1 are deemed to be not applicable, because the corresponding hazards are either not relevant for machines covered by this standard or do not require specific action by the designer. **A2**

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

EN 60320-1:2001+ EN 60320-1:2001/A1:2007, *Appliance couplers for household and similar general purposes – Part 1: General requirements (IEC 60320-1:2001 + A1:2007)*

EN 60320-2-1:2000, *Appliance couplers for household and similar general purposes – Part 2-1: Sewing machine couplers (IEC 60320-2-1:2000)*

EN 60320-2-2:1998, *Appliance couplers for household and similar general purposes – Part 2-2: Interconnection couplers for household and similar equipment (IEC 60320-2-2:1998)*

EN 60320-2-4:2006 + EN 60320-2-4:2006/A1:2009, *Appliance couplers for household and similar general purposes – Part 2-4: Appliance couplers dependent on appliance weight for engagement (IEC 60320-2-4:2005 + A1:2009)*

EN 60335-1:2012, *Household and similar electrical appliances – Safety – Part 1: General requirements (IEC 60335-1:2010, mod.)*

EN 60335-2-29:2004, *Household and similar electrical appliances – Safety – Part 2-29: Particular requirements for battery chargers (IEC 60335-2-29:2002)*

EN 61032:1998, *Protection of persons and equipment by enclosures – Probes for verification (IEC 61032:1997)*

EN 61058-1:2002,² *Switches for appliances - Part 1: General requirements* 

EN 62133:2003, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications (IEC 62133:2002)*

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

EN 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 3744:2010)*

EN ISO 4871:2009, *Acoustics – Declaration and verification of noise emission values of machinery and equipment (ISO 4871:1996)*

EN ISO 7010:2012, *Graphical symbols – Safety colours and safety signs – Registered safety signs (ISO 7010:2011)*

 EN ISO 8295:2004, *Plastics - Film and sheeting - Determination of the coefficients of friction (ISO 8295:1995)* 

EN 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 11201:2010)*

EN ISO 11203:2009, *Acoustics – Noise emitted by machinery and equipment – Determination of emission sound pressure levels at a work station and at other specified positions from the sound power level (ISO 11203:1995)*

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 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)*

ISO 683-4:2014, *Heat-treatable steels, alloy steels and free-cutting steels – Part 4: Free-cutting steels*

ISO 3767-1:1998+A1:2008+A2:2012, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment – Symbols for operator controls and other displays – Part 1: Common symbols*

ISO 3767-3:1995, *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 7000:2014, *Graphical symbols for use on equipment – Index and synopsis*

ISO 11684:1995, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment – Safety signs and hazard pictorials – General principles*

² As amended by EN 61058-1:2002/A2:2008.