
Varnost gospodinjskih in podobnih električnih aparatov - 2-107. del: Posebne zahteve za baterijske robotsko vodene električne vrtno kosilnice - Dopolnilo A3

Safety of household and similar appliances - Part 2-107: Particular requirements for robotic battery powered electrical lawnmowers

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

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

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**Safety of household and similar appliances - Part 2-107:
Particular requirements for robotic battery powered electrical
lawnmowers**

Appareils électrodomestiques et analogues - Partie 2-107:
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Sicherheit elektrischer Geräte für den Hausgebrauch und
ähnliche Zwecke - Teil 2-107: Besondere Anforderungen für
batteriebetriebene Roboter-Rasenmäher

This amendment A3 modifies the European Standard EN 50636-2-107:2015; it 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 amendment 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 amendment exists 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.

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

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20 European foreword

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

23 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

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

26 For the relationship with EU Directive(s) see informative Annex ZZ, which is an integral part of
27 EN 50636-2-107:2015/A2:2020.

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

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

1 Addition to Clause 2, “Normative references”

Add the following reference:

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

2 Modification to Clause 3, “Definitions”

Replace the existing 3.101 with the following:

“3.101

automatic mode

autonomous operation of the machine without the use of a **manual controller**”

3 Modification to Clause 15, “Moisture resistance”

Replace the existing subclause 15.2 with the following:

“15.2 Addition:

*Machines or **peripherals** fitted with an appliance inlet or cable coupler shall be tested with the appropriate mating connector in place.*

Air filters are not removed.”

4 Modifications to Clause 20, “Stability and mechanical hazards”

Replace the existing first paragraph of subclause 20.2 with the following:

“To prevent unexpected operation which could result in a hazard, the **cutting means** shall not start until either,

- a) a manual reset; or
- b) the start-up procedure as described in 22.110 is completed; or
- c) for manual control, as described in 20.101.3.”

Replace the existing subclause 20.101.3 with the following:

“20.101.3 **Manual Controller**

If a **manual controller** is supplied by the manufacturer, it shall meet the requirements of 22.107.

Compliance is checked by inspection and by the tests of 22.107 and 21.101.5.”

Replace the existing subclause 20.101.4 with the following:

“20.101.4 **Manual stop**

A single action clearly identifiable **manual stop** shall be provided on the machine in a prominent position on the top surface. The actuator of the **manual stop** shall have at least 20 % of its surface raised at least 5 mm above the immediate surrounding area. The minimum width of the immediate surrounding area shall be not less than 15 mm. The geometric minor dimension of the actuator of the **manual stop** shall be not less than 35 mm.

The operating force of the actuator of the **manual stop** shall not exceed 30 N on any part of its surface that is raised at least 5 mm above the immediate surrounding area.

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

64 The **manual stop** shall override all other **controls** and cause all moving parts to stop.

65 Restarting of the mower following a **manual stop** shall only be possible following either:

66 a) two separate actions; or

67 b) the introduction of an alpha-numeric code of at least four characters; or

68 c) multiple key strokes in response to prompts.

69 *Compliance is checked by inspection, practical test and by measurement, and if the compliance relies*
 70 *on the operation of an **electronic circuit**, it is checked under the following conditions applied separately:*

71 1) *the fault conditions in a) to g) of 19.11.2 applied one at a time to the **electronic circuit**;*

72 2) *the electromagnetic phenomena tests of 19.11.4.1 and 19.11.4.2 applied to the machine.*

73 *If the **electronic circuit** is programmable, the software shall contain measures to control the fault/error*
 74 *conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of*
 75 *Annex R."*

76 **Replace** the existing third paragraph of subclause 20.102.2 with the following:

77 "The total **stopping time**, as a result of condition 1), shall either

78 — not exceed twice of the value given above. Under this condition, a manual operation shall be
 79 required to restart the **cutting means**, such a restart shall only be allowed for one attempt;

80 — not exceed 0,1 J of rotational energy at the end of an interval of twice of the value given above. In
 81 this case, the test is repeated and either the **cutting means** stopping command shall comply with
 82 the **stopping time** limit value above or the **cutting means** shall be permanently disabled such that
 83 the **cutting means** cannot be reactivated by the operator and requires repair by qualified service
 84 personnel.

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85 The calculation of rotational energy shall be made using Annex AA or, as appropriate, the following:

86
$$E = \frac{1}{2}I\omega^2$$

87 where

E is the rotational energy

I is the moment of inertia around the axis of rotation

ω is the angular velocity

88 "

89 **Replace** the existing 2nd paragraph of subclause 20.102.4.1.2 with the following:

90 "The foot probe of Figure 102 shall be inserted towards the **cutting means** around the machine's
 91 external enclosure. The base of the probe is held horizontally at any height and then inclined up to 15°
 92 forward or backward from the horizontal. The probe is applied around the entire machine as described
 93 in Figure 102 until a horizontal force of 20 N maximum is reached, or until the machine's enclosure lifts
 94 or moves from the original position, or until contact is made with the **cutting means** path, whichever
 95 occurs first."

96 **Replace** the existing 2nd paragraph of subclause 20.102.4.1.3 with the following:

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97 “The foot probe of Figure 107 shall be inserted towards the **cutting means** around the machine’s
 98 external enclosure. The base of the probe is held horizontally at any height and then inclined up to 15°
 99 forward or backward from the horizontal. The probe is applied around the entire machine as described
 100 in Figure 102 until a horizontal force of 20 N maximum is reached, or until the machine’s enclosure lifts
 101 or moves from the original position, or until contact is made with the **cutting means** path, whichever
 102 occurs first.”

103 *Replace the existing first paragraph of subclause 20.102.6 with the following:*

104 “When a **tilt sensor** and/or **lift sensor** is activated, the **cutting means** shall stop within 2 s. If the
 105 machine attempts to recover from the condition that caused the activation of the **sensor(s)** the machine
 106 shall move away in a different direction (with the **cutting means** static).”

107 5 Modifications to Clause 21, “Mechanical strength“

108 *Replace the existing subclause 21.1 with the following:*

109 “**21.1** *Modification:*

110 The impact energy applied to all enclosures (including the **peripherals**) shall be $(1,0 \pm 0,05)$ J.

111 This subclause does not apply to

112 — **remote setting device(s)**; and

113 — **peripherals** that are covered by a separate end product standard, such as power supplies or
 114 battery chargers.”

115 *Replace the heading “21.101.1.2 Imbalance” with “21.101.2 Imbalance”.*

116 6 Modifications to Clause 22, “Construction“

117 *Add the following new subclause:*

118 “**22.40** This subclause is not applicable.

119 NOTE 101 This requirement is covered by 20.101.1 and 20.101.4.”

120 *Add the following new subclause:*

121 “**22.49** This subclause is not applicable.

122 NOTE 101 This requirement is covered in 20.101.2 for **remote setting devices**.”

123 *Add the following new subclause:*

124 “**22.50** This subclause is not applicable.

125 NOTE This requirement is covered by 20.101.4.”

126 *Add the following new subclause:*

127 “**22.51** This subclause is not applicable.

128 NOTE 101 This requirement is covered in 22.107 for **manual controllers**.”

129 *Replace the existing first paragraph of subclause 22.103.1 with the following:*

130 “When the **disabling device** is removed, it shall not be possible for the machine to be operable. A
 131 **removable disabling device** may be fulfilled by removal of all detachable battery pack(s), provided

132 — any individual battery pack does not have a mass exceeding 5,0 kg; and

133 — the detachable battery pack(s) are removable without the use of tools.

The machine is not considered to be operating when displaying, communicating, transmitting or storing data (e.g. error codes) whilst the **removable disabling device** is removed or operated.”

Add the following text after the first paragraph of subclause 22.103.2:

“The machine is not considered to be operating when displaying, communicating, transmitting or storing data (e.g. error codes) whilst the machine is disabled by the **code protected disabling device**.”

Replace the existing subclause 22.104 with the following:

“22.104 Working area

When the machine is operating in **automatic mode**, the machine shall not be able to leave the **working area**. It shall not be possible for the machine to cross the boundary of the **working area** by a distance greater than one full length of the machine when operating in **automatic mode**.

The boundary of the **working area** may be established by the use of a **perimeter delimiter** as specified in 22.104.2 or by a pre-programmed area.

If the machine is placed outside the **working area**, it shall not be able to operate at a distance of more than 1 m from the boundary of the **working area** to the nearest part of the machine, unless under manual control.

If the machine fails to receive any signal that is required to recognize the **working area**, the machine shall travel not more than 1 m or travel such that it is not displaced by more than 1 m and the **cutting means** shall stop within 5 s from the instant the machine fails to receive any signal that is required to recognize the **working area** to the time that the **cutting means** stops in accordance with 20.102.2.

If the machine regains recognition of the **working area**, the machine may operate in **automatic mode**, providing the **cutting means** start-up indication procedure in 22.110 is completed.

If the **working area** is changed, it shall not be possible for the machine to operate in **automatic mode** unless the restart procedure in 20.102.6 is completed. This requirement is not applicable for **perimeter delimiters**.

Compliance is checked by inspection, by measurement and by practical test.

*If the compliance relies on the operation of an **electronic circuit**, it is checked under the following condition:*

- 1) the fault conditions in a) to g) of 19.11.2 applied one at a time to the **electronic circuit**.

*The total travelling distance and/or the total **stopping time**, as a result of condition 1), shall not exceed twice of the values given above. Under this condition, a manual operation shall be required to restart the **cutting means**, such a restart shall only be allowed for one attempt.*

*If the **electronic circuit** is programmable, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of Annex R.*

22.104.1 Void

22.104.2 Perimeter delimiter

If a **perimeter delimiter** is provided which uses a boundary wire that emits a signal to indicate the limit of the **working area**, the maximum voltage shall not exceed **safety extra-low voltage**.

Compliance is checked by measurement.”

Replace the existing subclause 22.105.2 with the following:

“22.105.2 Obstruction sensors

The machine shall be provided with (an) **obstruction sensor(s)**. In **automatic mode**, the **sensor(s)** shall be active and capable of performing its intended function in all operating positions and in all directions of travel, except those directions of travel where

- the **cutting means** is not operating and the distance travelled does not exceed 2,0 times the length of the machine; or

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180 — the **cutting means** is operating and the distance travelled does not exceed the distance from the
181 edge of the machine in the direction of travel to the nearest **cutting means tip circle**.

182 NOTE 1 The machine does not have to incorporate discrete sensing devices for each **sensor** requirement. The
183 various sensing functions can be achieved by fewer devices that respond to multiple stimuli. Sensing requirements
184 can also be fulfilled by mechanical devices instead of electrical circuits.

185 The maximum kinetic energy of a machine that could be imparted to an obstruction upon impact when
186 travelling in **automatic mode** shall be 5 J.

187 The maximum force applied by the machine against an obstruction in **automatic mode** shall not be
188 greater than

189 — 260 N during the first 0,5 s after impact and a minimum of 50 N is exceeded; and

190 — 130 N thereafter.

191 NOTE 2 ISO/TS 15066:2016 provides guidance on relevant values of maximum force.

192 If an **obstruction sensor** is activated, the **traction drive** in the direction of travel shall stop within

193 $t_{ts} = D/v$, where

t_{ts} is the **traction drive stopping time**;

D is the distance from the front edge of the machine to the nearest edge of the nearest
cutting means tip circle; and

v is the velocity of the machine upon approach.

194 The machine shall then restart in a different direction to allow the machine to move away from the object
195 such that the **sensor** is deactivated within 3 s of initial activation. If the **sensor** is not deactivated within
196 3 s of initial activation, the **cutting means** shall stop as required by 20.102.2.

197 An additional non-contact **sensor**, if relied upon to reduce speed in order to fulfil the requirement for
198 maximum force upon impact, is permitted providing that it responds to a rigid non-metallic target of:

199 — cylindrical shape;

200 — (70 ± 2) mm diameter by (400 ± 5) mm high, standing on end;

201 — of a colour or shade that matches the background; and

202 — normalized to the ambient temperature.

203 *Compliance is checked by inspection, by measurement, by the following test and by 20.102.2.*

204 *The machine is placed on a level test surface as described in CC.3. The machine shall be made to*
205 *collide with a force measuring means. The force to operate the **obstruction sensor** at impact shall be*
206 *measured parallel to the ground plane and vertically aligned with the point of contact with the force*
207 *measuring means. The point of contact shall not be higher than 150 mm from the ground plane. Friction,*
208 *misalignment and other factors associated with the mounting of the force measuring means shall*
209 *minimize error in the measurement.*

210 *The force is measured by means of an instrument which incorporates a rigid impact plate having a*
211 *diameter of (90 ± 10) mm and a spring having a spring constant of (60 ± 2) N/mm. The spring acts on a*
212 *sensing element which is connected to a measuring instrument having a bandwidth limited to*
213 *(150 ± 50) Hz and with an accuracy of 5 %. The sampling rate shall be at least double of the bandwidth.*
214 *A typical arrangement is shown in Figure 106.*

215 *The test is performed a total of five times. The maximum forces during the first 0,5 s after impact and*
216 *thereafter are computed as the average of each of the five measurements.*

217 *If compliance relies on the operation of an **electronic circuit**, the test is repeated under the following*
218 *condition:*

- 219 1) the fault conditions in a) to g) of 19.11.2 applied one at a time to the **electronic circuit**.
- 220 If the **electronic circuit** is programmable, the software shall contain measures to control the fault/error
 221 conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of
 222 Annex R.
- 223 If within 10 s of initial activation the **sensor(s)** has/have become deactivated, the drive to the **cutting**
 224 **means** may be restarted providing the start-up procedure in 22.110 is completed.
- 225 If after 10 s of initial activation the **sensor(s)** has/have not become deactivated, the **cutting means** may
 226 only be restarted following either:
- 227 a) two separate actions; or
- 228 b) entering an alpha-numeric code of at least four characters; or
- 229 c) multiple key strokes in response to prompts.
- 230 *Compliance is checked by inspection and practical test."*
- 231 **Replace the existing subclause 22.105.3 with the following:**
- 232 **"22.105.3 Lift sensor**
- 233 A **lift sensor** shall be provided on all machines. The **lift sensor** shall detect when the machine is lifted
 234 both fully from the ground and when it is lifted from only a single point causing it to be tilted.
- 235 NOTE The machine does not have to incorporate discrete sensing devices for each **sensor** requirement. The
 236 various sensing functions can be achieved by fewer devices that respond to multiple stimuli. Sensing requirements
 237 can also be fulfilled by mechanical devices instead of electrical circuits.
- 238 If a **lift sensor** is operated, the **cutting means** shall stop as defined in 20.102.2 and the **traction drive**
 239 shall stop as specified in 20.102.5. [SIST EN 50636-2-107:2015/A3:2021](https://standards.iteh.ai/catalog/standards/sist/3ab8e8f5-2e77-4072-a078-01ac4508ce88/sist-en-50636-2-107-2015-a3-2021)
- 240 *Compliance is checked by inspection and by the following tests.*
- 241 a) The machine is placed on a hard, smooth horizontal surface. The machine is lifted by any parts of
 242 the external housing, except the ground contacting parts, in a uniformly horizontal manner, normal
 243 to the surface. The rate of lifting shall be (20 ± 10) mm/s. The **lift sensor** shall have activated after
 244 all the ground contacting parts lose contact with the surface and when the lowest ground contacting
 245 part is no more than 10 mm above the surface.
- 246 b) The machine is placed on a hard, smooth horizontal surface. The machine is lifted from a single
 247 point on any part of the machine's external housing, except the ground contacting parts. The rate
 248 of lifting shall be (100 ± 20) mm/s. The **lift sensor** shall have activated after at least one of the
 249 ground contacting parts loses contact with the surface and the highest ground contacting part is no
 250 more than 300 mm above the surface.
- 251 The operation of the **lift sensor** is verified by lifting the machine from different locations around the
 252 external housing that are likely to be grasped by users.
- 253 If compliance relies on the operation of an **electronic circuit**, the tests are repeated under the following
 254 conditions applied separately:
- 255 1) the fault conditions in a) to g) of 19.11.2 applied one at a time to the **electronic circuit**;
- 256 2) the electromagnetic phenomena tests of 19.11.4.2 applied to the machine, when the **lift sensor**
 257 has been activated for more than 10 s.
- 258 If the **electronic circuit** is programmable, the software shall contain measures to control the fault/error
 259 conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of
 260 Annex R.
- 261 In **automatic mode**, if within 10 s of activation the **sensor(s)** have become deactivated, the drive to the
 262 **cutting means** may be restarted providing the start-up procedure in 22.110 is completed.