

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Electric motor-operated hand-held tools, transportable tools and lawn and garden machinery – Safety –
Part 4-3: Particular requirements for pedestrian controlled walk-behind lawnmowers**

**Outils électroportatifs à moteur, outils portables et machines pour jardins et pelouses – Sécurité –
Partie 4-3: Exigences particulières pour tondeuses à gazon à conducteur à pied**



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRIC MOTOR-OPERATED HAND-HELD TOOLS, TRANSPORTABLE TOOLS AND LAWN AND GARDEN MACHINERY – SAFETY –**Part 4-3: Particular requirements for pedestrian controlled walk-behind lawnmowers**

FOREWORD

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International Standard IEC 62841-4-3 has been prepared by IEC technical committee 116: Safety of motor-operated electric tools.

The text of this International standard is based on the following documents:

FDIS	Report on voting
116/467/FDIS	116/478/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

This Part 4-3 is to be used in conjunction with the first edition of IEC 62841-1:2014.

This Part 4-3 supplements or modifies the corresponding clauses in IEC 62841-1, so as to convert it into the IEC Standard: Particular requirements for pedestrian controlled walk-behind lawnmowers.

Where a particular subclause of Part 1 is not mentioned in this Part 4-3, that subclause applies as far as reasonable. Where this document states “addition”, “modification” or “replacement”, the relevant text in Part 1 is to be adapted accordingly.

The following print types are used:

- requirements: in roman type;
- *test specifications: in italic type*;
- notes: in small roman type.

The terms defined in Clause 3 are printed in **bold typeface**.

Subclauses, notes, tables and figures which are additional to those in Part 1 are numbered starting from 101.

Subclauses, notes, tables and figures in Annex K and Annex L which are additional to those in the main body of this Part 4-3 are numbered starting from 301.

A list of all parts of the IEC 62841 series, under the general title: *Electric motor-operated hand-held tools, transportable tools and lawn and garden machinery – Safety*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

NOTE The attention of National Committees is drawn to the fact that equipment manufacturers and testing organizations may need a transitional period following publication of a new, amended or revised IEC publication in which to make products in accordance with the new requirements and to equip themselves for conducting new or revised tests.

It is the recommendation of the committee that the content of this publication be adopted for implementation nationally not earlier than 36 months from the date of publication.

ELECTRIC MOTOR-OPERATED HAND-HELD TOOLS, TRANSPORTABLE TOOLS AND LAWN AND GARDEN MACHINERY – SAFETY –

Part 4-3: Particular requirements for pedestrian controlled walk-behind lawnmowers

1 Scope

This clause of Part 1 is applicable, except as follows:

Addition:

This document applies to the design of pedestrian controlled walk-behind

- **cylinder lawnmowers;**

and

- **rotary lawnmowers**

equipped with

- metallic **cutting means**; and/or
- rigid non-metallic **cutting means**; and/or
- non-metallic **cutting means** with one or more cutting elements pivotally mounted on a generally circular drive unit, where these cutting elements rely on centrifugal force to achieve cutting, and have a kinetic energy for each single cutting element of greater than 10 J.

NOTE 101 Machines that have non-metallic **cutting means** and a kinetic energy for each single cutting element of less than or equal to 10 J are considered to be lawn trimmers.

This document does not apply to

- robotic lawnmowers;
- remote-controlled lawnmowers;
- flail mowers or flail-type attachments;
- scissors type lawnmowers;
- grassland mowers;
- sickle bar mowers;
- towed/semi-mounted grass-cutting machines;
- scrub-clearing machines;
- lawn trimmers and lawn edge trimmers;
- lawn edgers;
- grass trimmers;
- brush cutters;
- brush saws;
- agricultural mowers;
- trailing seat/sulky units;
- ride-on machines;

- non-powered lawnmowers;
- combustion engine powered lawnmowers;
- hybrid and fuel cell powered machines and associated charging systems; and
- garden tractors or their attachments.

NOTE 102 Robotic lawnmowers are covered by IEC 60335-2-107, and will be covered by a future part of IEC 62841.

NOTE 103 Lawn trimmers and lawn edge trimmers are covered by IEC 60335-2-91.

NOTE 104 Lawn trimmers, lawn edge trimmers, grass trimmers, brush cutters and brush saws will be covered by a future part of IEC 62841.

NOTE 105 Lawn edgers will be covered by a future part of IEC 62841.

2 Normative references

This clause of Part 1 is applicable, except as follows:

Addition:

IEC 60664-3, *Insulation coordination for equipment within low-voltage systems – Part 3: Use of coating, potting or moulding for protection against pollution*

IEC 60664-4, *Insulation coordination for equipment within low-voltage systems – Part 4: Consideration of high-frequency voltage stress*

IEC 61058-2-6:2018, *Switches for appliances – Part 2-6: Particular requirements for switches used in electric motor-operated hand-held tools, transportable tools and lawn and garden machinery*

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

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

ISO 5395-1:2013, *Garden equipment – Safety requirements for combustion-engine-powered lawnmowers – Part 1: Terminology and common tests*
ISO 5395-1:2013/AMD1:2017

ISO 5395-2:2013/AMD1:2016, *Garden equipment – Safety requirements for combustion-engine-powered lawnmowers – Part 2: Pedestrian-controlled lawnmowers*
ISO 5395-2:2013/AMD1:2016/AMD2:2017

ISO 13857:2019, *Safety of machinery – Safety distances to prevent hazard zones being reached by upper and lower limbs*

ANSI B71.1:2017, *Consumer turf care equipment – Pedestrian-controlled mowers and ride-on mowers – Safety specifications*

EN 12096, *Mechanical Vibration – Declaration and Verification of Vibration Emission Values*

Replacement:

IEC 61058-1:2016, *Switches for appliances – Part 1: General requirements*

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 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*

3 Terms and definitions

This clause of Part 1 is applicable, except as follows:

3.101

cutter bar

stationary device used on a **cylinder lawnmower** to provide a shearing action in combination with the **cutting means**

3.102

cutting height

shortest vertical distance between the cutting edge of the **cutting means** and the supporting surface of a **lawnmower**

3.103

cutting means

rotating mechanism or rotating part of the **lawnmower** that is designed to perform the cutting action

Note 101 to entry: **Cutting means** are also known as blades, cutting cylinders or reels.

3.104

cutting means assembly

cutting means together with the **cutting means enclosure**, including **cutting means** shaft(s)

3.105

cutting means control

device to engage and disengage the **cutting means** from its drive, in order to start and stop the **cutting means** motion

3.106

cutting means enclosure

part or assembly, including the **discharge chute** and **guard** for **grass catcher** opening, designed to prevent unintended contact with the **cutting means**

3.107

cutting means tip circle

path described by the outermost point of the **rotary lawnmower cutting means** cutting edge as it rotates about its shaft axis

3.108

cutting position

any height setting of the **cutting means** designated by the manufacturer for cutting grass

3.109

cutting width

total distance across the **cutting means** path at 90° to the direction of travel

3.110

discharge chute

portion of the **cutting means enclosure**, extending outward from the **discharge opening**, designed to control the ejection of material from the **cutting means**

3.111

discharge opening

opening in the **cutting means enclosure** through which material such as grass clippings can be discharged

3.112

grass catcher

part or combination of parts, intended to be used with the **lawnmower**, which provides a means for collecting material such as grass clippings

3.113

lawnmower

pedestrian controlled walk-behind lawn cutting machine, where the **cutting means** cuts approximately parallel to the ground and which uses the ground to determine the **cutting height** by means of wheels, air-cushion or skids, etc.

3.113.1

air-cushion lawnmower

rotary lawnmower which hovers using pressurized air as its ground support

3.113.2

cylinder lawnmower

lawnmower with one or more **cutting means** rotating about a horizontal axis to provide a shearing action with a **cutter bar**

Note 101 to entry: **Cylinder lawnmowers** are also known as reel **lawnmowers**.

3.113.3

rotary lawnmower

lawnmower in which one or more **cutting means**, cutting by impact, rotate about an axis perpendicular to the cutting plane

3.114

maximum speed

highest **cutting means** speed attainable under all conditions of **normal use**, including no-load

3.115

mulching

mode of operation of a **rotary lawnmower**, having a fixed or optional configuration, which returns clippings to the lawn without **discharge openings**

Note 101 to entry: Some **lawnmowers** are converted to a **mulching** type by the use of **mulching** parts or plugs.

3.116

operator control

device requiring operator actuation to perform specific functions during **normal operation**

3.117

operator presence control

device that deactivates rotation of the **cutting means** when the operator's hand(s) is removed from the control

Note 101 to entry: The device typically consists of a combination of a mechanical actuator and other mechanical and electrical components (e.g. tactile switch, relays, load switches).

3.118**parking brake**

device to prevent a stationary machine from moving

3.119**service brake**

device for decelerating and stopping a machine from its ground travel speed

3.120**throw line**

steepest line in a vertical plane, tangential to the periphery of the cutting cylinder in the direction of rotation, which does not intersect a **guard** or other components of a **cylinder lawnmower**

4 General requirements

This clause of Part 1 is applicable.

5 General conditions for the tests

This clause of Part 1 is applicable, except as follows:

5.4 Addition:

Handle positions that are used for storage purposes are not included in this requirement.

5.7.2 Replacement:

*Machines are tested at **rated voltage**. Machines having more than one **rated voltage** or having a **rated voltage range** are tested at the highest voltage.*

5.17 Addition:

*The mass of the machine includes the **cutting means**, **grass catcher** (empty) (if any), **grass catcher adapter** (if any), **mulching parts or plug** (if any), **cutting means enclosure cover** (if any) in the heaviest configuration in accordance with 8.14.2.*

5.101 *During the tests, the **cutting means** may be adjusted and lubricated as needed to permit operation for extended periods.*

NOTE 101 For example, it is possible that a **cylinder lawnmower cutting means** is not able to run for extended periods at normal adjustment because of lack of lubrication, etc. normally provided by the grass.

5.102 *For tests that are performed at **maximum speed** and no-load, the manufacturer may need to provide special hardware and/or software in order to achieve **maximum speed** at no-load.*

5.103 *The tests are performed using all **cutting means** in accordance with 8.14.2 a) 103).*

6 Radiation, toxicity and similar hazards

This clause of Part 1 is applicable.

7 Classification

This clause of Part 1 is applicable, except as follows:

7.1 Replacement:

Machines shall be of one of the following classes with respect to protection against electric shock:

class II tool (machine), **class III tool** (machine).

Compliance is checked by inspection and by the relevant tests.

7.2 Addition:

Class II tools (machines) shall be at least IPX4. **Class III tools** (machines) shall be at least IPX1.

8 Marking and instructions

This clause of Part 1 is applicable, except as follows:

8.1.101 Machines with more than one motor (i.e. separate motors for the **cutting means** and traction drive) shall be marked with the **rated input**, in watts or **rated current**, in amperes, for each motor. These markings may be located on each motor.

Compliance is checked by inspection.

8.2 Addition:

Lawnmowers shall be marked with the following safety warnings:

- “ **WARNING** – Beware of thrown objects – keep bystanders away” or one of the safety signs specified in Figure AA.1;

For mains supplied machines:

- “ **WARNING** – Remove plug from mains before maintenance or if cord is damaged” or one of the safety signs specified in Figure AA.2;
- “ **WARNING** – Keep the supply cord away from the blades” or the safety sign specified in Figure AA.3.

Rotary lawnmowers shall be marked with the following safety warning:

- “ **WARNING** – Keep hands and feet away from the blades” or one of the safety signs specified in Figure AA.4.

NOTE 101 In the United States of America, the following additional requirements apply.

For **lawnmowers** in accordance with 16 CFR 1205:

- Warning label for **cylinder lawnmowers** and **rotary lawnmowers**.
- (a) General. Walk-behind **cylinder lawnmowers** and **rotary lawnmowers** shall be labeled on the blade (**cutting means**) housing or, in the absence of a blade (**cutting means**) housing, on other blade (**cutting means**) shielding or on an adjacent supporting structure or assembly, with the warning label shown in Figure AA.8. The label shall be at least 82,5 mm high and 102 mm wide, and the lettering and symbol shall retain the same size relation to each other and to the label as shown in Figure AA.8.

- (b) **Rotary lawnmowers.** Walk-behind **rotary lawnmowers** shall have one label as shown in Figure AA.8, on the blade (**cutting means**) housing. The label shall be located as close as possible to any **discharge opening**, or, if there is no **discharge opening**, in a position that is conspicuous to an operator in the normal operating position.
- (c) **Cylinder lawnmowers.** Walk-behind **cylinder lawnmowers** shall have one label as shown in Figure AA.8, located as close to the centre of the **cutting width** of the blade (**cutting means**) as possible. However, in the absence of a suitable mounting surface near the centre of the **cutting width**, the label shall be placed on the nearest suitable mounting surface to the centre of the **cutting width**.

8.3 Addition:

For **rotary lawnmowers**, the **cutting means**, where replaceable during **user maintenance**, shall be marked to identify the part number(s) and the manufacturer, importer or supplier. This marking is not required to be clearly discernible from the outside of the machine.

NOTE 101 In the United States of America, the following additional requirements apply.

For **rotary lawnmowers** in accordance with 16 CFR 1205:

Rotary lawnmowers shall be marked with “Meets CPSC blade safety requirements” on the product.

Replacement of the sixth dash:

- “> 25 kg” if the mass of the machine is over 25 kg. For this requirement, the mass of the machine includes the mass of a **supply cord** with a length not less than 10 m, if any, in addition to the items specified in 5.17.

NOTE 102 In Europe, the following requirement applies:

Replacement of the sixth dash:

- the mass of the machine in kg. For this requirement, the mass of the machine includes the mass of a **supply cord** with a length not less than 10 m, if any, in addition to the items specified in 5.17.

8.9 Replacement:

Unless it is obviously unnecessary, switches and controls (e.g. a **cutting means** brake/clutch) which may give rise to a hazard when operated shall be marked or so placed as to indicate clearly which part of the machine they control.

Compliance is checked by inspection.

8.11 This subclause of Part 1 is not applicable for traction drive speed controls.

8.14.1 Addition:

The additional safety instructions as specified in 8.14.1.101 shall be given. This part may be printed separately from the “General Machine Safety Warnings”.

8.14.1.1 Addition for item 2) c):

For machines classified at least IPX4, the warning may be replaced as specified below.

- c) **Do not operate the lawnmower in rain or wet conditions. This may increase the risk of electric shock.**

8.14.1.101 Lawnmower safety warnings

- a) **Do not use the lawnmower in bad weather conditions, especially when there is a risk of lightning. This decreases the risk of being struck by lightning.**
- b) **Thoroughly inspect the area for wildlife where the lawnmower is to be used. Wildlife may be injured by the lawnmower during operation.**

- c) **Thoroughly inspect the area where the lawnmower is to be used and remove all stones, sticks, wires, bones, and other foreign objects.** *Thrown objects can cause personal injury.*
- d) **Before using the lawnmower, always visually inspect to see that the blade and the blade assembly are not worn or damaged.** *Worn or damaged parts increase the risk of injury.*
- e) **Before use, check the supply cord and any extension cord for signs of damage or aging. Do not use the lawnmower if the cord is damaged or worn. If the cord is damaged or worn during use, switch off the lawnmower and do not touch the cord before disconnecting it from the supply. A damaged supply cord or extension cord may result in electric shock, fire and/or serious injury.**
- f) **Check the grass catcher frequently for wear or deterioration.** *A worn or damaged grass catcher may increase the risk of personal injury.*

NOTE 101 It is possible to replace the term “catcher” by an alternative term such as “collector” or “bag”.

NOTE 102 The above warning is omitted for machines that can only be operated as a **mulching lawnmower**.

- g) **Keep guards in place. Guards must be in working order and be properly mounted.** *A guard that is loose, damaged, or is not functioning correctly may result in personal injury.*
- h) **Keep all cooling air inlets clear of debris.** *Blocked air inlets and debris may result in overheating or risk of fire.*
- i) **While operating the lawnmower, always wear non-slip and protective footwear. Do not operate the lawnmower when barefoot or wearing open sandals.** *This reduces the chance of injury to the feet from contact with the moving blade.*
- j) **While operating the lawnmower, always wear long trousers.** *Exposed skin increases the likelihood of injury from thrown objects.*
- k) **Do not operate the lawnmower in wet grass. Walk, never run.** *This reduces the risk of slipping and falling which may result in personal injury.*
- l) **Do not operate the lawnmower on excessively steep slopes.** *This reduces the risk of loss of control, slipping and falling which may result in personal injury.*
- m) **When working on slopes, always be sure of your footing, always work across the face of slopes, never up or down and exercise extreme caution when changing direction.** *This reduces the risk of loss of control, slipping and falling which may result in personal injury.*
- n) **Use extreme caution when reversing or pulling the lawnmower towards you. Always be aware of your surroundings.** *This reduces the risk of tripping during operation.*
- o) **Keep the supply cord away from the cutting blades.** *A damaged supply cord may result in electric shock, fire and/or serious injury.*
- p) **Switch off and remove plug from mains if the cord is entangled or damaged.** *Entangled or damaged cords can increase the risk of electric shock.*
- q) **Do not touch blades and other hazardous moving parts while they are still in motion.** *This reduces the risk of injury from moving parts.*
- r) **When clearing jammed material or cleaning the lawnmower, make sure all power switches are off and the power cord is disconnected.** *Unexpected operation of the lawnmower may result in serious personal injury.*

8.14.2 a) Addition:

- 101) Explanation of the safety devices that the **lawnmower** incorporates as part of the original equipment;
- 102) Information regarding pre-operating procedures;
- 103) Information regarding the recommended **cutting means** to be used on the **lawnmower**;
- 104) Instructions on the permitted operating positions for handles.

8.14.2 b) Addition:

- 101) Hazards which may be encountered while using the **lawnmower**, such as blockage of the **cutting means**, and how to avoid them while performing typical tasks;
- 102) Instructions to stop the **cutting means** if the machine has to be tilted for transportation when crossing surfaces other than grass and when transporting the machine to and from the area to be used;
- 103) Instructions not to tilt the machine when switching on the motor, except if the machine has to be tilted for starting. In this case, instruction not to tilt it more than absolutely necessary and to lift only the part which is away from the operator;
- 104) Instructions to stop the machine, and remove plug from the socket, and to make sure that all moving parts have come to a complete stop
 - after striking a foreign object, and to inspect the machine for damage and make repairs before restarting and operating the machine;
 - if the machine starts to vibrate abnormally, and then to immediately inspect for damage, replace or repair any damaged parts and to check for and tighten any loose parts;
- 105) Recommendation for the use of a **residual current device** with a tripping current of 30 mA or less;
- 106) Instructions to empty the **grass catcher** before storage.

8.14.2 c) Addition:

- 101) Information regarding regular maintenance routines;
- 102) Recommendations for cleaning and maintenance before storage;
- 103) Information explaining the consequences of improper maintenance, the use of non-conforming replacement components, or the removal or modification of safety components;
- 104) Instruction to replace worn or damaged components in sets to preserve balance, as applicable;
- 105) Instructions for machines with multiple **cutting means**, to take care as rotating one **cutting means** can cause other **cutting means** to rotate;
- 106) Instructions to be careful during adjustment of the machine to prevent entrapment of the fingers between moving **cutting means** and fixed parts of the machine;
- 107) Instructions to always allow the machine to cool down before storing;
- 108) Instructions regarding replacing or servicing **cutting means**;
- 109) Advice that when servicing the **cutting means** to be aware that, even though the power source is switched off, the **cutting means** can still be moved.

Replacement of NOTE:

NOTE In Europe (EN 62841-4-3), the following additional requirements apply:

Emissions

- 1) The noise emission, measured in accordance with Clause I.2, as follows:
 - A-weighted emission sound pressure level L_{pA} and its uncertainty K_{pA} , where L_{pA} exceeds 70 dB(A). Where L_{pA} does not exceed 70 dB(A), this fact shall be indicated;
 - the A-weighted measured and guaranteed sound power levels L_{WA} ;
 - peak C-weighted instantaneous emission sound pressure value L_{pCpeak} , where this exceeds 63 Pa (130 dB in relation to 20 μ Pa).
- 2) Recommendation for the operator to wear hearing protection.
- 3) The vibration total value and its uncertainty measured in accordance with Clause I.3.
 - When the vibration total value does not exceed 2,5 m/s², this shall be stated.
 - When the vibration total value exceeds 2,5 m/s², its value shall be given in the instructions.

4) The following information:

- that the declared vibration total value has been measured in accordance with a standard test method and may be used for comparing one machine with another;
- that the declared vibration total value may also be used in a preliminary assessment of exposure.

5) A warning:

- that the vibration emission during actual use of the machine can differ from the declared total value depending on the ways in which the machine is used; and
- of the need to identify safety measures to protect the operator that are based on an estimation of exposure in the actual conditions of use (taking account of all parts of the operating cycle such as the times when the machine is switched off and when it is running idle in addition to the trigger time).

8.14.3 Replacement:

If information about the mass or weight of the machine is provided, it shall be the mass specified in 5.17 together with the mass of a **supply cord** with a length not less than 10 m, if any.

Compliance is checked by inspection.

9 Protection against access to live parts

This clause of Part 1 is applicable, except as follows:

9.2 Addition:

For machines that are **class II tools**, access to the surface of **basic insulation** or metal parts separated from **live parts** by **basic insulation** is permitted when the **cutting means** is removed, if the use of a tool is required for its removal.

10 Starting

This clause of Part 1 is applicable.

11 Input and current

This clause of Part 1 is applicable.

12 Heating

This clause of Part 1 is applicable, except as follows:

12.2.1 Replacement:

The load conditions for the heating test of 12.2 are as follows.

*The test is conducted with the machine mounted on an unperforated flat horizontal surface with the **cutting means** attached, and with the minimum size of openings for connection to the torque load. The traction drive wheels, if any, are lifted the minimum amount required to avoid contact with the unperforated flat horizontal surface. The **lawnmower** is operated with a torque load applied such that **rated input** or **rated current** is drawn until thermal equilibrium is reached under the most unfavourable conditions. For machines with more than one motor (i.e. separate motors for the **cutting means** and traction drive), the **lawnmower** is operated with torque loads such that **rated input** or **rated current** of each motor in accordance with 8.1.101 is drawn until thermal equilibrium is reached under the most unfavourable conditions.*

For **lawnmowers** employing non-metallic filaments or one or more pivotally mounted cutting elements as the **cutting means**, at the manufacturer's discretion, the torque may be applied by either

- an external mechanical load; or
- extending or modifying the cutting elements

such that when supplied at **rated voltage**, the machine operates at **rated input** or **rated current**.

The most unfavourable conditions are determined using the configuration of **attachments** and **cutting means** in accordance with 8.14.2, which yields the highest temperature at a reference location when evaluated at both minimum and maximum **cutting height**. This determination may be made at one of the required voltages of 12.2 using thermocouples.

The reference location is chosen on the motor assembly at a location that minimises the cooling effect of air flow.

NOTE A measurement of the rotating speed of the **cutting means** during the heating test is needed in some cases for the test of 17.2.

13 Resistance to heat and fire

This clause of Part 1 is applicable.

14 Moisture resistance

This clause of Part 1 is applicable, except as follows:

14.2 Replacement:

The enclosure of the machine shall provide the degree of protection against moisture in accordance with the marking of the machine.

Compliance is checked by the appropriate treatment specified in 14.2.2, with the machine conditions as in 14.2.1.

14.2.1 Replacement:

The machine is not connected to the supply.

Detachable parts which can be removed without the aid of a tool are removed and subjected, if necessary, to the relevant treatment with the main part. Machines fitted with an appliance inlet, plug or other connector are tested without the mating connector in place. Air filters are not removed.

14.2.2 Replacement:

Machines other than IPX0 are subjected to tests of IEC 60529:2013 as follows:

- IPX1 machines are subjected to the test described in 14.2.1;
- IPX2 machines are subjected to the test described in 14.2.2;
- IPX3 machines are subjected to the test described in 14.2.3a;
- IPX5 machines are subjected to the test described in 14.2.5. For this test, the water stream is applied from all practicable directions, including the underside of the machine.

- *IPX6 machines are subjected to the test described in 14.2.6. For this test, the water stream is applied from all practicable directions, including the underside of the machine;*
- *IPX7 machines are subjected to the test described in 14.2.7. For this last test, the machine is immersed in water containing approximately 1,0 % NaCl.*

Machines classified as IPX4 are subjected to the test described in 14.2.4a of IEC 60529:2013, except as follows:

- *the test is conducted with a circular horizontal unperforated support having a diameter of twice the oscillating tube radius minus 15 cm. The support is placed at the level of the pivot axis of the oscillating tube. During the test, the support is rotated about its vertical axis at a rate of $(1 \pm 0,1)/\text{min}$;*
- *the machine is placed on the unperforated support; and*
- *the **cutting height** is set to 30 mm or the next higher **cutting position** when set on a hard level surface. Machines with a maximum **cutting height** setting of 30 mm or less are set at their maximum **cutting height** setting; and*
- *the horizontal centreline of the machine is aligned with the pivot axis of the oscillating tube at the start of test. The movement of the oscillating tube is limited to 90° either side from the vertical, the time for one complete oscillation ($2 \times 90^\circ$) being (6 ± 1) s;*
- *the duration of the test is 10 min.*

*Immediately after the appropriate treatment, the machine shall withstand the electric strength test of Annex D between **live parts** and **accessible parts**, the test voltage being 2 500 V. The function of any **SCF** shall not be impaired.*

14.3 to 14.5 These subclauses of Part 1 are not applicable.

15 Resistance to rusting

This clause of Part 1 is applicable.

16 Overload protection of transformers and associated circuits

This clause of Part 1 is applicable.

17 Endurance

This clause of Part 1 is applicable, except as follows:

17.2 Replacement:

*The machine is operated at no load. The machine is fitted with the most unfavourable **cutting means** in accordance with 8.14.2 a) 103).*

*Series motors are supplied at a voltage such that the rotating speed of the **cutting means** is the same as that obtained in 12.2.1 at **rated voltage** or the lower limit of the **rated voltage range**. Other motor types and **lawnmowers** employing non-metallic filaments or one or more pivotally mounted cutting elements as the **cutting means** are operated at **rated voltage** or the lower limit of the **rated voltage range**.*

The machine is operated for 48 h. If the test is conducted on the same sample used for the tests of Clause 12, the 48 h is reduced by the running time necessary for the tests of Clause 12. During the test, the machine is placed in its normal operating position according to 8.14.2.

Machines are operated continuously, or for a corresponding number of periods, each period being not less than 8 h.

The machine may be switched on and off by means of a switch other than that incorporated in the machine unless this disables a functionality of the machine switch.

*During this test, replacement of the carbon brushes is allowed, and the machine is oiled and greased as in **normal use**. If mechanical failure occurs and does not impair compliance with this document, the part that failed may be replaced.*

If the temperature rise of any part of the machine exceeds the temperature rise determined during the test of 12.1, forced cooling may be applied. If forced cooling is applied, it shall not alter the air flow of the machine or redistribute carbon deposits.

During these tests, overload protection devices incorporated in the machine shall not activate.

18 Abnormal operation

This clause of Part 1 is applicable, except as follows:

18.5 Replacement:

Protection against electric shock shall not be impaired when a **class II tool** (machine) is subjected to overload conditions according to the type of motor.

For machines with

- motors having electronically commutated stator windings, compliance is checked by the test of 18.5.4;*
- non-metallic filaments or one or more pivotally mounted cutting elements as the **cutting means** and series motors, compliance is checked by the test of 18.5.1;*
- other motors, compliance is checked by the test of 18.5.3.*

18.5.2 This subclause of Part 1 is not applicable.

18.8 Replacement of Table 4:

Table 4 – Required performance levels

Type and purpose of SCF	Minimum Performance Level (PL)
Power switch (operator presence control) – prevent unwanted switch-on	b
Power switch (operator presence control) – provide desired switch-off	b
Provide desired direction of rotation of the cutting means	Not an SCF
Provide desired direction of rotation of the traction drive	a
Function to fulfil the requirements of Clause 18	a
Service brake as in 19.101.1.2	b
Parking brake as in 19.101.1.3	b
Interlocked grass catcher or guard as in 19.102.2.1	b
Prevent machine operation while switching between operating positions of swing-over handles as in 19.102.3.2, if applicable	b
Prevent exceeding 150 % of the cutting means stopping time as required in 19.102.4 and 19.103.4	a
Prevent increase of rotational speed of cutting means that would cause non-compliance with 19.102.5	a
Prevent increase of rotational speed of cutting means that would cause non-compliance with 20.101.1	a
Prevent increase of rotational speed of cutting means that would cause non-compliance with 20.101.2	a
Prevent increase of rotational speed of cutting means that would cause non-compliance with 20.101.3	b
Any other speed limiting device	Not an SCF
Lock-off function as required by 21.104.2	b
Traction drive control system as in 21.104.3.1	b
Prevent self-resetting as required in 23.3	a

19 Mechanical hazards

This clause of Part 1 is applicable, except as follows:

19.1 Replacement:

All power-driven hazardous parts (e.g. drive belts), other than the **cutting means**, shall be so positioned or enclosed to provide adequate protection. The guarding of the **cutting means** is covered in 19.101, 19.102 and 19.103. Ground contacting parts (e.g. wheels) are considered not to be hazardous and are not required to be guarded.

All openings and safety distances shall conform to 4.2.4.1 and 4.2.4.3 of ISO 13857:2019 unless otherwise specified in this document.

Protective enclosures, covers, **guards** and the like shall have adequate mechanical strength for their intended purpose. They shall not be removable without the use of tools or shall withstand a force of 75 N in any direction.

Opening the following **guards** does not require the use of a tool:

- a) interlocking **guards** which disable the protected moving parts;

b) automatically closing **guards** for grass **discharge chutes**.

The use and adjustment of a **guard** shall not create other dangers, for example by reducing or obstructing the operator's view, by transferring heat, or causing other reasonably foreseeable hazards.

Compliance is checked by inspection, by measurement, by functional test, by the tests of Clause 20 and by means of the test probe B of IEC 61032:1997 with a force not exceeding 5 N. Prior to the application of the test probe, any soft materials (elastomers), such as soft grip coverings, shall be removed. It shall not be possible to touch power-driven hazardous parts with this test probe.

NOTE 101 In the United States of America, the following additional requirements apply.

A protective shield of a **lawnmower** shall have sufficient strength and resilience to sustain forces associated with reasonably foreseeable misuse during operation.

Compliance is checked by the following test.

*A 222 N static tensile force is to be uniformly distributed over not less than half the length of the shield. The force shall be applied for at least 10 s in the direction which produces the maximum stress on the shield. For the test, the shield shall be attached to the **lawnmower** in the manner in accordance with 8.14.2.*

The protective shield shall not permanently separate, crack or deform.

19.3 This subclause of Part 1 is not applicable.

19.4 This subclause of Part 1 is not applicable.

NOTE Requirements for handles are given in 19.102.3 and 19.103.1.

19.5 This subclause of Part 1 is not applicable.

19.6 This subclause of Part 1 is not applicable.

19.7 *Replacement:*

Lawnmowers shall have adequate stability.

Compliance is checked by the following test.

*For **lawnmowers** provided with an appliance inlet or a **supply cord** with a length between 0,2 m and 0,5 m, a mass of (500 ± 20) g is suspended from either*

- the appliance inlet; or*
- the **supply cord** plug; or*
- any **supply cord** retaining device in accordance with 8.14.2*

whichever is the most unfavourable.

*For **lawnmowers** provided with a **supply cord** with a length not less than 10 m, the **supply cord** is placed resting on the inclined plane in the most unfavourable position.*

The machine is placed with the motor switched off in any normal position of use on a plane inclined at an angle of 10° to the horizontal. If, however, the machine is such that, were it to be tilted through an angle of 10° when standing on a horizontal plane, a part of it not normally in contact with the supporting surface would touch the horizontal plane, the machine is placed on a horizontal support and tilted in the most unfavourable direction through an angle of 10°. For the test, the machine is prevented from sliding.

The machine shall not tip over.

19.8 This subclause of Part 1 is not applicable.

19.101 Requirements for all lawnmowers

19.101.1 Brake requirements and test method

19.101.1.1 General

A **lawnmower** exceeding a mass of 78 kg shall be equipped with a **service brake** and a **parking brake**.

Machines requiring a **service brake** and a **parking brake** shall fulfil the requirements of 19.101.1.2 and 19.101.1.3.

If steering-assist brakes are also used for the **service brake**, it shall be possible to connect them in a way that they apply both brakes with equal force.

Compliance is checked by inspection and by the requirements of 19.101.1.2 and 19.101.1.3.

19.101.1.2 Service brake

The **service brake** shall meet all of the following requirements:

- the **service brake** performance shall only rely on the effectiveness of the braking system;
- the **service brake** control shall be hand-operated;
- the **service brake control device** shall be located within the operator control zone (see Figure 101) and its position shall not interfere with the position of other controls; and
- if the **lawnmower** is equipped with combined traction clutch and brake controls, the **service brake** engagement shall simultaneously disengage the traction clutch.

NOTE 101 Examples of **service brakes** include mechanical, electric and hydrostatic means.

Compliance is checked by inspection and by manual test.

The **service brake** shall be capable of stopping the motion of the **lawnmower** so that the average measured stopping distance does not exceed 0,19 m for each 1 km/h of the maximum forward speed and maximum reverse speed, if a reverse traction drive is provided.

Compliance is checked by the following test.

*The tests are conducted on a **lawnmower** in its heaviest configuration in accordance with 8.14.2 and with*

- *pneumatic tyres, if any, inflated to the maximum recommended pressures for the **lawnmower** in accordance with 8.14.2; and*
- *brakes adjusted in accordance with 8.14.2; and*
- *any **grass catcher** filled to its maximum volumetric capacity with material of density $(150 \pm 10) \text{ kg/m}^3$. As an alternative to filling the **grass catcher** to its maximum volumetric capacity with a material of $(150 \pm 10) \text{ kg/m}^3$ density, an equivalent mass may be positioned and secured inside the **grass catcher** at its volumetric centre of gravity.*

The tests shall be conducted on a dry, smooth, hard concrete (or equivalent) surface with a maximum slope of 1 %.

*The **service brake** is first conditioned by running the **lawnmower** for 10 min during which 10 stops shall be performed from the maximum forward speed.*

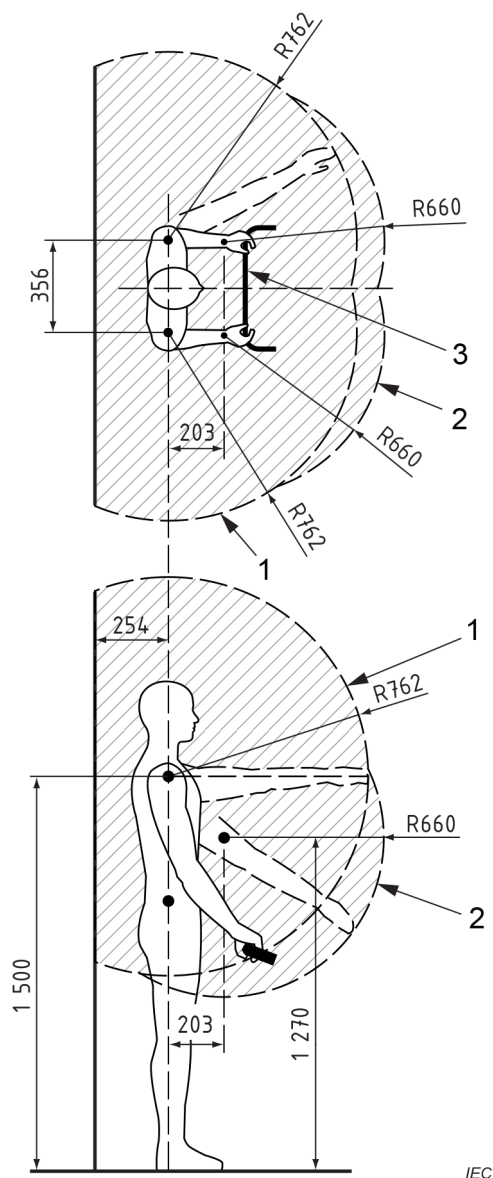
*If a reverse traction drive is provided, this break-in period shall be extended to 20 min during which the **service brake** shall be applied to stop the machine 10 times from maximum forward speed, and 10 times from maximum reverse speed.*

*If the **lawnmower** is equipped with separate traction drive and **service brake** controls, the traction drive is simultaneously disengaged with the **service brake** engagement.*

*After the conditioning procedure has been completed, the **service brake** test is conducted three times in the forward direction of travel and, for a **lawnmower** with a reverse traction drive, repeated three times in the reverse direction of travel.*

*With the **lawnmower** operating at its maximum ground speed, the traction drive control is released and a maximum force of 220 N is applied to the centre of the grip area of the hand control for the **service brake**. The stopping distance is measured for each test and the average value is calculated for each direction tested.*

Dimensions in millimetres



Key

- 1 zone 1 – **operator control** zone
- 2 zone 2 – **operator control** zone when leaning against handle
- 3 handle

NOTE 1 Zone 1 is the area into which the extremities of a 95th percentile male can reach from the normal operator position.

NOTE 2 Zone 2 is the area into which a 5th percentile male or a 50th percentile female can reach when against the handle. This zone can also be reached by a 95th percentile leaning forward against the handle.

NOTE 3 All handles within zone 1 will reduce the zone by the space occupied and protected by the handle.

NOTE 4 Zone 1 includes the maximum range of movement of all frequently used **operator controls** but is not intended to represent preferred **operator control** positions.

Figure 101 – Operator control zones

19.101.1.3 Parking brake

A **lawnmower** required to be equipped with a **service brake** shall also be equipped with a **parking brake**. The **parking brake** shall be capable of holding the **lawnmower** facing both uphill and downhill on a slope up to and including 16,7° (30 %).

To allow the removal of initial slack in the system, a distance of 50 mm movement is allowed during the first 30 s after the **parking brake** has been applied. There shall be no further movement after the 30 s.

The **parking brake** may be combined with the **service brake**.

The maximum force to actuate the **parking brake** shall not exceed

- 220 N for a hand-grip **parking brake**, actuated by hand gripping motion only; or
- 330 N for a hand-lever **parking brake**, actuated by arm motion with a hand on a lever; or
- 450 N for a foot-operated **parking brake**.

The unlocking force shall not exceed the maximum specified actuating force.

NOTE 101 The forces 220 N, 330 N and 450 N are considered as maximum forces that can be applied to meet the test requirements below. The operating forces during **normal use** would in general be less.

If the **lawnmower** is equipped with an automatic **parking brake**, it shall be activated when the **operator presence control** is released.

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

The tests are conducted

- *on the same sample and under the same conditions as in 19.101.1.2, if applicable;*
- *with the transmission in neutral and the motor stopped;*
- *if so equipped, with the hydrostatic bypass valve in the normal position for cutting grass;*
- *on a smooth flat surface with 16,7° (30 %) slope, and a coefficient of friction such that the **lawnmower** does not slide down the slope;*
- *with the **parking brake** applied; and*
- *for a period of 5 min, or if the **parking brake** is hydrostatic, for a period of 60 min.*

19.102 Particular requirements for rotary lawnmowers

19.102.1 Cutting means enclosure

19.102.1.1 General

For **rotary lawnmowers**, the **cutting means enclosure** shall comply with 5.3.1 of ISO 5395-2:2013/AMD1:2016/AMD2:2017, except that

- the foot protection test of Annex C of ISO 5395-1:2013/AMD1:2017 is replaced by the foot protection test of Annex CC, except it is not required to comply with all the other **discharge opening** requirements of ISO 5395-2:2013/AMD1:2016/AMD2:2017 but shall instead comply with the other **discharge opening** requirements of this document; and
- for **rotary lawnmowers** with a front opening, the foot protection requirement of 5.3.2 of ISO 5395-2:2013/AMD1:2016/AMD2:2017 is replaced by the requirements of 19.102.1.2.

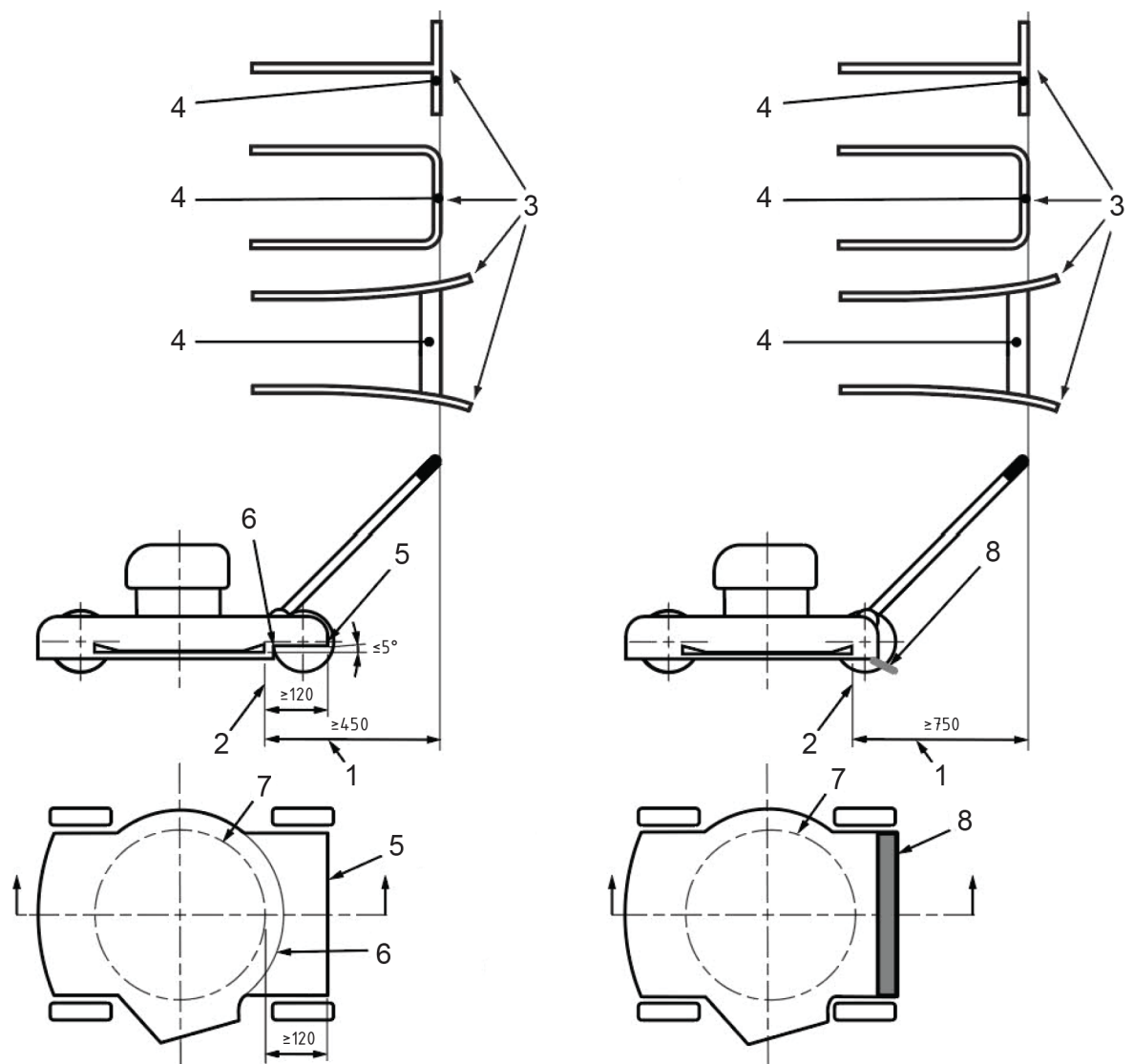
Additionally, there shall be a

- rear wall of the **cutting means enclosure**; and
- a rear protection barrier that shall extend at least 120 mm to the rear from the nearest point of the **cutting means tip circle** on the operator's side and rise by an angle of not more than 5° from horizontal (see Figure 102 a)).

The self-closing **guard** for the **discharge chute** shall not be considered as forming any part of the rear protection barrier.

For a **rotary lawnmower** having a horizontal handle distance between the **cutting means tip circle** and the rear edge of the handle barrier of 750 mm or more, this rear wall and rear protection barrier may be replaced by a trailing shield that complies with the relevant requirements of 4.4.1 of ISO 5395-2:2013/AMD1:2016/AMD2:2017. The trailing shield shall be positioned symmetrically about the centreline of the machine. See Figure 102 b).

Dimensions in millimetres



a) Rotary lawnmower with rear protection barrier

b) Rotary lawnmower with trailing shield

Key

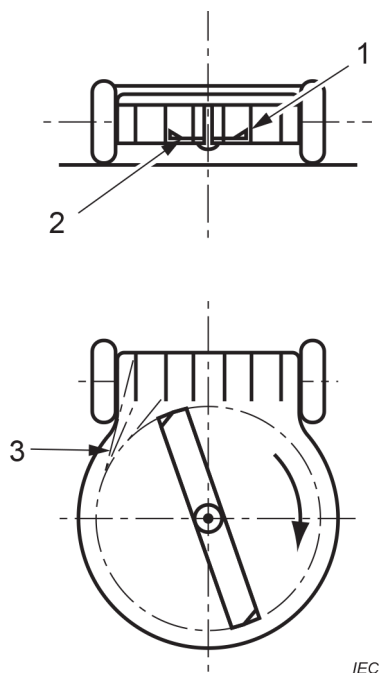
- 1 horizontal handle distance between the **cutting means tip circle** and the rear edge of the handle barrier
- 2 nearest point of **cutting means tip circle**
- 3 examples of handle configuration
- 4 handle barrier
- 5 rear protection barrier
- 6 rear wall of the **cutting means enclosure**
- 7 **cutting means tip circle**
- 8 trailing shield

Figure 102 – Handle distance and rear cutting means enclosure for rotary lawnmowers

Machines with a front opening shall satisfy the foot protection requirement of Annex CC. In addition, all tangential lines from the **cutting means tip circle**, in or above the plane of the **cutting means tip circle** and in the direction of rotation of the **cutting means**, shall intersect the **cutting means enclosure**.

NOTE 101 Figure 103 shows an example of a structure meeting this requirement.

Compliance is checked by inspection and by measurement.



Key

- 1 cutting means enclosure
- 2 cutting means
- 3 tangential lines from cutting means tip circle to intersect the cutting means enclosure

Figure 103 – Example of design for rotary lawnmower front opening

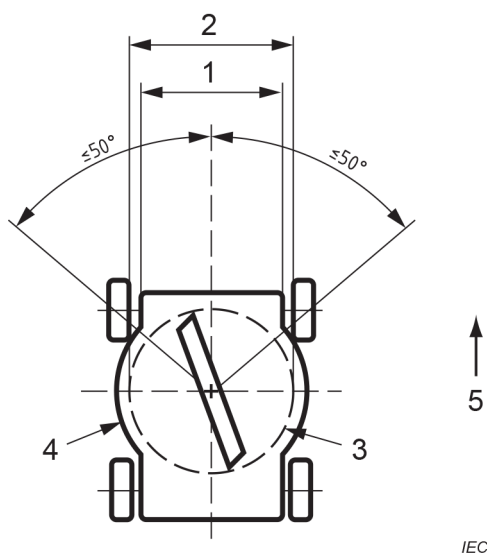
19.102.1.2 Foot protection

19.102.1.2.1 Requirements

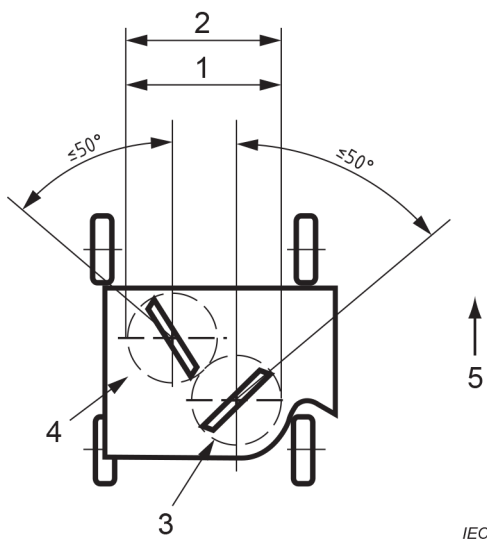
For **rotary lawnmowers**, feet shall be protected from unintentional contact with the **cutting means** at the following areas of the **cutting means enclosure**:

- a) dimensions of the front opening in the **cutting means enclosure** shall not exceed the smaller of either the **cutting width**, or the width generated by two radial lines (extending from the **cutting means** spindle(s) centre(s) at an angle of 50° either side of the direction of travel) at the points where these lines intersect the enclosure, as shown in Figure 104 a) and Figure 104 b);
- b) **discharge openings** and the sides of any **discharge opening** or chute if these are less than 3 mm below the **cutting means tip circle**; and
- c) the rear of the **lawnmower**.

*Compliance is checked by inspection, by measurement and by applying the test of 19.102.1.2.2 where the probe shall not enter the path of the **cutting means**. For machines with a swing-over handle in accordance with 19.102.3.2, the test is conducted in both operating positions of the handle.*



a) Example of front opening limited by 50° angle



b) Example of front opening limited by cutting width

Key

- 1 maximum front opening
- 2 cutting width
- 3 cutting means tip circle
- 4 cutting means enclosure
- 5 direction of travel

Figure 104 – Examples of front opening allowance for rotary lawnmowers

19.102.1.2.2 Foot protection test

The foot protection test of Annex CC is applied to:

- a) the front opening, if any;
- b) the **discharge opening**, if any, including:
 - the area below the **discharge opening**, if the **cutting means enclosure** is less than 3 mm below the **cutting means tip circle** as measured to the **cutting means tip circle** at the point of insertion; and
 - the sides of any **discharge opening** or chute if their lower edge(s) are less than 3 mm below the **cutting means tip circle** as shown in Figure CC.2;
- c) the rear of **rotary lawnmowers** between the wheels as shown in Figure CC.2;
- d) the rear between the wheels and sides, as applicable, of **rotary lawnmowers** with movable offset handles (see Figure CC.3), which includes
 - the area 250 mm to the right of the handle centreline when the handle is placed in the extreme right position; and
 - 250 mm to the left of the handle centreline when the handle is placed in the extreme left position;
- e) for **air-cushion lawnmowers**, both 60° to the right and 60° to the left of the rear of the fore-aft centreline of the **cutting width**.

For **air-cushion lawnmowers** with a single **cutting means**, these angles are measured from a point on this fore-aft centreline which is at the centre of the **cutting means tip circle** (see Figure CC.4).

For **air-cushion lawnmowers** with multiple **cutting means**, these angles are measured from a point on the fore-aft centreline of the **cutting width** which is 0,5 times the **cutting width** forward of the rearmost point of the composite of all the **cutting means tip circles** (see Figure CC.5).

NOTE 101 In the United States of America, the following additional requirements apply.

For **rotary lawnmowers** in accordance with 16 CFR 1205, the foot protection test of Annex CC, excluding the sequence specified in CC.5.2, is applied.

The minimum area to be probed shall include an area both 60° to the right and 60° to the left of the rear of the fore-aft centreline of the **cutting width** (see Figures CC.6 and CC.7).

19.102.2 Machines with grass catcher

19.102.2.1 General

If a **rotary lawnmower** is fitted with a **grass catcher**, it shall be designed so that either

- an interlocking **grass catcher** or **guard** which prevents access to the **cutting means** before it has come to a complete stop according to 19.102.4 is incorporated; or
- access to the **discharge opening**, after removing the **grass catcher**, is prevented by a self-closing **guard** that returns to its normal operating position when the **grass catcher** is removed.

Compliance is checked by inspection and by functional test.

19.102.2.2 Tilting

The front wheels of wheeled, rear discharge **rotary lawnmowers** fitted with a **grass catcher** shall remain on the supporting surface under normal operating conditions.

Compliance is checked by the following test.

*Prior to the test, the **grass catcher** is filled to its maximum volumetric capacity with material of density $(150 \pm 10) \text{ kg/m}^3$. The opening in the **grass catcher** is sealed with a lightweight material to retain the contents during the test.*

*As an alternative to filling the **grass catcher** to its maximum volumetric capacity with a material of $(150 \pm 10) \text{ kg/m}^3$ density, an equivalent mass may be positioned and secured inside the **grass catcher** at its volumetric centre of gravity.*

*The machine is placed on a hard flat horizontal surface. The **guards** are in the normal operating position on the **cutting means enclosure** and the machine support members are in contact with the supporting surface.*

*The test is conducted with the machine and the **cutting means** stationary. The tests are carried out with the **cutting means** and adjustable handles in the most unfavourable configuration in accordance with 8.14.2 b).*

A mass of $(100 \pm 5) \text{ g}$ is attached to the most unfavourable left-hand grasping surface and simultaneously a mass of $(100 \pm 5) \text{ g}$ is attached to the most unfavourable right-hand grasping surface of the handle(s) as identified in 8.14.2 b).

*The **supply cord** is removed at its point of exit from the machine or, if supplied with a cord guard, at its point of exit from the cord guard. If the machine is fitted with an appliance inlet, then no connection is made at the appliance inlet. A mass of $(250 \pm 10) \text{ g}$ is then attached to the*

- cable entry; or*
- appliance inlet; or*
- any **supply cord** retaining device in accordance with 8.14.2*

whichever is the most unfavourable.

*The **grass catcher** is attached to the machine in accordance with 8.14.2.*

There shall be no lift-off of both front wheels. Lift-off occurs when a gap of at least 10 mm is measured between each front wheel and the hard flat horizontal surface.

19.102.3 Handles

19.102.3.1 General

The handle(s) of **rotary lawnmowers** shall comply with the requirements of 4.4 of ISO 5395-2:2013/AMD1:2016/AMD2:2017.

Compliance is checked by inspection and by measurement.

19.102.3.2 Swing-over handle

A swing-over handle shall be allowed, provided it complies with 10.7.2.1 of ANSI B71.1:2017, except it is not required that a swing-over handle complies with the requirements of ANSI B71.1:2017 for all operating positions of the handle.

During adjustment, the **cutting means** of the **rotary lawnmower** shall either be prevented from being powered, or the foot probe of Figure CC.1 is applied around the whole periphery of the **cutting means enclosure**, with the sole of the foot probe held horizontally at any height and then tilted toe up and toe down to 15° from the horizontal. The foot probe shall not enter the path of the **cutting means**.

A **rotary lawnmower** with a swing-over handle shall meet the requirements of this document for all operating positions of the handle.

Compliance is checked by inspection.

19.102.4 Cutting means stopping time

Cutting means rotation shall stop within the maximum time specified in Table 101.

Table 101 – Cutting means stopping time

Lawnmower cutting width mm	Max stopping time s
≤ 762	3
> 762	5

Compliance is checked by the test of Annex DD.

19.102.5 Thrown objects

19.102.5.1 The **cutting means enclosure**, **guards**, trailing shields (if any) and **grass catchers** (if any) shall be designed and constructed in such a way as to minimize the risk of injury from thrown objects in **normal use**.

Compliance is checked by the tests of 19.102.5.2 to 19.102.5.5, with the test acceptance criteria of 19.102.5.6.

19.102.5.2 General test requirements

The tests are performed at an ambient temperature of (25 ± 10) °C.

*The **rotary lawnmower** is tested in all operational configurations in accordance with 8.14.2, e.g. with and without **attachments** such as **grass catchers** or **mulching parts**.*

*Each test is carried out on a **rotary lawnmower** equipped with a new **cutting means assembly**.*

*For **rotary lawnmowers** that have multiple vertical **cutting means** positions within the **cutting means enclosure** for the **cutting height** setting, the **cutting means** is positioned in the lowest recommended position within the **cutting means enclosure**.*

*The **cutting position**, with the **rotary lawnmower** standing on a hard level surface, is adjusted to 30 mm or, if this is not possible, the next higher **cutting position** is used. **Rotary lawnmowers** with a maximum **cutting position** with a **cutting height** of 30 mm or less are set at their maximum **cutting position**.*

*Multi-spindle **rotary lawnmowers** are tested for all spindles individually, and if one or more **cutting means assemblies** can be raised while others are running, tests are carried out in the worst combination of **cutting means assemblies** raised and lowered.*

***Air-cushion lawnmowers** are supported in the highest height they can reach when operated on the coconut matting of Clause BB.1. The **cutting means** is adjusted to its most unfavourable position relative to the **cutting means enclosure**.*

19.102.5.3 Test equipment

The following test equipment is required for the tests.

- 1) A base as specified in Clause BB.1.
- 2) A test enclosure as specified in Clause BB.2.
- 3) Steel balls of $(6,35 \pm 0,2)$ mm diameter, hardened to 45 HRC minimum (for example, balls used in ball-bearings). The steel balls shall not be chipped or damaged.
- 4) A ball injection system which has sufficient capacity to inject steel balls in accordance with 19.102.5.4 and 19.102.5.5.

19.102.5.4 Test preparation

The **rotary lawnmower** is prepared for the tests as follows:

- 1) Adjust the ball injection system so that the ball rise height will be as low as possible and yet ensure that the **cutting means** impacts with the ball. To establish the ball rise height, adjust the velocity with which the ball is injected so that the ball rises approximately 30 mm above the surface of the coconut matting and within an angle of 10° of the vertical axis.
- 2) The **rotary lawnmower** is positioned on the test base (see Figure BB.2) over the injection point so that it is located at the front (12 o'clock $\pm 5^\circ$ position) and within (25 ± 5) mm of the **cutting means tip circle**. See Figures BB.5 and BB.6. The **rotary lawnmower** is restrained in such a manner that the specified position relative to the injection point is maintained throughout the test. This may be achieved by elastically restraining the handle. The fixing medium shall not obstruct the free passage of balls from under the **cutting means enclosure**.
- 3) Locate the target panels specified in BB.2.1 and BB.2.2 around the **rotary lawnmower** in accordance with BB.2.1.
- 4) Operate the **rotary lawnmower** at **maximum speed**.
- 5) Inject the balls one at a time into the **cutting means** path. Increase the velocity of the balls in small increments until each ball is contacted by the **cutting means**.

19.102.5.5 Test procedure

The procedure for the tests is as follows.

- 1) The test is started when the minimum ball rise height has been established.
- 2) A new **cutting means** is used after each 100 **cutting means** to ball contacts. Balls remaining within the test fixture or on the test surface are removed to minimize ricochet. In the event of excessive target hits in a localised area, it may be necessary to repair or replace the target before continuing with the tests.
- 3) Continue and inject balls until 500 **cutting means** to ball contacts have been counted in each test.
- 4) Count and record hits. Only balls passing completely through all the layers of the panel material are considered as hits. Balls that hit and damage the centreline of the target zone height line are scored with the target zone below that line.

19.102.5.6 Test acceptance

The acceptance criteria for the tests are as follows:

The number of hits in any target zone, for each test of 500 ball contacts, shall not exceed the value shown in Table 102 for each spindle.

Table 102 – Permissible hits from thrown object test

Target zone as defined in Annex BB	Hits
From 0 mm to 450 mm	30 ^a / 40 ^b
From 300 mm to 450 mm	6
From 450 mm to 900 mm	0
From 0 mm to 450 mm in the operator target zone	2
Above 450 mm in the operator target zone	0
^a For rotary lawnmowers with a cutting width of 1 200 mm or lower, 30 hits are allowed.	
^b For rotary lawnmowers with a cutting width greater than 1 200 mm, 40 hits are allowed.	

19.102.6 Obstruction test

NOTE 101 In the United States of America, the following additional requirements apply.

For **rotary lawnmowers** in accordance with 16 CFR 1205:

The guarding provided with a **rotary lawnmower** shall not:

- stop the **rotary lawnmower** as a result of contact with a raised obstacle;
- enter the path of the **cutting means**; or
- cause more than one wheel at a time to be lifted from the test surface.

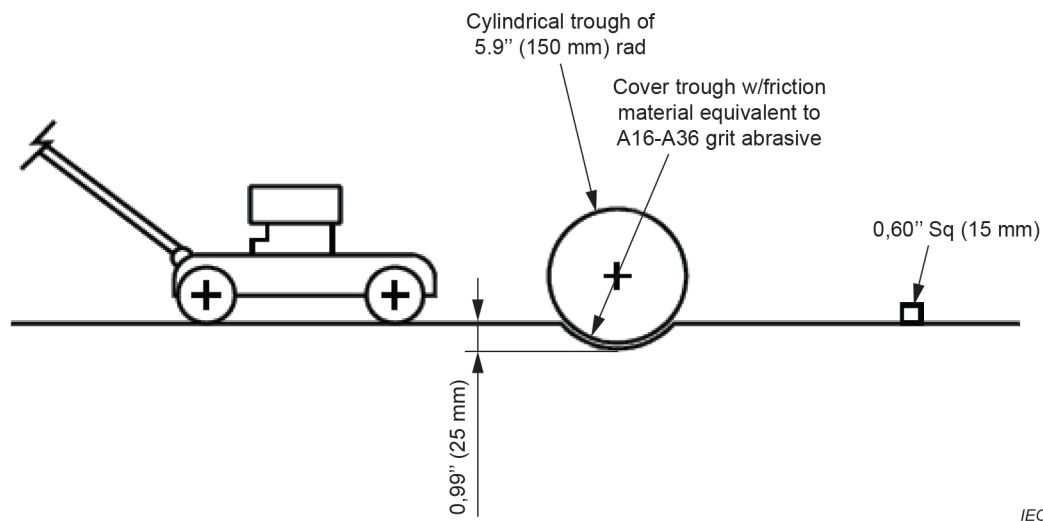
Compliance is checked by the following test:

Prior to the test,

- *pneumatic tyres, if any, are inflated to the cold pressure in accordance with 8.14.2; and*
- *the **cutting position** is adjusted to the highest **cutting height**.*

*The test is conducted on the fixture illustrated in Figure 105. The fixture consists of a level test surface having a $(25 \pm 0,5)$ mm deep depression with a (150 ± 2) mm radius of curvature and a raised obstacle (15 ± 1) mm square, each extending the full width of the fixture. The depression shall be lined with a material having a surface equivalent to a 16- to 36-grit abrasive. The depression and the obstacle shall be positioned so that the **rotary lawnmower** contacts only one at a time. The fixture may be relieved, only to the extent necessary, to prevent interference with any **cutting means** retaining device.*

*Using a horizontal force, the **rotary lawnmower** shall be pushed forward and pulled rearward, without lifting, with a horizontal force sufficient to transit the obstruction fixture perpendicular to and across the depression and the raised obstacle on the fixture at a speed not more than 0,7 m/s.*



NOTE This figure refers to additional conditions applicable in the United States of America.

Figure 105 – Obstruction test

19.102.7 Movable guard test

NOTE 101 In the United States of America, the following additional requirements apply.

For **rotary lawnmowers** in accordance with 16 CFR 1205:

A **guard** that is in any of the areas to be probed as specified in 19.102.1.2 and that is movable for the purpose of attaching auxiliary equipment shall be such that:

- it automatically returns to the position that complies with the requirements in this document when the auxiliary equipment is not present; or
- the blade or blades (**cutting means**) do not operate unless the auxiliary equipment is present or the movable **guard** is returned to a position that complies with the requirements in this document.

Compliance is checked by inspection and by the following test.

*For compliance with a), the movable **guard** shall be manually deflected to its extreme open position, then released and visually observed to see if it immediately returns to the position that complies with the requirements in this document.*

*For compliance with b), the movable **guard** shall be manually deflected to its extreme open position. While the **guard** is in the open position, the actions necessary to operate the blade (**cutting means**) are to be performed in accordance with 8.14.2, and a visual observation is to be made to see whether the blade(s) (**cutting means**) operate.*

19.103 Particular requirements for cylinder lawnmowers

19.103.1 Handles

19.103.1.1 Handle construction

The handle(s) of **cylinder lawnmowers** shall be fastened to the machine so as to prevent loss of control by unintentional uncoupling from the machine while in operation.

Compliance is checked by inspection.

19.103.1.2 Handle latches and handle length

19.103.1.2.1 The handle shall either

- have a horizontal distance of at least 450 mm from the rear part of the handle to the vertical tangent of the **cutting means**, which serves as a barrier between the operator and the **cutting means** (see Figure 110); or

- be so constructed that access to the **cutting means** by the operator's feet is unlikely.

Compliance is checked by measurement and if applicable by the following test.

*With the **cylinder lawnmower** set at the most unfavourable **cutting height**, the foot probe of Figure CC.1 is applied from the operator position side only, with the sole of the foot probe held horizontally at any height and then tilted toe up and toe down to 15° from the horizontal.*

*The foot probe shall not contact the **cutting means**.*

19.103.1.2.2 There shall be positive means (e.g. latch or upper stop) which cannot be unintentionally disengaged during **normal operation** of the **cylinder lawnmower**, to prevent dimension 2 in Figure 110 from becoming less than 450 mm.

Compliance is checked by inspection and by measurement.

19.103.1.3 Pivoting

A pivoting handle, if any, which has a temporary storage position (park position), usually just forward of the vertical, shall be equipped with a means to either manually or automatically lock the handle back into an operating position.

Compliance is checked by inspection.

19.103.2 Cutting means enclosure

19.103.2.1 Cutting means shall be guarded.

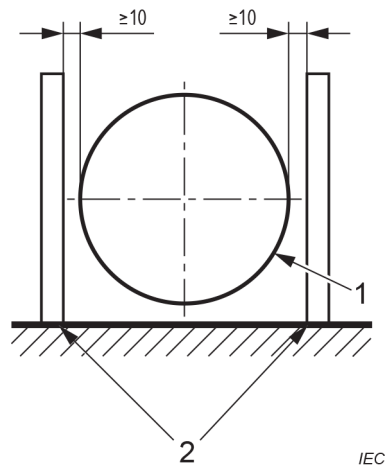
Compliance is checked by the requirements specified in 19.103.2.2 to 19.103.2.5.

19.103.2.2 It shall not be possible for any part of the rod specified below to approach closer than 10 mm to any point on the **cutting means**, with or without the **grass catcher** attached (see Figure 106).

Compliance is checked by measurement and by the following test.

*A rod, (50 ± 1) mm diameter and 500 mm long minimum, is placed on the supporting surface with its axis vertical and is moved towards the **cutting means** until stopped by a part of the **cylinder lawnmower**.*

Dimensions in millimetres

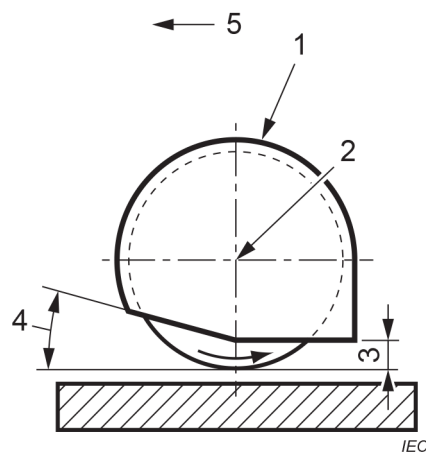
**Key**

- 1 cutting means
- 2 test rod

Figure 106 – Guarding of cylinder lawnmower cutting means, general

19.103.2.3 The **cutting means** shall be covered at the sides with **guards** which extend to a maximum height of 25 mm from the lowest limit of the **cutting means** from the centreline, rearward. From the centreline forward, the **guard** may be reduced up to 15° (see Figure 107).

Compliance is checked by inspection and by measurement.

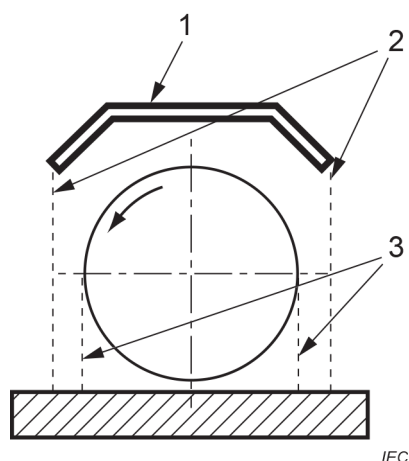
**Key**

- 1 minimum **guard** contour
- 2 centre of rotation of the **cutting means**
- 3 height of the **guard**, rear of centreline (≤ 25 mm)
- 4 angle of the **guard**, forward of centreline ($\leq 15^\circ$)
- 5 direction of travel

Figure 107 – Guarding of cylinder lawnmower cutting means, side coverage

19.103.2.4 A **cutting means assembly** where the grass clippings are thrown without guiding or collecting (i.e. free discharge) and a **cutting means assembly** where the grass clippings are discharged to the rear shall be covered from above by a **guard**. The vertical projection of the **guard** onto the supporting surface shall be at least as large, in all directions, as the vertical projection of the **cutting means**, when any **grass catcher** has been removed (see Figure 108).

Compliance is checked by inspection and by measurement.



Key

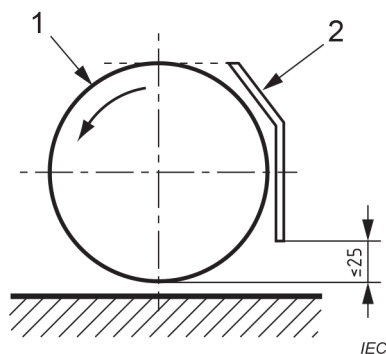
- 1 **guard**
- 2 vertical projection of **guard**
- 3 vertical projection of **cutting means**

NOTE Distance between 2 and 3 > 0.

Figure 108 – Guarding of cylinder lawnmower cutting means, free and rear discharge

19.103.2.5 A **cutting means assembly** where the grass clippings are discharged towards the front shall be covered from the rear with a **guard** that extends so that its projection on the vertical plane covers from the top of the **cutting means** to not more than 25 mm from the bottom of the **cutting means** (see Figure 109).

Compliance is checked by inspection and by measurement.



Key

- 1 **cutting means**
- 2 **guard**

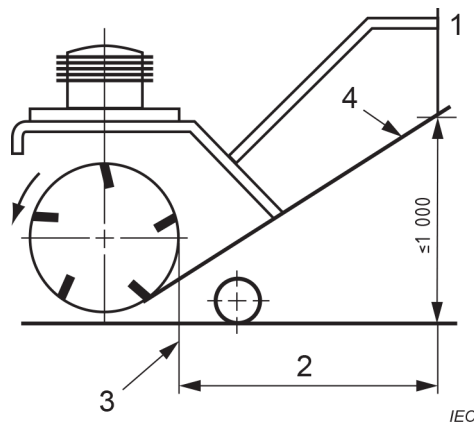
Figure 109 – Guarding of cylinder lawnmower cutting means, front discharge

19.103.3 Throw line

A **cylinder lawnmower**, with other than front discharge, shall be fitted with a **fixed guard** which limits the **throw line** to a maximum height of 1 000 mm in the vertical plane defined by the ends of the handle grips (see Figure 110).

*Compliance is checked by inspection and by measurement. Measurements are taken at the most unfavourable **cutting height** setting.*

Dimensions in millimetres



Key

- 1 handle end at highest position
- 2 handle distance
- 3 vertical projection of cutting cylinder
- 4 throw line

Figure 110 – Cylinder lawnmower throw line and handle distance

19.103.4 Stopping time of the cutting means

Cutting means rotation shall stop within 7 s.

Compliance is checked by the test of Annex DD.

20 Mechanical strength

This clause of Part 1 is applicable, except as follows:

20.3 Replacement:

*For **lawnmowers**, the test of 20.3.2 applies.*

20.3.2 Addition:

The test is carried out with the machine resting on a smooth horizontal concrete surface. During the test, the machine is not restrained or placed against any other supporting structure.

20.5 This subclause of Part 1 is not applicable.

20.101 Requirements for rotary lawnmowers

20.101.1 Structural integrity

The **cutting means enclosure**, **guards** and **grass catcher** shall withstand the impact stresses to which they are subjected in **normal use**.

Compliance is checked by the test of Annex D of ISO 5395-1:2013/AMD1:2017, except that in Clause D.4 of ISO 5395-1:2013/AMD1:2017.

- *for **air-cushion lawnmowers**, the machine is supported in the highest height they can reach when operated on the coconut matting of Clause BB.1. The **cutting means** is adjusted to its most unfavourable position relative to the **cutting means enclosure**; and*
- *the **rotary lawnmower** is operated at **maximum speed** at no-load.*

Any of the following outcomes of the test is regarded as failure to meet this requirement:

- *a hole produced in the **cutting means enclosure**, **guards** or **grass catcher** which has allowed a ball to pass through; or*
- *deformation of any part of the **cutting means enclosure**, **guards** or **grass catchers** such that the **cutting means** comes in contact with the **cutting means enclosure**, **guards** or **grass catcher**; or*
- *dislodging of the **grass catcher** or **guard**, including falling from the normal operating position; or*
- *any opening of a zipper or seam of the **grass catcher**.*

*A hole or opening in a secondary enclosure, if not a **guard**, such as an internal baffle, is not considered as a failure.*

*In the event of a test failure, two additional **rotary lawnmowers** of the same configuration may be tested in an attempt to demonstrate compliance. Both additional **rotary lawnmowers** are tested, and if either of these fails, the **rotary lawnmower** is considered not to be in compliance with the structural integrity requirement of this document.*

*It is not required that the **rotary lawnmower** be suitable for use after this structural integrity test is completed.*

20.101.2 Cutting means impact

The **rotary lawnmower** shall withstand a sudden impact to the **cutting means** in accordance with 5.2 of ISO 5395-2:2013/AMD1:2016/AMD2:2017.

Compliance is checked by inspection and by the test of Annex B of ISO 5395-1:2013/AMD1:2017, except that in Clause B.4 of ISO 5395:2013

- *for **air-cushion lawnmowers**, the machine is supported in the highest height they can reach when operated on the coconut matting of Clause BB.1. The **cutting means** is adjusted to its most unfavourable position relative to the **cutting means enclosure**; and*
- *the **rotary lawnmower** is operated at **maximum speed** at no-load.*

20.101.3 Imbalance

The **rotary lawnmower** shall comply with 5.1.2.1 of ISO 5395-2:2013/AMD1:2016/AMD2:2017.

Compliance is checked by inspection and by the test of 5.1.2.2 of ISO 5395-2:2013/AMD1:2016/AMD2:2017, except that

- for **air-cushion lawnmowers**, the machine is tested on the coconut matting of Clause BB.1; and
- the **rotary lawnmower** is operated at **maximum speed** at no-load.

21 Construction

This clause of Part 1 is applicable, except as follows:

21.17 Replacement:

Machines shall be fitted with a **power switch** to control the motor. The actuating member of this switch shall be easily visible and accessible. This requirement may be fulfilled by an **operator presence control** as specified in 21.104.2.

Compliance is checked by inspection.

21.18 Replacement:

Additional requirements for **power switches** are given in 21.104.2.

21.30 Replacement:

Handle shafts shall be

- of insulating material; or
- if not of insulating material,
 - covered with insulating material having a thickness of at least 1 mm which extends for a distance of 150 mm from handles and handle mounted **operator controls**; and
 - electrically isolated by material equivalent to **supplementary insulation** from other conductive **accessible parts** which are within 75 mm of the ground measured as a clearance or from conductive **accessible parts** connected to such parts.

Handles and **operator controls** which are held when operating the machine shall be insulated from the **cutting means assembly** and other parts that may become live in the event of contact with live wires.

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

An electric strength test according to Clause D.2 using 1 250 V AC is made between

- conductive parts of the **cutting means assembly** and all other conductive parts of the **lawnmower**, except for handle shafts and their fixings, within 200 mm from the supporting surface when the **lawnmower** is positioned for **normal use** and set for the lowest **cutting position**, and
- metal foil wrapped around the handle, **operator controls** and other controls located in the **operator control** zone defined in Figure 101.

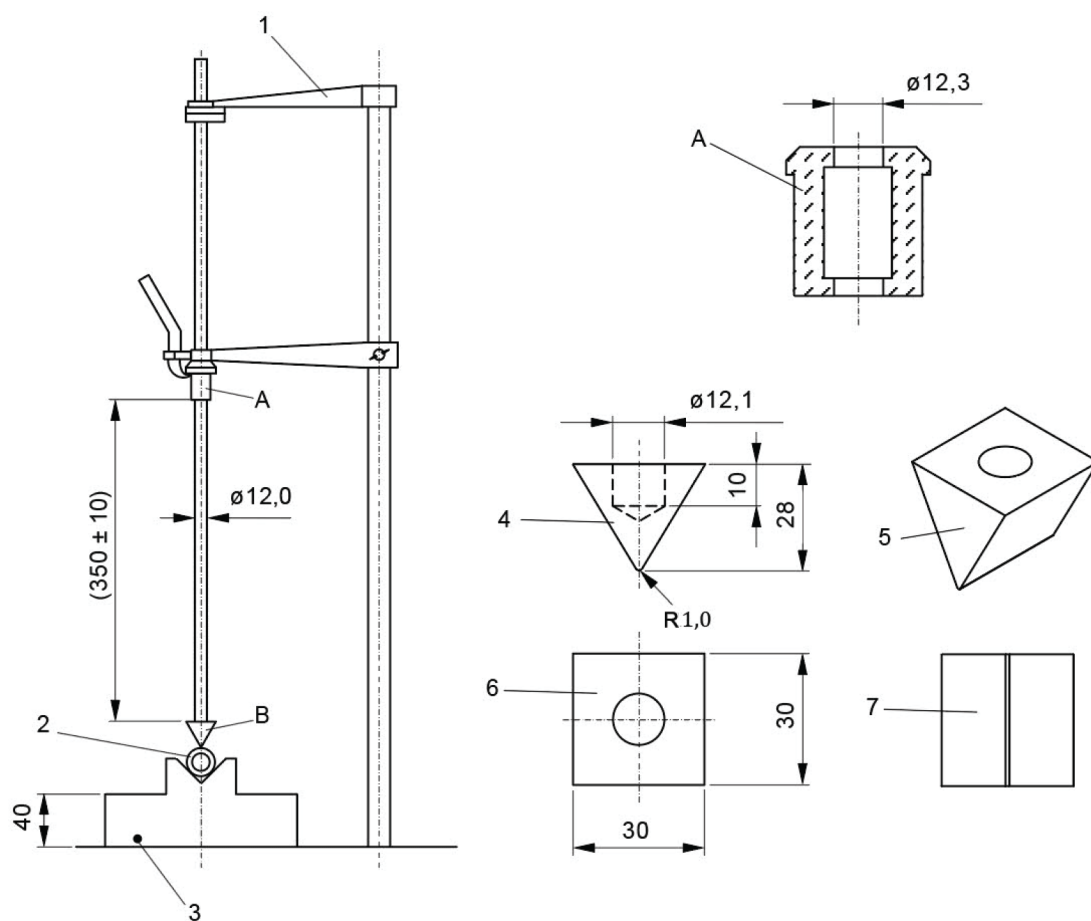
*If passing this test relies upon an insulating covering on metal parts of handles or **operator controls**, these parts are conditioned as follows prior to the test:*

A sample of the covered part is conditioned at a temperature of $(70 \pm 2) ^\circ\text{C}$ for at least 7 days (168 h). After conditioning, the sample is allowed to attain approximately room temperature. Inspection shall show that the covering has not shrunk to cause non-compliance with the insulation dimensional requirements, or the required insulation is no longer given, or that the covering has not peeled off and that it may move longitudinally. After this, the sample is conditioned by maintaining it for at least 4 h at a temperature of $(-10 \pm 2) ^\circ\text{C}$.

Immediately following the conditioning at $(-10 \pm 2) ^\circ\text{C}$, the sample is then subjected to impact by means of the apparatus shown in Figure 111. The weight A having a mass of $(300 \pm 5) \text{ g}$ falls from a height of $(350 \pm 10) \text{ mm}$ onto the chisel B of hardened steel, the edge of which is placed on the sample.

One impact is applied to each place where the covering is likely to be weak or damaged in **normal use**, the distance between the points of impact being at least 10 mm. After this test, inspection shall show that the covering has not peeled off.

Dimensions in millimetres



IEC

Key

- A weight with mass of $(300 \pm 5) \text{ g}$
- B chisel made of hardened steel
- 1 fixing arm
- 2 sample
- 3 base having a mass of at least 10 kg
- 4 chisel detail
- 5 chisel isometric view
- 6 chisel plan view
- 7 chisel bottom view

Figure 111 – Impact test fixture for handle insulation

21.35 Dust collection

This subclause of Part 1 is not applicable.

21.101 Any drain holes provided to prevent accumulation of water in an enclosure shall be at least 5 mm in diameter or 20 mm² in area with a width of at least 3 mm.

Compliance is checked by inspection and by measurement.

21.102 Machines shall be provided with a means such that damage to the **supply cord** due to movement of the machine is prevented as far as possible. The means provided shall be re-usable.

This requirement may be fulfilled by

- a **supply cord** retaining device to keep the **supply cord** out of the vicinity of the **cutting means**, to which the cable may be adequately fastened; or
- the **supply cord** entry or attachment being at least 0,6 m from the nearest point of the **cutting means**.

Compliance is checked by inspection and by measurement.

21.103 Air filters which can be removed for cleaning purposes shall be so designed that they are unlikely to come off during use.

This requirement may be fulfilled if the air filter

- can only be removed with the aid of a tool; or
- is provided with a spring that prevents it from falling away, during use, due to vibration; or
- needs a deliberate action of the user for its removal.

Compliance is checked by inspection.

21.104 Controls

21.104.1 Location

The location of **operator controls** which require sustained activation shall be within the gripping area of the handle(s).

The lock-off device specified in 21.104.2 shall be located

- in zone 1 as shown in Figure 101; and
- within 600 mm from the top of the **lawnmower** handle(s).

NOTE 101 The 600 mm requirement is based on a 24 inch requirement in a United States regulation found in 16 CFR Part 1205.

The location of **operator controls** that do not require sustained activation but that might be operated during grass cutting shall be within zone 1 or zone 2 as shown in Figure 101.

A manually operated **parking brake**, if any, shall be operable within zone 1 or zone 2.

NOTE 102 The **operator control** zones defined in Figure 101 includes the maximum movement range of the controls but is not intended to represent preferred **operator control** positions.

For the purpose of 21.104.1, the following shall not be considered as controls that are operated during grass cutting:

- **cutting height** setting;
- **cutter bar** setting or adjustment;
- grass **discharge opening** to the **grass catcher**.

Compliance is checked by inspection and by measurement.

21.104.2 Operator presence control

Machines shall be fitted with an **operator presence control** on the handle, which automatically stops **cutting means** rotation when the operator's hand(s) is removed from the **operator presence control**. This may be accomplished, for example, by stopping the drive motor or by an intermediate **cutting means** brake/clutch mechanism. If the **operator presence control** operates by electrical means, the **operator presence control** is considered to be a **power switch**.

For restarting **cutting means** rotation, the control shall require a lock-off device such that two separate and dissimilar actions are necessary before drive to the **cutting means** is restarted (e.g. an actuator which has to be pushed in before it can be moved laterally to close the contacts to start the motor). It shall not be possible to achieve these two actions with a single grasping motion or a straight line motion. The lock-off device shall fulfil the requirements of 21.17.1.

Compliance is checked by inspection.

21.104.3 Traction drive control

21.104.3.1 General

Machines shall be fitted with a device on the handle which will automatically stop the traction drive, if any, when the operator's hand(s) is removed from the handle. This may be fulfilled in combination with the **operator presence control** specified in 21.104.2.

The traction drive may be started by a single action.

Compliance is checked by inspection.

21.104.3.2 The traction drive control system shall be sufficiently durable.

Compliance is checked by cycling the traction drive control system "on" and "off" for 10 000 operations. After the test, the traction drive control system shall comply with 21.104.3.1.

21.105 For **lawnmowers** with non-metallic **cutting means**, any single cutting element shall have a kinetic energy greater than 10 J.

NOTE 101 **Lawn and garden machinery** having non-metallic **cutting means**, where any single cutting element has a kinetic energy of 10 J or less is considered a lawn trimmer.

For the purposes of this document, the kinetic energy, in Joules, shall be determined by means of the following formula:

$$\text{kinetic energy} = \frac{1}{2}mv^2$$

where

m is the mass of the conditioned cutting element with the length L , in kilograms (see Figure 112), where cutting elements of hygroscopic material are stored for at least seven days in a humidity cabinet under the same conditions as those required for the test of 14.1 before carrying out the test and measurement;

v is the maximum attainable velocity of point Z which is half-way along the length L of the cutting element, in metres per second.

Therefore:

$$v = 0,104\,7n\left(r - \left(\frac{L}{2}\right)\right)$$

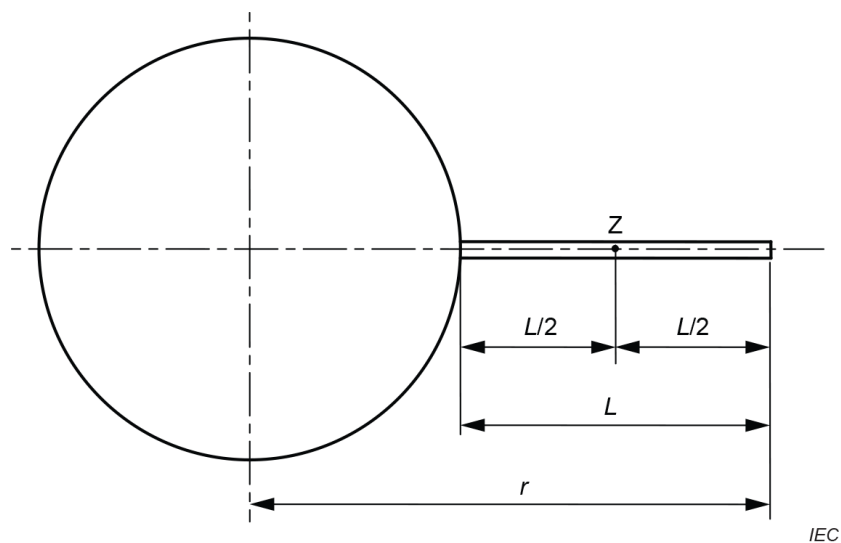
where

n is the **maximum speed** with a full length of line(s) or a new cutting element(s) fitted, in revolutions per minute;

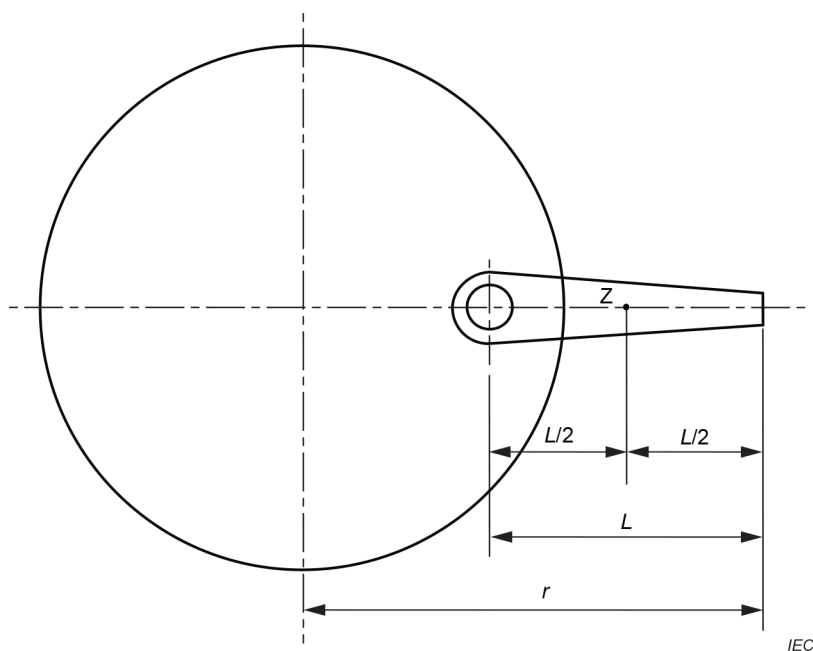
r is the distance from the axis of rotation of the cutting head to the outer tip of the **cutting means**, in metres;

L is the measured length of the cutting element, in metres.

Compliance is checked by measurement and by calculation.



a) Filament line



b) Pivoting cutting element

Key

L length of the cutting element

r distance from the axis of rotation of the cutting head to the outer tip of the **cutting means**

Z point which is half-way along the length L of the cutting element

Figure 112 – Lawnmower cutting means measurement

22 Internal wiring

This clause of Part 1 is applicable.

23 Components

This clause of Part 1 is applicable, except as follows:

23.1.10 Replacement:

Switches shall be so constructed that there will be no failure that might impair compliance with this document.

Compliance is checked by the following.

Switches, if separately tested and found to comply with IEC 61058-1:2016 or IEC 61058-2-6:2018, shall meet the requirements specified in 23.1.10.1.

Switches which have not been separately tested and found to comply with IEC 61058-1:2016 or IEC 61058-2-6:2018 or do not meet the requirements of 23.1.10.1, are tested as in 23.1.10.2 to 23.1.10.3.

23.1.10.1 Replacement:

Switches shall be rated and classified as follows.

Power switches shall be rated as follows:

- for a voltage not less than the **rated voltage** of the machine;
- for a current not less than the **rated current** of the machine;
- for AC, if the machine is rated for AC;
- for DC, if the machine is rated for DC.

Electronic **power switches** shall, as a minimum, be classified for continuous duty in accordance with IEC 61058-1:2016 or IEC 61058-2-6:2018.

Power switches shall further be classified with respect to load:

- switches for motor-operated tools and motor-operated **lawn and garden machinery**: for resistive and motor load in accordance with 7.2.2 of IEC 61058-1:2016 or IEC 61058-2-6:2018, if the switch would encounter this load in **normal use**;
- switches for magnetically driven tools and magnetically driven **lawn and garden machinery**: for inductive load in accordance with 7.2.8 of IEC 61058-1:2016 or IEC 61058-2-6:2018, if the switch would encounter this load in **normal use**;
- alternatively, switches may be regarded as switches for a declared specific load in accordance with 7.2.5 of IEC 61058-1:2016 or IEC 61058-2-6:2018 and may be classified based upon the load conditions encountered in the machine in **normal use**.

Ratings and load classifications for switches other than **power switches** shall be based on the conditions encountered in the machine.

Switches shall further be classified as follows with respect to endurance:

- **power switches (operator presence control)** for **lawnmowers**: 10 000 operating cycles, applied at the **power switch (operator presence control)** actuator;
- electromechanical switches employed within the circuit of the **power switch (operator presence control)** that switch motor load: 50 000 operating cycles as specified in IEC 61058-1:2016 or IEC 61058-2-6:2018;
- **power switches** which possess series electronics: 1 000 operating cycles with the electronics bypassed;

NOTE 1 By default, switches without any declared endurance with the electronics bypassed have been tested to 1 000 operating cycles in accordance with IEC 61058-1:2016 or IEC 61058-2-6:2018.

- switches other than **power switches**, such as speed selector switches, which are likely to be switched under electrical load: 1 000 operating cycles. However, this test is not required, if the requirements of this document are met with the switch short-circuited;
- switches other than **power switches** that either
 - are intended for operation without electrical load, and which can be operated only with the aid of a tool or are interlocked so that they cannot be operated under electrical load; or
 - provide a motor direction reversing function; or
 - are switches for 20 mA load as classified in 7.2.6 of IEC 61058-1:2016 or IEC 61058-2-6:2018are not required to possess any particular endurance characteristic.

NOTE 2 Motor reversing endurance is tested in 18.7.

Compliance is checked by inspection of the markings on the switch and by the documentation and certificate provided with the switch.

NOTE 3 **Power switches** for **lawnmowers** are covered by the **operator presence control** specified in 21.104.2.

23.3 Replacement:

Protective devices (e.g. overload or over-temperature devices) or circuits that switch off the **cutting means** and/or the traction drive (if any) shall be of the non-self-resetting type.

Electronic speed and load regulators that do not switch off the machine but reduce the speed of the **cutting means** and/or the traction drive (if any), including down to zero, as a load is applied and increase the speed of the machine when the load is removed are not covered by 23.3. An **RCD** is considered not to be a **protective device**.

Resetting a **protective device** by switching the machine off and on with the **power switch** is considered to be a non-self-resetting action.

Compliance is checked by inspection and by manual test.

24 Supply connection and external flexible cords

This clause of Part 1 is applicable, except as follows:

24.1 Replacement:

Machines shall be provided with one of the following means of connection to the supply:

- an appliance inlet; or
- a **supply cord** with a length between 0,2 m and 0,5 m and fitted with a plug or other connector having at least the same degree of protection against moisture as marked in accordance with 8.1 for the machine when it is connected to a mating connector in accordance with 8.14.2 a) 3); or
- a **supply cord** with a length not less than 10 m and fitted with a plug.

Plugs, connectors and appliance inlets shall be suitable for the **rated voltage**, **rated current** or **rated input** of the machine, as applicable.

Compliance is checked by inspection and by measurement.