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Electrically powered walk-behind and hand-held lawn trimmers and lawn edge trimmers — Mechanical safety

[Revision of first edition (ISO 10518:1991)]

Coupe-bordures de gazon et coupe-gazon portables à la main et à conducteur à pied à moteur électrique — Sécurité mécanique

ICS 65.060.70

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The CEN Secretary-General has advised the ISO Secretary-General that this ISO/DIS covers a subject of interest to European standardization. **In accordance with the ISO-lead mode of collaboration as defined in the Vienna Agreement, consultation on this ISO/DIS has the same effect for CEN members as would a CEN enquiry on a draft European Standard.** Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month FDIS vote in ISO and formal vote in CEN.

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

Pour accélérer la distribution, le présent document est distribué tel qu'il est parvenu du secrétariat du comité. Le travail de rédaction et de composition de texte sera effectué au Secrétariat central de l'ISO au stade de publication.

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

International Standard ISO 10518 was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry.*, Subcommittee SC 13, *Powered lawn and garden equipment*.

This second edition cancels and replaces the first edition.

Electrically powered walk-behind and hand-held lawn trimmers and lawn edge trimmers — Mechanical safety

1 Scope

This International Standard specifies mechanical safety requirements and testing for the design and construction of electrically powered walk-behind and hand-held lawn trimmers and lawn edge trimmers, with cutting element(s) of non-metallic filament line or freely pivoting non-metallic cutter(s) with a kinetic energy of not more than 10 J each, and used by a standing operator primarily for cutting grass.

It describes methods for the elimination or reduction of hazards arising from their use. In addition, it specifies the type of information to be provided by the manufacturer on safe working practices.

This standard is not applicable to:

a) scissor type or lawn trimmers and lawn edge trimmers with cutting means other than those described above;

b) self-propelled lawn trimmers or lawn edge trimmers;

c) lawn trimmers or lawn edge trimmers which do not have a distance of at least 600 mm between the cutting means control and the cutting head.

The electrical aspects of electrically powered lawn trimmers and lawn edge trimmers are not covered by this standard.

The list of significant hazards dealt with in this standard is given in annex A. Annex A also indicates the hazards which have not been dealt with.

Environmental aspects have not been considered in this standard.

This International Standard applies primarily to machines which are manufactured after the date of issue of this standard.

NOTE: The method of calculating the kinetic energy for the purposes of this standard is given in annex B.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 354:1985, *Acoustics – Measurement of sound absorption in a reverberation room*

ISO 3744:1994, *Acoustics - Determination of sound power levels of noise sources using sound pressure - Engineering method in an essentially free field over a reflecting plane*

ISO 3767-1: 1991 *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Symbols for operator controls and other displays — Part1: Common symbols.*

ISO 3767-3: 1995 *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Symbols for operator controls and other displays — Part 3: Symbols for powered lawn and garden equipment.*

ISO 11201:1995, *Acoustics - Noise emitted by machinery and equipment - Measurement of emission sound pressure levels at a work station and at other specified positions - Engineering method in an essentially free field over a reflecting plane*

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

ISO 13852: , *Safety of machinery - Ssafety distances to prevent danger zones being reached by the upper limbs.*

ISO 20643:????, *Hand-transmitted vibration from hand-held of hand-guided machinery - Measurement at the grip surface.*

3 Terms and definitions

For the purposes of this International Standard, the following terms and definitions

3.1
hand-held:
supported by hand, possibly assisted by wheel(s), skids or harness, etc.

3.2
walk-behind
ground supported, controlled by an operator walking behind.

3.3
lawn trimmer
grass trimming machine where the cutting means operates in a plane approximately parallel to the ground.

3.4
lawn edge trimmer
grass trimming machine where the cutting means operates in a plane approximately perpendicular to the ground.

3.5
cutting means
mechanism used to provide the cutting action in which one or more cutting elements, cutting by impact, rotate about an axis normal to the cutting plane.

3.6
cutting element
single non-metallic filament line or freely pivoting non-metallic cutter.

3.7
cutting head
support system for the cutting element.

3.8
cutting means control
device activated by the operator's hand or finger, for controlling the cutting means movement.

3.9
fixed guard
guard kept in place (i.e. closed) either permanently (by welding etc.) or by means of fasteners (screws, nuts etc.) making removal/opening impossible without the use of tools.

4 Safety requirements and/or measures

4.1 Handling

Hand-held lawn trimmers and lawn edge trimmers shall have at least one handle.

All hand-held lawn trimmers and lawn edge trimmers with a mass of more than 3,5 kg shall have two handles and the distance between the centres of the two handles shall be at least 250 mm.

NOTE This measurement of 250 mm does not apply to two handled lawn trimmers with a mass of 3,5 kg or less.

Additionally, hand-held lawn trimmers and lawn edge trimmers with a mass of more than 6 kg shall also have at least a single shoulder harness and those with a mass of more than 7.5 kg shall have a double shoulder harness.

The mass of the machine shall be determined in its heaviest condition for normal use and without cable.

The gripping length of any handle required by this standard shall be at least 100 mm.

If a part containing the motor complies with the dimensions pertaining to handles it may be considered as a handle.

The gripping length of a bail or closed handle shall comprise any length that is straight or curved at a radius of greater than 100 mm together with any blend radius but not more than 10 mm at either or both ends of the gripping surface.

If a straight handle is supported centrally (i.e. 'T' type) the gripping length shall be calculated as follows:

a) for handles with a periphery (not including the support) less than 80 mm the gripping length is the sum of the two parts either side of the support;

b) for handles with a periphery (not including the support) of 80 mm or more the gripping length is the complete length from end to end.

Where appropriate the part of the handle containing the cutting means control actuator shall be counted as part of the handle gripping length. Finger grip or similar superimposed profiles shall not affect the method of calculating handle gripping length.

4.2 Protection of power driven transmission parts (other than the cutting means

All power driven transmission parts shall be guarded to prevent the operator's contact with these parts. All apertures and safety distances shall conform to 4.5.1 and 4.5.3 of ISO 13852.

Compliance shall be checked by inspection.

4.3 Guard attachment

All guards required by this standard shall be fixed guards or the construction of the machine shall be such that it cannot be used without the guard in its guarding position and shall be designed according to the principles of ISO 12100.

4.4 Controls

4.4.1 One cutting means control shall be provided and either this shall require two separate and dissimilar actions before the cutting elements can be driven or the control shall be guarded to prevent inadvertent operation. There shall be no means of locking this control in the 'on' position and the cutting element shall come to rest when the control is released.

Compliance shall be checked by inspection and for a guarded cutting means control it shall not be possible to operate the control by means of a 100 mm ± 1 mm diameter solid sphere.

4.4.2 Controls, where the purpose is not obvious, shall have the function, direction and method of operation clearly identified by a durable marking.

Detailed instructions on the operation of all controls shall be provided in the instruction handbook (see 5.1).

NOTE Symbols according to ISO 3767 Parts 1 and 3 may be used as appropriate.

4.5 Cutting means

4.5.1 A cutting means shall consist of one or more non-metallic cutting elements mounted on or emergent from a generally circular cutting head.

4.5.2 A cutting element shall consist of one of the following (see figure 1):

a) a non-metallic filament line; or

b) a non-metallic freely pivoting cutter.

Machines having cutting means using one or more cutting elements of continuous filament line (e.g. wound on a spool contained either in the cutting head or other attachment) shall incorporate a means to automatically limit the line to its correct operating length after the line has been extended and/or the machine is operated.

The machine manufacturer shall not supply metallic cutting elements that can replace the non-metallic ones.

4.5.3 The kinetic energy of a cutting element shall be determined in accordance with annex B.

Polyamide cutting elements shall be stored at (20 ± 3)°C and atmospheric humidity for at least seven days before testing.

4.6 Guarding of cutting means

4.6.1 General

Guards shall be imperforate and not be detachable without the use of a tool.

4.6.2 Lawn trimmers

Lawn trimmers shall be guarded on the operator's side as a minimum, to the extent shown in figure 2. The radius 'x' of the guard shall not be smaller than the major swept radius of the cutting head, and the guard shall extend beyond the plane of the cutting element by at least 3 mm for walk-behind lawn trimmers and at least 10 mm for hand-held lawn trimmers. The guard shall extend at least 45° from the axis of the handle on the side where the cutting element is moving away from the operator and at least 90° from the axis of the handle on the side where the cutting element is moving towards the operator.

NOTE The vertex of the angle lies on the cutting head spindle.

4.6.3 Lawn edge trimmers

Lawn edge trimmers shall be guarded, as a minimum, to the extent shown in figure 3. The radius 'y' of the guard shall not be smaller than the major swept radius of the cutting head. The guard shall extend beyond the plane of the cutting element by at least 10 mm. With the lawn edge trimmer in its normal position of use the guard shall extend a minimum of 90° from the vertical towards the ground on the side where the cutting element is moving upwards and a minimum of 45° from the vertical towards the ground on the side where the cutting element is moving downwards.

NOTE The vertex of the angle lies on the cutting head spindle.

4.7 Mechanical strength and rigidity

4.7.1 General

All the tests of 4.7 shall be carried out when the temperature of the parts to be tested has stabilized to an ambient temperature of (20 ± 3)°C.

4.7.2 Cutting means guard (mechanical strength and rigidity)

4.7.2.1 The mechanical strength and rigidity of cutting means guards of trimmers shall be adequate for normal use. Compliance shall be checked by the tests given in 4.7.2.2 and 4.7.2.3 or 4.7.2.4.

After the tests the guard shall not have become detached nor show any visible cracks. Screws and retaining clips shall be secure and the requirements of 4.6.2 or 4.6.3 shall still be met.

4.7.2.2 The rigidity of the guard shall be checked by applying a force, at any point, equivalent to the weight of the trimmer in the most unfavourable direction for 30 s.

4.7.2.3 The strength of guards of walk-behind lawn trimmers and walk-behind lawn edge trimmers shall be tested by means of the following ball impact test. Each of the three samples of the complete machine shall be subjected to an impact of (6,5 ± 0,2) J on a part of the guard likely to be the weakest, with the lawn trimmer or lawn edge trimmer resting on a smooth, rigid, level surface. The tests shall be so conducted that in each test the sample receives an impact in a location different from the other two tests. The impact shall be produced with a smooth solid steel sphere (as used for ball bearings) having a diameter of 50 mm. If the part being tested is at an angle of up to 45° to the horizontal, the sphere shall be allowed to fall vertically from rest to strike the part. Otherwise, the sphere shall be suspended by a cord and shall be allowed to fall from rest as a pendulum to strike the part. In either case, the vertical travel of the sphere shall be 1.3 m.

4.7.2.4 The strength of guards of hand-held lawn trimmers and hand-held lawn edge trimmers shall be tested by means of the following drop test.

NOTE A string should be used to suspend the machine so that the desired orientation of the machine can be achieved. Cutting the string will allow the machine to f all in the correct orientation to test the guard or the cutting head.

One sample of the complete machine without supply cord shall be dropped three times so that the guard falls through a vertical distance of 0,9 m onto a smooth horizontal concrete surface in such a manner as to test the guard most severely (see figure 4).

4.7.3 Cutting head (mechanical strength)

4.7.3.1 The mechanical strength of the cutting head shall be adequate for normal use. Compliance shall be checked by the test given in 4.7.3.2.

NOTE A string should be used to suspend the machine so that the desired orientation of the machine can be achieved. Cutting the string will allow the machine to fall in the correct orientation to test the guard or the cutting head.

4.7.3.2 The complete machine shall be dropped so that the cutting head, in a horizontal plane, falls through a vertical distance to make contact with a rigidly supported horizontal steel block. The drop height shall be 0,9 m for hand-held lawn trimmers and lawn edge trimmers and 0,25 m for walk-behind (see figure 5)

NOTE It is not necessary for the machine to be operable after the test.

If the machine is operable then immediately following this test the machine shall be run at its maximum speed for 30 s both with and without cutting elements.

If the machine will not work after the test but the cutting head is not visibly damaged and if the cutting head is designed to be replaceable then the cutting head shall be fitted to a new machine and run at maximum speed for 30 s both with and without the cutting element(s) fitted.

No parts shall become detached and no visible cracks shall have developed.

4.8 Vibration

4.8.1 Reduction by design and protective measures

The machine shall be designed to generate a vibration level as low as practicable. The main sources causing vibration are the :

— oscillating forces from the motor ;

— cutting means ;

— unbalanced moving parts ;

— impact in gears, bearings and other mechanisms ;

— interaction between operator, machine and material being worked;

and in addition for walk-behind machines:

— machine design related to mobility;

— travelling surface, speed, tyre pressure.

NOTE 1 Besides the vibration reduction of the source, technical measures to isolate the vibration source from the handle may be used, when appropriate, such as isolators and resonating masses.

4.8.2 Reduction by information

After taking possible technical measures for vibration reduction, it is still recommended that, when appropriate, the instruction handbook recommends :

_ the use of low-vibration operating modes, and/or limited time of operation ;

_ the wearing of personal protection equipment (PPE).

4.8.3 Vibration measurement

For the measurement of hand-arm vibration of hand-held lawn trimmers and hand-held lawn edge trimmers the methods given in Annex C shall be used.

For the measurement of hand-arm vibration of walk-behind lawn trimmers and walk-behind lawn edge trimmers the methods given in Annex D shall be used.