
**Powered edgers with rigid cutting means —
Definitions, safety requirements and test
procedures**

*Coupe-bordures à moteur avec organe de coupe rigide — Définitions,
exigences de sécurité et modes opératoires d'essai*

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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.

International Standard ISO 11789 was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 13, *Powered lawn and garden equipment*.

Annex A forms an integral part of this International Standard. Annex B is for information only.

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Powered edgers with rigid cutting means — Definitions, safety requirements and test procedures

1 Scope

This International Standard specifies mechanical safety requirements and test methods applicable to walk-behind powered edgers that employ rigid cutting means with a blade tip circle not more than 305 mm in diameter, and where the plane of the blade tip circle is designed to operate at not more than 15° from the vertical.

This International Standard applies to hand-held portable and powered edgers employing a rigid cutting element with a blade tip circle not more than 305 mm in diameter.

This International Standard also includes test methods for noise and vibration.

This International Standard does not cover edgers with cutting means of non-metallic filament line or freely pivoting non-metallic cutters.

This International Standard does not cover accessories or attachments that alter the function of the machine.

The electrical aspects of electrically powered edgers are not covered by this International Standard. For the electrical requirements applicable to electrically driven machines, reference should be made to IEC 60335-1.

NOTE — For motion control requirements related to self-propelled machines, reference should be made to ISO 5395.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of the IEC and ISO maintain registers of currently valid International Standards.

ISO 3304:1985, *Plain end seamless precision steel tubes — Technical conditions for delivery.*

ISO 3305:1985, *Plain end welded precision steel tubes — Technical conditions for delivery.*

ISO 3306:1985, *Plain end as-welded and sized precision steel tubes — Technical conditions for delivery.*

ISO 3767-1:1998, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Symbols for operator controls and other displays — Part 1: Common symbols.*

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

ISO 3767-5:1992, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Symbols for operator controls and other displays — Part 5: Symbols for manual portable forestry machinery.*

ISO 3789-1:1982, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Location and method of operation of operator controls — Part 1: Common controls.*

ISO 3789-3:1989, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Location and method of operation of operator controls — Part 3: Controls for powered lawn and garden equipment.*

ISO 4200:1991, *Plain end steel tubes, welded and seamless — General tables of dimensions and masses per unit length.*

ISO 5347-0:1987, *Methods for the calibration of vibration and shock pick-ups — Part 0: Basic concepts.*

ISO 5348:1998, *Mechanical vibration and shock — Mechanical mounting of accelerometers.*

ISO 5349:1986, *Mechanical vibration — Guidelines for the measurement and the assessment of human exposure to hand-transmitted vibration.*

ISO 5395:1990, *Powered lawn-mowers, lawn tractors, lawn and garden tractors, professional mowers, and lawn and garden tractors with mowing attachments — Definitions, safety requirements and test procedures.*

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

IEC 60335-1:1991, *Safety of household and similar electrical appliances — Part 1: General requirements.*

IEC 60651:1979, *Sound level meters.*

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3 Definitions

For the purposes of this International Standard, the following definitions apply:

NOTE — For different types of machines, see figures 1 and 2, showing a walk-behind and a hand-held edger.
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3.1

blade

cutting means

mechanism used to provide the cutting action of an edger

3.2

blade retainer

mechanism which holds the blade to the driving member

3.3

blade guard

structure covering a portion of the blade arc

3.4

blade-tip circle

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

3.5

clutch

mechanism for connecting and disconnecting a driven member to and from a rotating source of power

3.6

debris deflector

additional guarding made of flexible material fitted to the unit as an extension of the guard to protect the operator from thrown debris

3.7**depth of cut**

vertical location of the blade-tip circle relative to the surface level

NOTE — See figure 9.

3.8**edger**

grass/soil trimming machine where the cutting means operates in a plane approximately perpendicular to the ground

NOTE — The cutting means is only adjustable within an angle of $\pm 15^\circ$ from the vertical.

3.9**governor**

device that limits the maximum speed of the engine

3.10**guiding handle**

the front handle of a hand-held portable machine by which the operator supports the least percentage of machine weight

NOTE — See figure 2.

3.11**handle**

structure that enables the operator to hold and control the unit during operation

3.12**hand-held**

supported by hand, possibly assisted by wheel(s) or skids

3.13**maximum engine speed**

engine speed at wide open throttle, using carburetor settings according to the manufacturer's recommendation or 133 % of the maximum power speed, whichever is less

3.14**maximum governed speed**

maximum speed an engine is capable of attaining, equal to the greater of

— the value of the speed when limited by a governor (3.9) or other means, and

— the value declared by the manufacturer.

3.15**normal operation**

use of the machine which is reasonably foreseeable, as seen by the ordinary user, and which is consistent with such activities as cutting grass, starting, stopping, fueling, or connecting to (or disconnecting from) a power source

3.16**operator control**

control requiring operator actuation to perform specific functions

3.17**starter**

mechanism that rotates the engine to start it

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**3.18
support handle**

handle of a hand-held portable machine by which the operator supports the greatest percentage of the product weight

**3.19
throttle**

device that adjusts the volume of fuel and air mixture delivered to the combustion chamber of an internal combustion engine

**3.20
unit
machine**

complete edger

**3.21
walk-behind**

normally controlled by an operator walking behind a ground-supported unit

4 General construction**4.1 Handling (hand-held machine)**

A hand-held edger shall be provided with two separate handles. The handles shall:

- a) be fixed in position, except that the guiding handle may be adjustable;
- b) be located so that the distance (D), measured in a horizontal plane, between the rearmost portion of the blade-tip circle and the foremost position (as defined by the manufacturer) of the guiding handle is at least 450 mm. See figure 3.

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4.2 Power driven components

All power driven components except

- any part of a component functioning in contact with the soil;
- any axle of a ground wheel;

shall be guarded to prevent human contact with these parts during normal operation. The principles set out in ISO 5395:1990, annex A, shall be followed when developing a guarding system.

4.3 Heat protection**4.3.1 Requirements**

A guard shall be provided to prevent accidental contact with any exposed engine exhaust components with a hot surface area greater than 10 cm² and with a temperature greater than 80 °C at (20 °C ± 3 °C) ambient temperature during normal operation of the machine. For purposes of this requirement, the guard is considered part of the exposed engine exhaust components.

4.3.2 Test equipment

The measuring equipment shall have an accuracy of ± 4 °C.

4.3.3 Test method

The test shall be conducted in the shade on a hard, flat and level surface. The engine shall be operated at its maximum engine or governed speed (whichever is appropriate) until the surface temperature stabilizes.

Temperatures shall be determined by correcting the observed temperature by the difference between the specified ambient and the test ambient temperature. Identify the hot surface area(s) on the engine exhaust system. When the distance between the identified hot area and the nearest control is in excess of 100 mm, cone A in figure 4 shall be used. For a distance less than 100 mm between the identified hot area and the nearest control, cone B in figure 4 shall be used.

Move cone A, with the axis of the cone anywhere between 0° and 180° to the horizontal with the nose or point of the cone in a downward to horizontal direction towards the hot surface. The cone shall not be moved upwards. When moving the cone, determine if contact is made with the hot surface area(s) with the cone tip or conical surface of the cone.

Move cone B in any direction.

4.3.4 Test acceptance

The tip or conical surface of cone A or B shall not be able to make contact with a hot surface area greater than 10 cm² of the exhaust system.

4.4 Protection from exhaust fumes

Engine exhaust shall not be directed toward the operator during normal operation.

4.5 Guard attachment

All guards required under 4.2, 4.3 and 7 shall be permanently attached to the machine and shall not be detachable without the use of tools, or the construction of the machine shall be such that it cannot be used without the guard in its guarding position.

4.6 Electrical requirements

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For electrical requirements for electrically driven machines, see JEC 60335-1.

4.6.1 Battery circuits

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The requirements in 4.6.1.1, 4.6.1.2, 4.6.1.3 and 4.6.1.4 apply only to battery circuits of less than 42 V.

4.6.1.1 Electrical cables

Electrical cables shall be protected if located in potentially abrasive contact with the metal surfaces.

The wiring assembly shall, where possible, be grouped together, be properly supported, and be located so that no portion is in contact with the carburetor, metallic fuel lines, the exhaust system, moving parts or sharp edges. Any edges of metal members likely to be in contact with the cables shall be rounded or protected to prevent possible damage to the cables by cutting or abrasion.

4.6.1.2 Battery installation

The compartment for a vented storage battery shall have an opening to provide ventilation and drainage. When the battery is in the operating position, acid shall not leak onto parts that would be affected to the extent that a hazard would be created from corrosion.

4.6.1.3 Overload protection

All circuits, except starter motor and high-tension ignition circuits, shall be provided with overload protection devices in the ungrounded line near the battery terminal or starter cable. The overload protection may be located in either wire of a two-wire system. This requirement need not apply to battery-powered machines capable of passing the following test.

With the motor shaft locked to prevent rotation, connect it to its fully charged integral battery and leave it in that condition until the battery is discharged or failure of any component takes place. The machine shall not emit flames

or molten metal. Any internal explosion shall be contained so as not to cause any material to be ejected from the machine

4.6.1.4 Terminals and uninsulated electrical parts

Terminals and uninsulated electrical parts and two-wire non-grounded systems shall be protected against short-circuiting by the fuel can, or tools, during normal refuelling and lubrication servicing.

4.6.2 Ignition circuits

4.6.2.1 Ignition interruption or short-circuiting shall be provided and shall be fitted on the low-voltage side.

4.6.2.2 All high-voltage parts of the circuit including spark-plug terminals shall be electrically protected in such a manner that the operator cannot make accidental contact with them.

4.7 Engine (motor) stopping

4.7.1 The machine shall be fitted with a stopping device, which brings it to a final stop and does not depend on sustained manual effort for its operation. The device shall be so positioned that it can be operated while the machine is being held with both hands by the operator wearing protective gloves. The purpose and method of operation of the device shall be clearly and durably marked. The colour of the stop switch shall be in good contrast compared with its background.

4.8 Controls

Operator controls shall meet the requirements specified in ISO 3789-1 and ISO 3789-3.

4.8.1 Operator presence control requirements

A machine shall be provided with a device on the handle which will automatically stop blade rotation when the operator's hands are removed from a handle.

NOTE — On walk-behind machines, this may be accomplished by stopping the drive engine (motor) or by an intermediate blade clutch brake device. On hand-held machines, this may be accomplished by means of a centrifugal clutch and a continuous pressure throttle control system that will shut off the drive of the engine after the pressure is released.

4.8.2 Restarting requirement

For restarting blade rotation, the control shall require two separate actions. If these actions are to be carried out using the same hand, then they shall be totally distinct thereby preventing accidental starting.

4.9 Identification of controls

Controls, other than those the purpose of which is obvious, shall have the function direction and/or method of operation clearly identified by a durable label or mark.

Easily understood detailed instructions on the operation of all controls shall be provided in an operator's manual.

NOTE — International symbols may be used for control identification. Reference should be made to ISO 3767-1, ISO 3767-3 and ISO 3767-5.

4.10 Fuel tanks

4.10.1 Tank filler

The fuel tank filler opening shall be located so that it will not be obstructed by the edger components, as verified by the procedure described in 4.10.1.1. For hand-held edgers, the fuel tank filler opening shall have a minimum diameter of 20 mm.

4.10.1.1 Test method and acceptance criteria

The diameter of the fuel tank opening shall be checked by measurement. Accessibility shall be verified by using a test probe that is 100 mm long and 20₋₁⁰ mm diameter. It shall be possible for the centre of one end of the probe to be aligned with the centre of the filler opening and for axis of the probe to be within 15° of the centreline of the filler opening.

5 Marking

5.1 Machine and blade identification

All machines shall be marked legibly and indelibly with the following minimum information:

- name of the manufacturer;
- model number or type;
- serial number.

Each blade shall be marked to identify the part number and the manufacturer, importer or supplier.

5.2 Warnings and symbols

Every machine shall be prominently marked with the following warnings, hazards pictorials or appropriate symbols:

- WARNING;
- read operators manual;
- wear eye protection; <https://standards.iteh.ai/catalog/standards/sist/23ff5caa-8b8d-4cee-aa18-052e0d715727/iso-11789-1999>
- wear ear protection (when appropriate);
- keep by-standers away;
- direction of edger blade rotation.

The symbols of hazard pictorials shall follow the conventions laid down in ISO 3767-1, ISO 3767-3 and ISO 3767-5 (for symbols) and ISO 11684 for hazard pictorials. This International Standard does not mandate the symbols or hazard pictorials to be used on the machine, but stresses that the accepted ISO conventions shall be used when developing the appropriate symbol or hazard pictorial.

All symbols and/or hazard pictorials shall be explained in the operators manual.

Annex B presents examples of symbols and hazard pictorials which can be used on edgers.

5.3 Label requirements

Labels provided for identification, directional and cautionary information, shall have a reasonable life for the anticipated machine operating environment and satisfy the following requirements:

- a) the label shall have a durable bond with the base surface material;
- b) the label shall be weather resistant and under normal cleaning procedures shall not fade, discolour, crack, or blister and shall remain legible;
- c) the label shall not curl at the edges and legibility shall not be affected by spilled fuel or oil.

Marks or labels giving cautionary information shall be located close to the relevant hazard and if wording is used, it shall be in the language(s) of the country in which the product is sold.

5.3.1 Test method

The marking shall be rubbed by hand for 15 s with a piece of cloth soaked with water and again for 15 s with a piece of cloth soaked with fuel.

5.3.2 Test acceptance

After the test, the marking shall be easily legible; it shall not be easily possible to remove any labels and they shall show no curling.

6 Safety instructions

The manufacturer shall supply with the machine pertinent instructions such as those presented in annex A.

7 Enclosures and guards (cutting means)

7.1 Cutting means contact protection — Foot probe

Walk-behind machines for which the distance D , as illustrated in figure 5, is less than 450 mm shall be provided with a blade guard supplemented by other parts of the machine as necessary. The foot contact probe test described in 7.1.1 is to be conducted with the machine placed on a smooth, level surface and be adjusted to the wheel height and blade height setting that will result in the most severe test condition.

7.1.1 Test method

The foot probe as illustrated in figure 6 shall be applied at any angle on the operator's side, and moved forward in a direction parallel to the plane of the blade. The sole of the foot probe shall be maintained parallel to the supporting surface during the test.

7.1.2 Test acceptance

The foot probe shall not make contact with the cutting means.

NOTE — Hand-held machines are not subject to the foot probe requirements but shall conform to 4.1 b).

7.2 Thrown object protection

7.2.1 Guard dimensions

Machines when positioned for edging shall be guarded (as a minimum) to the extent shown in figure 7 and shall fulfil the requirements of 7.3.

When other guards and/or machine structures provide guarding equivalent to this minimum requirement, they shall be considered as part of this requirement.

7.2.2 Guard strength

The guard or guarding that is described in 7.2.1 for the cutting means, and any mounting means provided for such guarding, shall withstand the ball-impact test described in 7.2.2.1 and shall fulfil the requirements of 7.3.

7.2.2.1 Test method

The ball-impact test shall be conducted using a 50 mm diameter smooth steel sphere with a mass of approximately 0,45 kg. If the component being tested can be struck from above, and is at an angle of less than 45° to the horizontal, the sphere shall be allowed to fall vertically from rest to strike the component. Otherwise, the sphere

shall be suspended by a cord and allowed to fall from rest as a pendulum to strike the component. In either case, the vertical travel of the sphere shall be 1 300 mm.

7.2.22 Test acceptance

The guards shall withstand the test of 7.2.2.1 without cracking or deforming such that the function of the guard is affected.

7.2.3 Debris deflector strength

Where a debris deflector of flexible material is fitted it shall pass the test as described in 7.2.3.1.

7.2.3.1 Test method

A force of 200 N (for walk-behind edgers) or the weight of the unit (for hand-held edgers) shall be applied for 10 s over the width of the deflector in a direction that produces the maximum stress on the deflector.

7.2.3.2 Test acceptance

After the test the debris deflector shall not crack or separate from the edger, nor shall it be permanently deformed such that any of the requirements of this International Standard would not be met.

7.3 Thrown objects protection test

Hand-held machines when positioned in accordance to 7.3.1 shall pass the line of sight test as described in 7.3.3

Walk-behind machines when positioned in accordance to 7.3.2 shall pass the line of sight test as described in 7.3.3.

7.3.1 Hand-held edgers test setup

The edger shall be positioned on a flat and level surface as shown in figure 3. The height of (775 ± 25) mm shall be met at the lower contour of the rear support handle 50 mm upwards from where the gripping length starts.

The edger shall be adjusted to 50 % of its depth of cut as shown in figure 9.

A panel with an operator zone cutout as defined in figure 8 shall be positioned perpendicular to the test surface and blade tip circle at a distance of 850 mm rearwards from the rear edge of the cutting means.

Dimension x for the operator zone cut out is the distance between the cutting plane and the parallel plane containing the centreline of the support handle.

7.3.2 Walk-behind edgers test setup

The edgers wheels shall be positioned on a flat and level surface and adjusted to 0 % depth of cut.

A panel with an operator zone cut out as defined in figure 10 shall be positioned perpendicular to the test surface at a distance of 330 mm rearward of the rear most portion of the handle.

7.3.3 Test method and acceptance criteria

There shall be no line of sight contact with the leading edge of the edger blade when viewed from the operator position through the operator zone cut out as defined in 7.3.1 and 7.3.2. Construction/assembly gaps of 3 mm or less shall be ignored.

8 Structural integrity

8.1 Strength of cutting means

Walk-behind machines when positioned for edging shall pass the impact test as described in 8.1.1, 8.1.2 and 8.1.4.