
**Garden equipment — Safety
requirements for
combustion-engine-powered
lawnmowers —**

**Part 2:
Pedestrian-controlled lawnmowers**

*Matériel de jardinage — Exigences de sécurité pour les tondeuses à
gazon à moteur à combustion interne —*

Partie 2: Tondeuses à gazon à conducteur à pied

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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 document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 5395-2 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 144, *Tractors and machinery for agriculture and forestry* in collaboration with ISO Technical Committee TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 13, *Powered lawn and garden equipment*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition of ISO 5395-2, together with ISO 5395-1 and ISO 5395-3, cancels and replaces ISO 5395:1990, which has been technically revised. These three parts also incorporate the Amendment ISO 5395:1990/Amd.1:1992.

ISO 5395 consists of the following parts, under the general title *Garden equipment — Safety requirements for combustion-engine-powered lawnmowers*:

- *Part 1: Terminology and common tests*
- *Part 2: Pedestrian-controlled lawnmowers*
- *Part 3: Ride-on lawnmowers with seated operator*

Introduction

This document is a type-C standard as stated in ISO 12100.

The machinery concerned and the extent to which hazards, hazardous situations or hazardous events are covered are indicated in the scope of this document.

When requirements of this type-C standard are different from those which are stated in type-A or type-B standards, the requirements of this type-C standard take precedence over the requirements of the other standards for machines that have been designed and built according to the requirements of this type-C standard.

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Garden equipment — Safety requirements for combustion-engine-powered lawnmowers —

Part 2: Pedestrian-controlled lawnmowers

1 Scope

1.1 This part of ISO 5395 specifies safety requirements and their verification for combustion-engine-powered pedestrian-controlled rotary lawnmowers and cylinder lawnmowers, including pedestrian-controlled mowers with a sulky having a seated operator (hereafter named “lawnmower”), and equipped with:

- 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 10 J or more.

This part of ISO 5395 does not apply to:

- robotic and remote-controlled lawnmowers, flail mowers, grassland mowers, sickle bar mowers, towed/semi-mounted grass-cutting machines, and scrub-clearing machines;
- electrically powered and battery-powered lawnmowers;
- pedestrian-controlled lawnmowers with a swing-over handle.

NOTE IEC 60335-1^[2] together with IEC 60335-2-77^[3] give requirements for pedestrian-controlled walk-behind electrically powered lawnmowers.

1.2 This part of ISO 5395 deals with all significant hazards, hazardous situations or events (see [Annex A](#)) relevant to lawnmowers when used as intended and under the conditions of misuse which are reasonably foreseeable by the manufacturer.

1.3 It is not applicable to lawnmowers which are manufactured before the date of publication of this document.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61032:1997, *Protection of persons and equipment by enclosures — Probes for verification*

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

ISO 5395-3:2013, *Garden equipment — Safety requirements for combustion-engine-powered lawnmowers — Part 3: Ride-on lawnmowers with seated operator*

ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction*

ISO 5395-2:2013(E)

ISO 13849-1:2006, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design*

ISO 13857:2008, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs*

ISO 14119:1998, *Safety of machinery — Interlocking devices associated with guards — Principles for design and selection*

ISO 14982:1998, *Agricultural and forestry machinery — Electromagnetic compatibility — Test methods and acceptance criteria*

ISO 17398:2004, *Safety colours and safety signs — Classification, performance and durability of safety signs*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12100 and ISO 5395-1 apply.

4 Requirements for pedestrian-controlled lawnmowers

4.1 General

The lawnmower shall comply with the safety requirements and/or protective measures of this clause. The lawnmower shall be marked and carry warnings according to [7.2](#) and shall be provided with an instruction handbook which complies with [7.1](#).

In addition, the lawnmower shall be designed according to the principles of ISO 12100 for relevant but not significant hazards which are not dealt with by this document. An audible warning device (for example, horn) is not required. Unless otherwise stated, all tests shall be carried out at an ambient temperature between 15 °C and 35 °C.

If not otherwise specified within this part of ISO 5395, the tests may be carried out in any order and on separate machines, cutting-means enclosures, and cutting-means components.

When the order in which tests should be carried out and the number of permitted machines are not defined in this part of ISO 5395, these conditions should be determined by agreement between the persons carrying out the tests and the manufacturer.

Where it is specified that the engine shall run during the test, it shall be operated at the maximum operating engine speed (see definition in ISO 5395-1). If the measured engine speed is not within the limits specified in the instruction handbook, the engine speed shall be adjusted in accordance with the manufacturer's instructions.

4.2 Controls

4.2.1 Location

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

The location of operator controls that do not require sustained activation but that might be operated during grass cutting shall be within the zones shown in [Figure 1](#).

The operator control zone defined in [Figure 1](#) includes the maximum movement range of the controls but is not intended to represent preferred operator control positions.

NOTE 1 ISO/TS 15079^[12] gives useful information about the location and operation of operator controls.

For lawnmowers with a sulky, see the additional requirements in [4.17.2](#).

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

- height-of-cut setting;
- fixed cutting-means setting or adjustment;
- grass discharge opening to the grass catcher;
- hydrostatic bypass valve;
- engine-starting controls which meet [4.2.3](#) requirements;
- engine-stopping controls, if separate from cutting-means stopping.

A manually operated parking brake shall be operable from the operator position.

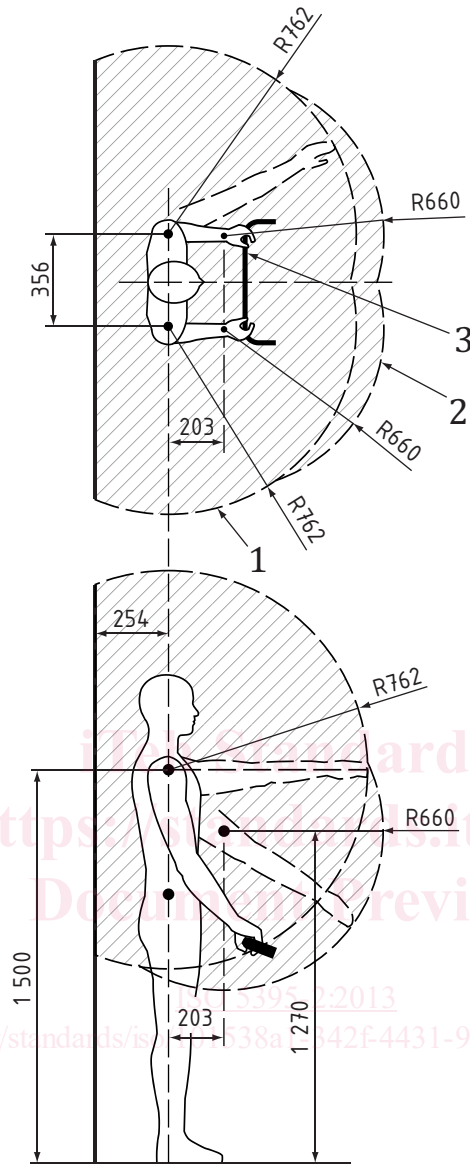
Compliance shall be checked by inspection and measurements.

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Dimensions in millimetres, tolerance ± 3 mm



Key

- 1 operator control zone
- 2 operator control zone when leaning against handle barrier
- 3 handle barrier

Figure 1 — Operator control zone

NOTE 2 The operator control zone, illustrated in [Figure 1](#), is the area into which the extremities of a 95th percentile male can reach from the normal operator position. The lowest forward zone is the area into which a 5th percentile male or a 50th percentile female can reach when against the handle barrier. This zone can also be reached by a 95th percentile male leaning forward against the handle barrier.

4.2.2 Engine speed

The lawnmower shall be designed so that it is not possible to sustain an engine speed greater than the maximum operating engine speed (see definition in ISO 5395-1) by the use of any control or by adjustments made without breaking a manufacturer’s seal, if so provided, or without replacing or reconfiguring engine speed control components.

Compliance shall be checked by inspection and measurement.

4.2.3 Engine starting

Any engine-starting device (e.g. start switch, recoil rope starter) shall require intentional activation in order to start the engine.

A starter operated by means of a loose rope shall not be allowed.

For battery-started lawnmowers, the start switch shall be of the type operated by a removable key or a similar device, to prevent unauthorized starting of the engine.

An engine-starting device located outside the operator control zone (see 4.2.1) shall only allow starting with the cutting-means drive disengaged or if the lawnmower satisfies the foot protection requirements of 5.3.2.2 d) at the starting position.

Compliance shall be checked by inspection.

4.2.4 Engine stopping

An engine-stopping device shall be provided. The device shall not depend on sustained manual pressure for its continued operation. The stopping device can be included in the operator presence control (OPC).

NOTE An emergency stop device is not required.

Compliance shall be checked by functional test and inspection.

4.2.5 Brake steering or clutch steering

The brake-steering or clutch-steering controls shall be arranged so that:

- if actuated by dual controls, the control farthest to the right shall induce a movement of the machine to the right and the control farthest to the left shall induce a movement of the machine to the left; or,
- if actuated by a single control, a clockwise movement of the control about its axis shall effect a clockwise turn of the machine about its axis, and a counter-clockwise movement shall effect a counter-clockwise turn.

Compliance shall be checked by functional test and inspection.

4.2.6 Traction drive

Both the forward and reverse functions of the traction-drive control, if present, shall require an OPC.

Compliance shall be checked by functional test and inspection.

4.3 Operator presence control (OPC)

The lawnmower shall be fitted with operator presence control device(s) which:

- meets the requirements in ISO 13849-1:2006, for Category 1; and
- requires activation by the operator before the lawnmower's traction (if so equipped) and cutting-means drive systems can be started; these functions shall be separate; and
- requires sustained activation by the operator to allow continued operation; and
- automatically activates the stopping of the cutting-means rotation and/or traction-drive system if so equipped, when the operator releases the control device.

The sustained activation and release functions of the traction-drive OPC can be combined with the cutting means OPC.

NOTE The hazards from failure of the OPC system as well as use of performance level (PL) are under review.

From a complete stop position, restart of the cutting-means rotation shall require two separate and distinct actions. Activation of the OPC shall be one of the actions. If these actions are to be carried out using the same hand, then the actions shall be separate and dissimilar to prevent accidental restarting of the cutting means.

If the OPC is reactivated before the cutting means have stopped, the cutting means can resume operation if there is sufficient kinetic energy to restart the engine.

Automatic or single-action stopping and starting of the cutting means shall be allowed during continuous operation of the OPC.

Compliance shall be checked by functional test and inspection.

4.4 Handle

4.4.1 Distance

There shall be a horizontal distance of at least 450 mm from the rear part of the handle, which serves as a barrier between the operator and the nearest point of the cutting means, and the nearest point of the cutting means (dimension 1 in [Figure 2](#)).

There shall also be positive means (e.g. latch or upper stop) which cannot be unintentionally disengaged during normal operation of the lawnmower, to prevent dimension 1 in [Figure 2](#) from becoming less than 450 mm.

Additionally, there shall be a rear wall of the cutting-means enclosure and a 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 2](#));

For a handle distance of 750 mm or more, this rear wall can be replaced by a trailing shield which shall be provided at the rear of the lawnmower and shall extend to not more than 6 mm above a level supporting surface at all cutting heights. For cutting widths less than 762 mm, the trailing shield shall have a composite width, including wheels, within the width of the cut area, of at least 90 % of the width of cut. For cutting widths greater than or equal to 762 mm, the trailing shield shall have a minimum composite width of 90 % of the distance between the wheels.

Compliance shall be checked by inspection..

4.4.2 Pivoting

A pivoting handle 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 shall be checked by inspection.