INTERNATIONAL STANDARD

ISO 5395-3

Second edition
2013-09-01

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

Part 3: Ride-on lawnmowers with seated operator

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

Partie 3: Tondeuses à gazon à conducteur assis

Reference number
ISO 5395-3:2013(E)

COPYRIGHT PROTECTED DOCUMENT

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

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 5395-3 was prepared by the European Committee for Standarization (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 5395-3, together with ISO 5395-1 and ISO 5395-2, 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.

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

Part 3: Ride-on lawnmowers with seated operator

1 Scope

1.1 This part of ISO 5395 specifies safety requirements and their verification for combustion-engine-powered ride-on (seated) rotary lawnmowers and cylinder lawnmowers (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;

— cutting-means assembly when used in combination with an agricultural tractor;

— electrically powered and battery-powered lawnmowers.

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

1.3 This part of ISO 5395 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 3776-2:2013, *Tractors and machinery for agriculture — Seat belts — Part 2: Anchorage strength requirements*

ISO 3776-3:2009, *Tractors and machinery for agriculture — Seat belts — Part 3: Requirements for assemblies*

ISO 5353, *Earth-moving machinery, and tractors and machinery for agriculture and forestry — Seat index point*

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

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

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*

ISO 21299:2009, *Powered ride-on turf care equipment — Roll-over protective structures (ROPS) — Test procedures and acceptance criteria*

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 ride-on 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 part of ISO 5395. An audible warning device (for example, a 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 General

Separate controls shall be provided for the traction drive and cutting-means engagement.

Directional control mechanisms that cause forward and reverse propulsion as well as forward and reverse speed control shall have a neutral position.

Except for lever-steer lawnmowers, when released, a traction drive speed control shall automatically return to the neutral position or shall be capable of being overridden by the service brake.

Foot control pedals shall have slip-resistant surfaces or other means of minimizing the possibility of the operator's foot slipping off the control pedal.

Except for lever-steer lawnmowers, forward/reverse directional controls shall require at least one of the following:

a) a distinct change in direction of the control actuation (for example, right angle to general path of control motion) at a point before a change in direction occurs; or

b) a distinct change in force level at the point of entry into the selected direction; or

c) a positive means of retarding machine acceleration, for example hydrostatic control with valves operated by rigid linkages.

The traction drive and cutting means shall automatically stop or disengage when the operator leaves the operating position.

Compliance shall be checked by functional test and inspection to demonstrate that it meets the above requirements.

The location of operator controls, to be operated from the operator's position during grass cutting, shall be within the zones of Figure 1 for an operator in the required operator position.

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.

For the seated operator, the operator control zone is established with the seat in the rear-most position.

NOTE ISO/TS 15079[10] gives useful information about location and operation of operator controls.

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

— height-of-cut setting;

— fixed cutting-means setting or adjustment;

— grass catcher discharge opening;

— hydrostatic bypass valve;

— engine-starting controls which meet 4.2.3;

— engine-stopping controls if separate from cutting-means stopping control;

— parking brake.

Compliance shall be checked by inspection and measurement.

Dimensions in millimetres, tolerances ± 3 mm

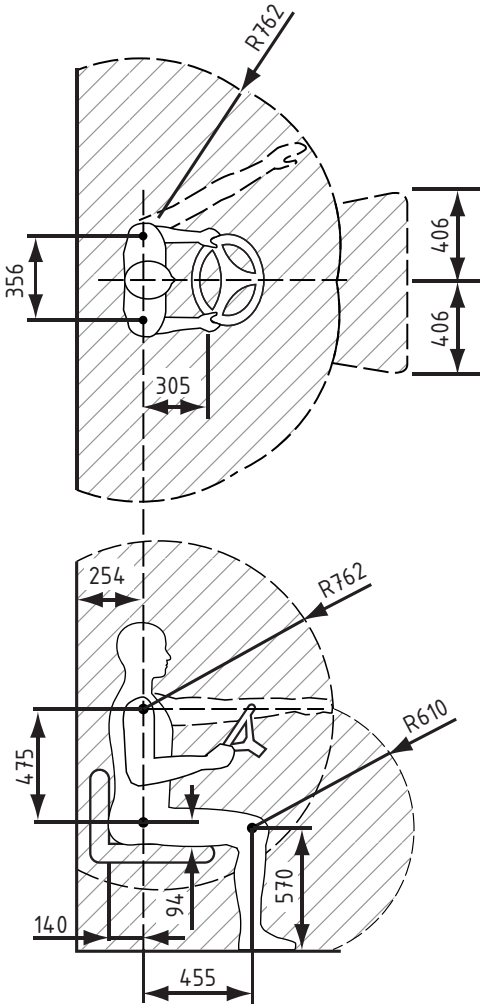


Figure 1 — Operator control zone for seated operator

NOTE 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.

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 without replacing or reconfiguring engine speed control components.

Compliance shall be checked by inspection and measurement.

4.2.3 Engine-starting device

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 is not allowed.

For battery started engines, the start switch shall be operated by a removable key or a similar device to prevent unauthorized starting.

The engine shall only start if the:

— operator is in position or parking brake is applied; and

— traction drive and cutting means are disengaged.

Compliance shall be checked by functional test and inspection.

4.2.4 Engine-stopping device

An engine-stopping device shall be provided. The device shall not depend on sustained manual pressure for its continued operation.

NOTE An emergency stop device is not required.

Compliance shall be checked by functional test and inspection.

4.2.5 Steering wheel

If the lawnmower is equipped with a steering wheel, when moving forward a clockwise rotation shall effect a right turn and counter-clockwise rotation shall effect a left turn.

During operation, the steering mechanism shall not lock in any position.

Compliance shall be checked by functional test and inspection.

4.2.6 Lever steering and motion controls

4.2.6.1 General

If the lawnmower is equipped with lever(s) for directional control, movement of the lever(s) forward shall result in forward motion, and movement of the lever(s) rearward shall result in rearward motion. If the operator releases the levers while in the rearward position, the directional controls shall automatically return to the neutral position or the machine's rearward motion shall stop.

Compliance shall be checked by functional test and inspection.

4.2.6.2 Lawnmower with two control levers

Movement of the right lever shall control the right drive wheel. Movement of the left lever shall control the left drive wheel. The lawnmower shall turn right when the left lever is displaced further in the direction of the machine travel than the right lever. The lawnmower shall turn left when the right lever is displaced further in the direction of the machine travel than the left lever.

Compliance shall be checked by functional test and inspection.

4.2.6.3 Lawnmower with a single control lever

For the lawnmower with lateral displacement for the steering control, the lawnmower shall turn right when the lever is moved to the right. The lawnmower shall turn left when the lever is moved to the left.

For the lawnmower with rotational displacement for the steering 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.

4.2.7 Traction speed and braking control

If the lawnmower is equipped with lever(s) for traction speed and braking, then increased displacement of the lever(s) shall produce increased traction speed. A neutral position shall be provided. Lever motion in a direction opposite that of machine travel shall be accepted as engagement of the service brakes.

Compliance shall be checked by functional test and inspection and tested according to the brake test in 4.4.1.

4.3 Operator presence control (OPC)

4.3.1 General

The lawnmower shall be fitted with an operator presence control device which:

— meets the category 1 requirements in ISO 13849-1:2006, Clause 6; and,

— requires activation by the operator before the lawnmower's traction and cutting-means drive systems can be started; and

— requires continuous activation by the operator to allow rotation of the cutting means and the activation of the traction drive; and

— automatically activates the stopping of the cutting-means rotation and traction drive when the operator leaves the operating position used when cutting grass.

NOTE The hazards from failure of the OPC system, use of performance level (PL) and difficulty to neutralize the OPC, as well as the use of a slope indicator, are under review.

From a complete stop position, restarting of 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 without the operator leaving the operator's position and before the cutting means and/or traction drive have stopped, the cutting-means and/or traction drive 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 Brakes

4.4.1 Service brake performance

4.4.1.1 Requirements

The lawnmower shall be equipped with a service brake.

The service brake shall meet the following requirements:

— the service brake performance shall only rely on the effectiveness of the braking system; and

— the service brake control device shall be located within the operator control zone (see Figure 1) 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; and

— for lawnmowers with a maximum speed up to and including 13 km/h, the service brake shall be capable of stopping the lawnmower's motion 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; and

— for lawnmowers with a maximum speed greater than 13 km/h, the service brake shall be capable of stopping the lawnmower's motion so that the average measured stopping distance in metres does not exceed $0{,}015 \bullet v^2$ where v is the maximum speed in km/h forward speed and maximum reverse speed, if a reverse traction drive is provided.

The service brake system can be provided by a hydrostatic, electric or mechanical drive.

Compliance shall be checked by functional test and inspection and tested in accordance with 4.4.1.2.

4.4.1.2 Service brake test

a) The tests shall be conducted on a lawnmower:

   1) in its heaviest design configuration as available from the manufacturer, with grass catcher filled to its maximum volumetric capacity with material of density 150 kg/m^3 ± 10 kg/m^3; and

   2) with full fuel tanks; and

   3) with pneumatic tyres inflated to the maximum recommended pressures for the lawnmower; and

   4) with brakes adjusted in accordance with the manufacturer's instructions; and,

   5) with a 90 kg ± 0,5 kg operator, or an equivalent weight. The operator, if present, shall sit or stand upright without any intentional leaning in any direction during the test.

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

c) First condition the service brake system 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 brakes shall be applied to stop the machine 10 times from maximum forward speed, and 10 times from maximum reverse speed.

d) If the lawnmower is equipped with separate traction clutch and service brake controls, the traction clutch shall be simultaneously disengaged with the service brake engagement.

e) After the conditioning procedure has been completed, the service brake test shall be conducted three times in the forward direction of travel and, if provided with a reverse traction drive, repeated three times in the reverse direction of travel.

f) Operate the lawnmower at its maximum ground speed and apply a maximum force of:

   1) 220 N to the centre of the grip area of the hand control; or

   2) 450 N for a foot-operated service brake on lawnmowers not having a backrest on the seat; or

   3) 600 N for a foot-operated service brake on lawnmowers with a backrest on the seat.

   NOTE The forces 220 N, 450 N and 600 N are considered as maximum forces that can be applied to meet the test requirements. The operating forces during normal use would, in general, be less.

g) Measure the stopping distances for each brake test and calculate the average value for each direction tested.

4.4.2 Service brake strength

4.4.2.1 Requirement

Except for hydrostatic or electric drive systems the service brake system shall, without loss of function, withstand an overload of applied force which shall be:

— 1 670 N ± 50 N for foot-operated brakes; or

— 625 N ± 25 N for hand-operated brakes.

Compliance is verified by applying the force for 5 s on each brake control, in the direction of brake actuation. After release of the applied force on the brake control, the service brake system shall meet the requirements of 4.4.1.1.

4.4.3 Parking brake

4.4.3.1 Requirements

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

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 can 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 on lawnmowers not having a backrest on the seat; or

— 600 N for a foot-operated parking brake on lawnmowers with a backrest on the seat.

NOTE The forces 220 N, 330 N, 450 N and 600 N are considered as maximum forces that can be applied to meet the test requirements of 4.4.3.2. The operating forces during normal use would, in general, be less.

The unlocking force shall be minimum 100 N and shall not exceed the maximum specified actuating force or shall require two dissimilar actions.

Compliance shall be checked by functional test and inspection and tested in accordance with 4.4.3.2.

4.4.3.2 Parking brake test

a) The tests shall be conducted on the same lawnmower and under the same conditions as in the service brake test. The transmission shall be in neutral and the engine shall be stopped. If so equipped, the hydrostatic bypass valve shall be in the normal working position of the machine.

b) The tests shall be conducted 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.

c) A 90 kg ± 0,5 kg operator, or equivalent weight, shall be positioned on the lawnmower seat. If an equivalent weight is used, it shall be securely fastened to the seat to simulate an operator. The centre of gravity of the mass shall be 150 mm ± 5 mm above the lowest point of the operator supporting surface of the seat and 250 mm ± 5 mm forward of the seat back. If a seat back is not used, the forward measurement of 250 mm ± 5 mm shall be measured from the back of an actual seated operator.

d) The parking brake shall be applied.

e) The test shall be conducted for a period of 5 min, or if the parking brake is hydrostatic, the test period shall be 60 min.

4.5 Guards

4.5.1 Detaching or opening of guards

The opening or detaching of guards shall require the use of a tool except for:

a) interlocked guards, in accordance with ISO 14119, which prevent access before the moving parts have come to a complete stop. While the hazardous part is exposed, it shall not be possible to apply power to it;

b) the opening of automatically closing guards for grass discharge chutes. Such a guard shall remain in its operating position when:

   1) the lawnmower is operated on the coconut matting of ISO 5395-1:2013, E.6; and

   2) the cutting means are engaged and operated at maximum operating engine speed; and

   3) the cutting means are adjusted to the lowest and highest cutting positions;

c) engine compartment access of machines where the operator presence control stops the engine.

Fixed guards shall be fixed by systems that can be opened or removed only with tools. A fixed guard that has to be removed as a part of maintenance procedures as described in the instruction handbook, shall be retained by fixing system that shall remain attached to the guard or to the machinery when the guard is removed.

Where possible, fixed guards shall be incapable of remaining in place without their fixings.

Compliance shall be checked by functional test and inspection. Compliance via the foot protection test in 5.3.2 shall be determined with the lawnmower engine and cutting means stopped.

4.5.2 Prevention of contact with a power-driven component

Power-driven components, except the cutting means and ground-contacting parts, shall be guarded so they are not accessible according to Annex B.

Requirements for cutting means are given in Clause 5 for rotary lawnmowers and Clause 6 for cylinder lawnmowers.

Outside the testing zones defined in Annex B, access to moving power-driven components shall comply with the requirements of ISO 13857:2008, 4.2.4.1 or 4.2.4.3, Table 4.

Compliance shall be checked by inspection and functional test in accordance with Annex B.

4.5.3 Prevention of operator contact with moving power-driven components from the driving position

All moving power-driven components, except the cutting means and ground-contacting parts, shall be guarded to prevent contact with these components during normal operation for grass cutting.

Requirements for cutting means are given in Clause 5 for rotary lawnmowers and Clause 6 for cylinder lawnmowers.

Any openings which could, if not controlled, allow access to moving power-driven components, except the cutting means and ground-contacting parts, within the reach zone of the upper limbs shall comply with ISO 13857:2008, 4.2.4.1 and 4.2.4.3.

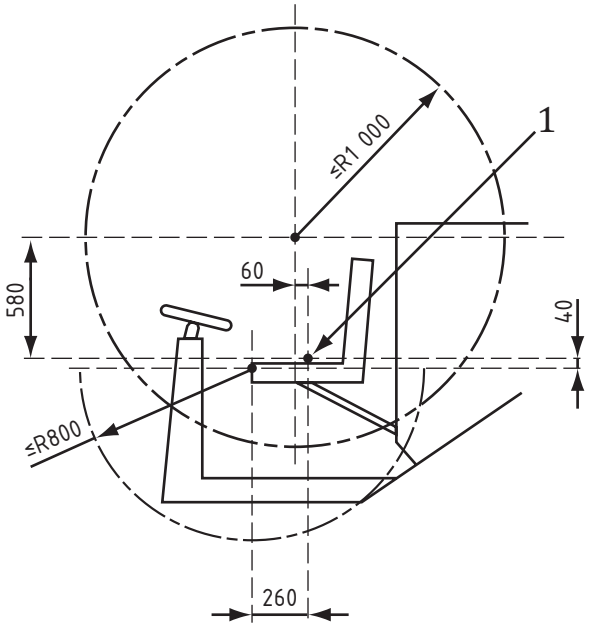
— The reach zone for upper limbs is defined as a sphere of 1 000 mm radius with its centre 60 mm forward of and 580 mm above the seat index point (SIP) as defined in ISO 5353. (See Figure 2.)

Any openings which could, if not controlled, allow access to moving power-driven components, except cutting means and ground-contacting parts, within the reach zone of the lower limbs, shall conform to ISO 13857:2008, 4.3.

— The reach zone for the lower limbs is defined as a sphere of 800 mm radius with its centre 260 mm forward of and 40 mm below the SIP as defined in ISO 5353. (See Figure 2.)

Compliance shall be checked by inspection and measurement.

Dimensions in millimetres with tolerance of ±3 mm



Key

1 seat index point (SIP) as defined in ISO 5353

Figure 2 — Reach zones for seated operator's upper and lower limbs

4.5.4 Guards used as steps

4.5.4.1 Requirements

When a guard is positioned and of such design that it is likely to be used as a step during normal use, it shall withstand a downward force of 1 200 N ± 20 N, without showing any visible signs of breaking, cracking or permanent deformation, and shall not be distorted to the extent that it comes into contact with moving parts.

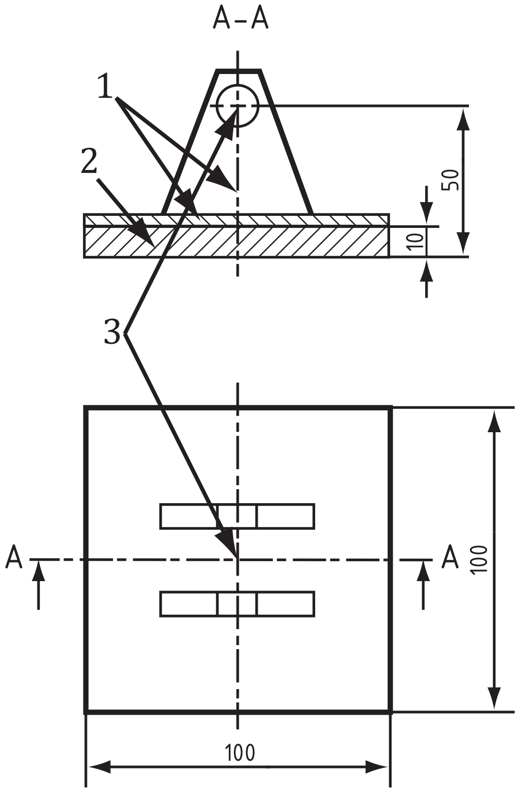
Compliance shall be checked by inspection and by functional test in accordance with 4.5.4.2.

4.5.4.2 Verification

The lawnmower shall be on a hard horizontal surface.

The load shall be applied by means of a pad with dimensions as shown in Figure 3. The pad shall be placed on the most unfavourable area of the guard to be tested. The pad is to be placed to allow it to pivot around the force application point to maximize contact with the guard. Where the guard being tested is smaller than the pad, it is not necessary that the entire pad be on the guard. The force shall be applied slowly and steadily, without dynamic effect, vertically downward, and maintained for 30 s at the point indicated in Figure 3, even if the guard is not horizontal.

Dimensions in millimetres with tolerance ± 2mm



Key

1 steel sufficiently strong enough to avoid deflection during testing

2 rubber layer approximately 20 Shore A

3 force application point

Figure 3 — Test pad for guards used as a step

4.6 Stability

4.6.1 General

Except as specified in 4.6.2 and 4.6.3, lawnmowers without a grass catcher shall have a lateral stability of at least 25° and a longitudinal stability of at least 30°. Lawnmowers with a grass catcher shall have a lateral and longitudinal stability of at least 20° with the grass catcher filled.

Additionally, lawnmowers with a high-tip grass catcher (see Figure A.1) shall, in the fully raised position prior to dumping, have a lateral and longitudinal stability of at least 5°.

Compliance shall be checked by functional test in accordance with Annex A.

4.6.2 Zero-turn lawnmowers with mid-mounted cutting means

All lawnmowers with zero-turn capability and a mid-mounted cutting-means assembly and equipped with ROPS shall have a longitudinal stability of at least 25° and a lateral stability of 20°.

Compliance shall be checked by functional test in accordance with Annex A.

4.6.3 Lawnmowers with front or rear attachment

Lawnmowers with a front- or rear-mounted cutting attachment shall have a longitudinal stability of 30° with the front or rear attachment resting on the tilt-table supporting surface at the beginning of the test.

For the same lawnmower, a lift-off before 30° shall be allowed with the cutting attachment in the fully raised position, but only if this cutting attachment provides a positive stop preventing the lawnmower from tilting more than an additional 20° from the horizontal.

Compliance shall be checked by functional test in accordance with Annex A.

4.7 Rollover protective structure (ROPS)

All lawnmowers with a mass of ≥ 600 kg shall be fitted with a ROPS.

NOTE Lowering the mass limit for requiring a ROPS as well as the use of a slope indicator is under study.

All lawnmowers with zero-turn capability and a mid-mounted cutting-means assembly (rear engine transmission steer lawnmowers with two rear-drive wheels, front caster wheels) and a mass of ≥ 400 kg shall be fitted with a ROPS.

Lawnmowers other than those with zero-turn capability and a mid-mounted cutting-means assembly and with a mass of ≥ 400 kg to < 600 kg and with a lateral or longitudinal stability of ≤ 30° shall be fitted with a ROPS.

A ROPS is not required on lawnmowers with a mass of < 400 kg.

The mass is defined as the mass of the lawnmower in working order, with all fluid levels full, without grass catcher or with an empty grass catcher if the grass catcher is a standard equipment with the lawnmower, and with the heaviest cutting-means assembly but excluding the mass of the operator, optional ballast weights, additional wheel equipment, other special equipment and loads.

For lawnmowers with an operator who sits astride a seat with unobstructed egress to the rear, a ROPS is not required.

If fitted, the ROPS shall comply with ISO 21299.

Compliance shall be checked by inspection.

4.8 Seat belts

If the lawnmower is fitted with a ROPS, the lawnmower shall also be fitted with a seat belt. The seat belt shall comply with ISO 3776-2 and ISO 3776-3.

Compliance shall be checked by inspection and measurements and tested according to ISO 3776-2 *and* ISO 3776-3.

4.9 Seats and foot rests

4.9.1 Seat dimensions

Except for lawnmowers where the operator sits astride the frame and holds handlebars, the following apply.

— Lawnmowers provided with a seat and with a cutting width less than or equal to 1 200 mm, the operator seat shall have a support at least 115 mm high at the rear above the seating surface. The seat shall be at least 400 mm wide.

— Lawnmowers provided with a seat and with a cutting width greater than 1 200 mm, the operator seat shall be at least 450 mm wide, and shall have a back support at least 260 mm high at the rear above the seating surface. The seat shall also have a total longitudinal adjustment of at least 50 mm.

Compliance shall be checked by inspection.

4.9.2 Foot rest strength

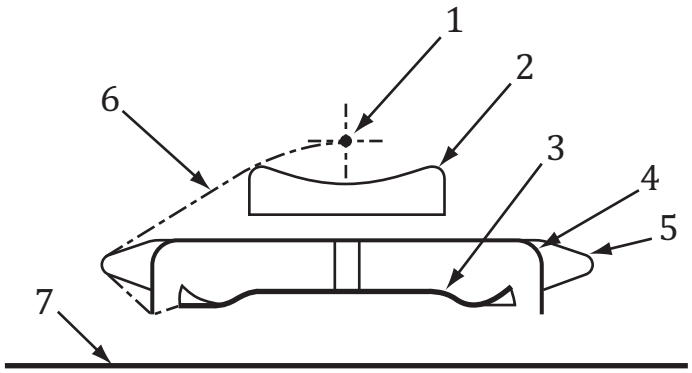
There shall be a floor or foot rest, provided for the operator's feet, able to withstand a downward force of 1 200 N ± 20 N as specified in the requirements of 4.5.4.1. A slip-resistant surface shall be provided to minimize the possibility of an operator's foot slipping off the support or platform.

Compliance shall be checked by inspection and by functional test in accordance with 4.5.4.2.

4.9.3 Seat Position

For all ride-on lawnmowers, the seat index point shall be at least 500 mm from the cutting-means tip circle for rotary lawnmowers, or the cutting-means cylinder for cylinder lawnmowers, measured as a chain dimension around any fixed components (see Figure 4).

Compliance shall be checked by inspection.



Key

1 seat index point
2 seat
3 cutting means (rotary or cylinder)
4 cutting-means enclosure
5 fixed component
6 chain dimension – seat index point to cutting-means tip circle
7 ground surface

Figure 4 — Example of chain distance measurement

4.10 Transport position of the cutting-means assembly

4.10.1 Disengagement of the cutting means

If movement of the cutting means to the transport position changes the position of any part of the cutting-means tip circle, or of the contact line of a cylinder cutting means, to a position above 400 mm from the ground, then the cutting-means drive shall be automatically disengaged or require manual disengagement before the cutting means can be raised above 400 mm.

When there is a designated transport position below 400 mm and where the height of any part of the cutting-means tip circle, or the contact line of a cylinder cutting means, is less than 400 mm, there shall be a means of disengaging the cutting-means drive while the traction drive is engaged.

Compliance shall be checked by inspection.

4.10.2 Manual movement to the transport position

Handles shall be provided if the cutting-means assembly is to be moved manually to the transport position. The force required for manual movement from working position to the transport position shall not exceed 250 N.

Compliance shall be checked by inspection and measurement.

4.10.3 Securing in the transport position

The cutting-means assembly shall be capable of being held in the transport position by secure means, for example by latches.

Compliance shall be checked by inspection.

4.10.4 Movement from the transport position

When moving the cutting means from the transport position to the working position, it shall not be possible to engage the drive to the cutting means unless:

— the operator is in the operating position; and

— the cutting-means tip circle or the contact line of a cylinder cutting means is within 400 mm of the ground; and

— there is a deliberate activation of the drive to the cutting means by the operator.

Compliance shall be checked by inspection and measurement.

4.11 Separate fan for grass collection

If a lawnmower is equipped with a fan to assist grass collection, it shall be provided with:

— a device that will automatically stop fan rotation when the operator leaves the operator position. This device can be the same as the one provided for the stopping of the cutting means by the operator presence control (OPC) (see 4.3); or

— interlocked guards on the collection device which prevent access to the fan during the removal or opening of the grass catcher, before it has come to a complete stop.

Compliance shall be checked by functional test and inspection.

4.12 Hot surfaces

Engine exhaust components or their guards with a surface temperature greater than 90 °C for non-metallic materials or 80 °C for metallic materials, and that are accessible during normal operation shall be guarded from inadvertent contact so that the tip or conical surface of cone A or B shall not contact any individual area of 10 cm^2 or more of the hot surface.

Compliance shall be checked by the test of ISO 5395-1:2013, Annex H *where the requirement is that the tip or conical surface of cone A or B is not contacting any individual area of 10 cm^2 or more of the hot surface.*

4.13 Exhaust fumes

Engine exhaust fumes shall be directed away from the operator when in the operating position. On machines equipped with an operator enclosure, the engine exhaust shall be directed away from any air inlets of the enclosure.

Compliance shall be checked by functional test and inspection.

4.14 Pressurized components of hydraulic systems

Hoses, pipes, couplings, pressure relief valves and other pressurized components that operate at a maximum working pressure greater than 5 000 kPa and located less than 1 000 mm of the operator control zone shall be located or shielded so that, in the event of a rupture, the fluid cannot be discharged directly onto the operator when in the normal operating position.

The same requirements apply to pressurized components with a working pressure of 500 kPa to 5 000 kPa and within 1 000 mm of the operator control zone and where the temperature of the pressurized fluid exceeds 50 °C when operated at an ambient temperature of 20 °C ± 5 °C.

Compliance shall be checked by inspection and measurement.

4.15 Liquid spillage

4.15.1 Requirements

A lawnmower with an operator enclosure shall have the fuel system filler opening located outside the enclosure.

Liquid containers, batteries, fuel systems, oil reservoirs, and coolant systems shall be designed and constructed so as to prevent spillage when the lawnmower is in a tilted position during normal operation. There shall be no leakage from the filling openings.

Compliance shall be checked by inspection and by the test given in 4.15.2.

4.15.2 Spillage test

The liquid container, battery, fuel system, oil reservoir or coolant system shall be filled to its maximum as specified by the manufacturer in the instruction handbook.

The lawnmower shall be tilted for 1 min at 20° lateral with the right side downhill and again with the left side downhill.

Repeat the test when tilted for 1 min at 20° longitudinal, with the front downhill and again with the rear downhill.

Weeping at vent systems is not considered as spillage.

4.16 Electrical system

4.16.1 Electrical cables and wiring (including high tension cables)

Electrical cables shall be protected if located in a position of potentially abrasive contact with metal surfaces, or lubricants or fuel. The lawnmower wiring assembly shall, where possible, be grouped together, and shall be supported and located so that no portion is in contact, except for electrical connections, with the fuel system, fuel lines, exhaust system or moving parts. High tension cables shall be supported and located so that no portion is in contact, except for electrical connections, with the carburettor, fuel lines, exhaust system or moving parts. Any edges of metal parts or components with the potential to contact the electrical cables or wiring shall be rounded or shielded to prevent possible abrasion or cutting damage to the cables or wiring.

Compliance shall be checked by inspection.

4.16.2 Starting battery installation

Battery compartments shall have openings to provide ventilation. If drainage is provided, acid from the battery in any of the normal operating positions shall not contact parts that will be affected to the extent that a hazard will be created. The compartment need not be a complete enclosure, but shall be designed so that the described drainage hazards are avoided. It shall be possible to disconnect the battery electrical circuit, for example with common tools, a switch, or tool-less quick connect systems.

Compliance shall be checked by inspection.

4.16.3 Overload protection

All circuits, except the starter motor and high-tension ignition circuits, shall be provided with an overload protection device in the ungrounded line of a single wire system near the battery terminal, or in either wire of a two-wire system.

Compliance shall be checked by inspection.

4.16.4 Terminals and electrical parts

Terminals and un-insulated electrical parts and two-wire non-grounded systems shall be protected against short-circuiting.

Compliance shall be checked by inspection.

4.16.5 Ignition circuits (spark ignition engines)

A control to stop the spark ignition engine by interruption of the ignition or grounding of the magneto shall be provided and shall be fitted on the low-voltage side.

Compliance shall be checked by inspection.

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.

Compliance shall be checked by the finger probe test (probe B) of IEC 61032:1997*.*

4.17 Electromagnetic immunity

All electronic components used in the systems to control the machine shall meet the acceptance criteria of ISO 14982:1998, 6.3 and 6.6 concerning electromagnetic immunity.

Compliance shall be checked by testing according to ISO 14982:1998*,* 6.3 and 6.6*.*

4.18 Noise

4.18.1 Reduction by design, at source and by protective measures

Noise reduction shall be an integral part of the design process thus specifically taking into account measures at the source. The success of the applied noise reduction measures is assessed on the basis of the actual noise emission values.

The main sources causing and influencing noise are generally the air intake system, engine cooling system, engine exhaust system, cutting system, and vibrating surfaces. See ISO/TR 11688-1[5] for general technical information and guidance for the design of low-noise machines. Special care shall be taken in the acoustical design of machine.

NOTE ISO/TR 11688-2[6] gives useful information on noise generating mechanisms in machinery and ISO 14163[9] gives guidelines for noise control by silencers. ISO 11691[7] and ISO 11820[8] can be used for testing of the silencer.

4.18.2 Noise measurements

Where required to be declared, emission sound pressure levels and sound power levels including the uncertainties shall be determined in accordance with ISO 5395-1:2013, Annex F.

NOTE The provision of this information is mandatory only when required by regional regulations.

4.19 Vibration

4.19.1 Reduction by design, at source and by protective measures

Vibration reduction shall be an integral part of the design process thus specifically taking into account measures at the source. The success of the applied vibration reduction measures is assessed on the basis of the actual vibration values.

The main sources causing and influencing vibration are generally the dynamic forces from the engine, cutting means, unbalanced moving parts, impact in gear sprockets, bearings and other mechanisms, travelling surface, speed, tyre pressure and the interaction between operator, machine and material being worked.

NOTE CR 1030-1[1] gives general technical information and guidance for the reduction of hand-arm vibration on machines.

4.19.2 Vibration measurements

Where required to be declared,

— the vibration total value to which the hand-arm system is subjected and the uncertainty of measurement shall be determined in accordance with ISO 5395-1:2013, Annex G

— the highest root mean square value of frequency-weighted acceleration to which the whole body is subjected and the uncertainties of measurements, shall be determined in accordance with ISO 5395-1:2013, Annex G.

NOTE The provision of this information is mandatory only when required by regional regulations.

5 Particular requirements for ride-on rotary lawnmowers

5.1 Cutting means

5.1.1 Reverse operation

Except for zero turn lawnmowers and machines with only front-mounted cutting-means assemblies, lawnmowers with a cutting width less than 1 500 mm shall be provided with means that limits reverse drive operation with powered cutting means to ground speed no greater than 0,3 m/s.

An override capability can be provided to permit reverse drive with powered cutting means at ground speed greater than 0,3 m/s. If an override capability is provided, the override shall automatically deactivate when at least one of the following three actions occurs:

— the cutting means is (are) re-engaged; or

— the engine is restarted; or

— the directional control is moved from the reverse position.

Compliance shall be checked by functional test and inspection.

5.1.2 Stopping time and durability

The cutting-means rotation shall stop within the maximum time specified in Table 1.

Table 1 — Cutting-means stopping time

Lawnmower cutting width mm	**Max stopping time** s
≤ 1 200	5
> 1 200	7

Compliance shall be checked in accordance with ISO 5395-1:2013, Annex A.

5.1.3 Imbalance

5.1.3.1 Requirements

The lawnmower shall withstand an imbalanced cutting means. No part of the lawnmower shall loosen, break up or be ejected if they are necessary for compliance with the requirements of this part of ISO 5395. Nor shall any other component or part of the lawnmower pass through all layers of a target panel when tested according to 5.1.3.2.

Compliance shall be checked by inspection and tested in accordance with 5.1.3.2

5.1.3.2 Imbalance test

The lawnmower shall be tested with the target panel arrangement described in ISO 5395-1:2013, E.7.2. Lawnmowers shall be tested on a smooth hard horizontal level surface.

The cutting-means imbalance, in kilogram-metres, shall be 0,024 d^3, where d is the diameter of the cutting-means tip circle, in metres. The calculated imbalance shall be created by removing material from, and/or adding it to, the cutting means until the desired imbalance is obtained.

The lawnmower shall be run at the maximum operating engine speed for 60 min for each cutting means. All cutting-means assemblies of a multi-spindle lawnmower shall be tested individually unless the

manufacturer chooses to test them all simultaneously, which shall be allowed. When testing the cutting-means assemblies on a multi-spindle lawnmower, a new lawnmower can be used for each test.

If the lawnmower fails to complete the 60 min run without stoppage, because of failures not related to loss of structural integrity caused by imbalance of rotating parts, but otherwise meets the requirements of this clause (e.g. spark plug lead failure), the lawnmower can be repaired to complete the test.

The test does not require that the lawnmower be suitable for use after test.

5.2 Impact of the cutting means

The lawnmower shall withstand a sudden impact to the cutting means in accordance with ISO 5395-1:2013, Annex B. Any of the following outcomes of the tests required by ISO 5395-1:2013, Annex B, shall be regarded as a failure to meet this requirement:

— target penetration by any part of the lawnmower; or

— breakage of the cutting means or the cutting-means retaining device; or

— detachment from the lawnmower of the cutting means, or of the cutting-means arm or disc on which it is mounted.

Breakage of a drive shearing device or chipping of the cutting-means cutting edge shall not be considered as test failures.

The test does not require that the machine be suitable for use after the test.

Compliance shall be checked by inspection and tested in accordance with ISO 5395-1:2013, Annex B.

5.3 Cutting-means enclosure

5.3.1 Enclosure

The cutting-means enclosure shall extend at least 3 mm below the plane of the cutting-means tip circle at its lowest position, except as allowed for front openings and discharge openings. If portions of the cutting-means securing parts extend below the cutting-means enclosure, these shall be located within the inner 50 % of the cutting-means tip-circle diameter. Any extension of the wall(s) of the cutting-means enclosure adjacent to the discharge opening, including the walls of the discharge chute, not meeting the 3 mm distance requirement, shall be considered as part of the discharge opening. These extensions shall be tested by the foot protection test (see ISO 5395-1:2013, Annex C) and meet all the other discharge opening requirements of this part of ISO 5395.

If openings in the cutting-means enclosure are required, they shall be in the top surface within 150 mm radius of the cutting-means rotational axis. These openings shall meet the requirements of ISO 13857:2008, 4.2.4.1 and 4.2.4.3. If other openings in the cutting-means enclosure are provided (for example, drain holes, tooling holes, attachment mounting holes), the openings shall:

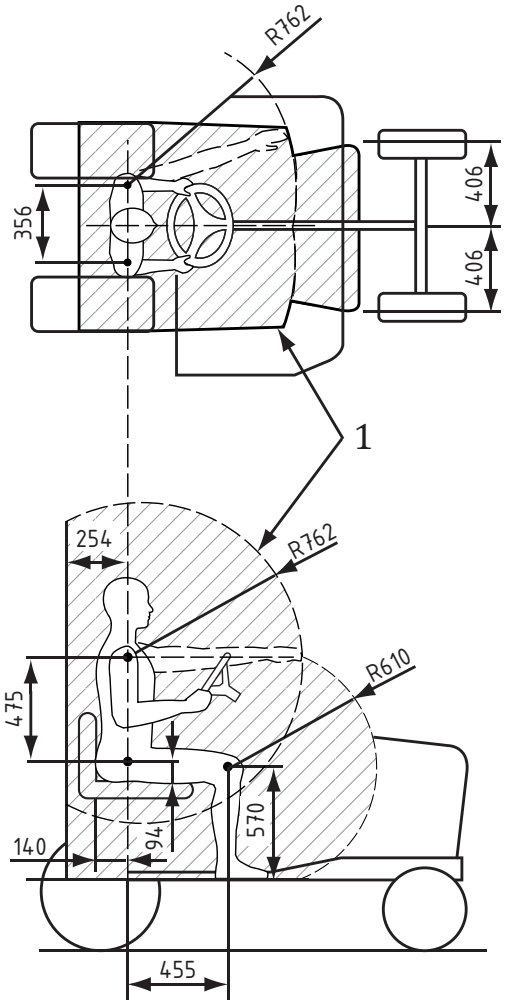
— not exceed a total number of 10; and

— be less than 6 mm in diameter or width; and

— meet the requirements of ISO 13857:2008, 4.2.4.1 and 4.2.4.3; and

— not allow direct line of sight between the operator zone (Figure 5) and the cutting means.

Dimensions in millimetres, tolerances ± 3 mm



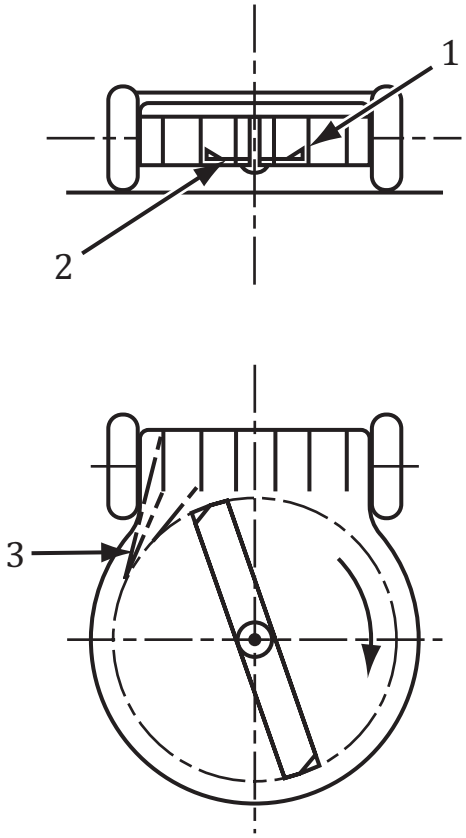
Key

1 Operator zone

Figure 5 — Operator zone

Machines with a front opening shall satisfy the foot protection requirement of 5.3.2. 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 structure.

NOTE Figure 6 shows an example of a structure meeting this requirement.



Key

1 vertical baffles
2 visible cutting means
3 tangential lines from cutting-means tip circle to intersect vertical baffles

Figure 6 — Example of design for front opening

Compliance shall be checked by inspection and measurement.

5.3.2 Foot protection

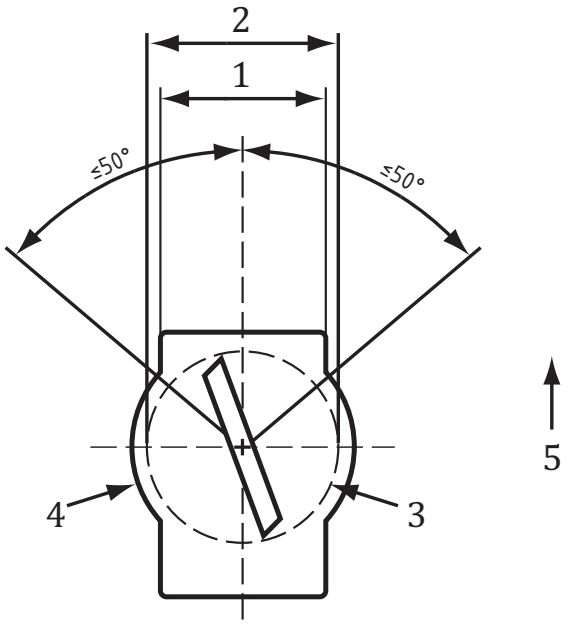
5.3.2.1 Requirements

Any person shall be protected from unintentional foot contact with the cutting means at the following areas of the cutting-means enclosure:

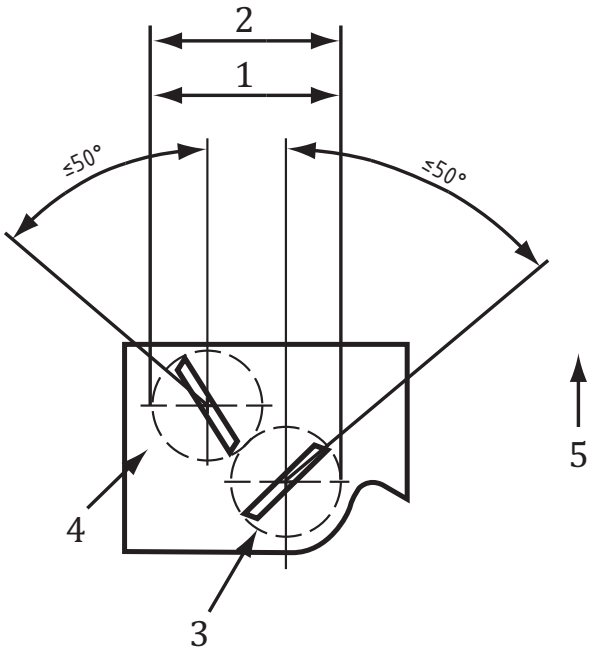
a) dimensions of the front openings in the cutting-means enclosure shall not exceed the smaller of either the cutting width, or the width generated by two radial lines [extending from the cutting-means spindle(s) centre(s) at an angle of 50° either side of the direction of travel] at the points where these lines intersect the enclosure, as shown in Figures 7 a) and 7 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;

Compliance is checked by 5.3.2.2 where the probe shall not enter the path of the cutting-means tip circle.



a) Example of front opening limited by 50° angle



b) Example of front opening limited by width of cut

Key

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

Figure 7 — Determination of the width of the front opening

5.3.2.2 Foot protection test

Protection from contact with cutting means shall be verified by applying the foot protection test in accordance with ISO 5395-1:2013, Annex C to:

a) the front opening, if any;

b) the discharge opening, if any, including:

   1) 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 tip circle at the point of insertion;

   2) the sides of any discharge opening or chute if these are less than 3 mm below the cutting-means tip circle.

5.4 Structural integrity

The cutting-means enclosure, guards and grass catcher shall withstand the impact stresses to which they are subjected when used.

Compliance shall be checked by the test of ISO 5395-1:2013, Annex D *and any of the following outcomes shall be regarded as a 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 enclosure, guards or grass catcher; or

— dislodging of the grass catcher or guard; 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, shall not be considered as a failure.

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

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

5.5 Thrown objects

The cutting-means enclosure, guards and grass catchers shall be designed and constructed in such a way as to minimize the risk of thrown objects in normal use.

Compliance shall be verified according to the test of ISO 5395-1:2013, Annex E. The number of hits in any zone shall not exceed the value shown in Table 2 for each spindle.

Only balls passing completely through all the layers of the panel material shall be considered as hits.

Table 2 — Permissible hits from thrown object test

Target zone as defined in ISO 5395-1:2013, Annex E	**Max allowed number of hits**
From 0 mm to 450 mm	30[a]
of which from 300 mm to 450 mm	6
From 450 mm to 900 mm	0

[a] For lawnmowers with a width of cut greater than 1 200 mm, 40 hits are allowed.

In the event of a test failure, two additional lawnmowers of the same model and configuration can be tested in an attempt to demonstrate compliance. If so, both additional lawnmowers shall be tested, and if either of these fails, the lawnmower shall be considered not to be in compliance with the thrown objects requirement of this part of ISO 5395. It is not required that the lawnmower be suitable for use after this thrown objects test is completed.

5.6 Grass catchers

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

— an interlocked grass catcher or guard which prevents access to the cutting means before it has come to a complete stop according to 5.1.2; or

— access to the discharge opening, after removing the grass catcher, is prevented by a self closing guard that shall return to its normal operating position when the grass catcher is removed.

Compliance shall be checked by functional test and inspection.

6 Particular requirements for ride-on cylinder lawnmowers

6.1 Cutting-means enclosure

6.1.1 Requirements

Cutting means shall be guarded.

It shall not be possible for any part of the rod (6.1.2) to approach closer than 10 mm to any point on the cutting means, with or without a grass catcher attached (see Figure 8). 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 9).

Cutting-means assembly where the grass clippings are thrown without guiding or collecting and 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 10).

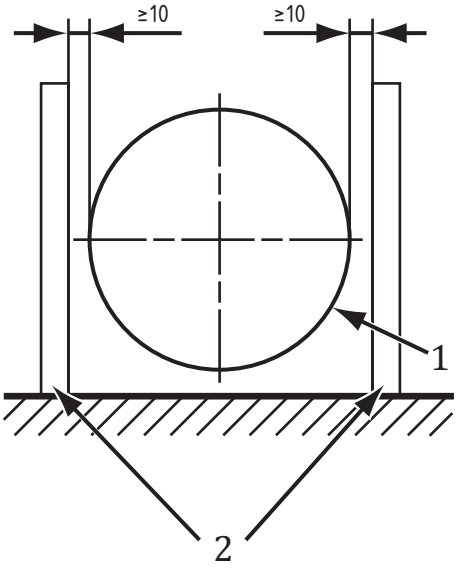
Cutting-means assembly where the grass clippings are discharged at the front shall be covered from the rear with a guard that extends so that its projection on the vertical plane covers from the top of the cutting means to not more than 25 mm from the bottom of the cutting means (see Figure 11).

Compliance shall be checked by inspection and tested according to 6.1.2.

6.1.2 Verification

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

Dimensions in millimetres

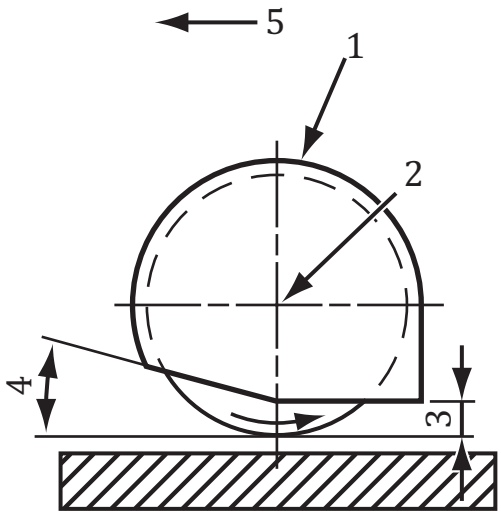


Key

1 test rod

2 cutting cylinder

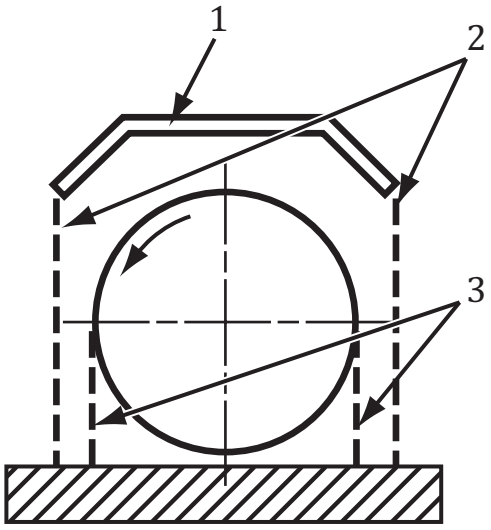
Figure 8 — Guarding for cylinder lawnmowers, general



Key

1 minimum guard contour
2 centre of rotation of the cylinder cutting means
3 height of the guard, rear of centreline (≤25 mm)
4 angle of guard, forward of centreline (≤15°)
5 direction of travel

Figure 9 — Guarding for cylinders, side coverage



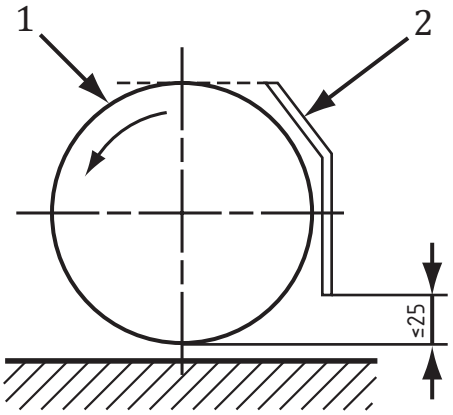
Key

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

NOTE Distance between 2 and 3 > 0.

Figure 10 — Guarding for cylinders, free and rear discharge

Dimensions in millimetres



Key

1 cutting means

2 guard

Figure 11 — Guarding for cylinder lawnmowers, front discharge

6.2 Throw line

Lawnmowers with free discharge or rear discharge openings shall be designed so that the throw line (see definition in ISO 5395-1:2013) does not intersect the vertical plane at the front edge of the driver's seat at a point higher than the seat upper surface, with the seat adjusted to its most unfavourable position and loaded with 90 kg ± 0,5 kg. It shall be ensured that this is satisfied for a width of 400 mm on both sides of the seat centreline.

Compliance shall be checked by inspection and measurement.

6.3 Stopping time of the cutting means

Cutting-means rotation shall stop within 7 s.

Compliance shall be verified according to the test of ISO 5395-1:2013, Annex A.

The stopping time shall be measured from the moment of release of the cutting-means operator presence control or disengagement of the cutting-means manual control until the cutting-means rotation has stopped.

7 Information for use

7.1 Instruction handbook

7.1.1 General

For the information to be provided to the user the content of this clause together with ISO 12100:2010, 6.4, apply as applicable.

7.1.2 Technical data

The instruction handbook shall give at least the following technical information for each lawnmower model, where required to be declared.

NOTE The provision of this information is mandatory only when required by regional regulations.

Nominal power	kW
Maximum operating engine speed (rotational frequency)	min^{-1}
Machine mass with empty tanks and in normal operating configuration	kg
Cutting width	cm
Equivalent A-weighted emission sound pressure level at the operator position, determined in accordance with ISO 5395-1:2013, Annex F	dB (A)
— together with the measurement uncertainty	dB (A)
A-weighted sound power level, determined in accordance with ISO 5395-1:2013, Annex F	dB (A)
— together with the measurement uncertainty	dB (A)
For hand-arm vibrations, the equivalent vibration total value for each handle or hand position determined in accordance with ISO 5395-1:2013, Annex G	m/s^2
— together with uncertainty of stated values	m/s^2
For whole body vibrations, the highest root mean square value of weighted acceleration determined in accordance with ISO 5395-1:2013, Annex G	m/s^2
— together with uncertainty of stated values	m/s^2

Sales literature describing the machinery should not contradict the instructions as regards health and safety aspects. Sales literature describing the performance characteristics of machinery should not contradict the same information on noise emissions and vibration values as are contained in the instruction handbook.

7.1.3 Other information

The instruction handbook shall contain, in accordance with ISO 12100:2010, 6.4.5, comprehensive instructions and information on all aspects of operator/user maintenance and the safe use of the lawnmower, including type and use of personal protective equipment (PPE), suitable clothing and the need for training in all manual operations. The instructions shall take into account use of a lawnmower by a first-time and/or inexperienced operator.

Extensive use should be made of safety signs and/or diagrams. ISO 3600[2] gives guidance on the structure of the handbook.

The importance of reading the instruction handbook thoroughly before using the lawnmower shall be stressed in the instruction handbook.

Terms used in all documentation shall be in accordance with this standard.

The instruction handbook shall at least cover information relating to the following:

a) assembly instructions, initial adjustments and checks, including description of method to install the blade assembly;

b) transport, handling and storage of the lawnmower, including:

   1) instruction for parking and storage including cleaning and maintenance before storage;

2) instructions for securing during transport to prevent loss of fuel, damage or injury;

c) preparation of the lawnmower, including:

1) information about the maximum levels for all liquid containers and battery;

2) information about filling of fuel and oil, especially concerning fire precautions;

3) assembling instructions, initial adjustments and checks, including description of method to install the blade assembly;

4) recommended tyres and pressures and approved tyre combinations for different wheel track-widths;

5) information regarding regular maintenance, pre-operating procedures and daily maintenance routines and consequences of improper maintenance;

d) information regarding the lawnmower, including:

1) description, identification and nomenclature of principal parts including the safety devices and explanation of their function;

2) explanation of symbols and safety signs;

3) a list of recommended blades, including a warning of possible consequences from using non-genuine parts;

4) where required to be declared, noise levels in accordance with 7.1.2, including warning about the risks and measures to be taken to minimize those risks;

NOTE 1 The provision of this information is mandatory only when required by regional regulations.

5) where required to be declared, vibration values in accordance with 7.1.2, including warning about the risks and measures to be taken to minimize those risks;

NOTE 2 The provision of this information is mandatory only when required by regional regulations.

e) the use of the lawnmower, including:

1) instructions regarding inspection of the mowing area and the need to remove foreign objects such as stones, toys, sticks and wires;

2) instructions to mow only when there is good visibility and the need to keep bystanders away;

3) warning about operating the lawnmower in slopes and near drop-offs, ditches or embankments;

4) warning about mowing in reverse;

5) instructions regarding starting procedure and the operation of all controls;

6) instructions for ensuring that all starting interlocks and operator presence controls are properly functioning including necessary regular checking;

7) instructions that the lawnmower safety systems or features shall not be tampered with or disabled;

8) instructions that the operator shall not alter or tamper with any sealed adjustments for the engine speed control;

9) the procedure(s) for properly adjusting the lawnmower with a warning about the danger of moving blade assemblies;

10) instruction about required ballast, if applicable;

11) the need for adequate training, including prohibited operations and warning against the use of the unit while being tired, ill or under influence of alcohol or other drugs;

12) instructions about stopping and parking procedures before leaving the operator's position;

13) where appropriate, cautions for such items as: "the lawnmower shall not be operated without either the entire grass catcher or self-closing discharge opening guard in place";

14) information to use slip-resistant foot protection as well as suitable clothing;

15) instructions regarding exposure to noise, selection and use of hearing protection, including recommendations for limiting the duration of operation, if appropriate;

16) instructions regarding exposure to vibration, including recommendations for limiting the duration of operation, if appropriate;

17) hazards which may be encountered while using the lawnmower and how to avoid them while doing typical tasks, e.g. blockage;

18) warning about the emission of exhaust gases;

19) warning about the use of the lawnmower when there is a risk for lightning;

f) maintenance of the lawnmower, including:

1) appropriate user maintenance information shall be provided;

2) instructions to do servicing and replacement tasks with the engine shut off, including the need to keep the lawnmower in good working condition;

3) the provision of sufficient information to enable the user to maintain all safety systems throughout the life of the product and to explain the consequences of improper maintenance, use of non-conforming replacement components, or the removal or modification of safety components;

4) instructions for de-energizing stored energy devices, if applicable, (for example, spring-loaded mechanisms) and maintenance of engine cooling hydraulic systems;

5) information on hydraulic components (if applicable); more specifically, that hydraulic fluid escaping under pressure can penetrate and seriously damage the skin, requiring immediate medical assistance;

6) instructions to check and replace worn or damaged parts;

7) instruction on how to verify the blade stopping device(s) are functioning as intended;

8) specifications of the spare parts to be used, when these affect the health and safety of the operator in particular the cutting means.

Compliance shall be checked by inspection.

7.2 Markings and warnings

7.2.1 Marking requirements

The lawnmower shall be marked with the following minimum information:

a) business name and address of the manufacturer or where appropriate, his authorized representative;

The address can be simplified as long as the manufacturer (and where applicable, his authorized representative) can be identified. In any event, the address on the plaque shall be sufficient for mail to reach the company.

b) designation of the machine;

The designation of the machinery can be achieved by a combination of letters and/or numbers.

c) where required to be marked, year of construction that is the year in which the manufacturing process is completed;

d) designation of the series or type;

The designation of the series or type is to allow the technical identification of the product and this can be achieved by a combination of letters and/or numbers and can be combined with the designation of the machinery.

e) where required to be declared, the mass in kilograms of the machine with empty tanks;

f) where required to be declared, the nominal power in kilowatts;

NOTE The provision of this information is mandatory only when required by regional regulations.

g) the serial number.

In addition, the lawnmower shall bear the following information:

— controls which can give rise to a hazard when operated shall be marked or so placed as to indicate clearly which part of the machine they control.

For rotary lawnmowers, the cutting means shall be marked for identification with the part number and manufacturer, importer or supplier.

If symbols are used, they shall be explained in the instruction handbook.

When symbols are used, they shall, except if they are cast, embossed or stamped, be in contrast to their background. Embossed features shall be at least 0,3 mm in height. The information and/or instructions provided by the symbols shall be clearly legible when viewed by from a distance of (500 ± 10) mm.

The markings shall be located in a readily visible position and shall resist the anticipated service conditions, e.g. the effects of moisture, and weathering exposure. Labels after testing in accordance with no less than one of the test methods of 7.2.3 shall show no significant indications of indentation, separation, splitting, chalking, swelling, peeling, edge curling, blistering, flaking, large scratches or cracking of the material and/or its graphical components.

Compliance shall be checked by inspection and functional test in accordance with 7.2.3.

7.2.2 Warning requirements

All lawnmowers shall be marked with warnings with the substance of the following:

— “WARNING: READ INSTRUCTION HANDBOOK!”;

— “WARNING: KEEP BYSTANDERS AWAY”;

— “WARNING: KEEP HANDS AND FEET AWAY FROM THE BLADES”;

— “WARNING - Do not use this machine on slopes greater than Y”.

“Y” is determined individually for each machine and may be stated as degree of angle, (e.g. 20 °) or percentage of slope (e.g. 30 %) but cannot be more than the 60 % of the lowest measured lateral or longitudinal stability angle.

When a guard is positioned that it is likely to be used as a step during normal use but not designed for that purpose, it shall be marked with “DO NOT STEP”.

The text can be replaced by safety signs, see examples in ISO 11684.[4] If safety signs are used, they shall be explained in the instruction handbook.

The warnings shall be located in a readily visible position close to the hazard and shall resist the anticipated service conditions, e.g. the effects of temperature, moisture, fuel, oil, abrasion and weathering exposure.

When symbols are used, they shall, except if they are cast, embossed or stamped, be in contrast to their background. Embossed features shall be at least 0,3 mm in height. The information and/or instructions provided by the symbols shall be clearly legible when viewed by from a distance of (500 ± 10) mm.

The markings shall be located in a readily visible position and shall resist the anticipated service conditions, e.g. the effects of temperature and weathering exposure. Labels after testing in accordance with no less than one of the test methods of 7.2.3 shall show no significant indications of indentation, separation, splitting, chalking, swelling, peeling, edge curling, blistering, flaking, large scratches or cracking of the material and/or its graphical components.

Compliance shall be checked by inspection and functional test in accordance with 7.2.3.

7.2.3 Artificial weathering test

All markings and warnings according to 7.2 (except if they are embossed, cast, moulded) shall be tested according to:

— the open-flame carbon lamp accelerated weathering test of ISO 17398:2004, 7.3.2; or

— the xenon-arc artificial weathering resistance test of ISO 17398:2004, 7.3.4.

Other test methods can be used, provided the method ensures at least equivalent label durability.

Annex A
(normative)

Ride-on lawnmower stability test

A.1 General

This annex specifies the test method to evaluate the stability of the ride-on lawnmower.

A.2 Preparation

A.2.1 Ballast and tanks

No ballast, except as required for normal operation, shall be added to the machine. Lawnmower attachments and cutting-means assemblies shall be placed in its most unfavourable position allowed by the instruction handbook. Any fluid tanks shall be either full or empty, whichever is the most unfavourable condition.

A.2.2 Tyres

The machine shall be equipped with the tyre size and wheel track-width setting that gives the most unfavourable test condition. Pneumatic tyres shall be inflated to the maximum pressure recommended in the instruction handbook for normal operation. Stability requirements shall apply for all tyre combinations at all wheel track-width settings recommended in the instruction handbook.

A.2.3 Wheels

All wheels shall be locked to prevent rotation about their axles, and the machine shall be loose-tethered and secured to prevent excessive sliding or tip-over.

A.2.4 Steel strips

Steel strips, approximately 1 mm thick, 50 mm wide and of sufficient length to extend beyond the tyre footprint, shall be placed under each uphill tyre of the machine being tested. The strips shall be positioned parallel to the axis of rotation of the tyres.

A.2.5 Operator simulation

A mass of 90 kg ± 0,5 kg shall be securely positioned on the seat and secured to the chassis to simulate an operator. The centre of gravity of the mass shall be 150 mm ± 5 mm above the lowest point of the operator supporting surface of the seat and 250 mm ± 5 mm forward of the seat back. If a seat back is not used, the forward measurement of 250 mm ± 5 mm shall be measured from the back of an actual seated operator.

A.2.6 Seat

Seats which are adjustable (for example, up and down, fore and aft) shall be placed in their most unfavourable position for the test being conducted.

A.2.7 Grass catcher

The catcher shall be tested both empty and filled to its maximum volumetric capacity with a material of 150 kg/m^3 ± 10 kg/m^3 density in the most unfavourable position.

If a lawnmower can be fitted with a high-tip grass catcher (see Figure A.1), it shall be tested empty in the normal operating position as noted above, and the high-tip grass catcher shall also be tested in the fully raised position filled to its maximum volumetric capacity with a material of 150 kg/m^3 ± 10 kg/m^3 density.

As an alternative to filling the grass catcher to its maximum volumetric capacity with a material of 150 kg/m^3 ± 10 kg/m^3 density, an equivalent mass can be positioned and secured inside the grass catcher at its volumetric centre of gravity.

A.3 Testing

A.3.1 General

Place the machine on a variable-slope, single-plane tilt table with the machine supported on its own wheels. The table shall be capable, without significant bending, of tilting along one edge and supporting the weight of the machine in test configuration. The table surface shall have a coefficient of friction sufficient to prevent the machine tyres from sliding on the surface when the table is tilted as required for the test.

When a means is provided to transfer weight to or from a cutting-means assembly in its functional position, the stability shall be checked with the machine state that presents the most unfavourable test condition. This condition might require that the engine is running during the test.

Position the lawnmower on the tilt table according to A.3.2 and A.3.3. Unless otherwise indicated, tilt the table until lift-off occurs and record the slope angle.

Lift-off occurs when the steel strip can be pulled from under the last uphill tyre using a force of 10 N ± 2 N.

A.3.2 Longitudinal stability

Position the machine on the tilt table with its longitudinal centreline perpendicular to the tilt axis of the table. All steerable wheels and caster wheels shall be held in the straight-ahead position. Articulated machines shall be held in the straight-ahead position

Lift the tilt table until lift-off occurs or until the stability requirement has been met or exceeded, with the machine front facing:

a) downhill with the seat in its most forward position; and

b) uphill with the seat in its most rearward position.

A.3.3 Lateral stability

Position the machine on the tilt table so that a line through the centre of the footprint of the two downhill tyres is parallel to the tilt axis of the table. All steerable and caster wheels shall be held in the most unfavourable position. Articulated machines shall be held in the straight-ahead position

Lift the tilt table until lift-off occurs or until the stability requirement has been met or exceeded, with the machine:

a) left-hand side downhill; and

b) right-hand side downhill.

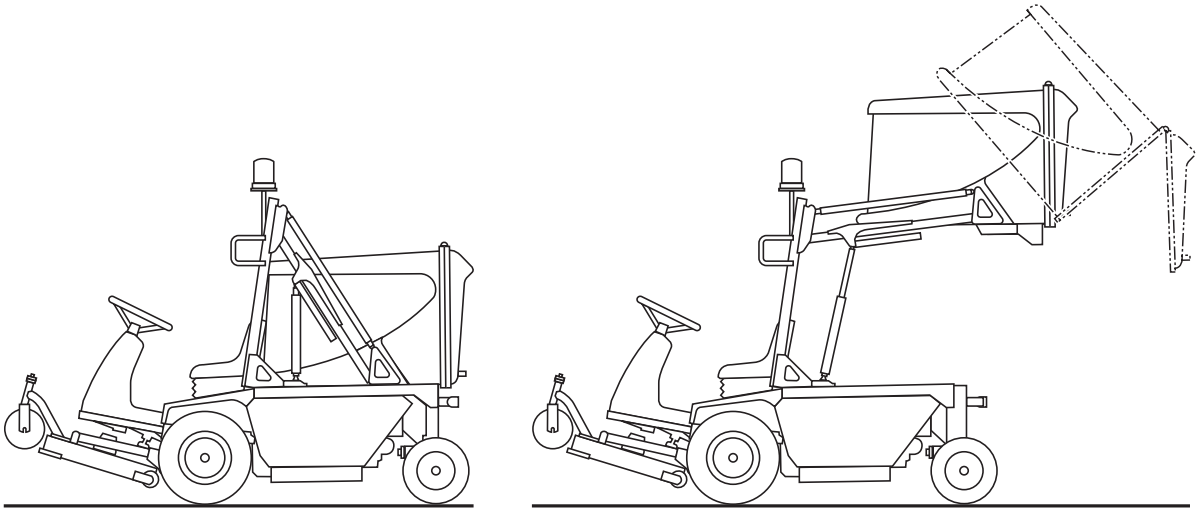


Figure A.1 — Example of a high-tip grass catcher in the normal material collection operating position and also the fully raised high-tip position

Annex B
(normative)

Determination of contact with moving power-driven components

B.1 General

This annex specifies the test method to determine contact with moving power-driven components.

B.2 Definition of the testing zones (frame envelope)

The testing zone (frame envelope) is the volumetric zone defined by the space under and within the perimeter of the lawnmower chassis, footrests or other fixed structural components. (See examples in Figures B.1, B.2 and B.3)

The height of the testing zone shall follow the contour of these structural components and may vary in different areas of the lawnmower, but shall be limited to a maximum height of 400 mm from the lawnmower supporting surface.

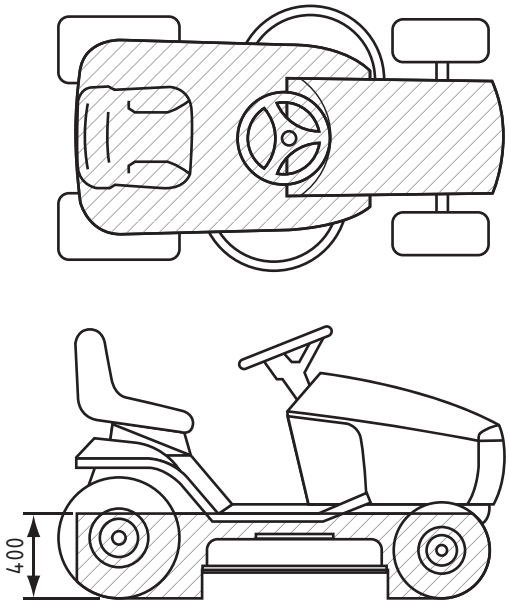


Figure B.1 — Example of frame envelope for mid-mounted cutting attachment

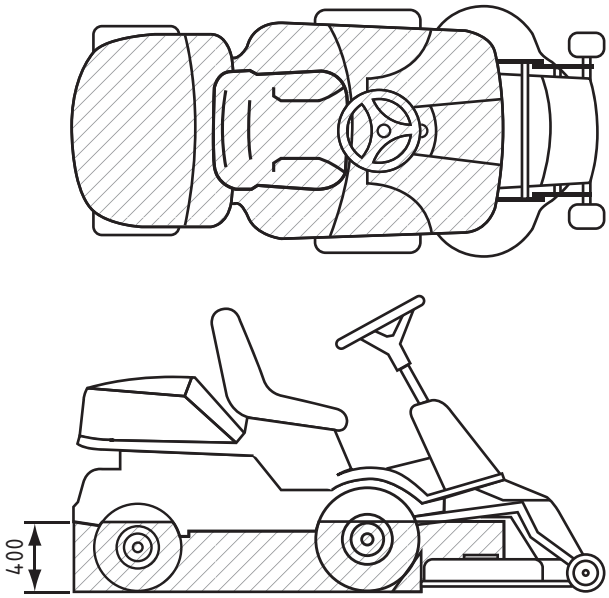


Figure B.2 — Example of frame envelope for front-mounted cutting attachment and rear steering

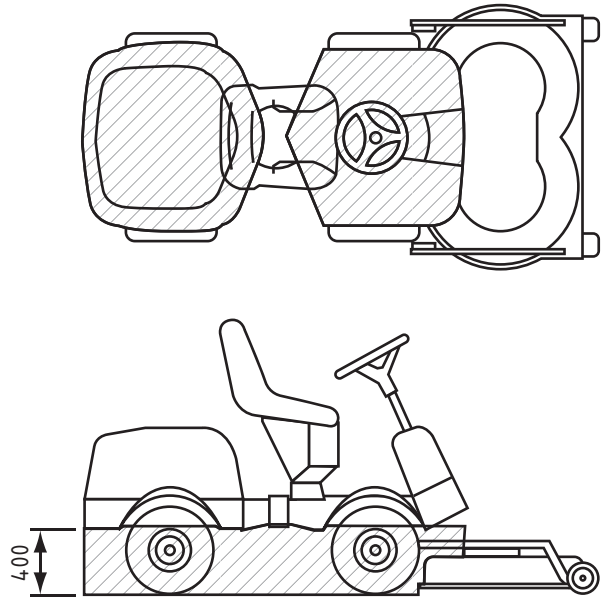
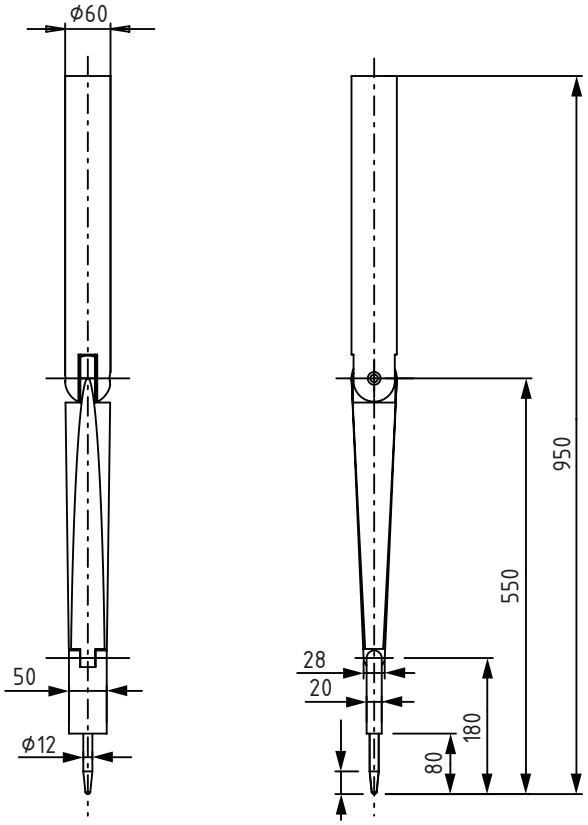


Figure B.3 — Example of frame envelope for articulated front-mounted cutting attachment

B.3 Test probe

The test probe shall have dimensions according to Figure B.4 and shall have a joint representing the elbow.

Dimensions in millimetres



Key

1 elbow joint
2 wrist joint (not flexible)
3 finger joints (not flexible)

Figure B.4 — Test probe

B.4 Test procedure

The test probe, see Figure B.4, positioned as shown in Figures B.5 and B.6 shall be used to determine access to moving power-driven components

With the upper arm always held in a vertical position, the probe shall be applied until contact is made with a guard or the perimeter of the frame envelope (see Figures B.1, B.2 and B.3). With the upper arm vertical, the fore arm can be pivoted and moved during the insertion:

— from horizontal position downwards within the limit of 180° of the angle formed with the upper arm (see Figure B.5); and

— laterally within a limit of 90° on each side of its axis (See Figure B.6).

The test probe shall be applied inwards with a maximum force of 20 N.

The probing shall be carried out with the lawnmower on a smooth and hard horizontal surface and:

— in all possible mowing configurations, as indicated in the instruction handbook;

— with the cutting-means enclosure adjusted in all cutting height positions;

— the wheels in the straight ahead position.

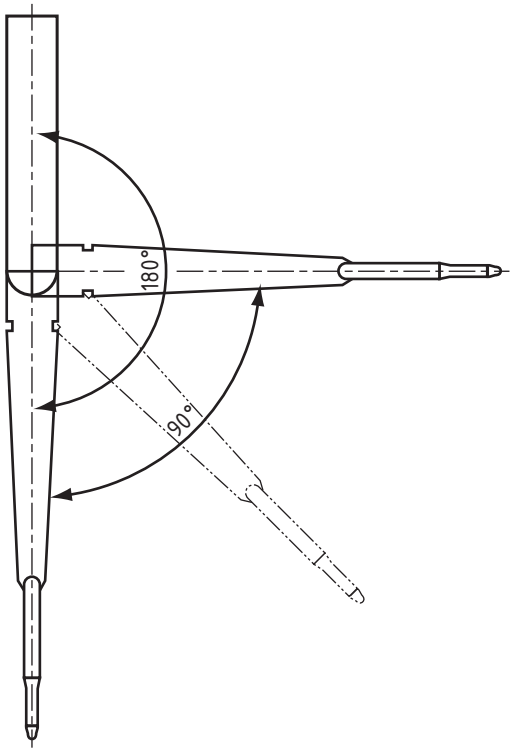


Figure B.5 — Arm probe/side view

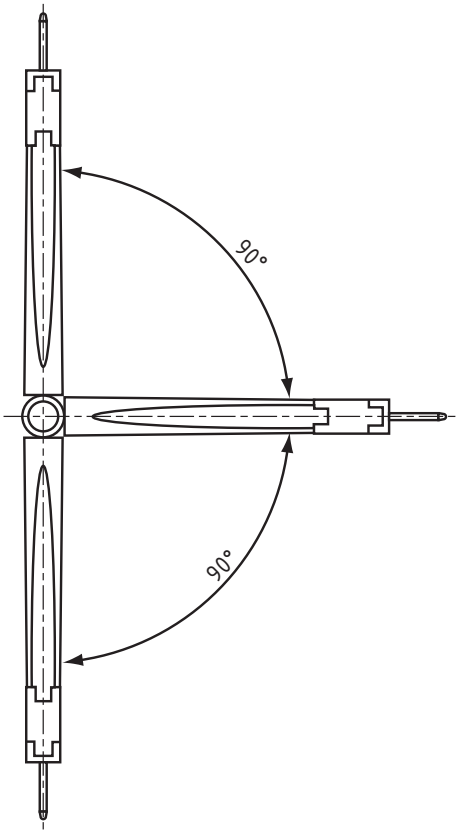


Figure B.6 — Arm probe/top view

Annex C
(informative)

List of significant hazards

Table C.1 specifies the significant hazards, significant hazardous situations and significant hazardous events that have been identified as being significant to the types of machines covered by this part of ISO 5395 and which require specific action by the designer or manufacturer to eliminate or reduce the risk.

Table C.1 — List of significant hazards associated with ride-on lawnmowers

Ref. No.	Origin (source)	Potential consequences	Subclause of this part of ISO 5395
	Mechanical hazards		
1	Moving cutting-means assembly (e.g. mower deck)	Crushing of lower extremities	4.10, 5.1.2, 5.3, 5.4, 6
2	Rotary cutting means	Cutting or severing of upper and lower extremities	4.10. 5.1.2, 5.2, 5.3, 5.4, 5.6, 7.2.1, 7.2.2
3	Cylinder cutting means	Shearing of upper and lower extremities	4.10, 6, 7.2.2
4	Separate fan for grass collection	Cutting or severing of upper extremities	4.11
5	Moving transmission parts	Entanglement, drawing-in, crushing, cutting, severing of upper and lower extremities	4.5
6	Thrown objects from cutting means	Injury from impact of ejected objects	5.1.3, 5.2, 5.4, 5.5, 6.1, 7.2.2
7	Instability/overturning of machine	Injuries due to crushing by uncontrolled movements of machine	4.4, 4.6, 4.7, 4.8
8	Traction control system failure resulting in impossibility of stopping the machine in the best possible conditions	Injuries due to crushing by or collision with uncontrolled machine	4.2.1. 4.2.5, 4.2.7, 4.3, 4.4, 5.1.1
9	Engine control system malfunction or controls resulting in unexpected start-up with the cutting means engaged, unexpected over-run/over-speed	Shearing, cutting, severing or entanglement of upper and lower extremities	4.2.1, 4.2.2, 4.2.3, 4.2.4, 4.3, 4.10.1, 4.17
10	Hydraulic system	Injury from high pressure fluid injection	4.14, 7.1.3
	Electrical hazards		
11	Live parts of electrical system	Injuries from electric shock to the body	4.16, 7.1.3
12	Lightning	Injuries from electric shock to the body	7.1.3
	Thermal hazards		
12	Hot engine parts	Injury from burns and scalds from accidental contact	4.12, 7.1.3
	Noise hazards		
13	Engine, transmission and cutting means including resonance of fixed machine parts	Discomfort, partial hearing loss, deafness, loss of balance, loss of awareness, stress	4.18, 7.1.3, 7.2.2
	Vibration hazards		

Table C.1 *(continued)*

Ref. No.	Origin (source)	Potential consequences	Subclause of this part of ISO 5395
14	Engine failure, handles, foot controls, steering wheel and seats	Discomfort, low-back morbidity, neurological, osteo-articular and vascular disorders, trauma of the spine	4.19, 7.1.3
	Material/substance hazards		
15	Engine exhaust gases, gasoline, brake and battery liquids	Respiratory problems through inhalation of harmful gases and injuries to the skin from contact with harmful liquids	4.13, 4.15, 7.1.3
	Ergonomic hazards		
16	Location and design of controls, handles, seats, steering wheel, platforms, footboards, etc.	Discomfort, fatigue, injuries to locomotor apparatus, injuries from contact with moving parts	4.2, 4.3, 4.9, 4.10.2, 7.1.3, 7.2.1
	Hazards associated with the environment in which the machine is used		
17	Footboards under wet conditions	Slip, trip and fall of operator	4.2.1, 4.9.2
	Combination of hazards		
18	Poor postures or excessive effort in combination with inadequate design or location of manual controls	Fatigue, injuries to locomotor apparatus	4.2, 4.10.2
19	Long operation, particularly in combination with poor posture	Fatigue, injuries to locomotor apparatus, loss of control	4.4, 7.1.3
20	Hot engine parts/electrical short-circuiting in combination with leaking gasoline tank/ gasoline spilling	Burns and scalds by resulting fire/ explosion	4.15, 4.16, 7.1.3

Bibliography

[1] CR 1030-1, *Hand-arm vibration — Guidelines for vibration hazards reduction — Part 1: Engineering methods by design of machinery*

[2] ISO 3600, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Operator's manuals — Content and presentation*

[3] ISO 3767 (all parts), *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Symbols for operator controls and other displays*

[4] ISO 11684, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Safety signs and hazard pictorials — General principles*

[5] ISO/TR 11688-1, *Acoustics — Recommended practice for the design of low-noise machinery and equipment — Part 1: Planning*

[6] ISO/TR 11688-2, *Acoustics — Recommended practice for the design of low-noise machinery and equipment — Part 2: Introduction to the physics of low-noise design*

[7] ISO 11691:1995, *Acoustics — Measurement of insertion loss of ducted silencers without flow — Laboratory survey method*

[8] ISO 11820, *Acoustics — Measurements on silencers in situ*

[9] ISO 14163, *Acoustics — Guidelines for noise control by silencers*

[10] ISO/TS 15079, *Powered lawn, garden and horticultural equipment — Operator controls — Guidance on actuating forces, displacement, location and methods of operation*

ICS 65.060.70

Price based on 42 pages