International Standard ISO 5395/4

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Power lawn mowers, lawn tractors, and lawn and garden tractors with mowing attachments — Safety requirements and test procedures — Part 4 : Requirements for cylinder (reel) mowers

Tondeuses à gazon à moteur, tracteurs de pelouse, tracteurs de jardin et de pelouse avec équipements de tonte adaptables — Règles de sécurité et méthodes d'essai — Partie 4 : Spécifications des tondeuses à lames hélicoïdales

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Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 5395/4 was developed by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, and was circulated to the member bodies in January 1981.

It has been approved by the member bodies of the following countries :

Australia	Germany, F.R.	Romania
Belgium	India	South Africa, Rep. of
Canada	Iran	Spain
China	Italy	Switzerland
Czechoslovakia	Korea, Dem. P. Rep. of	Turkey
Denmark	Korea, Rep. of	United Kingdom
Egypt, Arab Rep. of	Mexico	USSR
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France	Portugal	

The member bodies of the following countries expressed disapproval of the document on technical grounds :

Austria
Sweden
USA

It incorporates draft Addendum 1, which was circulated to the member bodies in July 1981 and has been approved by the member bodies of the following countries :

Australia	Germany, F.R.	Romania
Austria	India	South Africa, Rep. of
Belgium	Iraq	Spain
Brazil	Italy	Sweden
China	Korea, Dem. P. Rep. of	Switzerland
Czechoslovakia	Korea, Rep. of	United Kingdom
Egypt, Arab Rep. of	Mexico	USA
France	New Zealand	USSR

No member body expressed disapproval of the document.

Power lawn mowers, lawn tractors, and lawn and garden tractors with mowing attachments — Safety requirements and test procedures — Part 4 : Requirements for cylinder (reel) mowers

0 Introduction

This International Standard forms part of a series covering safety requirements and test procedures for power lawn mowers, lawn tractors, and lawn and garden tractors with mowing attachments. The complete list of parts will be as follows :

Part 1 : Definitions.[1]

Part 2 : Basic requirements.

Part 3 : Requirements for rotary mowers.

- Section one : General construction.
- Section two : Test procedures.
- Section three : Pedestrian controlled machines — Requirements.
- Section four : Ride-on (riding) machines — Requirements.
- Section five : Towed units — Requirements.

Part 4 : Requirements for cylinder (reel) mowers.

- Section one : General construction.
- Section two : Test procedures.
- Section three : Pedestrian controlled machines — Requirements.
- Section four : Ride-on (riding) machines — Requirements.
- Section five : Towed units — Requirements.

Part 5 : Noise measurement.[2]

1 Scope and field of application

This International Standard specifies safety requirements and test procedures applicable to powered cylinder (reel) mowers, including pedestrian controlled and ride-on (riding) types, ride-on (riding) lawn tractors, and lawn and garden tractors with mower attachments, and having a width of cut greater than 300 mm.

NOTES

1 This International Standard does not apply to sulky-type attachments, flail mowers, or sickle-bar mowers, and the electrical aspects of electrically-driven machines with rated voltages above 42 V are not covered.

2 Where applicable, the requirements of this International Standard could be applied to professional (commercial) power lawn mowers, lawn and garden tractors and lawn tractors.

3 Safety requirements common to all types of machines are covered by ISO 5395/2.

2 References

ISO 4254, *Agricultural tractors and machinery — Technical means for providing safety*.[2]

ISO 5395, *Power lawn mowers, lawn tractors, and lawn and garden tractors with mowing attachments — Safety requirements and test procedures —*

Part 2 : *Basic requirements.*

Part 3 : *Requirements for rotary mowers.*

1) In preparation.

2) At present at the stage of draft.

Section one : Cylinder (reel) mowers — General construction

3 Guarding and shielding

3.1 Cutting cylinders (reels) shall be guarded on both sides and from front and rear, so that it is not possible for a vertical rod 50 mm in diameter and 500 mm in length, with its lower end in contact with the ground (supporting surface) to approach within 10 mm from any portion of the cylinder blades, when any grass catcher has been removed. (See figure 1.)

3.2 Cutting cylinders (reels) shall be covered at the sides with shields extending at least as shown in figure 2.

3.3 Cutting cylinders (reels) of free discharge and of rear discharge mowers shall be covered from above with a shield that extends so that its projection on the horizontal plane covers at least the projection of the cylinder on the same horizontal plane, when any grass catcher has been removed. (See figure 3.)

3.4 Cutting cylinders (reels) of front discharge mowers shall be covered from the rear and from above with a shield that extends so that its projection on the vertical plane covers at least the projection of the cylinder on the same vertical plane, less up to 25 mm ground clearance, and that its projection on the horizontal plane covers at least the projection from the middle axis to the rear contour of the cylinder on the same horizontal plane, when any grass catcher has been removed. (See figure 4.)

NOTES

1 Free discharge denotes throwing out grass clippings without guiding or collecting.

2 Rear discharge denotes throwing out grass clippings so that they will be collected in a grass catcher which is located behind the cylinder in the rear.

3 Front discharge denotes throwing out grass clippings so that they will be collected in a grass catcher which is located in front of the cylinder.

Section two : Test procedures

4 General test conditions

4.1 The grass surface of the test site shall extend to a length of at least 30 m and shall be level. The grass height shall be approximately five thirds of the maximum adjustable cutting height of the mower under test. The grass surface shall be free of visible moisture.

4.2 The wind velocity on the test site shall not exceed 1,5 m/s, measured at a height of approximately 1 m.

5 Test method — Ejection of cut material

5.1 For pedestrian controlled cylinder mowers, an 800 mm long rod shall be placed above the handle parallel to the cutting cylinder, symmetrically to the longitudinal axis of the handle, so that its upper edge is 1 000 mm above the ground. (See figure 5.)

5.2 For ride-on cylinder (reel) mowers, an 800 mm long rod shall be placed on the upper edge of the driver's seat at the front, symmetrically to the longitudinal axis of the seat. The driver's seat, loaded with 75 kg shall be brought to the lowest and most forward position. (See figure 6.)

5.3 The mower shall mow a level plot of grass that is 30 m long. The cutting height shall be adjusted to the most unfavourable position, giving the highest ejection of grass cuttings.

Ride-on and self-propelled pedestrian controlled mowers shall be operated at maximum mowing speed, but at no more than 8 km/h. Pedestrian controlled mowers which are not self-propelled shall be pushed at the speed of 1 m/s.

5.4 During operation the cut material shall not be ejected higher than 1 000 mm (1 m) above the ground at the steering handle ends for pedestrian controlled cylinder (reel) mowers, and not higher than the front edge of the surface of the driver's seat of ride on cylinder (reel) mowers.

Visual inspection shall determine if the cut grass is thrown over the test rods of 5.1 or 5.2. Single blades of grass thrown over the test rods shall be disregarded.

Section three : Cylinder (reel) mowers pedestrian controlled machines — Requirements

6 Handle structure

6.1 The end of the handle adjacent to the operator shall be at least 450 mm horizontally behind the rear vertical tangent of the cylinder, or 6.2 applies.

6.2 If the end of the handle adjacent to the operator is less than 450 mm horizontally behind the rear vertical tangent of the cylinder, the requirements of a foot probe test shall be fulfilled. The foot probe test shall be the same as that used for rotary mowers (see ISO 5395/3).

7 Safety instructions

A manufacturer shall supply pertinent instructions with the equipment as follows :

a) for petrol engine machines : instructions such as those given below;

b) for mains connected electrically driven machines : instructions such as those given below, revised as necessary to conform with IEC Publication 335/1 or other relevant IEC Publications;

c) for battery powered machines (less than 42 V) : instructions such as those given below and also given in ISO 5395/2-1982 and relevant IEC Publications.

Important

Safe operation practices for walk-behind mowers

7.1 Training

7.1.1 Read the instructions carefully. Be familiar with the controls and the proper use of the equipment.

7.1.2 Never allow children or *people unfamiliar* with these instructions to use the mower. Local regulations may restrict the age of the operator.

7.1.3 Avoid mowing while people, especially children, or pets are nearby.

Keep in mind that the operator or user is responsible for accidents or hazards occurring to other people or their property.

7.2 Preparation

7.2.1 While mowing, always wear substantial footwear and long trousers.

Do not operate the equipment when barefoot or wearing open sandals.

7.2.2 Thoroughly inspect the area where the equipment is to be used and remove all stones, sticks, wires, bones, and other foreign objects.

7.2.3 DANGER — Petrol is highly flammable.

a) store fuel in containers specifically designed for this purpose;

b) refuel outdoors only. Do not smoke while fueling engine;

c) add fuel before starting the engine. Never remove the cap of the fuel tank or add petrol while engine is running or when engine is hot;

d) if petrol is spilled, do not attempt to start the engine but move machine away from the area of spill and avoid creating any source of ignition until petroleum vapours have dissipated.

7.2.4 Replace faulty silencers.

7.3 Operation

7.3.1 Do not operate the engine in a confined space where dangerous carbon monoxide fumes can collect.

7.3.2 Mow only in daylight or in good artificial light.

7.3.3 Avoid operating the equipment in wet grass, where feasible.

Always be sure of your footing on slopes.

Walk, never run.

7.3.4 Mow across the face of slopes, never up and down.

Exercise extreme caution when changing direction on slopes.

Do not mow excessively steep slopes.

7.3.5 Use extreme caution when backing up or pulling the mower towards you.

7.3.6 Stop the blade(s) if mower has to be tilted for transportation, when crossing surfaces other than grass, and when transporting the mower to and from the area to be mowed.

7.3.7 Never operate the mower with defective guards, shields, or without safety devices, for example, deflectors, in place.

7.3.8 Do not change the engine governor settings or overspeed the engine. Operating an engine at excessive speed may increase the hazard of personal injury.

7.3.9 Disengage all blade and drive clutches before starting.

7.3.10 Start the engine or switch on the motor carefully with feet well away from the blade(s).

7.3.11 Do not put hands or feet near rotating parts while the mower is being operated.

7.3.12 *Never* pick up or carry a mower while the engine is running.

7.3.13 Stop the engine and disconnect the spark plug wire :

a) before checking, cleaning or working on the mower;

b) after striking a foreign object (inspect the mower for damage and make repairs before restarting and operating the mower);

c) if mower starts to vibrate abnormally (check immediately).

7.3.14 Stop the engine :

a) whenever you leave the mower;

b) before removing grass catcher;

c) before refuelling;

d) before making height adjustments;

e) before clearing blockages.

7.3.15 Reduce the throttle setting during engine run-out and, if the engine is provided with a shut-off valve, turn the fuel off at the conclusion of mowing.

7.4 Maintenance and storage

7.4.1 Keep all nuts, bolts, and screws tight to be sure the equipment is in safe working condition.

7.4.2 Never store the equipment with petrol in the tank inside a building where fumes may reach an open flame or spark.

Allow the engine to cool before storing in any enclosure.

7.4.3 To reduce fire hazard, keep the engine and silencer free of grass, leaves, or excessive grease.

7.4.4 Check the grass catcher frequently for wear or deterioration.

Replace worn or damaged parts for safety.

Section four : Cylinder (reel) mowers ride on (riding) machines — Requirements

8 Transport

8.1 With the mower sitting on the ground, the rotation of the front centre cylinder of a multiple cylinder machine on which the centre cutting unit can be lifted more than 200 mm shall stop automatically if it is lifted more than 200 mm clear of the ground surface.

8.2 All other cylinders must stop at the transport position.

8.3 Cutting cylinders shall be secured in the transport position by positive means, such as latches, etc.

8.4 If the cutting cylinders have to be brought to the transport position by hand, they shall be provided with appropriate handles.

8.5 The operation of the cutting cylinders shall be independent from the operation of the traction drive, including a separate control for declutching.

9 Safety instructions

A manufacturer shall supply with the equipment pertinent instructions such as given below. For electric aspects of safety, consult relevant IEC documents.

Important

Safe operation practices for ride-on (riding) machines

9.1 Training

9.1.1 Read the instructions carefully. Be familiar with the controls and the proper use of the equipment.

9.1.2 Never allow children or *people unfamiliar* with these instructions to use the mower. Local regulations may restrict the age of the operator.

9.1.3 Do not carry passengers.

Avoid mowing while people, especially children, or pets are nearby.

Keep in mind that the operator or user is responsible for accidents or hazards occurring to other people or their property.

9.2 Preparation

9.2.1 While mowing, always wear substantial footwear and long trousers.

Do not operate the equipment when barefoot or wearing open sandals.

9.2.2 Thoroughly inspect the area where the equipment is to be used and remove all stones, sticks, wires, bones, and other foreign objects.

9.2.3 DANGER — Petrol is highly flammable.

a) store fuel in containers specifically designed for this purpose;

b) refuel outdoors only. Do not smoke while fuelling engine;

c) add fuel before starting the engine. Never remove the cap of the fuel tank or add petrol while engine is running or when engine is hot;

d) if petrol is spilled, do not attempt to start the engine but move machine away from the area of spill and avoid creating any source of ignition until petroleum vapours have dissipated.

9.2.4 Replace faulty silencers.

9.3 Operation

9.3.1 Do not operate the engine in a confined space where dangerous carbon monoxide fumes can collect.

9.3.2 Mow only in daylight or in good artificial light.

9.3.3 Before attempting to start the engine, disengage all cylinder and attachment clutches and shift into neutral.

9.3.4 Do not stop or start suddenly when going uphill or downhill.

Never mow across the face of the slope.

Reduce speed on slopes and in sharp turns to prevent overturning or loss of control.

Exercise extreme caution when on slopes.

9.3.5 Stay alert for holes in the terrain and other hidden hazards.

9.3.6 Use care when pulling loads or using heavy equipment :

a) use only approved drawbar hitch points;

b) limit loads to those you can safely control;

c) do not turn sharply. Use care when backing up;

d) use counterweight(s) or wheel weights when suggested in the owner's manual.

9.3.7 Watch out for traffic when crossing or near roadways.

9.3.8 Stop the blades rotating before crossing surfaces other than grass.

9.3.9 When using any attachments, never direct discharge of material toward bystanders nor allow anyone near the vehicle while in operation.

9.3.10 Never operate the mower with defective guards, shields or without safety protective devices in place.

9.3.11 Do not change the engine governor settings or overspeed the engine. Operating an engine at excessive speed may increase the hazard of personal injury.

9.3.12 Before leaving the operator's position :

a) disengage all clutches and secure cutting units;

b) change into neutral and set the parking brake;

c) stop the engine and remove the key.

9.3.13 Stop the engine and disengage drive to attachments :

a) before refuelling;

b) before removing grass catcher/catchers;

c) before making height adjustment unless adjustment can be made from the operator's position;

d) before clearing blockages;

e) before checking, cleaning or working on the mower;

f) after striking a foreign object (inspect the mower for damage and make repairs before restarting and operating the equipment);

g) if machine starts to vibrate abnormally (check immediately).

9.3.14 Disengage drive to attachments when transporting or not in use.

9.3.15 Reduce the throttle setting during engine run-out and, if the engine is provided with a shut-off valve, turn the fuel off at the conclusion of mowing.

9.3.16 On multi-cylinder machines, take care as rotating one cylinder can cause other cylinders to rotate.

9.4 Maintenance and storage

9.4.1 Keep all nuts, bolts, and screws tight to be sure the equipment is in safe working condition.

9.4.2 Never store the equipment with petrol in the tank inside a building where fumes may reach an open flame or spark.

Allow the engine to cool before storing in any enclosure.

9.4.3 To reduce fire hazard, keep the engine and silencer free of grass, leaves, or excessive grease.

9.4.4 Check the grass catcher/catchers frequently for wear or deterioration.

Replace worn or damaged parts for safety.

Section five : Towed units — Requirements

10 Hitches

Suitable hitch devices with secure couplings shall be provided.

For towed units with over 500 N downward force at the hitch point with the unit fully laden, see ISO 4254.

11 PTO drive shafts to power source

PTO drive shafts shall be protected as follows :

— a guard that cannot rotate with the PTO drive shaft and protects the shaft throughout its length;

— the guard must be firmly mounted, for example, it must be detachable only by means of tools, and can be fitted to the shaft in an undetachable manner.

Other drive means, such as hydraulic, electric or auxiliary power units, shall conform to all applicable requirements provided in this International Standard.

12 Controls

The controls shall be readily accessible, convenient to the operator, and meet the requirements of ISO 5395/2.

Controls shall be so positioned on the towed implement that when the propelling machine is turned or otherwise operated through its maximum operable limitations, the controls do not physically infringe on the operator zone in a hazardous manner.

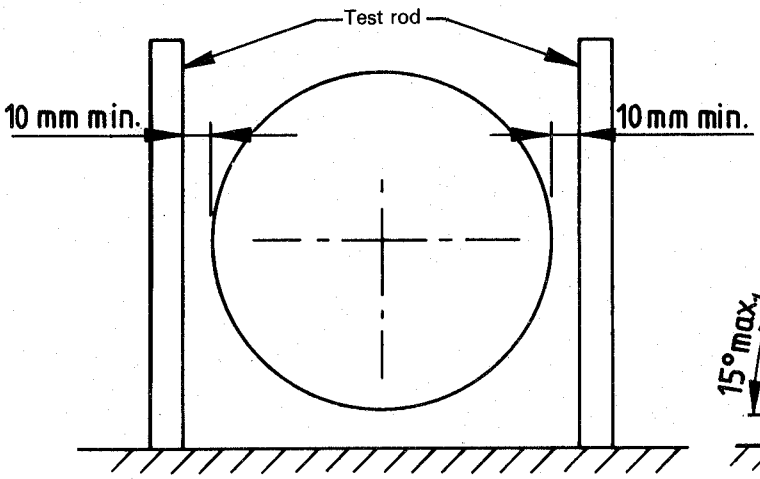

Figure 1 — Guarding cylinders (see 3.1)

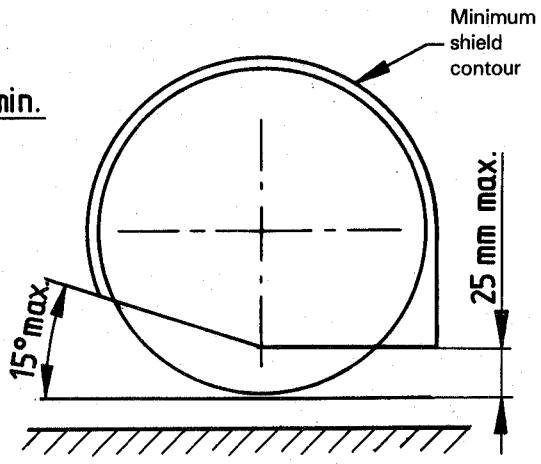

Figure 2 — Lateral coverage of the cylinders (see 3.2)

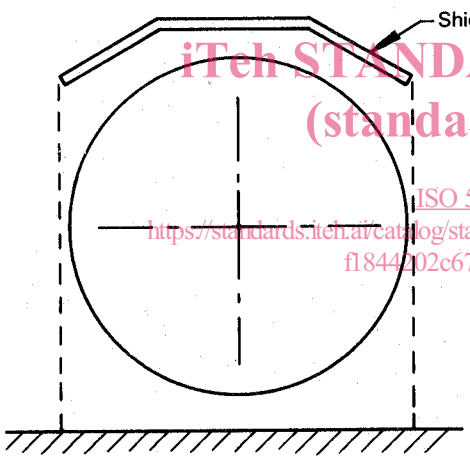

Figure 3 — Guarding cylinders (see 3.3)

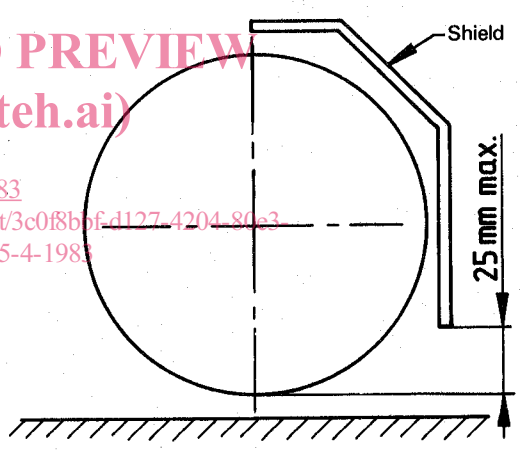

Figure 4 — Guarding cylinders (see 3.4)

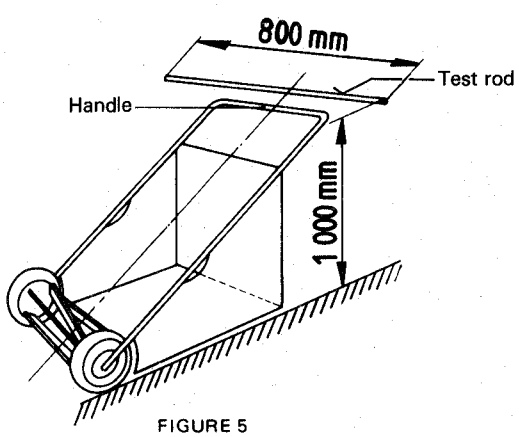

FIGURE 5

Figure 5 — Position of the test rod (see 5.1)

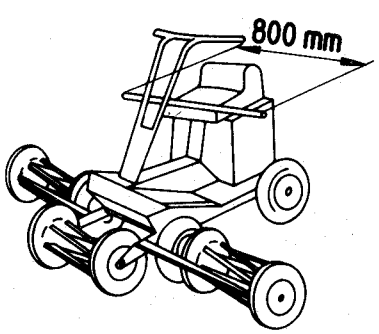

FIGURE 6

Figure 6 — Position of the test rod (see 5.2)