
**Snow throwers — Safety requirements
and test procedures —**

Part 2:
Pedestrian-controlled snow throwers

Chasse-neige — Exigences de sécurité et essais —

Partie 2: Chasse-neige à conducteur à pied

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Contents

	Page
Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Requirements for pedestrian-controlled snow thrower safety	2
4.1 General.....	2
4.2 Controls.....	2
4.2.1 General.....	2
4.2.2 Engine stopping and starting.....	5
4.2.3 Collector and impeller control.....	6
4.2.4 Self-propelled pedestrian-controlled snow throwers.....	7
4.3 Guards, shields, chutes, deflectors and housings.....	7
4.3.1 General.....	7
4.3.2 Hot surfaces.....	10
4.3.3 Engine exhaust.....	10
4.3.4 Snow clean-out tool.....	10
4.4 Fuel.....	11
4.4.1 Fuel tank overfill test.....	11
4.4.2 Fuel line axial pull test.....	11
4.5 Electrical equipment: battery powered circuits (not including magneto grounding circuits).....	11
4.5.1 Insulated cables.....	11
4.5.2 Battery installation.....	11
4.5.3 Overload protection.....	11
4.5.4 Terminals and non-insulated electrical parts.....	11
4.6 Power drives.....	11
4.7 Probe test.....	12
4.7.1 Test procedure.....	12
4.7.2 Test acceptance.....	12
4.8 Electromagnetic immunity.....	13
4.9 Noise.....	13
4.10 Vibration.....	13
5 Instructions for use	13
5.1 Instruction handbook.....	13
5.2 Markings.....	13
5.3 Warnings.....	13
Annex A (normative) Instruction handbook	14
Bibliography	17

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

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

This first edition of ISO 8437-2, together with ISO 8437-1, ISO 8437-3 and ISO 8437-4, cancels and replaces ISO 8437:1989, which has been technically revised. It also incorporates the Amendment ISO 8437:1989/Amd.1:1997.

A list of all parts in the ISO 8437 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The structure of safety standards in the field of machinery is as follows.

- a) Type-A standards (basic standards) give basic concepts, principles for design and general aspects that can be applied to machinery.
- b) Type-B standards (generic safety standards) deal with one or more safety aspects or safeguards that can be used across a wide range of machinery:
 - 1) type-B1 standards on particular safety aspects (e.g. safety distances, surface temperature, noise);
 - 2) type-B2 standards on safeguards (e.g. two-handed controls, interlocking devices, pressure sensitive devices, guards).
- c) Type-C standards (machinery safety standards) deal with detailed safety requirements for a particular machine or group of machines.

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

This document is of relevance, in particular, for the following stakeholder groups representing the market players with regard to machinery safety:

- machine manufacturers (small, medium and large enterprises);
- health and safety bodies (regulators, accident prevention organizations, market surveillance, etc.).

Others can be affected by the level of machinery safety achieved with the means of the document by the above-mentioned stakeholder groups:

- machine users/employers (small, medium and large enterprises);
- machine users/employees (e.g. trade unions, organizations for people with special needs);
- service providers, e.g. for maintenance (small, medium and large enterprises);
- consumers (in case of machinery intended for use by consumers).

The above-mentioned stakeholder groups have been given the possibility to participate at the drafting process of this document.

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

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Snow throwers — Safety requirements and test procedures —

Part 2: Pedestrian-controlled snow throwers

1 Scope

This document specifies safety requirements applicable to combustion engine powered pedestrian-controlled snow throwers. It is intended to be used with ISO 8437-1 and ISO 8437-4 to achieve the full requirements and means of verification for pedestrian-controlled snow throwers.

The ISO 8437 series deals with significant hazards, hazardous situations and events relevant to snow throwers used as intended and under the conditions reasonably foreseeable by the manufacturer.

It does not apply to the following:

- electrically powered and battery powered snow throwers;
- hand-held snow throwers;
- airport or highway snow removal machines and equipment;
- machines intended for use in potentially explosive atmospheres.

It does not deal with hazards related to the following:

- battery circuits exceeding 42 V;
- mains connected starting motor;
- magneto grounding circuits;
- working environment;
- electromagnetic compatibility.

The ISO 8437 series is not applicable to machines that were manufactured before the date of its publication.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3411:2007, *Earth-moving machinery — Physical dimensions of operators and minimum operator space envelope*

ISO 8437-1:2019, *Snow throwers — Safety requirements and test procedures — Part 1: Terminology and common tests*

ISO 8437-4:2019, *Snow throwers — Safety requirements and test procedures — Part 4: Information on national and regional provisions*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions in ISO 12100 and ISO 8437-1 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

4 Requirements for pedestrian-controlled snow thrower safety

4.1 General

The machines shall comply with the safety requirements and/or protective measures of this clause. In addition, the machine shall be designed in accordance with the principles of ISO 12100 for hazards relevant but not significant that are not dealt with by this document (e.g. sharp edges on the outside of the machine).

4.2 Controls

4.2.1 General

Operator controls shall be located within, and have a range of movement which remains within, the operator control position given in [Figure 1](#), except for

- engine controls,
- snow discharge chute, and
- snow discharge deflector.

Compliance shall be checked by inspection and measurement.

The controls shall be designed such that they can be operated by an operator with and without arctic mittens (see [Figure 2](#)).

Compliance shall be checked by functional test.

No controls shall be in any hazard zone (see [Figure 1](#)). The discharge hazard zone shall be limited by a line tangent to, or in line with, the inside walls of the discharge chute. The discharge hazard zone moves as the discharge chute is moved from side to side. The operator position shall not intersect the discharge hazard zone.

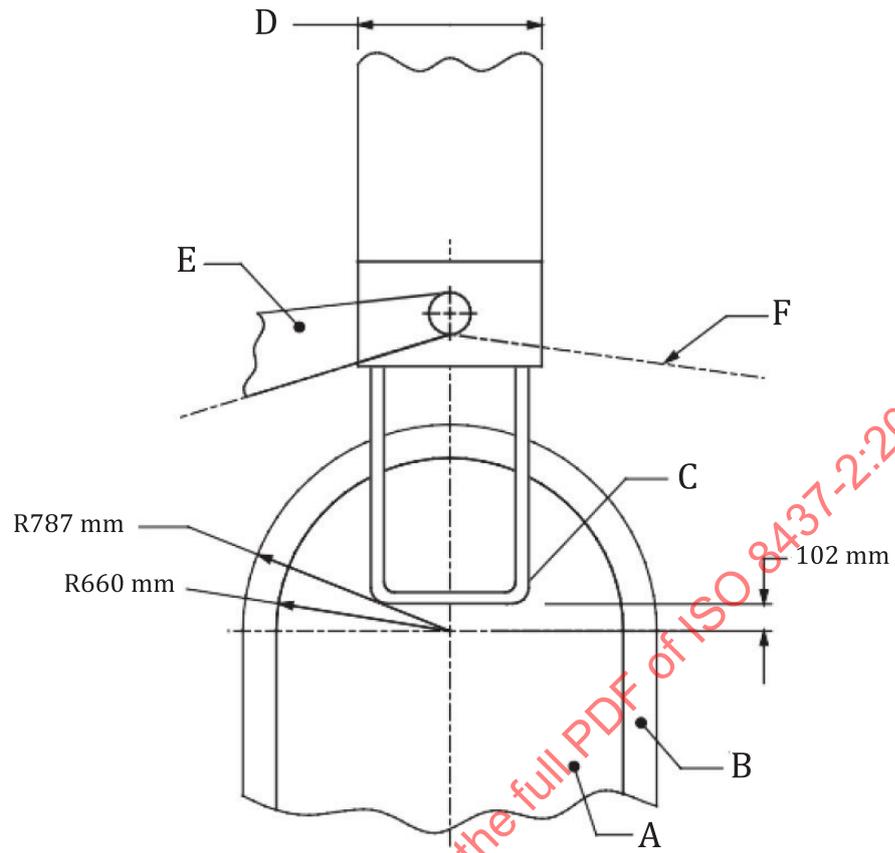
Compliance shall be checked by inspection and functional test.

Controls where the purpose is not obvious to the user shall have the function, direction and/or method of operation clearly identified by a durable label or mark.

Compliance shall be checked by inspection and labels shall be tested in accordance with ISO 8437-1:2019, 5.3

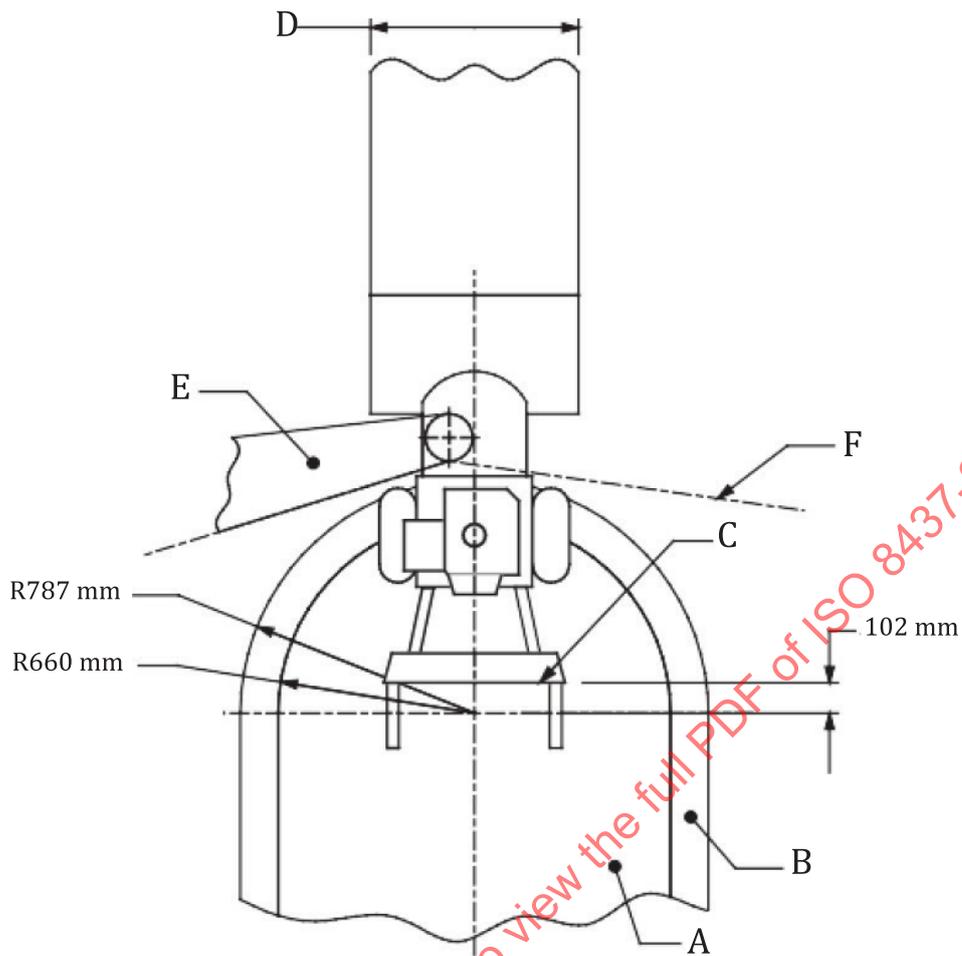
Detailed instructions on the operation of all controls shall be provided in an instruction handbook. (see [Annex A](#)).

Compliance shall be checked by inspection.



a) Single-stage, top view

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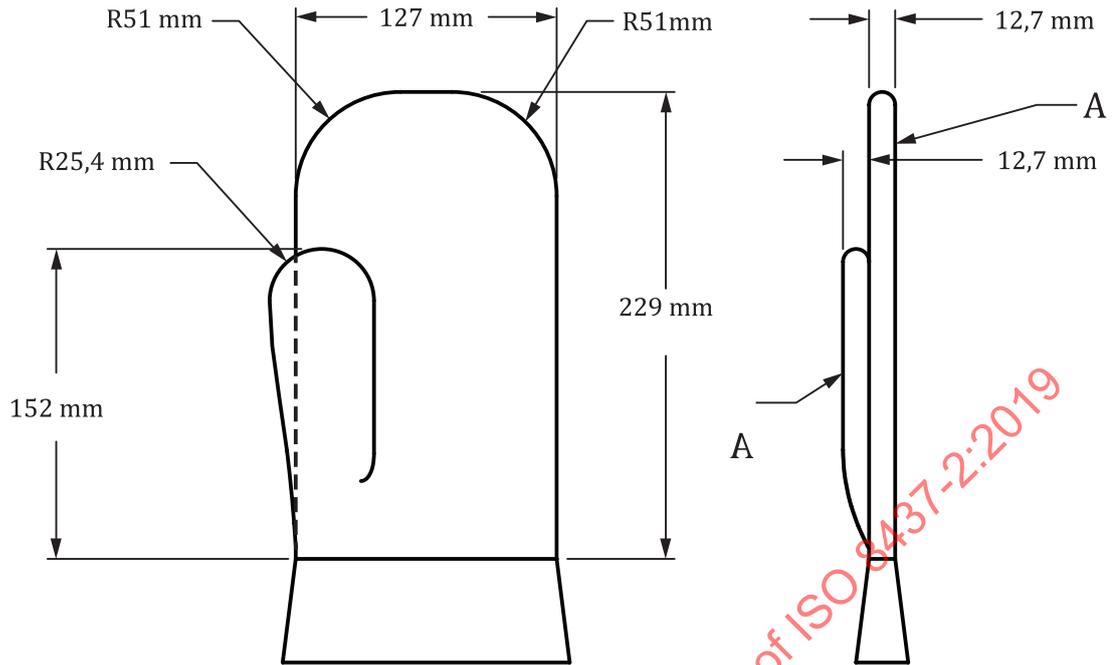


b) Two stage, top view

Key

- | | | | |
|---|---------------------------|---|-----------------------|
| A | operator control position | D | collector hazard zone |
| B | operator position | E | discharge hazard zone |
| C | barrier | F | discharge limit |

Figure 1 — Pedestrian-controlled snow throwers: operator position, operator control position, and hazard zones

**Key**

A pressed flat

NOTE 1 All dimensions approximate, without hand in glove.

NOTE 2 Material: buckskin outer shell with knit liner.

Figure 2— Arctic mitten

4.2.2 Engine stopping and starting

4.2.2.1 Starting device

A switch operated by a removable key, or a similar device, shall be provided to prevent unauthorized starting of the engine unless a manual starter (such as an integral starter rope) is the only means of starting the engine. Any engine starting device shall require intentional activation in order to start the engine. A starter operated by means of a loose rope shall not be allowed.

Compliance shall be checked by inspection and functional test.

4.2.2.2 Stopping device

An engine stopping device shall be provided. The device shall not depend on sustained manual pressure for its continued operation. An emergency stop device is not required.

Compliance shall be checked by inspection and functional test.

4.2.2.3 Hand-operated

The direction of motion for a handle-mounted engine speed hand-lever control shall be

- a) generally forward or upward, or both, to increase speed, and
- b) generally rearward or downward, or both, to decrease speed.

Compliance shall be checked by inspection.

4.2.2.4 Drive interlock for starting

A means shall be provided to prevent starting of the engine unless

- a) the collector and impeller drive are disengaged, and
- b) the traction drive is disengaged or in a neutral position.

Such means shall not be required on a traction drive or impeller/collector drive that is equipped with operator-presence controls for the traction drive and impeller/collector drive. If the only engine starting device is located behind the barrier that restrains the operator of reaching moving parts (see [Figure 1](#)), the impeller/collector drive need not be disengaged during starting.

Compliance shall be checked by inspection and functional test.

4.2.2.5 Engine speed

For regional and national requirements on engine speed, see ISO 8437-4:2019, Clause 5.

4.2.3 Collector and impeller control

4.2.3.1 Operator-presence control

A means shall be provided to automatically stop the impeller and/or collector when the operator leaves the operator position. The impeller and/or collector may resume operation upon reactivation of the operator-presence control.

The operator-presence control shall conform to well-trying principles and applies well-trying components. A “well-trying component” for a safety-related application is a component which has been either

- a) widely used in the past with successful results in similar applications, or
- b) made and verified using principles which demonstrate its suitability and reliability for safety-related applications.

Newly developed components and safety principles may be considered as equivalent to “well-trying” if they fulfil the conditions of b).

Compliance shall be checked by inspection and functional test.

4.2.3.2 Stopping time

The impeller and/or collector shall stop within 5 s and comply with [4.2.3.4](#) when the control is disengaged.

The engine shall be set at the equipment manufacturer’s maximum specified speed. The control shall be fixed to maintain the maximum speed.

Compliance shall be checked by inspection, measurement and test in accordance with [4.2.3.4](#).

4.2.3.3 Impeller or traction engagement control

If a traction drive is provided separate from the collector and impeller drive, a means shall also be provided to permit engagement of the impeller without engagement of the traction drive.

Compliance shall be checked by inspection and functional test.

4.2.3.4 Impeller control tests

4.2.3.4.1 Test procedure

Stopping time shall be measured from the initiation of a stop command from the maximum speed achievable by means of the operator's engine speed control.

When collector and impeller stopping is achieved by means of a power disconnecting device (e.g. clutch), the engine shall be run for 15 min uninterrupted, with controls in the disengaged position. The engine shall be operated at the maximum operating speed obtained by the operator control.

This test is not required if a means is provided to automatically stop the engine when the operator leaves the operator position.

4.2.3.4.2 Test acceptance

The criteria for failure shall be as follows.

- For all machines, the measured stopping time for the collector and/or impeller exceeds 5 s.
- For machines with a power disconnection device (e.g. clutch), the impeller and/or collector revolve more than 3 revolutions during the 15 min test period with the control in the disengaged position.

Compliance shall be checked by inspection.

4.2.4 Self-propelled pedestrian-controlled snow throwers

4.2.4.1 Traction drive

A traction drive engagement control shall be provided. If the control is not a squeeze-grip control, it shall move in the direction of intended travel for engagement. A means shall be provided to permit the machine to be transported under its own power without impeller engagement.

Compliance shall be checked by inspection and functional test.

4.2.4.2 Reverse traction control

The reverse traction-engagement control shall be an operator-presence (normally off) control.

Compliance shall be checked by inspection and functional test.

4.3 Guards, shields, chutes, deflectors and housings

4.3.1 General

All guards, shields, chutes, deflectors and housings shall be designed to prevent removal from the machine without tools.

An adjustable snow discharge chute shall be provided to control the direction of discharge. Non-metallic discharge chutes shall pass the test in ISO 8437-1:2019, 4.2.

Adjustable snow discharge deflectors shall be provided to direct the flow of snow discharge leaving the discharge chute. Non-metallic discharge deflectors shall pass the test in ISO 8437-1:2019, 4.2. The deflector may be part of the discharge chute.

The discharge limit shall not encroach into the operator position, as illustrated in [Figure 1](#).

An unperforated collector/impeller housing shall cover the top, rear, and sides of the collector/impeller as shown in [Figure 3](#). The sides of the housing shall cover the diametrical extremities of the collector/impeller except as shown in [Figure 3](#).

The housing opening limits as shown in [Figure 3](#) shall not intersect the operator position shown in [Figure 1](#). Intersection, as applied here, is defined as allowing line-of-sight between the collector and/or impeller and the operator position.

As an alternative to continuous unperforated sides to the collector/impeller housing, access to the rotating collector/impeller can be prevented by means of a fixed circumferential unperforated rear and top guard combined with a reject ring fixed to the collector/impeller as shown in [Figure 4](#).

The housing opening limits as shown in [Figure 4](#) shall not intersect the operator position shown in [Figure 1](#). Intersection, as applied here, is defined as allowing line-of-sight between the collector and/or impeller and the operator position.

The reject ring shall

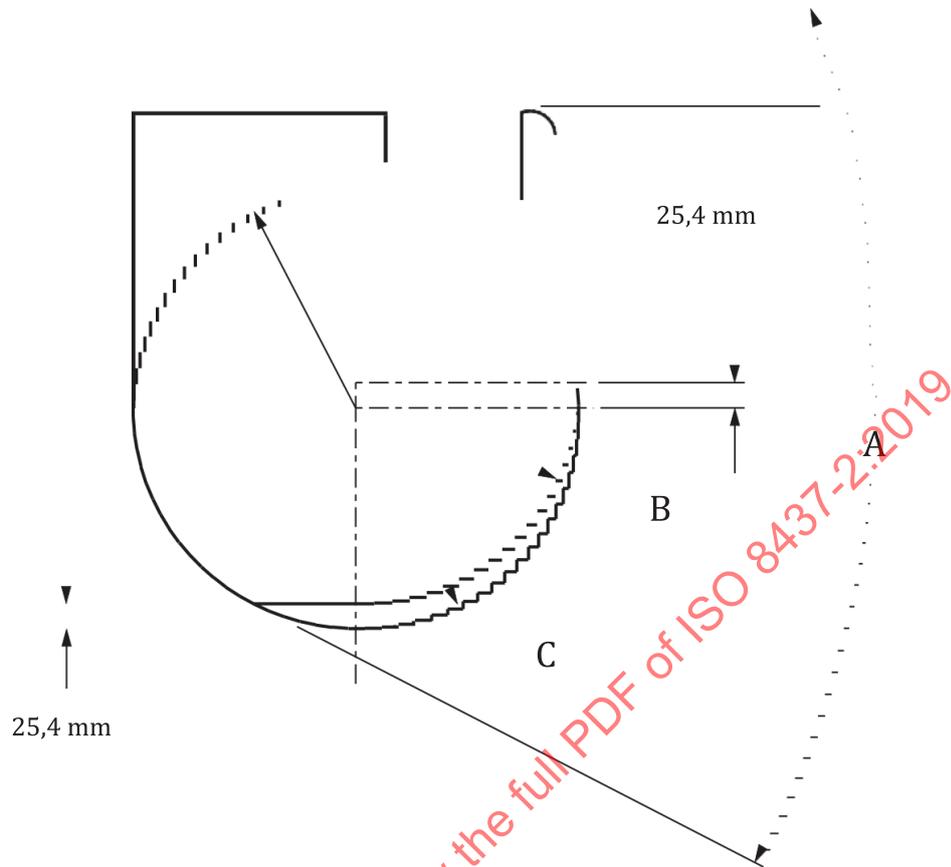
- have a smooth surface without projections,
- have a maximum clearance with the rear circumferential guard of 50 mm,
- have a radius no less than 25,4 mm than the maximum radius of the collector/impeller, and
- not extend axially more than 10 mm beyond the rear circumferential guard.

Ancillary openings, such as those required to facilitate manufacture or mount accessories, shall not intersect the operator position. Intersection, as applied here, is defined as allowing line-of-sight between the collector and/or impeller, and the operator position.

For additional regional and national requirements, see ISO 8437-4:2019, Clause 5.

Compliance shall be checked by inspection, measurement, and tested in accordance with ISO 8437-1.

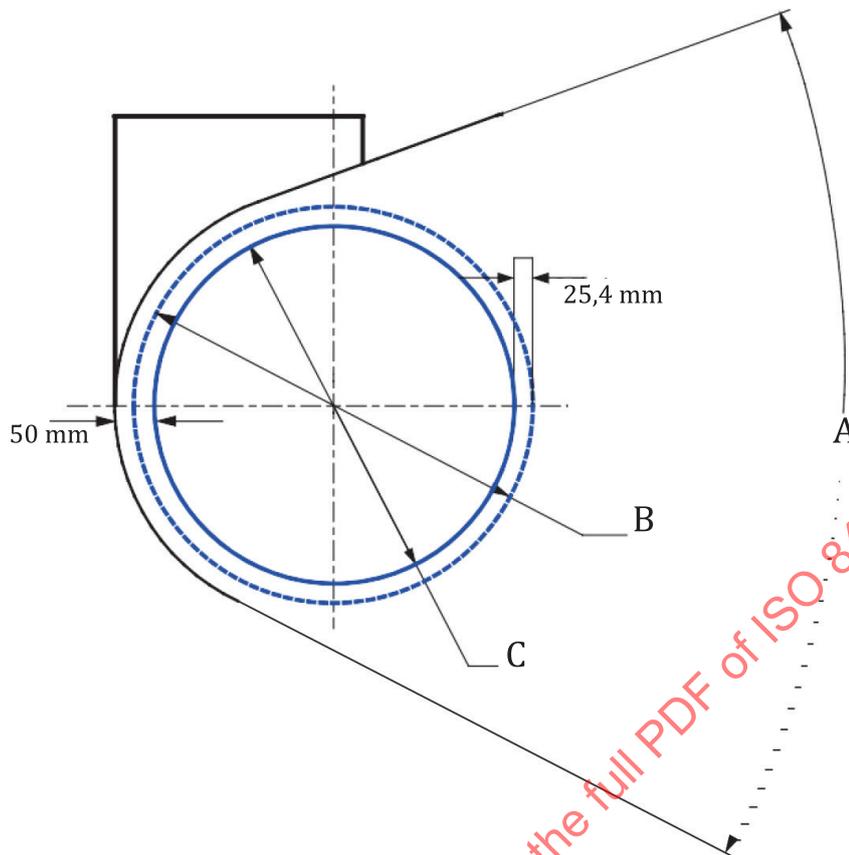
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Key

- A opening limits
- B minimum side of collector housing
- C maximum diametrical extremity of collector/impeller

Figure 3 — Snow thrower housing



Key

- A opening limits
- B maximum diametrical extremity of collector/impeller
- C reject ring

Figure 4 — Snow thrower housing with reject ring

4.3.2 Hot surfaces

Compliance shall be checked in accordance with ISO 8437-1.

4.3.3 Engine exhaust

Engine exhaust emission shall be directed away from the operator during normal operation of the machine.

Compliance shall be checked by inspection.

4.3.4 Snow clean-out tool

This requirement applies to pedestrian-controlled snow throwers with more than a single stage throwing mechanism. A suitable tool(s) shall be provided for clearing blockages of the discharge chute. It shall be attached to the snow thrower and readily accessible to the operator.

Compliance shall be checked by inspection.

4.4 Fuel

4.4.1 Fuel tank overfill test

Compliance shall be checked by inspection and tested in accordance with ISO 8437-1.

4.4.2 Fuel line axial pull test

Compliance shall be checked by inspection and tested in accordance with ISO 8437-1.

4.5 Electrical equipment: battery powered circuits (not including magneto grounding circuits)

4.5.1 Insulated cables

Insulated cables comprising wiring circuits should be protected by rubber, plastic, non-metallic tape or non-metallic braid covering capable of withstanding severe abrasion, except where otherwise protected or not in potentially abrasive contact with metal surfaces. This wiring assembly shall, where possible, be grouped together, be properly supported and be located so that no portion is in contact with the carburettor, metallic fuel lines, the exhaust system, moving parts or sharp edges. Any edges of metal members subject to contact with the cables shall be rounded or protected to prevent possible damage to the cables by cutting or abrasion.

Compliance shall be checked by inspection.

4.5.2 Battery installation

The compartment for a vented storage battery shall have openings to provide ventilation. If ventilation is provided, acid from the battery in any of the normal operator 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.

4.5.3 Overload protection

All circuits, except starting motor and ignition circuits, shall have overload protective devices on the battery-feed side of switches, and except for two-wire, non-grounded systems where the overload protection shall be located in either line.

Compliance shall be checked by inspection.

4.5.4 Terminals and non-insulated electrical parts

Terminals and non-insulated electrical parts shall be protected to prevent short circuiting by the fuel can or tools during normal refuelling and lubrication maintenance.

Compliance shall be checked by inspection.

4.6 Power drives

Nip and pinch points as well as outside faces of pulleys, sheaves, sprockets and gears shall be guarded by location or otherwise guarded to prevent inadvertent contact by the operator during normal starting and operation of the machine.

These guarding requirements shall not apply

- a) during maintenance activities,
- b) to rotating shafts protruding less than half of their outside diameter, and
- c) to ground-contacting parts.

Compliance with these requirements shall be determined by the probe test given in [4.7](#).

4.7 Probe test

4.7.1 Test procedure

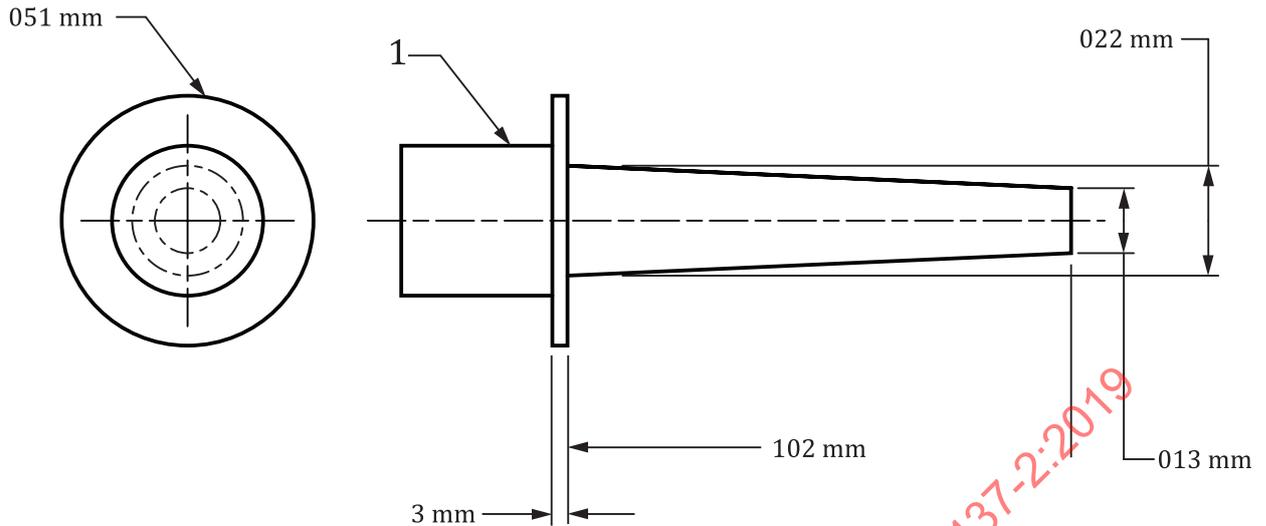
CAUTION — The following procedures should be conducted with the engine not running.

Simulate the operator during normal operation of the machine and insert the finger probe shown in [Figure 5](#) into all openings to its maximum depth (102 mm) or until a force of 4,4 N is attained. As the finger probe is inserted, rotate and position it in all possible angles allowed by the opening, attempting to contact the part or parts under test. The finger probe shall not be inserted beyond the length of the finger probe (102 mm).

4.7.2 Test acceptance

The machine shall be considered properly guarded when with the operator-presence control operated in its normal manner with the test operator in the normal operating position conformity with the following is achieved.

- a) The hazard cannot be contacted with the finger probe shown in [Figure 5](#) when held by a large test operator (as specified in ISO 3411), manoeuvring the probe in any manner.
- b) For hazards under and within the perimeter of the chassis elements, such as the frame or fender, the hazard cannot be reached with the finger probe shown in [Figure 5](#) when held by a large test operator (as specified in ISO 3411), and manoeuvring the finger probe as follows:
 - 1) from above the chassis elements, downward through openings in or between the elements;
 - 2) underneath the chassis elements allowing only horizontal or downward probe movement, or both; upward probe movement shall not be permitted.

**Key**

1 suitable handle, optional

Figure 5 — Finger probe

4.8 Electromagnetic immunity

For regional and national requirements on electromagnetic immunity, see ISO 8437-4:2019, Clause 5.

4.9 Noise

For regional and national requirements on noise, see ISO 8437-4:2019, Clause 5.

4.10 Vibration

For regional and national requirements on vibration, see ISO 8437-4:2019, Clause 5.

5 Instructions for use

5.1 Instruction handbook

An instruction handbook shall be provided with the snow thrower and shall comply with [Annex A](#).

5.2 Markings

The machine shall be marked according to ISO 8437-1:2019, 5.1 and ISO 8437-4.

5.3 Warnings

The machine shall be marked with warnings according to ISO 8437-1:2019, 5.2.