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Snow throwers — Safety requirements and test procedures —

Part 4: Additional national and regional requirements

Chasse-neige — Exigences de sécurité et essais —

Partie 4: Exigences nationales et régionales additionnelles

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Foreword

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

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 is ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 13, *Powered lawn and garden equipment*.

This first edition of ISO 8437-4, together with ISO 8437-1, ISO 8437-2 and ISO 8437-3, 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.

ISO 8437 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.

Snow throwers — Safety requirements and test procedures —

Part 4: Additional national and regional requirements

1 Scope

This document provides additional national and regional requirements applicable to combustion engine powered pedestrian-controlled and ride-on snow throwers. It is intended to be used with ISO 8437-1, ISO 8437-2 and ISO 8437-3 to achieve the full requirements and means for pedestrian-controlled and ride-on 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 3744, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for an essentially free field over a reflecting plane*

ISO 4871, *Acoustics — Declaration and verification of noise emission values of machinery and equipment*

ISO 5008, *Agricultural wheeled tractors and field machinery — Measurement of whole-body vibration of the operator*

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

ISO 8437-2:2019, *Snow throwers — Safety requirements and test procedures — Part 2: Pedestrian-controlled snow throwers*

ISO 8437-3:2019, *Snow throwers — Safety requirements and test procedures — Part 3: Ride-on snow throwers*

ISO 11201, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions in an essentially free field over a reflecting plane with negligible environmental corrections*

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

ISO 16063, *Methods for the calibration of vibration and shock transducers*

ISO 20643:2005, *Mechanical vibration — Hand-held and hand-guided machinery — Principles for evaluation of vibration emission*

EN 1032:2003+A1:2008, *Mechanical vibration — Testing of mobile machinery in order to determine the vibration emission value*

EN 14982:2009, *Agricultural and forestry machinery — Electromagnetic compatibility — Test methods and acceptance criteria*

ASTM G 152, *Standard practice for operating open flame carbon arc light apparatus for exposure of non-metallic materials*

ASTM G 155, *Standard practice for operating xenon arc light apparatus for exposure of non-metallic materials*

SAE J594, *Reflex Reflectors*

3 Terms and definitions

For the purposes of this document, the terms and definitions given 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 National/regional provisions related to ISO 8437-1

4.1 EU

See Table 1.

Table 1 — Additional requirements to ISO 8437-1 specific to the EU

Subclause of ISO 8437-1:2019	EU provision(s)
5.1	All snow throwers shall be marked legibly and indelibly with the following minimum information: — business name and address of the manufacturer or, where appropriate, the manufacturer's authorized representative; The address can be simplified as long as the manufacturer (and, where applicable, the manufacturer's authorized representative) can be identified. In any event, the address on the plaque shall be sufficient for mail to reach the company. — designation of the machine; The designation of the machinery can be achieved by a combination of letters and/or numbers. — year of construction, i.e. the year in which the manufacturing process is completed; — 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. — the machine mass with empty fuel tanks in kilograms; — the nominal power in kilowatts; — the serial number.

4.2 USA and Canada

See Table 2.

Table 2 — Additional requirements to ISO 8437-1 specific to the USA and Canada

Subclause of ISO 8437-1:2019	USA and Canada provision(s)
5.1	All snow throwers shall be marked legibly and indelibly with the following minimum information: — name of the manufacturer or supplier; — markings that uniquely identify the machine (such as, model and/or serial number); — contact information for a source of replacement parts.
5.3	A 2 000 h carbon-arc test in accordance with ASTM G152 (Cycle 1) or a 2 000 h xenon-arc test in accordance with ASTM G155 (Cycle 1) are accepted alternative test methods.

5 National/regional provisions related to ISO 8437-2

5.1 EU

See Table 3.

Table 3 — Additional requirements to ISO 8437-2 specific to the EU

Subclause of ISO 8437-2:2019	EU provision(s)
4.2.2.5	**4.2.2.5 Engine speed** The snow thrower shall be designed in such a way that it is not possible to sustain an engine speed greater than the maximum operating engine speed by the use of any control or by simple adjustments made — without tools, or — with standard tools, or — without breaking a manufactures seal. Compliance shall be checked by inspection.
4.3.1	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 a fixing system that shall remain attached to the guard or to the machinery when the guard is removed. Where possible, a fixed guard shall be incapable of remaining in place without its fixing system.
4.8	**4.8 Electromagnetic immunity** All electronic components used in the systems to control the machine shall meet the acceptance criteria of EN 14982:2009, 6.3 and 6.6 concerning electromagnetic immunity.
4.9	**4.9 Noise** **4.9.1 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. ISO 11688-1:2009 gives general technical information and guidance for the design of low-noise machines. Special care shall be taken in the acoustical design of machines. **4.9.2 Noise measurements** Emission sound pressure levels and sound power levels including the uncertainties shall be determined in accordance with ISO 8437-4:2019, Annex A.
4.10	**4.10 Vibration** **4.10.1 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. **4.10.2 Vibration measurements** The vibration total value to which the hand-arm system is subjected and the uncertainty of measurement shall be determined in accordance with ISO 8437-4:2019, Annex B.

5.2 USA and Canada

See Table 4.

Table 4 — Additional requirements to ISO 8437-2 specific to the USA and Canada

Subclause of ISO 8437-2:2019	USA and Canada provision(s)
A.2	Use a grounded three-wire plug-in for all units with electric starting motors except for double insulated starting motors.

6 National/regional provisions related to ISO 8437-3

6.1 EU

See Table 5.

Table 5 — Additional requirements to ISO 8437-3 specific to the EU

Subclause of ISO 8437-3:2019	EU provision(s)
4.2.2.6	**4.2.2.6 Engine speed** The snow thrower shall be designed in such a way that it is not possible to sustain an engine speed greater than the maximum operating engine speed by the use of any control or by simple adjustments made — without tools, or — with standard tools, or — without breaking a manufactures seal. *Compliance shall be checked by inspection.*
4.3.1	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 a fixing system that shall remain attached to the guard or to the machinery when the guard is removed. Where possible, a fixed guard shall be incapable of remaining in place without its fixing system.
4.8	**4.8 Electromagnetic immunity** All electronic components used in the systems to control the machine shall meet the acceptance criteria of EN 14982:2009, 6.3 and 6.6 concerning electromagnetic immunity.
4.9	**4.10 Noise** **4.10.1 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. EN/ISO 11688-1:2009 gives general technical information and guidance for the design of low-noise machines. Special care shall be taken in the acoustical design of machines. **4.10.2 Noise measurements** Emission sound pressure levels and sound power levels including the uncertainties shall be determined in accordance with ISO 8437-4:2019, Annex A.

Table 5 *(continued)*

Subclause of ISO 8437-3:2019	EU provision(s)
4.10	**4.10 Vibration** **4.10.1 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. **4.10.2 Vibration measurements** The vibration total value to which the hand-arm system is subjected and the uncertainty of measurement shall be determined in accordance with ISO 8437-4:2019, Annex B. 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 8437-4:2019, Annex B.

6.2 USA and Canada

See Table 6.

Table 6 — Additional requirements to ISO 8437-3 specific to the USA and Canada

Subclause of ISO 8437-3:2019	USA and Canada provision(s)
4.1	For ride-on snow throwers, reflectors shall comply with SAE J594.

Annex A
(normative)

Noise test code (Grade 2)

A.1 General

This annex specifies a noise test code for determining, efficiently and under standardized conditions, the noise emission characteristics of pedestrian-controlled and ride-on snow throwers. Noise emission characteristics include the A-weighted emission sound pressure level at the operator position and the A-weighted sound power level.

Although the noise emission values determined are obtained in an artificial operation, they are representative of noise emission in a real work situation.

A.2 A-weighted sound power level determination

For the determination of sound power level, ISO 3744 shall be used.

A.3 A-weighted emission sound pressure level measurement at the operator position

For the measurement of the A-weighted emission sound pressure level, ISO 11201 shall be used subject to the following modifications.

— The operator or an equivalent dummy shall be 1,75 m ± 0,05 m tall and shall stand or sit upright and look straight ahead. The microphone shall be head mounted 200 mm ± 20 mm from the median plane of the head on the louder side and in line with the eyes. The microphone shall be aimed with its axis of maximally flat response (as specified by the manufacturer of the microphone) pointing forwards and at an angle of 45° downwards from the horizontal. If a helmet is used to mount the microphone, the helmet shall be of a shape so that its outer edge is at least 30 mm closer to the head than the microphone.

A.4 Installation, mounting and operating conditions

Measurements shall be carried out on a normal production machine featuring standard equipment.

The engine shall be run-in and warmed up until stable conditions are reached before the test is started. The engine shall be set to the maximum operating engine speed and collector and/or impeller devices lubricated according to the instruction handbook. The maximum operating engine speed shall be checked before testing. If the measured maximum operating engine speed is outside the value specified in the instruction handbook, the engine speed shall be adjusted in accordance with the manufacturer's instructions.

During the test, the collector and/or impeller shall be engaged and unloaded. The test shall be carried out at the maximum operating engine speed. An engine speed indicator shall be used to check the speed of the engine. It shall have an inaccuracy of ±2,5 % of the reading. The indicator and its engagement with the snow thrower shall not affect the operation during the test.

For the sound power level determination, machines shall be measured by placing them on the surface in such a way that the projection of the geometrical centre of their main parts (excluding handle, etc.) coincides with the origin of the coordinate system of the microphone positions. If an artificial surface

is used, it shall be placed so that its geometrical centre also coincides with the origin of the coordinate system of the microphone positions. The longitudinal axis of the machine shall be on the x-axis. The measurement shall be carried out without an operator.

For the sound pressure level determination, adjustable features (e.g. handle height, seat position) shall be set to suit the operator.

A.5 Measurement uncertainties and declaration of noise emission values

When measuring the emission sound pressure level at the operator position, tests shall be repeated to attain the required grade of accuracy, and until three consecutive A-weighted results give values within not more than 2 dBA. The arithmetic average of these shall be the measured A-weighted emission sound pressure level of the machine. The uncertainties associated with the measurements shall be taken into account when deciding on the declared noise emission values.

NOTE The methodology used for taking uncertainties into account is based on the use of measured values and measurement uncertainties. The latter are the uncertainty associated to the measurement procedure (which is determined by the grade of accuracy of the measurement method used) and the production uncertainty (variation of noise emission from one machine to another of the same type made by the same manufacturer).

The declaration of noise emission values shall be made according to ISO 4871. Applying the dual number declaration is recommended.

A.6 Information to be recorded and reported

The information shall be recorded and reported in accordance with ISO 3744 and ISO 11201.

The instruction handbook and the technical documentation describing the machine shall provide the following:

— the A-weighted emission sound pressure level at the operator position of the machinery;

— the measured and guaranteed A-weighted sound power level of the machinery;

— reference to the noise test code used for the tests in the technical documentation only.

Annex B
(normative)

Vibration test code — Whole-body vibration and hand-arm vibration

B.1 General

This annex specifies a vibration test code for determining, efficiently and under specified conditions, the magnitude of vibration at the handles of pedestrian-controlled snow throwers, steering controls and whole-body vibrations operators and ride-on snow throwers.

Although the magnitudes measured are obtained in an artificial operation, they nevertheless give an indication of the values to be found in a real work situation.

B.2 Quantities to be measured

The quantities to be measured are the frequency-weighted accelerations in the three perpendicular directions: *a*hw*x*, *a*hw*y* and *a*hw*z*.

B.3 Instrumentation

B.3.1 General

Tachometers shall have an inaccuracy of ±2,5 %.

For specification of other instrumentation, see EN 1032:2003+A1:2008, Clause 4 for the hand-arm vibration measurement and EN 1032:2003+A1:2008, Clause 5 for the whole body vibration measurement.

B.3.2 Fastening of transducer

B.3.2.1 Transducers for hand-arm vibration measurements

The transducer shall be fastened in accordance with ISO 20643:2005, 7.2.2. If a resilient coating is being used between the hand and vibration structure (for example, a cushioned handle or steering wheel), it is permissible to use a suitable mounting for the transducer (for example, a thin suitably formed metal sheet) placed between the hand and the surface of the resilient material. In either case, care shall be taken that the size, shape and mounting of the transducer or of the special transducer support does not significantly influence the transfer of vibration to the hand. Care shall also be taken when mounting the transducer that the transfer function is flat up to 1,5 kHz for all three directions.

The transducers used for hand-transmitted vibration measurements on the steering wheel shall be mounted firmly to the steering wheel, for example by using a threaded stud or clamp. The total mass of the accelerometers and mounting devices (stud or clamp) shall not be more than 50 g (and preferably not more than 30 g). The mounting device shall be selected to minimize the distance between the base surface of the accelerometers and the vibrating surface of the steering wheel and the distance shall not exceed 15 mm.

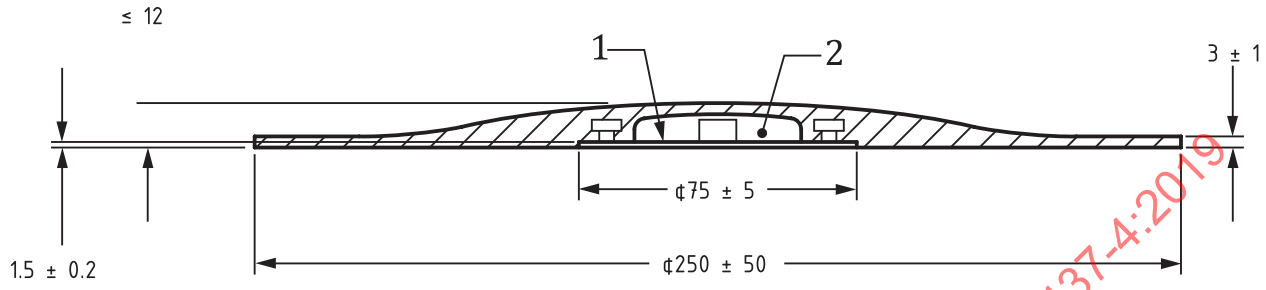
NOTE Tangling of signal carrying wires on the steering column can be eliminated by attaching the wires to a spoke on the steering wheel and trailing them to the centre of the wheel.

B.3.2.2 Transducers for whole-body vibration measurements

The transducer shall be fastened in accordance with EN 1032:2003+A1:2008, 6.2.

The transducers used for the measurement in the seat shall be mounted in a semi-rigid disc which is defined in ISO 5008 and described as follows (see Figure B.1).

Dimension in millimetres



Key

1 thin metal disc for accelerometer mount and added centre rigidity

2 appropriate cavity for accelerometer(s)

Figure B.1 — Design of a semi-rigid mounting disc

The disc shall be as thin as possible and be of approximately 80 Shore-A to 90 Shore-A moulded rubber or plastic material.

NOTE For practical reasons, it is usually not possible to perfectly align the accelerometers in the disc with the directions of the basicentric coordinate system. In a tolerance range within ±15° of the appropriate directions the accelerometers can be considered as aligned parallel to these directions.

The transducers used for the measurement at the feet of an operator shall be rigidly fixed on the working platform. If the working platform is covered by a resilient material, the transducers can be mounted in the middle of a rigid metal plate (about 300 mm × 400 mm).

B.3.3 Calibration

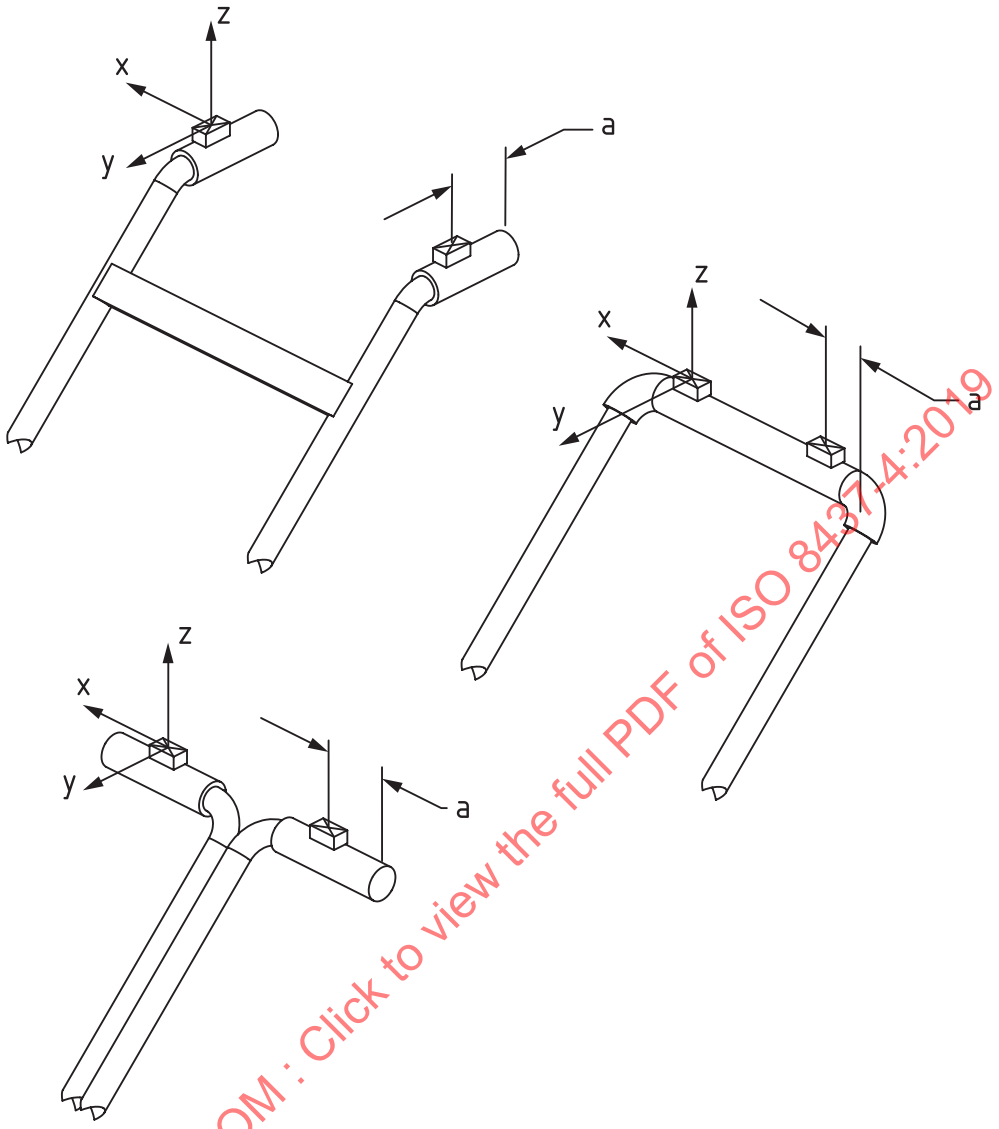
Calibration shall be in accordance with ISO 16063 for the hand-arm vibration and for the whole-body vibration.

B.3.4 Measurement direction

Measurements shall be made simultaneously for the three (3) directions x, y and z (see Figure B.2 for pedestrian-controlled snow throwers and Figure B.3 for ride-on snow throwers).

B.3.5 Measurement location

A maximum of two transducers shall be used for hand-arm vibration and one for whole-body vibration. The transducer(s) for the hand-arm vibration measurements shall be placed where an operator holds the steering control(s) according to Figure B.2 or Figure B.3. The transducer for the whole-body vibration measurement shall be placed according to EN 1032:2003+A1:2008, 6.2.



Key

a 100 mm

Figure B.2 — Examples of transducer location/orientation (pedestrian-controlled machines)