
**Gardening machinery — Powered
material-collecting systems — Safety**

*Matériel de jardinage — Systèmes motorisés de collecte des
matériaux — Sécurité*





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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 of 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 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 second edition cancels and replaces the first edition (ISO 21628:2008), which has been technically revised. It also incorporates the Amendment ISO 21628:2008/Amd 1:2015.

The main changes compared to the previous edition are as follows:

- withdrawn references to ISO standards have been replaced with references to current standards;
- applicability of the scope has been clarified.

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

This document is a type C standard as stated in ISO 12100-1.

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 organisations, 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. These hazards are specific to material collecting systems.

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.

Gardening machinery — Powered material-collecting systems — Safety

1 Scope

This document gives safety requirements and the means for their verification specific to the design and construction of powered material-collecting systems used in agriculture, gardening and area maintenance (such as landscaping). It is applicable to mounted, semi-mounted or trailed machines manufactured after the date of its publication.

This document specifies means for eliminating or reducing mechanical hazards when the material-collecting system is used as intended.

It does not deal with environmental hazards, road safety, electromagnetic compatibility, power take-off (PTO), PTO drive shaft guarding or control requirements.

This document is not applicable to machines within the scope of ISO 5395-2 or ISO 5395-3.

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 730, *Agricultural wheeled tractors — Rear-mounted three-point linkage — Categories 1N, 1, 2N, 2, 3N, 3, 4N and 4*

ISO 2332, *Agricultural tractors and machinery — Connection of implements via three-point linkage — Clearance zone around implement*

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

ISO 4413, *Hydraulic fluid power — General rules and safety requirements for systems and their components*

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

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

ISO 13857:2019, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs*

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

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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/>

3.1
material collecting system
mounted, semi-mounted or trailed machine used to collect grass and leaves by means of a vacuum provided by a blower

Note 1 to entry: The collected material can include other organic or non-organic material present as debris on the working area.

3.2
inlet device
opening of the blower casing at the suction side to which the suction hose or pipe is connected

3.3
discharge chute
opening of the blower casing allowing the transport of the material from the blower to the hopper

3.4
normal operation and service
intended use of the machine in compliance with the information for operation, service and safe practices

4 Safety requirements

4.1 Fundamental principles, design guidance

The machine shall be designed according to the principles of risk reduction specified in ISO 12100:2010, Clause 5, for hazards relevant but not significant.

Unless specified otherwise in this document, openings and relative safety distances shall be in accordance with ISO 13857:2019, Tables 1, 3, 4 and 6.

4.2 Access to the blower

4.2.1 Suction (inlet) side

The suction hose or pipe shall be fixed to the inlet device. The removal of the suction hose or pipe shall not be possible except by using a tool. The operator's manual shall include information about the removal of blockages [see 5.1.2 e)].

4.2.2 Discharge chute opening

4.2.2.1 The maximum size of the discharge chute opening shall be 625 cm².

4.2.2.2 To prevent access to hazardous parts of the blower, the machine shall comply with at least one of the following:

- a) The minimum distance between the discharge chute opening and the outer contour of the blower shall be 850 mm.

The safety distance is measured as chain measurement.

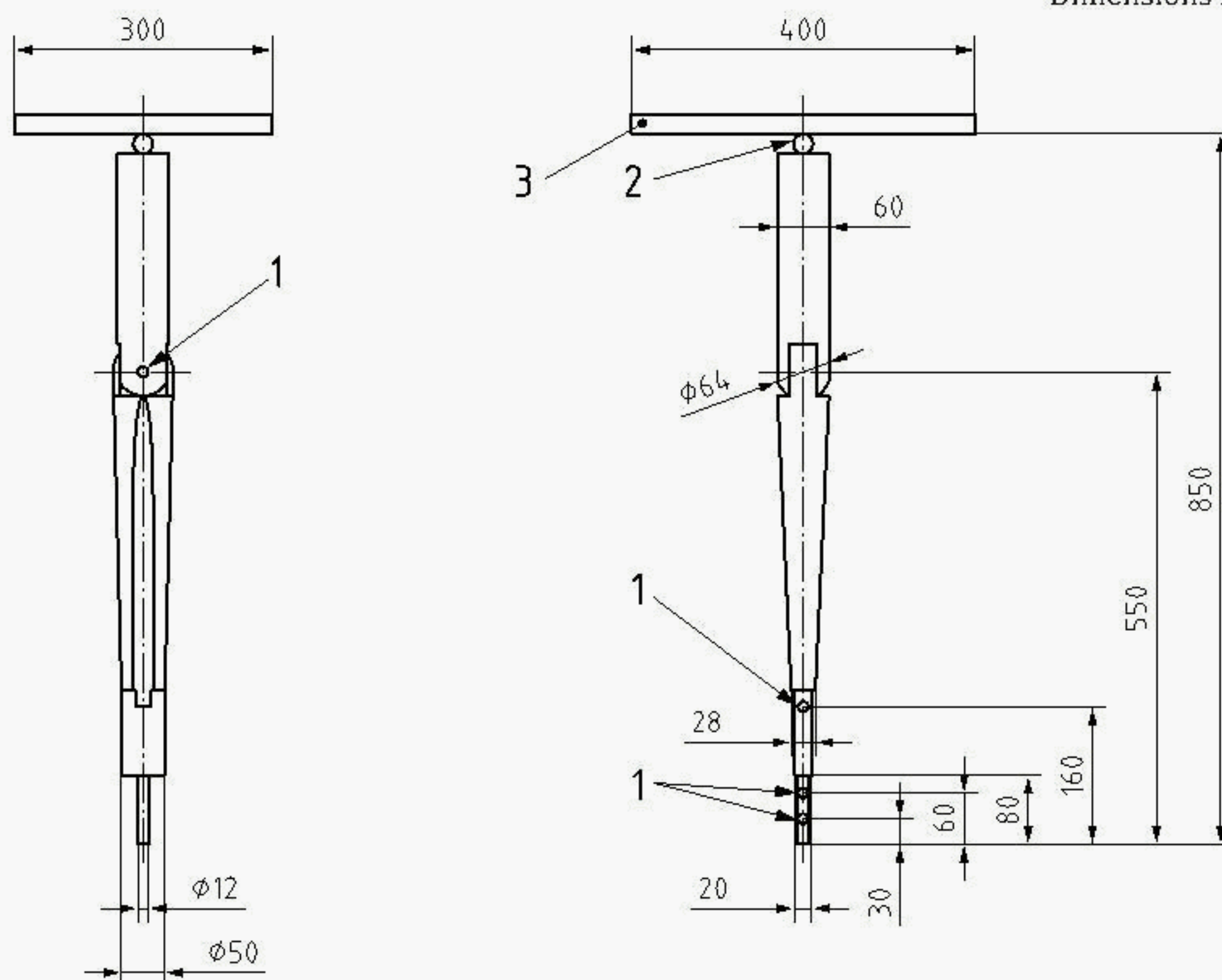
- b) The minimum distance between the contour or parts of the machine restricting access to the blower and the outer contour of the blower shall be 850 mm. This requirement shall be verified using the arm test probe shown in [Figure 1](#). The probe shall be applied in all directions in which the operator's arm could be used and in the shaded area shown in [Figure 2](#). The 850 mm safety

distance shall apply beneath the height of this shaded area, i.e. beneath a height of 700 mm. See [Figure 2](#).

The plate of the probe shall be kept parallel to the machine. The arm test probe shall be applied with a force not exceeding 20 N.f

- c) The discharge chute opening shall be in accordance with ISO 13857:2019, Tables 1, 3, 4 and 6. If this is achieved by additional means, such means shall be in place whenever operator access to the discharge chute opening is possible. They shall not be removable except using a tool and shall correspond to ISO 13849-1, category 1.
- d) Means shall be provided to stop the blower — for example, when raising or opening the hopper — before direct operator access such as that described in b), above, is possible.

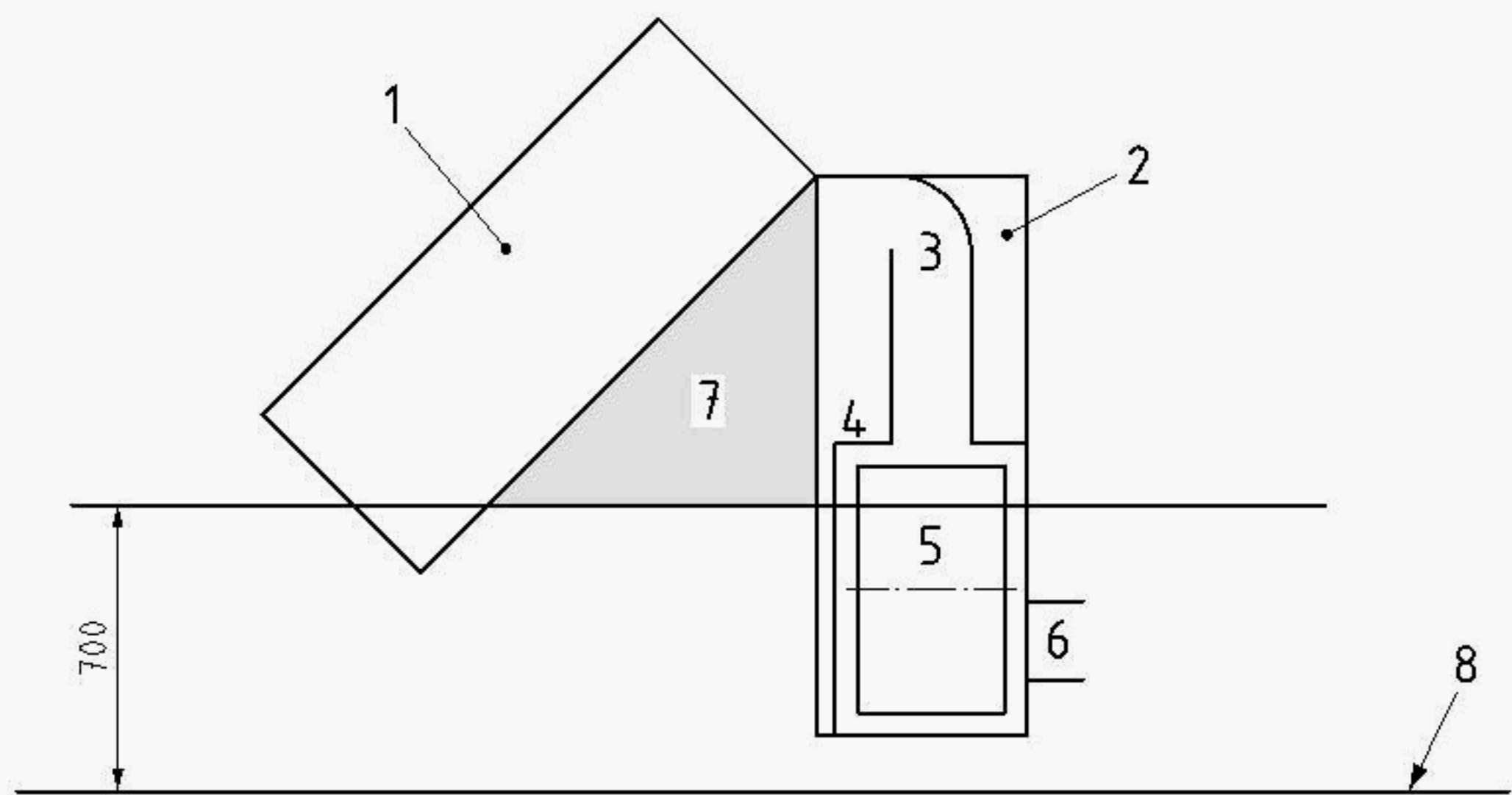
Dimensions in millimetres



key

- 1 articulation allowing rotation of $\pm 90^\circ$ about articulation axis
- 2 articulation allowing free rotation
- 3 plate representing the upper body

Figure 1 — Arm test probe



key

- | | | | |
|---|--------------------------|---|--------------------------|
| 1 | hopper (opened position) | 5 | blower (outer contour) |
| 2 | machine body | 6 | inlet device |
| 3 | discharge chute opening | 7 | access area to be tested |
| 4 | blower enclosure | 8 | ground surface |

Figure 2 — Access area and machine

4.3 Direction of airflow

The airflow at the outlet at the rear side of the hopper shall be directed downwards to avoid contact with the collected material.

4.4 Hopper discharge

The linkage system for raising or lowering the hopper during its discharge shall be designed so that pinching and shearing points are avoided and a distance of 25 mm between moving linkage components is maintained.

Information on possible hazards that could occur when the door of the hopper is opened shall be provided on the machine and in the operator's manual [see 5.1.2 g)].

4.5 Stability

Empty material-collecting systems shall be designed to be stable when dismounted and parked according to the operator's manual on firm ground, with an inclination up to 8,5° in any direction. If needed, means to block the transport wheels shall be provided.

4.6 Clearance zone of mounted machines

Material-collecting systems to be attached to three-point linkage hitches according to ISO 730 shall provide a clearance zone as specified in ISO 2332.

4.7 Hydraulics

Hydraulic components shall be in accordance with ISO 4413.

5 Information for use

5.1 Operator's manual

5.1.1 Each machine shall be provided with an operator's manual, whose content and presentation shall be in accordance with ISO 3600.

5.1.2 Comprehensive instructions for, and information on, all aspects of the safe use of the machine, including personal protective equipment requirements and the need for training, if necessary, shall be provided. At least the following information shall be included, as appropriate:

- a) foreseen uses of the machine;
- b) initial set-up of the machinery (unless this will be carried out by the dealer);
- c) the correct methods of mounting and dismounting;
- d) compatibility with the tractors (e.g. hitching system, engine power, stability, braking, steering);
- e) removal of blockages (see [4.2](#));
- f) pinching and shearing points when raising and lowering the hopper (see [4.4](#));
- g) hazards related to door opening (see [4.4](#));
- h) a warning that the machine may be operated only when correctly attached to the vehicle or machine.

5.2 Safety and instructional signs

5.2.1 Safety signs shall be appropriately displayed when necessary to alert the operator and others of the risk of personal injury during normal operation and service (see also [4.4](#)).

5.2.2 Safety signs shall be in accordance with ISO 11684.

