
**Agricultural machinery — Rotary and flail
mowers — Thrown-object test and
acceptance criteria**

*Matériel agricole — Faucheuses rotatives et faucheuses-broyeuses —
Essai de projection d'objets et critères d'acceptation*

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO 17101:2004](https://standards.iteh.ai/catalog/standards/sist/80a32620-94a9-495d-929d-dc796d744d52/iso-17101-2004)

[https://standards.iteh.ai/catalog/standards/sist/80a32620-94a9-495d-929d-
dc796d744d52/iso-17101-2004](https://standards.iteh.ai/catalog/standards/sist/80a32620-94a9-495d-929d-dc796d744d52/iso-17101-2004)



PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 17101:2004

<https://standards.iteh.ai/catalog/standards/sist/80a32620-94a9-495d-929d-dc796d744d52/iso-17101-2004>

© ISO 2004

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

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
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Thrown-object test	2
4.1 Testing conditions	2
4.2 Target	2
4.3 Test material	9
4.4 Test method	12
4.5 Test results	14
4.6 Acceptance criteria	14
Annex A (informative) Illustrations of mowers	17

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO 17101:2004](https://standards.iteh.ai/catalog/standards/sist/80a32620-94a9-495d-929d-dc796d744d52/iso-17101-2004)

<https://standards.iteh.ai/catalog/standards/sist/80a32620-94a9-495d-929d-dc796d744d52/iso-17101-2004>

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 17101 was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 7, *Equipment for harvesting and conservation*.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[ISO 17101:2004](https://standards.iteh.ai/catalog/standards/sist/80a32620-94a9-495d-929d-dc796d744d52/iso-17101-2004)

<https://standards.iteh.ai/catalog/standards/sist/80a32620-94a9-495d-929d-dc796d744d52/iso-17101-2004>

Agricultural machinery — Rotary and flail mowers — Thrown-object test and acceptance criteria

1 Scope

This International Standard gives specifications and acceptance criteria for the thrown-object testing of rotary and flail mowers used in agriculture. Examples of machines are shown in Annex A. It is not applicable to

- mowers with an articulated arm,
- mowers with one or more vertical axis designed for mulching,
- pedestrian-controlled motor mowers,
- lawn mowers or machines designed as lawn mowers,
- inter-row mowing units,
- machines designed for highway and road maintenance only.

NOTE If a machine is also designed for use outside agriculture, other thrown-object tests may apply.

2 Normative references (standards.iteh.ai)

The following referenced documents are indispensable for the application 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 536, *Paper and board — Determination of grammage*

ISO 789-1, *Agricultural tractors — Test procedures — Part 1: Power tests for power take-off*

ISO 1974, *Paper — Determination of tearing resistance (Elmendorf method)*

ISO 2758, *Paper — Determination of bursting strength*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

rotary mower

mower in which one or more functional components cut or shear by impact without mulching and rotate about a vertical axis

3.2

flail mower

mower with a multiplicity of free-swinging cutting elements that rotate about a horizontal axis, which cuts the grass by impact and mulches it with the same tools

3.3

conditioning device

mechanical device allowing the acceleration of the crop-drying process (e.g. crushing, impact, abrasion, lamination)

3.4

swath board

adjustable device for controlling the swath width

3.5

kraft paper

paper produced from pure unbleached sulfate kraft pulp with machine-finished surface

NOTE 1 It is mainly used for the manufacture of paper sacks and for lining and laminating.

NOTE 2 See 4.2.1 for details of specifications.

3.6

impact

hole in kraft paper caused by a stone passing completely through the kraft paper or tear with a deformation of the paper towards the exterior

4 Thrown-object test

4.1 Testing conditions

4.1.1 General

Tests shall be performed on horizontal hard ground.

EXAMPLE Concrete, asphalt.

Tests shall be performed using the same mower, or mower with conditioning device, and the same protective devices. If the mower can be fitted with a removable conditioning device, the test shall be performed both with and without the conditioning device. If the mower can be operated in different working positions (right side, centre or left side of the tractor, see 4.2.7), the test shall be performed with the mower in the rightmost and leftmost working positions behind the tractor, as given by the manufacturer in the instruction handbook.

Adjustable devices (e.g. swath board) which could influence the efficiency of the protective device in preventing projections shall be located in the least favourable position.

During tests, the mower shall be moved so that the tools run through the test material with a forward speed of from 2 km/h to 4 km/h.

4.1.2 Mounted, semi-mounted or trailed mowers

During tests, the mowers shall be driven at the speed recommended by the manufacturer, e.g. at power take-off (PTO) speed of 540 min^{-1} or $1\,000 \text{ min}^{-1}$, by a tractor with minimum power at least equal to the minimum (PTO) needed for the mower measured according to ISO 789-1.

4.2 Target

4.2.1 General

A target is used to record the impact of stones projected from the protected zone of the mower.

The target consists of several panels on which kraft paper is stretched such that it extends below in the lower zone (see 4.4.1) for a minimum of 50 mm. The kraft paper grammage shall be $120 \text{ g/m}^2 \pm 10 \text{ g/m}^2$, determined in accordance with ISO 536. The bursting strength shall be 500 kPa minimum, determined by using the method specified in ISO 2758. The tearing resistance shall be 1 200 mN minimum, in the machine direction, determined in accordance with the test method specified in ISO 1974. There shall be no reinforcing slat within 20 mm of the

kraft paper. There shall be no overlapping of kraft paper, and, in order to have no overlaps, the kraft paper should be stretched from the roll in the horizontal direction on the frames.

Panels 1 to 4 shall be made of a rigid frame, 2 000 mm in height (see Figures 2 to 6).

4.2.2 Panels in the operator's zone for mowers attached at the rear three-point tractor linkage

Panels 5, 7a and 7b act as a target in the operator's zone (see Figure 1); they shall be made of a rigid frame and shall comply with the specifications given in Table 1.

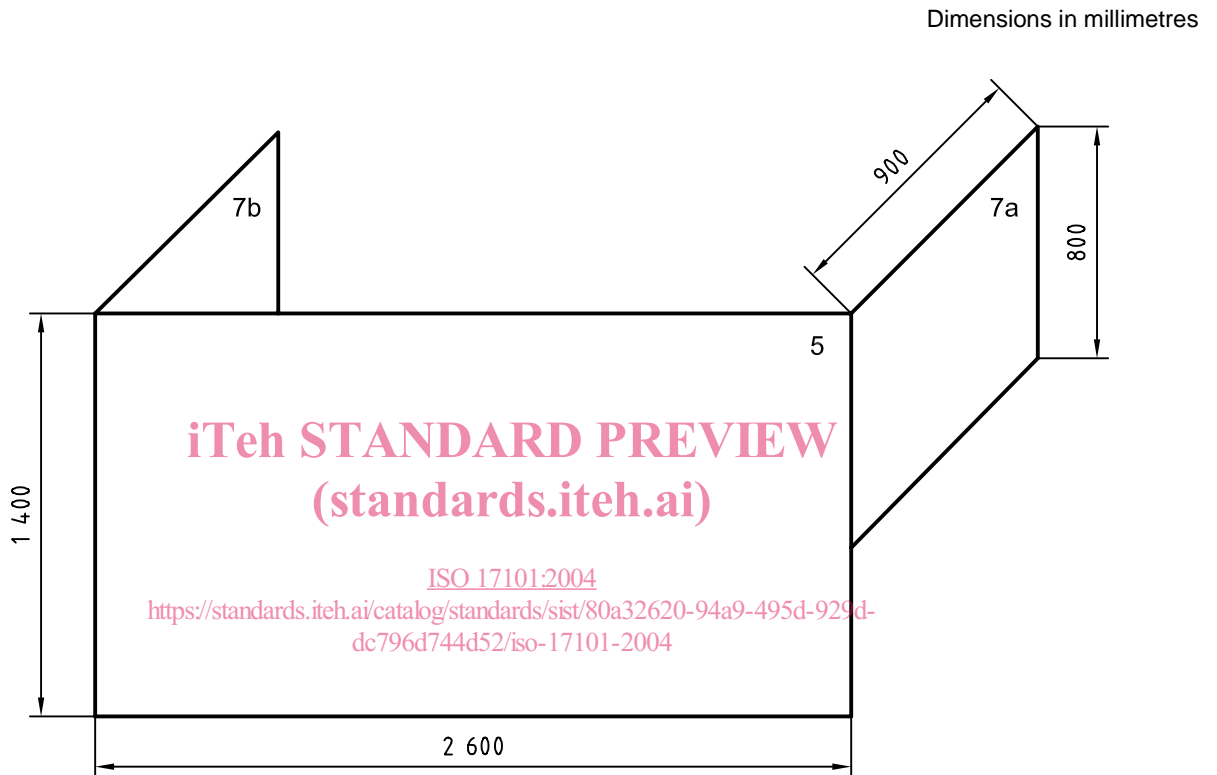


Figure 1

Table 1 — Panels 5, 7a and 7b

Dimensions in millimetres

Panel	Dimensions	Height above ground of lower edge
5	height: 1 400 width: 2 600	900
7a and 7b	height: 800 width: 900	1 500

At the rear angle of Panels 7a and 7b, there may be a slat, in contact with paper and with a maximum thickness of 3 mm.

Panel 5 connects Panels 7a and 7b and shall be perpendicular to them. Panels 7a and 7b shall be parallel to the longitudinal axis of the tractor.

Panel 5 shall be located at a horizontal distance of 800 mm in front of the axis of the lower hitch points of the mower. In order to comply with the required dimensions, it may be necessary to use an intermediate frame on

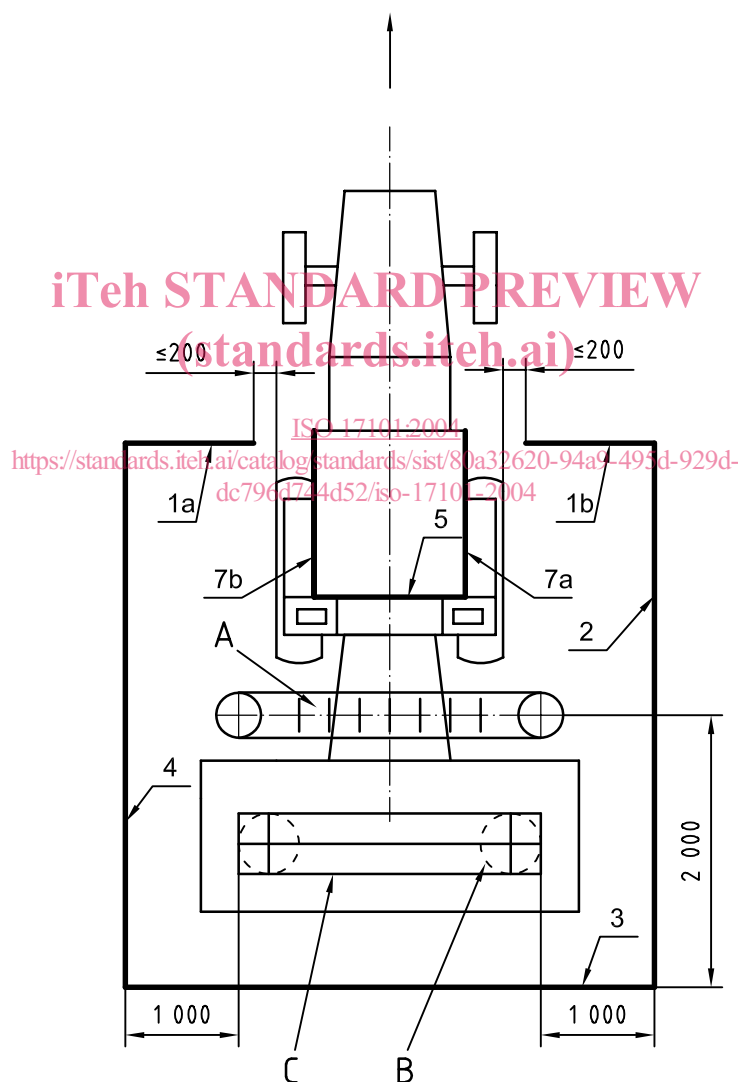
Panel 4 shall be parallel to Panel 2 and located at a distance of 2 000 mm from the nearest tool path. When, owing to the dimensions of the tractor, this distance cannot be achieved, it may be increased. In this case, Panel 4 shall be located at a maximum horizontal distance of 200 mm from the rear wheel of the tractor.

Panel 3 connects Panels 2 and 4 and shall be perpendicular to them.

Panel 1 shall be perpendicular, and immediately adjacent, to Panel 2 with the unattached end located at a maximum horizontal distance of 200 mm from a horizontal line projected forward across the outside face of the rear wheel of the tractor nearest to the mower in the test starting position.

4.2.4 Target for in-line mowers with one or several vertical axes or horizontal axis attached at rear three-point tractor linkage (see Figure 3)

Dimensions in millimetres



Key

- A test material
- B tool path (mower with vertical axle)
- C tool path (mower with horizontal axle)
- panel (1a, 1b, 2, 3, 4, 5, 7a, 7b)

Figure 3

The target is made up of six (or eight) panels (Panels 1a, 1b, 2, 3, 4, 5 and, in some cases, 7a and 7b) which shall comply with the specifications of 4.2.1. and 4.2.2.

Panels 7a and 7b shall be used when the cutting width of the mower is more than 2 m or the mower can be operated at different working positions (right side, centre or left side of the tractor).

Panels 2 and 4 shall be 4 000 mm long. If, owing to mower dimensions, it is not possible to achieve this length, it may be increased. In this case, Panel 3 shall be located at a maximum horizontal distance of 200 mm from the rear of the mower in the test starting position.

Panel 1a shall be perpendicular, and immediately adjacent, to Panel 4, with the unattached end located at a maximum horizontal distance of 200 mm from a horizontal line projected forward across the outside face of the rear wheel of the tractor nearest to Panel 4 in the test starting position.

Panel 1b shall be perpendicular, and immediately adjacent, to Panel 2, with the unattached end located at a maximum horizontal distance of 200 mm from a horizontal line projected forward across the outside face of the rear wheel of the tractor nearest to Panel 2 in the test starting position.

Panels 2 and 4 shall be parallel to the longitudinal tractor axis and located at a distance of 1 000 mm from the nearest tool path.

Panel 3 connects Panels 2 and 4, and shall be perpendicular to them.



4.2.5 Target for front mowers or self-propelled mowers with one or several vertical axes or horizontal axis (see Figure 4)

The target is made up of six panels (Panels 1, 2, 3a, 3b, 4 and 6).

<https://standards.iteh.ai/catalog/standards/sist/80a32620-94a9-495d-929d-dc796d744d52/iso-17101-2004>

Panels 1 to 4 shall comply with the specifications of 4.2.1.

Panel 6 acts as a target at the rear side of the mower.

For mounted mowers, Panel 6 shall be located in front, on an intermediate frame located between the mower and the tractor, at a distance of 500 mm behind the lower link hitch point of the mower. The width of Panel 6 shall be equal to the working width of the mower and its height shall be 1 000 mm. An adequate opening inside Panel 6 for the passage of the PTO drive shaft is acceptable. Panel 6 shall be placed vertically, with its lower edge at a height of 200 mm from the ground.

For a self-propelled mower, Panel 3a and Panel 3b are not required.

For a self-propelled mower, Panel 6 acts as a target in the operator's zone. It shall consist of a rigid frame, on which is stretched kraft paper covering the exposed faces of the cab. This panel shall be fixed on the cab.

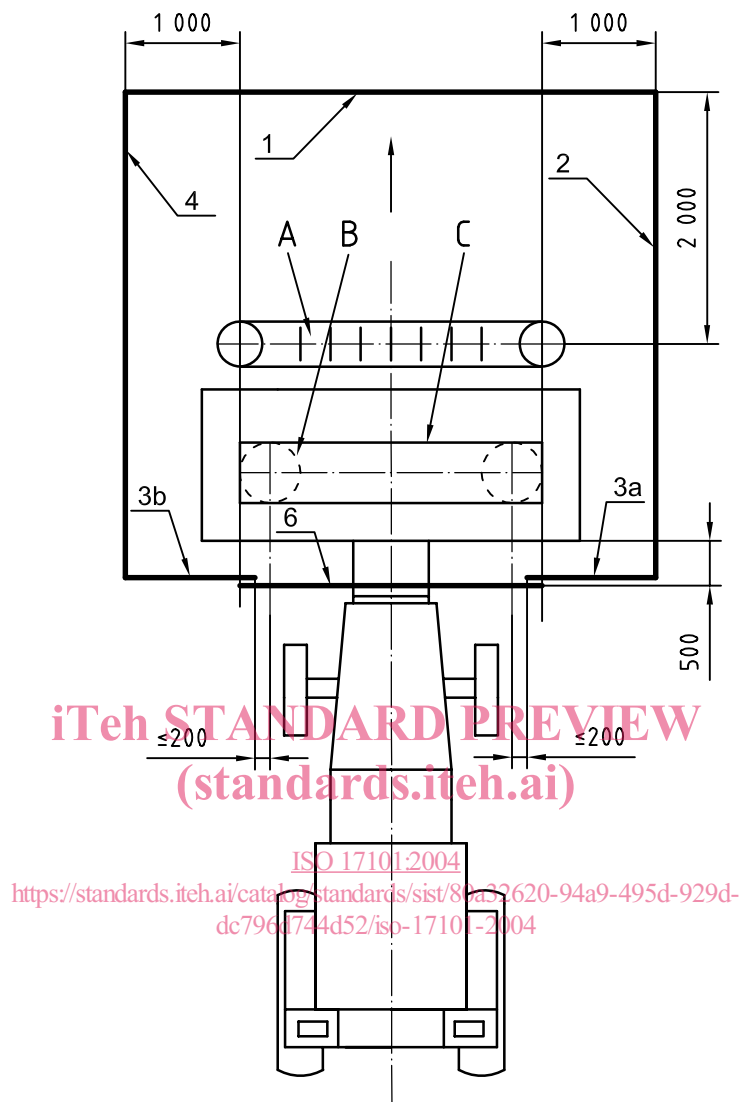
Panels 2 and 4 shall be 4 000 mm long. If, owing to mower dimensions, it is not possible to achieve this length, it may be increased. In this case, Panels 3a and 3b shall be located at a maximum horizontal distance of 200 mm from the rear of the mower in the test starting position.

Panel 6 shall be perpendicular to, and at a maximum distance of 200 mm from, Panel 3a and Panel 3b.

Panels 2 and 4 shall be parallel to the longitudinal tractor or self-propelled mower axis, and located at a distance of 1 000 mm from the nearest tool path.

Panel 1 connects Panels 2 and 4 and shall be perpendicular to them.

Dimensions in millimetres



Key

- A test material
- B tool path (mower with vertical axle)
- C tool path (mower with horizontal axle)
- panel (1, 2, 3a, 3b, 4, 6)

Figure 4