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**Wood-based panels — Determination of  
resistance to axial withdrawal of screws**

*Panneaux à base de bois — Détermination de la résistance à  
l'arrachement axial des vis*

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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.

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 27528 was prepared by Technical Committee ISO/TC 89, *Wood-based panels*.

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# Wood-based panels — Determination of resistance to axial withdrawal of screws

## 1 Scope

This International Standard specifies a method for determining the resistance of wood-based panels, of thickness 15 mm and greater, to the withdrawal of screws under axial load.

NOTE This International Standard establishes fastener holding performance of screws commonly used in applications involving wood-based panels used for building, furniture, cabinet making, joinery or other work in particular regions. Different screws will give different results.

## 2 Normative references

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 286-2, *ISO system of limits and fits — Part 2: Tables of standard tolerance grades and limit deviations for holes and shafts*

[ISO 27528:2009](https://standards.iteh.ai/catalog/standards/sist/f53cb5f9-acc8-4a4d-b6ed-bb9236d22c30/iso-27528-2009)

ISO 2074, *Plywood — Vocabulary*

ISO 2768-1, *General tolerances — Part 1: Tolerances for linear and angular dimensions without individual tolerance indications*

ISO 4757, *Cross recesses for screws*

ISO 9424, *Wood-based panels — Determination of dimensions of test pieces*

ISO 16999, *Wood-based panels — Sampling and cutting of test pieces*

ISO 17064, *Wood-based panels — Fibreboard, particleboard and oriented strand board (OSB) — Vocabulary*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 17064 and ISO 2074 apply.

## 4 Principle

Determination of the maximum axial force required to extract a screw from the face and edge of wood-based panels.

## 5 Apparatus

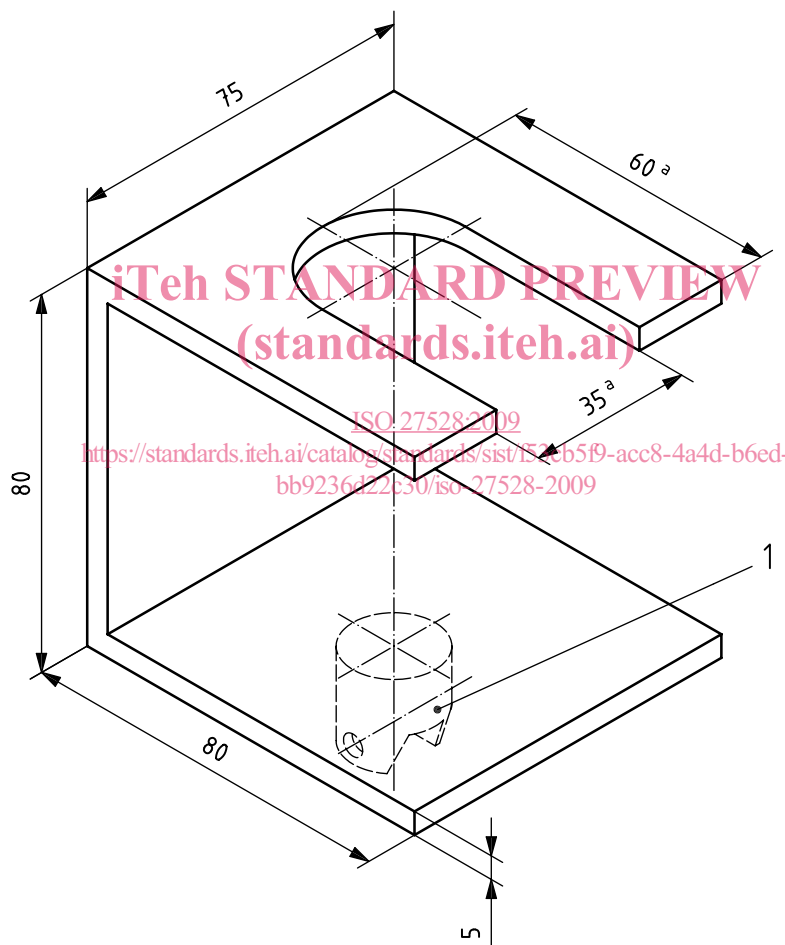
**5.1 Testing machine**, capable of applying an increasing axial load to the underside of the screw head through a suitable stirrup, whilst adequately restraining the test piece at the same time and measuring the maximum load to an accuracy of 1 %.

**5.2 Grip**, allowing the holding of the screw with a resulting force along the screw axis and no significant moment applied.

**5.3 Metal jig**, having a central slot to restrain the test piece and allow the application of an extraction force along the screw axis. No part of the restraint shall be closer to the screw than three times the diameter of this screw. Figure 1 gives an example of an adequate jig.

**5.4 Measuring instruments**, as specified in ISO 9424.

Dimensions in millimetres



### Key

1 spigot for attachment to test machine

<sup>a</sup> Slot to allow positioning of test piece with screw uppermost.

**Figure 1 — Example of metal jig for holding face and edge test pieces**

## 6 Test pieces

### 6.1 Sampling and cutting

Sampling and cutting of the test pieces shall be carried out in accordance with ISO 16999. The number of test pieces cut from each panel shall be five, unless otherwise specified in the relevant product specification.

### 6.2 Dimensions of test pieces

Test pieces shall have side lengths of at least 75 mm × 50 mm and shall be cut from panels that are at least 15 mm thick. If panels of less than 15 mm thickness are to be tested, two or more thicknesses shall be glued together to achieve the 15 mm minimum thickness. Test pieces shall be cut with clean, straight edges at right angles to panel surfaces.

### 6.3 Conditioning

Test pieces shall be conditioned to a constant mass in an atmosphere with a relative humidity of  $(65 \pm 5) \%$  and a temperature of  $(20 \pm 2) ^\circ\text{C}$ . Constant mass is considered to have been reached when the results of two successive weighing operations, carried out at an interval of 24 h, do not differ by more than 0,1 % of the mass of the test piece. Testing shall be carried out not later than 1 h after removal of the test pieces from the conditioning environment.

While the standard moisture conditioning cycle is stated above, the test method may be used for testing panels at other moisture conditions (including that attained by water soaking). If other moisture conditioning cycles are used, relevant information shall be included in the test report.

### 6.4 Screws

Screws used for this test shall be those in common use or intended to be used for a particular application and shall be fully described in the test report (see Clause 9).

For general testing, new steel screws, which are free from rust, oil and grease, have a smooth surface of the thread and are not damaged, distorted or blunt, shall be used.

If reference testing is required, medium screws, as specified in ISO 2768-1 (see Annex A) shall be used. Screw length shall be sufficient to allow for the specified embedded length and extension above the test piece for insertion in the test jig. Embedded lengths specified in 7.1.1 and 7.1.2 shall be full diameter and shall not include the end tapered section.

## 7 Procedure

### 7.1 Preparation for withdrawal tests

#### 7.1.1 Face withdrawal of screws

After the test pieces have been conditioned, one screw shall be inserted into a drilled pilot hole. The pilot hole shall be drilled perpendicular to the surface of the test piece, located at the midpoint of one face. The pilot hole length shall exceed the embedded length of the test screw. The pilot hole diameter shall be according to the wood panel manufacturer's recommendations, or in the absence of such advice, as recommended by the screw manufacturer. If no information is available from either, the pilot hole diameter shall be the next drill size below the test screw root diameter. The pilot hole length and diameter used for the test shall be included in the test report. The full diameter of the thread shall be embedded in the test piece for a depth of at least  $(11 \pm 0,5)$  mm.

7.1.2 Edge withdrawal of screws

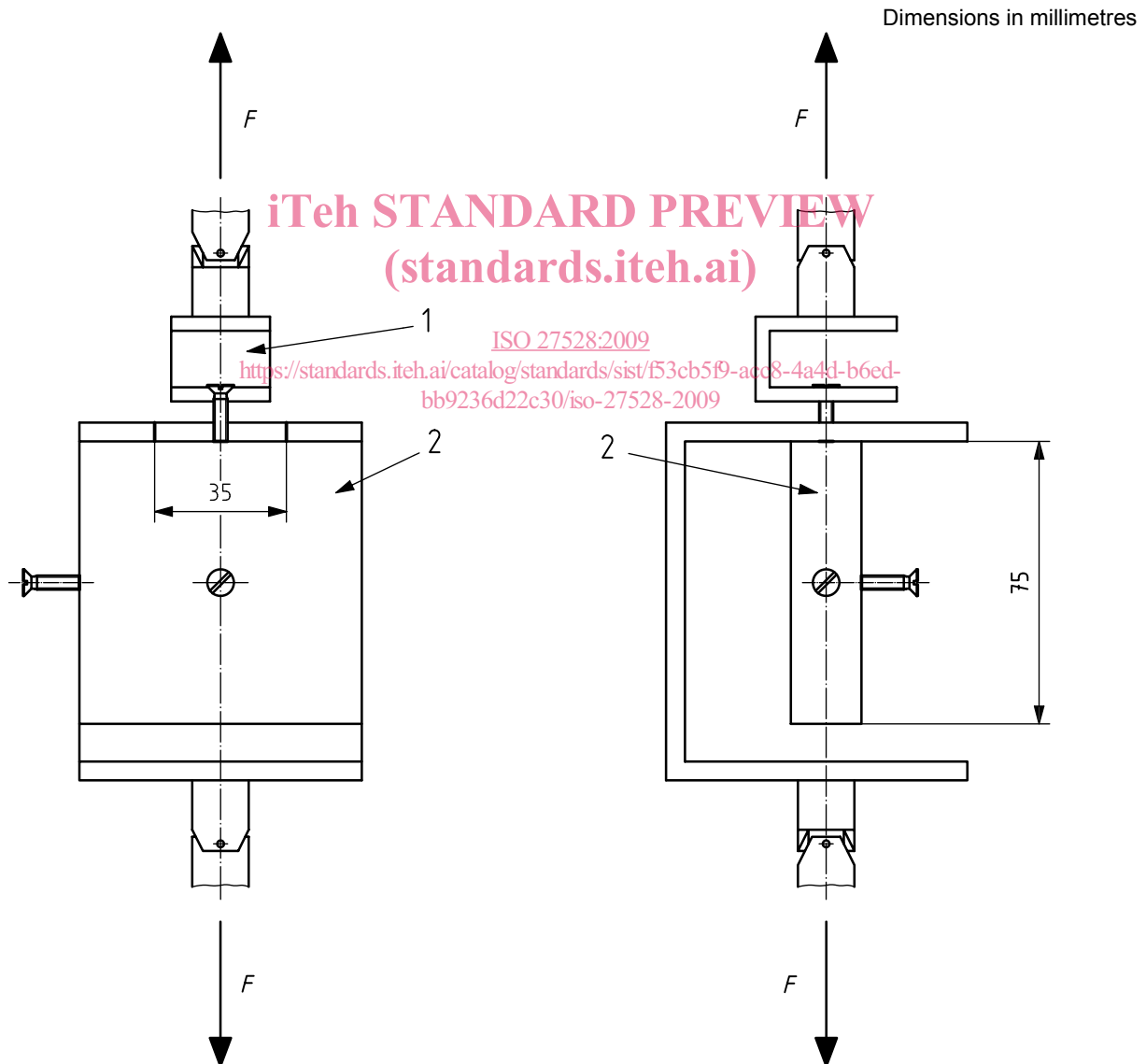
After the test pieces have been conditioned, two screws shall be inserted into two adjacent edges of each test piece using drilled pilot holes. Pilot holes shall be drilled perpendicular to the edges of the test piece, located at the midpoint of each edge to be tested with length and diameter as specified in 7.1.1. The full diameter of the thread shall be embedded in the test piece for a depth of at least  $(15 \pm 0,5)$  mm.

7.2 Positioning of test pieces

Mount the test pieces in the testing machine so that the surface under test:

- a) is not supported at any point closer than three times the screw diameter to the periphery of the embedded part of the screw;
- b) is held perpendicular to the direction of the force applied to the screws.

Figure 2 gives an example of the edge withdrawal test piece and its positioning in the example jig. Face test piece positioning is done in a similar manner with the face screw uppermost.



- Key**
- 1 stirrup
  - 2 test piece

Figure 2 — Positioning of test piece (edge withdrawal) in the example jig



### 7.3 Application of the force

Apply an increasing axial force to the underside of the head of each screw in turn, for example through a stirrup incorporating a parallel-sided slot of suitable width to fit easily to the shank of the screw. Apply the axial load at a constant rate of movement of the test machine cross head so that maximum load is reached in  $(60 \pm 30)$  s.

### 7.4 Measurement of maximum load

Record the maximum load, to the nearest 10 N, sustained by the test piece during the withdrawal test on the face and both edges.

## 8 Expression of results

Record separate withdrawal strengths for the face and edges of the test piece, expressed to the nearest 10 N. The two possible orthogonal directions of the panel shall be recorded separately, unless analysis of results indicates they may be combined.

## 9 Test report

The test report shall include the following information:

- a) the name and address of the test laboratory;
- b) a sampling report in accordance with ISO 16999;
- c) the date of the test report;
- d) a reference to this International Standard, i.e. ISO 27528;
- e) the type and thickness of the panel together with relevant product specification;
- f) the surface treatment, if relevant;
- g) the moisture conditioning or moisture content of samples, if different from standard conditioning;
- h) a full description of the screws used for the test, including the International Standard with which they comply, if applicable. As a minimum, screw description shall include size, length, root diameter, thread diameter and thread pitch;
- i) the pilot hole diameter used for face and edge screws;
- j) the specific apparatus used, in the case of different possibilities allowed in this International Standard;
- k) the test results expressed as stated in Clause 8, including all individual test results;
- l) any deviation from this International Standard.