
**Wood-based panels — Determination of
moisture resistance — Boil test**

*Panneaux à base de bois — Détermination de la résistance à
l'humidité — Essai à l'eau bouillante*



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Foreword

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Wood-based panels — Determination of moisture resistance — Boil test

1 Scope

This International Standard specifies a method of test for evaluating the bond quality of particleboards, OSB and fibreboards, intended for use in humid conditions.

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

ISO 12466-2, *Plywood — Bonding quality — Part 2: Requirements*

ISO 16984, *Wood-based panels — Determination of tensile strength perpendicular to the plane of the board*

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

3 Principle

Tensile strength, perpendicular to the plane of the panel (internal bond), is determined using test pieces which have been immersed in boiling water.

4 Apparatus

4.1 Sliding caliper, as specified in ISO 9424.

4.2 Laboratory water bath, temperature controlled, capable of raising the contents to boiling point at a specified rate (see 6.1) and maintaining boiling for not less than 2 h.

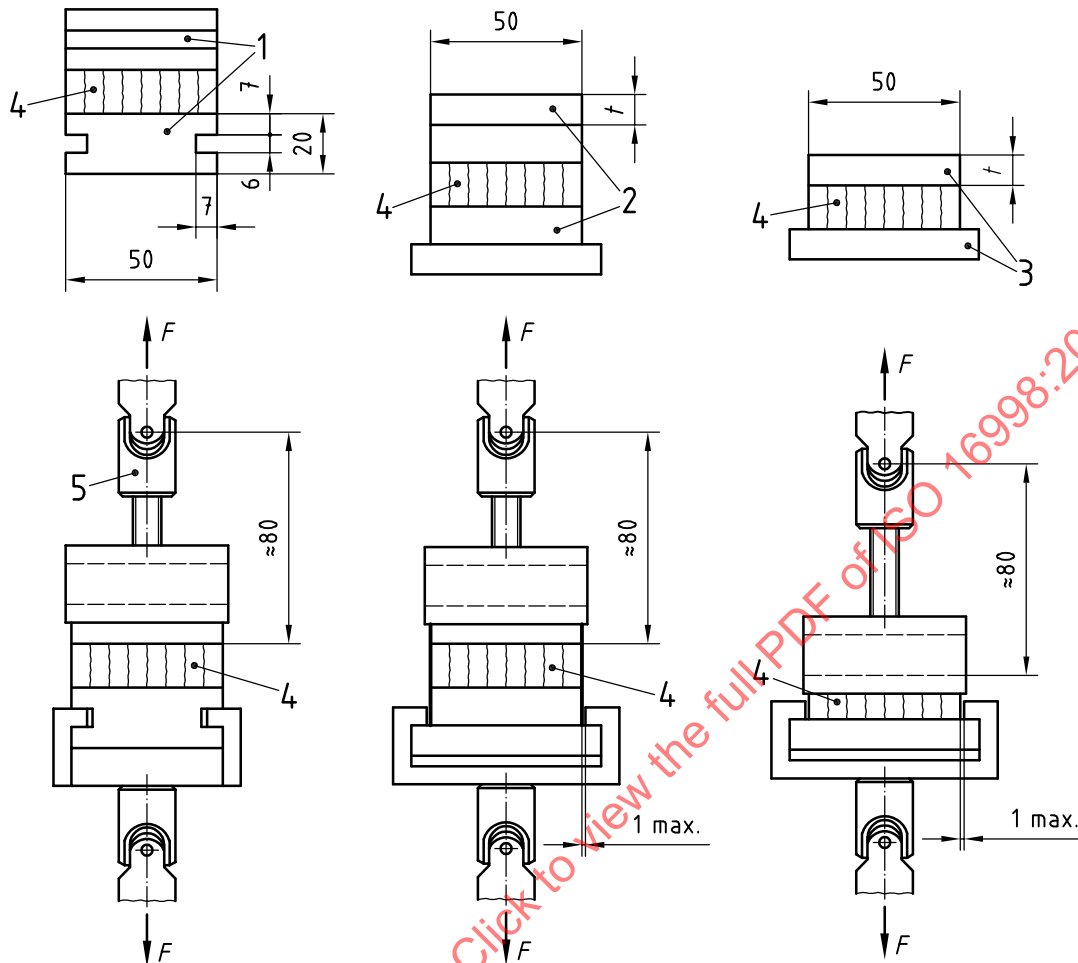
The heating zone should be separated from the immersed sample by baffles or by the use of separate chambers. This will prevent erosion of the test pieces by air bubbles or strong water flows. A level control device (e.g. float chamber) may also be required to maintain the water level as water will be lost due to vaporization. A back-flow connection between the water bath and the float chamber will also ensure preheating of water entering the water bath from the float chamber.

4.3 Testing machine, as described in ISO 16984.

4.4 Testing blocks, of metal, hardwood or hardwood plywood), compatible with the fixing device, to which the test pieces are to be bonded (see Figure 1). Hardwood or hardwood plywood shall have a density greater than 600 kg/m³.

When thin panels (of thickness less than 8 mm) or high-density panels (greater than 800 kg/m³) are tested, metal blocks shall be used.

4.5 Oven, air-circulating, capable of maintaining an internal temperature of $(70 \pm 2) ^\circ\text{C}$.



Key

- 1 metal testing block
- 2 testing block (metal, hardwood or hardwood plywood)
- 3 hardwood-plywood testing block (not suitable for thin boards)
- 4 test piece
- 5 self-aligning ball-and-socket joint

$t \geq 15 \text{ mm}$

Figure 1 — Examples of apparatus for testing tensile strength perpendicular to the plane of the panel

5 Test pieces

5.1 Sampling

Sampling and cutting of at least eight test pieces per panel shall be carried out according to the principles of ISO 16999.

5.2 Dimensions

The dimensions of the test pieces shall be as described in ISO 16984.

5.3 Conditioning

Test pieces and the hardwood, or hardwood plywood, testing blocks shall be conditioned to constant mass in a standard climate of $(20 \pm 2) ^\circ\text{C}$ and relative humidity of $(65 \pm 5) \%$. 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.

5.4 Measurement of dimensions

After conditioning, measure the length and width of each test piece in accordance with ISO 9424.

5.5 Bonding of the test pieces to the testing blocks

Bond each test piece to testing blocks, using a suitable adhesive. The upper and lower blocks shall be orientated at 90° as shown in Figure 1. Excess glue squeezed out from the glueline shall be removed before testing.

The bonding of the test pieces to the testing blocks shall only be carried out after the boil treatment (see 6.1) and subsequent treatment (see 6.2) have been completed.

For particle boards, the loading blocks may also be bonded to the test pieces before the boil treatment if a valid correlation to the specified procedure can be proven. In this case, immersion in water should only be carried out after the glue has had sufficient time to cure (so that rupture does not occur in the glueline) and after the test pieces have had sufficient time to regain an equal distribution of moisture. During this time, the glued assembly should be stored under controlled conditions of $(65 \pm 5) \%$ relative humidity and a temperature of $(20 \pm 2) ^\circ\text{C}$. Experience has shown that equilibrium conditions are reached in approximately 24 h if epoxy resins are used and approximately 72 h if phenol-resorcinol resins are used.

When gluing, additional stresses affecting the test piece, e.g. caused by the moisture contained in the adhesive, and/or any rise in temperature, shall be avoided as far as possible.

NOTE 1 The following combinations have proved suitable:

- epoxy resins with metal blocks;
- epoxy resins, phenol-resorcinol resins and two-component polyurethane resins with hardwood plywood blocks.

NOTE 2 The cleaning of metal blocks for re-use can be carried out as follows. After roughly removing the remains of the broken test pieces, the metal blocks are immersed in acetone for 12 h to 24 h. Thereafter, the remaining glue can be easily removed.

WARNING — Acetone is highly flammable.

6 Procedure

6.1 Boil treatment

Place the test pieces in the water bath (4.2) and cover them with clean water, having a temperature of $(20 \pm 5) ^\circ\text{C}$ and a pH of 7 ± 1 to a depth of $(75 \pm 25) \text{ mm}$. They shall be separated from each other, and from the sides and bottom of the water bath by at least 15 mm, to allow free circulation of the water. This distance shall be maintained throughout the treatment.

Renew the water at the start of each test.

Heat the water to boiling point ($\approx 100 ^\circ\text{C}$) over a period of $(90 \pm 10) \text{ min}$. Continue boiling for $(120 \pm 5) \text{ min}$. The water shall be in a state of gentle boiling with no violent or turbulent action on or below the surface.

6.2 Cooling and drying of test pieces before testing

After boiling, remove the test pieces and immerse them in water at $(20 \pm 5) ^\circ\text{C}$ for (60 ± 5) min. The test pieces shall have their faces vertical and be separated from each other and from the sides and the bottom of the water bath by at least 15 mm.

Remove the test pieces from the water, dry them with a paper towel and place them, with their faces horizontal, in the oven (4.5) at $(70 \pm 2) ^\circ\text{C}$ for (960 ± 15) min.

Remove the test pieces from the oven, allow them to cool to approximately room temperature and bond the loading blocks (4.4) to the faces.

NOTE If the surfaces of the test pieces are rough or uneven, they can be smoothed before bonding on the blocks by rubbing on a piece of abrasive paper which is held on a flat surface.

6.3 Application of the load and measurement of failing load

See ISO 16984.

7 Expression of results

See ISO 16984.

8 Test report

The test report shall contain the following information:

- name and address of test laboratory;
- sampling report according to ISO 16999;
- date of the test report;
- reference to this International Standard;
- type and thickness of the panel;
- relevant product specification;
- surface treatment, if relevant;
- specific apparatus used, in case of different possibilities allowed in this International Standard;
- test results expressed as stated in Clause 7;
- all deviations from this International Standard.