INTERNATIONAL STANDARD

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Wood-based panels — Determination of tensile strength perpendicular to the plane of the panel

Panneaux à base de bois — Détermination de la résistance à la traction perpendiculaire aux faces du panneau

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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 16984 was prepared by Technical Committee ISO/TC 89, *Wood-based panels*. ISO 16984 is based on European Standard EN 319.

Wood-based panels — Determination of tensile strength perpendicular to the plane of the panel

1 Scope

This International Standard specifies a method for determining the resistance to tension perpendicular to the plane of the panel, also known as “internal bond”, of particleboards, OSB, fibreboards, and cement-bonded particleboards.

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

3 Principle

Determination of resistance to tension perpendicular to the surface of the test piece by submitting the latter to a uniformly distributed tensile force until rupture occurs. The tensile strength perpendicular to the plane of the panel is determined by the maximum load in relation to the surface area of the test piece.

4 Apparatus

4.1 Sliding caliper, as specified in ISO 9424.

4.2 Testing machine, capable of applying a tensile force perpendicular to the surfaces of the test piece by means of grips (see Figure 1), and measuring this force to an accuracy of 1 %. At least one grip shall be self-aligning.

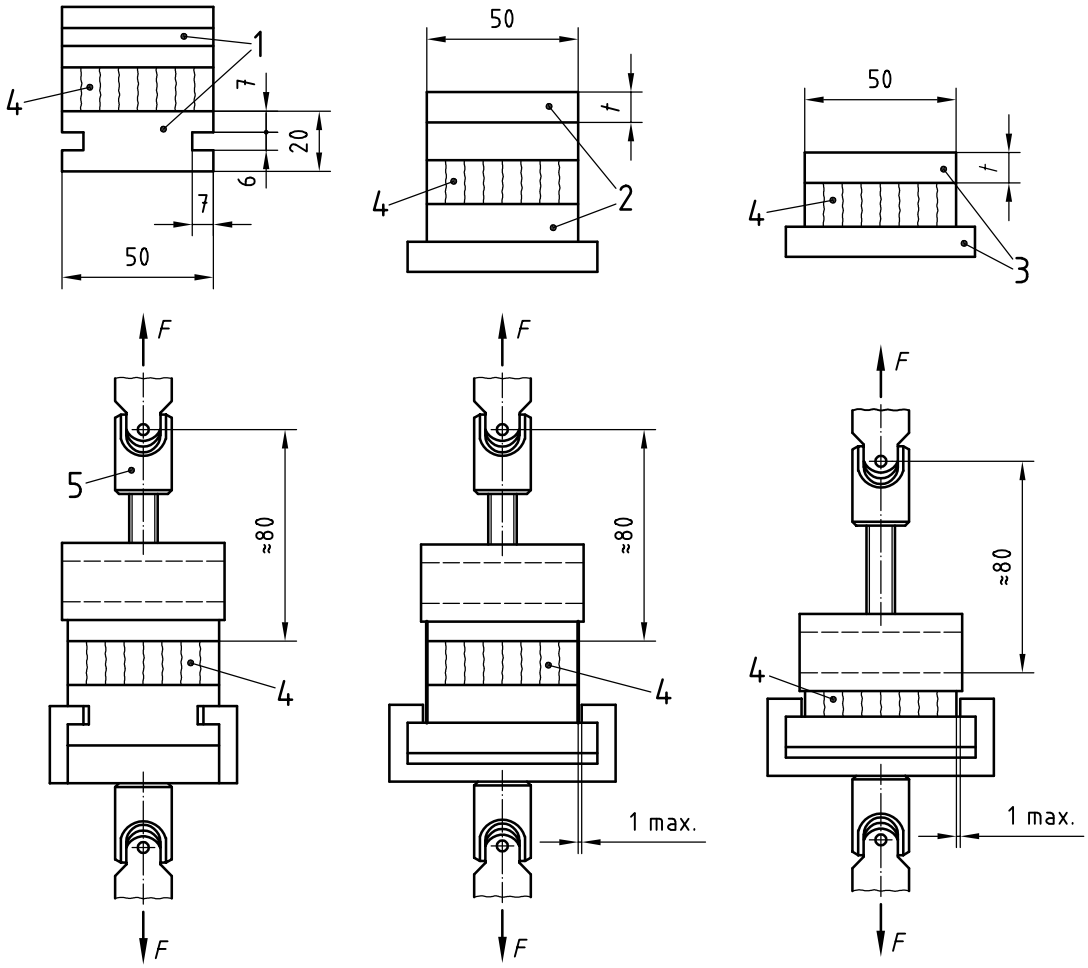
4.3 Test blocks, of metal, hardwood or hardwood plywood, compatible with the fixing device, to which the test pieces are to be bonded (see Figure 1). Hardwood or hardwood plywood shall have a density of greater than 600 kg/m^3.

5 Test pieces

5.1 Sampling

Sampling and cutting of the test pieces shall be carried out according to ISO 16999.

Dimensions in millimetres



Key

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

$t \geqslant 15$ mm

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

5.2 Dimensions

The test pieces shall be square with a side length of (50 ± 1) mm. The test pieces shall be cut with precision, the angles shall be 90° and the edges shall be straight and clean.

5.3 Conditioning

The test pieces and the hardwood, or hardwood-plywood, testing blocks shall be conditioned to constant mass in a standard climate of (20 ± 2) °C and relative humidity of (65 ± 5) %. Constant mass of the test pieces is considered as having 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.

In some cases, for instance in a cyclic test in humid conditions or in an immersion-in-water test, alternative conditioning procedures can be specified. In this case, the appropriate standard shall be consulted and followed.

5.4 Determination of dimensions

After conditioning, measure the length and width of each test piece according to ISO 9424.

5.5 Bonding of the test pieces to the loading blocks

Each test piece shall be bonded to loading blocks using a suitable adhesive. The upper and lower blocks shall be orientated at 90° as shown in Figure 1. Excess glue pressed out from the glueline shall be removed. If hot-melt glue is used, the screen side of hardboards shall be sanded off until a smooth surface is achieved. If the screen side is not sanded off, a gap-filling glue (epoxy glue) shall be used.

When glueing, additional stresses affecting the test piece, by the moisture contained in the adhesive and the rise in temperature, etc., shall be avoided as far as possible.

NOTE The following combinations have proved suitable:

— hot melt and epoxy glues with metal blocks;

— hot melt, epoxy, PVAC, UF, phenol-resorcinol glues with hardwood and hardwood-plywood blocks.

Certain glues are not suitable for bonding test pieces which have been subjected to a cyclic test in humid conditions or an immersion-in-water test. If the test pieces are bonded to their loading blocks after such a pretreatment, they may be lightly sanded (top and bottom) to remove any roughness which has occurred during pretreatment.

The tests shall not be carried out until the glue has had sufficient time to cure, so that the rupture does not occur in the glueline, and until the test pieces have regained an equal distribution of moisture.

By experience, approximately 24 h are sufficient if hot-melt or epoxy glues are used, and approximately 72 h, if other glues are used. During this time, the glued assembly should be stored under controlled conditions of (65 ± 5) % relative humidity and a temperature of (20 ± 2) °C. Test pieces should be tested not more than 1 h after removal from the conditioning environment.

Conditioning is not applicable to test pieces or glued assemblies which have been subjected to a cyclic test in humid conditions or an immersion-in-water test and which are tested in the humid stage.

When thin panels ($< 8{,}0$ mm thickness) or high-density panels (> 800 kg/m^3) are tested, it is recommended to use metal blocks, since experience has shown that the results are more variable with wooden blocks in these cases.

6 Procedure

6.1 Application of the load

Place the testing assembly in the grips and apply an increasing force until rupture occurs. The load shall be applied at a constant rate of crosshead-movement throughout the test. The rate of loading shall be adjusted so that the maximum load is reached within (60 ± 30) s.

6.2 Measurement of failing load

Record the maximum load sustained by the test piece with a precision of 1 %. Reject the results from any test piece that exhibits partial or total glueline failure or failure in the testing block. In this case, the test shall be repeated using new test pieces.

7 Expression of results

7.1 Test piece

The tensile strength perpendicular to the plane of the panel of each test piece, $f_{t,\perp}$, expressed in megapascals (MPa) to two decimals, shall be calculated according to the following equation:

$$f_{t,\perp} = \frac{F_{max}}{ab}$$

where

F_{max} is the breaking load, in newtons (N);

a is the length of the test piece, in millimetres (mm);

b is the width of the test piece, in millimetres (mm).

7.2 Panel

The tensile strength perpendicular to the plane of the panel is the mean value of all the results obtained from the test pieces from that panel, expressed in megapascals (MPa) to two decimals.

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.

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