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Wood-based panels — Determination of moisture resistance under cyclic test conditions

Panneaux à base de bois — Détermination de la résistance à l'humidité selon essais cycliques

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Foreword

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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 16987 was prepared by Technical Committee ISO/TC 89, *Wood-based panels*. ISO 16987 is based on European Standard EN 321.

Wood-based panels — Determination of moisture resistance under cyclic test conditions

1 Scope

This International Standard specifies a test method for the determination of the moisture resistance of wood-based panels under cyclic test 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 16978, *Wood-based panels — Determination of modulus of elasticity in bending and of bending strength*

ISO 16983, *Wood-based panels — Determination of swelling in thickness after immersion in water*

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

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

3 Principle

Test pieces are exposed to three cycles, each comprising immersion in water, freezing, and drying at an elevated temperature. After cyclic treatment, the test pieces are then reconditioned and their swelling in thickness and residual strength are determined.

4 Apparatus

4.1 Water bath, which shall maintain water at a temperature of (20 ± 1) °C.

4.2 Freezing cabinet, which shall be capable of maintaining a temperature of between -12 °C and -25 °C. It shall also be capable of regaining this temperature within 1 h after inserting the test pieces.

4.3 Laboratory drying cabinet, with forced, evenly distributed air ventilation, which shall maintain a temperature of (70 ± 2) °C and have (25 ± 5) air exchanges per hour. It shall be capable of reaching a temperature of (70 ± 2) °C within 2 h after inserting the test pieces.

5 Test pieces

5.1 Sampling

Sampling and cutting of the test pieces shall be carried out in accordance with to ISO 16999 and the relevant specification standard corresponding to the material.

5.2 Dimensions of test pieces

Dimensions shall be in accordance with ISO 16978, ISO 16983 and ISO 16984, as appropriate.

5.3 Conditioning

The test pieces shall be conditioned to constant mass in an atmosphere with a relative humidity of (65 ± 5) % and a temperature of (20 ± 2) °C. Constant mass 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 each test piece.

6 Procedure

6.1 Treatment of the test pieces

6.1.1 General

The following sequence of operations shall be carried out.

6.1.2 Initial conditioning and measurement

Condition the test pieces in accordance with 5.3.

Determine the dimensions of the test pieces in accordance with ISO 9424.

6.1.3 Cyclic treatment

6.1.3.1 First cycle.

6.1.3.1.1 Immerse the test pieces in the water bath, which shall contain fresh water of pH (7 ± 1) and be at a temperature of (20 ± 1) °C.

The test pieces shall be placed standing on one edge (one long edge in the case of the bending test pieces) and shall be separated from each other, and from the bottom and sides of the water bath, by at least 15 mm. The upper edges of test pieces shall be covered by (25 ± 5) mm of water throughout the immersion period.

The immersion period shall be (70 ± 1) h.

6.1.3.1.2 Remove the test pieces from the water bath. Allow the surface water to drain off for a few minutes and then place the test pieces in the freezing cabinet which shall be at a temperature between −12 °C and −25 °C.

The test pieces shall be placed standing on the same edge as when immersed, and shall be separated from each other by at least 15 mm.

The freezing period shall be (24 ± 1) h.

6.1.3.1.3 Remove the test pieces from the freezing cabinet and immediately place them in the drying cabinet which shall be at a temperature of (70 ± 2) °C.

The test pieces shall be placed standing on the same edges as when immersed and frozen, and shall be separated from each other by at least 15 mm. The total volume of the test pieces shall not exceed 10 % of the internal volume of the drying cabinet.

The drying period shall be (70 ± 1) h.

6.1.3.1.4 Remove the test pieces from the drying cabinet and place them in a room at a temperature of (20 ± 5) °C.

The test piece shall be placed standing on the same edge as when immersed, frozen and dried, and shall be separated from each other by at least 15 mm.

The cooling period shall be $(4 \pm 0{,}5)$ h.

6.1.3.2 Second cycle.

6.1.3.2.1 At the end of the cooling period, immerse the test pieces again in the water bath, which shall contain fresh water of pH (7 ± 1) and be at a temperature of (20 ± 1) °C.

Before standing them in the water bath, the test pieces shall be inverted to stand on their opposite edges. The test pieces shall be separated from each other and from the bottom and sides of the bath by at least 15 mm. The upper edges of test pieces shall be covered by (25 ± 5) mm of water throughout the immersion period.

The immersion period shall be (70 ± 1) h.

6.1.3.2.2 Remove the test pieces from the water bath. Allow the surface water to drain off for a few minutes and then place the test pieces in the freezing cabinet which shall be at a temperature between -12 °C and -25 °C.

The test pieces shall be placed standing on the same edges as when immersed (6.1.3.2.1), and shall be separated from each other by at least 15 mm.

The freezing period shall be (24 ± 1) h.

6.1.3.2.3 Remove the test pieces from the freezing cabinet and immediately place them in the drying cabinet which shall be at a temperature of (70 ± 2) °C.

The test pieces shall be placed standing on the same edges as when immersed (6.1.3.2.1) and frozen (6.1.3.2.2), and shall be separated from each other by at least 15 mm. The total volume of the test pieces shall not exceed 10 % of the internal volume of the drying cabinet.

The drying period shall be (70 ± 1) h.

6.1.3.2.4 Remove the test pieces from the drying cabinet and place them in a room with a temperature of (20 ± 5) °C.

The test piece shall be placed standing on the same edges as when immersed (6.1.3.2.1), frozen (6.1.3.2.2) and dried (6.1.3.2.3), and shall be separated from each other by at least 15 mm.

The cooling period shall be $(4 \pm 0{,}5)$ h.

6.1.3.3 Third cycle.

6.1.3.3.1 At the end of the cooling period, immerse the test pieces again in the water bath, which shall contain fresh water of pH (7 ± 1) and be at a temperature of (20 ± 1) °C.

Before standing them in the water bath, the test pieces shall be inverted to stand on their opposite edges (i.e. each test piece shall be standing on the same edge as during the initial immersion period described in 3). The test pieces shall be separated from each other and from the bottom and sides of the bath by at least 15 mm. The upper edges of test pieces shall be covered by (25 ± 5) mm of water throughout the immersion period.

The immersion period shall be (70 ± 1) h.

6.1.3.3.2 Remove the test pieces from the water bath. Allow the surface water to drain off for a few minutes and then place the test pieces in the freezing cabinet which shall be at a temperature between -12 °C and -25 °C.

The test pieces shall be placed standing on the same edges as when immersed (6.1.3.3.1), and shall be separated from each other by at least 15 mm.

The freezing period shall be (24 ± 1) h.

6.1.3.3.3 Remove the test pieces from the freezing cabinet and immediately place them in the drying cabinet which shall be at a temperature of (70 ± 2) °C.

The test pieces shall be placed standing on the same edges as when immersed (6.1.3.3.1) and frozen (6.1.3.3.2), and shall be separated from each other by at least 15 mm. The total volume of the test pieces shall not exceed 10 % of the internal volume of the drying cabinet.

The drying period shall be (70 ± 1) h.

NOTE Stages 6.1.3.1.1 to 6.1.3.3.3 take approximately 500 h to complete.

6.1.4 Reconditioning

Remove the test piece from the drying cabinet and condition them to constant mass in accordance with 5.3.

Determine the dimensions of the test pieces in accordance with ISO 9424.

6.2 Determination of swelling in thickness

Determine the swelling in thickness of the test pieces according to ISO 16983.

6.3 Determination of tensile strength perpendicular to the plane of the panel

Determine the tensile strength perpendicular to the plane of the panel according to ISO 16984 using the dimensions determined in 6.1.2.

NOTE Before bonding the test pieces to the loading blocks, their faces may be lightly sanded to remove any roughness and/or slight deformation caused by the cyclic test.

6.4 Determination of bending strength

When required, determine the bending strength according to ISO 16978 using the dimensions of the test pieces after either initial (see 6.1.2) or final (see 6.1.4) conditioning depending on the requirements of the relevant specification.

7 Expression of results

7.1 Swelling in thickness

According to ISO 16983.

7.2 Tensile strength

According to ISO 16984.

7.3 Bending strength

According to ISO 16978. The method of calculation used shall be stated in the report.

8 Test report

The test report shall contain the following information:

— name and address of the 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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