INTERNATIONAL STANDARD

ISO 16985

First edition
2003-05-15

Wood-based panels — Determination of dimensional changes associated with changes in relative humidity

Panneaux à base de bois — Détermination des variations dimensionnelles sous l'influence de variations de l'humidité relative

Reference number
ISO 16985:2003(E)

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Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
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Published in Switzerland

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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 16985 was prepared by Technical Committee ISO/TC 89, *Wood-based panels.* ISO 16985 is based on European Standard EN 318.

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Wood-based panels — Determination of dimensional changes associated with changes in relative humidity

1 Scope

This International Standard specifies a method for the determination of dimensional changes in wood-based panels, due to variations in relative humidity.

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 16979, *Wood-based panels — Determination of moisture content*

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

3 Principle

The equilibrium moisture content of panel products is dependent on the history of moisture change. Higher equilibrium moisture contents for any one relative humidity are achieved in desorption compared with adsorption; this gives rise to a hysteresis effect.

In order to obtain the true dimensional change, this is measured between 65 % and 85 % relative humidity in adsorption and between 65 % and 30 % relative humidity in desorption.

4 Apparatus

4.1 Balance, as described in ISO 16979.

4.2 Instruments for measuring length and thickness, with an accuracy of ± 0,01 mm. An example of length-measuring equipment is shown in Figure 1.

4.3 Calibration bar, corrosion-resistant metal bar of sufficient length and shape to calibrate the length-measuring equipment. The length of the calibration bar shall be known to within 0,01 mm.

4.4 Climate chamber(s), capable of maintaining the required temperature at ± 1 °C and relative humidity at ± 3 %.

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Dimensions in millimetres

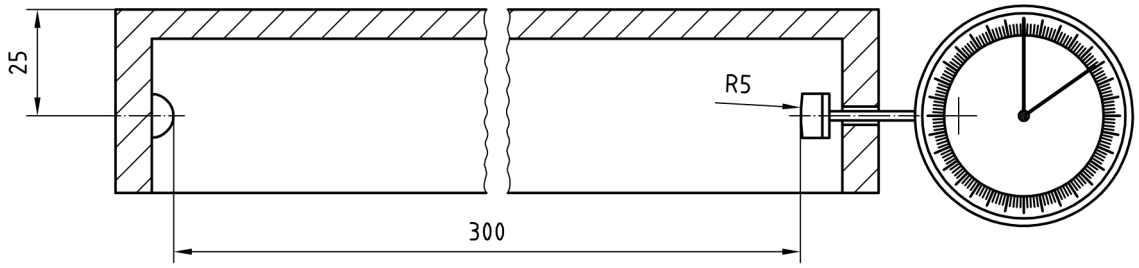


Figure 1 — Example of length-measuring equipment

4.5 Drying oven, ventilated and capable of being controlled at (103 ± 2) °C.

4.6 Hygrometer, with an accuracy of ± 1 % relative humidity to measure and record the relative air humidity in the climate chamber.

4.7 Thermometer, with an accuracy of ± 0,5 °C to measure and record the temperature in the climate chamber.

5 Test pieces

Dimensions of test pieces are (300 ± 1) mm × (50 ± 1) mm × t (panel thickness). From each panel, two sets of four test pieces shall be cut in each panel direction. The general conditions for sampling of the test pieces shall be in accordance with ISO 16999.

6 Procedure

6.1 Test-piece preparation

6.1.1 General

The test pieces shall be prepared with suitable markings to ensure that the measurement will be carried out at the same position each time.

6.1.2 Thickness-measuring points

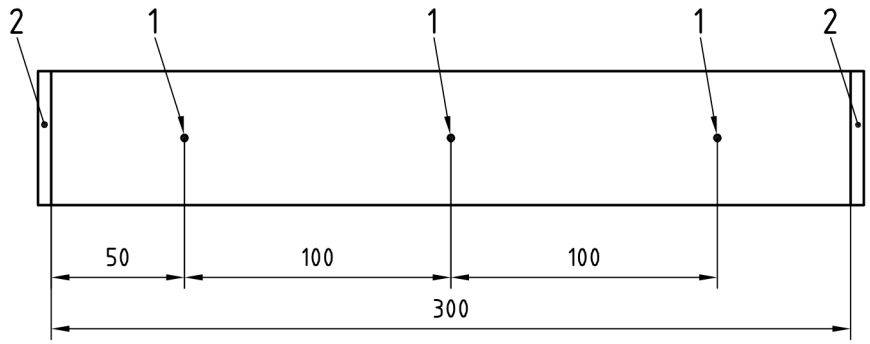
The marks are placed on the centre-line of the test piece 50 mm from the ends and at the mid-point, as shown in Figure 2. Ink marks on the surface of the test piece are considered to be adequate. Other types of markings may be used if proven to give correct results.

6.1.3 Length-measuring points

A suitable reference system comprises glass plates with a thickness of at least 1 mm glued to the ends of the test piece. An alternative reference system consists of metal knobs, placed at a distance of 250 mm apart, approximately 25 mm from each end. The knobs can be mechanically fastened or glued onto the surface of the test piece. The adhesive shall not be water-based or hygroscopic. Other types of markings may be used if proven to give correct results.

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Dimensions in millimetres



Key

1 ink mark
2 glass plate

Figure 2 — Example of a suitable test-piece preparation with glass plates

6.2 Conditioning

The two sets of test pieces will be treated separately and each will be conditioned in three steps. Condition the test pieces to constant mass in each of the steps given in Table 1. Measure length, thickness and mass according to 6.3 after steps 2 and 3.

Table 1 — Conditioning climates for the two sets of test pieces

Step	Set No. 1	Set No. 2
1	20 °C, 30 % relative humidity	20 °C, 85 % relative humidity
2	20 °C, 65 % relative humidity	20 °C, 65 % relative humidity
3	20 °C, 85 % relative humidity	20 °C, 30 % relative humidity

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 the test piece.

The climate shall be measured and recorded at an interval of not less than once an hour during the conditioning of the test pieces.

6.3 Measurement

Before measuring the length, the equipment shall be calibrated by using the calibration bar described in 4.3. Warped or bent test pieces shall be straightened during the measurement.

After steps 2 and 3 of the conditioning periods, the following parameters shall be measured on the test pieces:

— the distance between the length markings;

— the thickness of the test pieces (the measurements shall be carried out at three points, see Figure 2);

— the mass of the test pieces.

All measurements shall be performed in the conditioning atmosphere or within 5 min after the test pieces have been taken out from the climate chamber.

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6.4 Drying

After the test, the test pieces shall be dried according to ISO 16979 and then be weighed.

7 Expression of results

7.1 Moisture content

For each test piece, calculate the moisture content for the three climates in steps 2 and 3 in accordance with ISO 16979 by using the results from 6.3 and 6.4. When necessary, the recorded masses shall be corrected to take account of the mass of the markings used.

NOTE For cement-bonded particle boards, determination of the moisture content according to ISO 16979 is not relevant and could give misleading results.

7.2 Change in length

For each test piece, the relative change in length shall be calculated according to equations (1) and (2), and rounded off to the nearest 0,1 mm/m.

$$\Delta l_{65,85} = \frac{l_{85} - l_{65}}{l_{65}} \times 1\ 000 \quad (1)$$

$$\Delta l_{65,30} = \frac{l_{30} - l_{65}}{l_{65}} \times 1\ 000 \quad (2)$$

where

l_{85} is the length between measurement points at 20 °C, 85 % relative humidity, corrected when necessary for the effect of the markings used, in millimetres (mm);

l_{65} is the length between measurement points at 20 °C, 65 % relative humidity, corrected when necessary for the effect of the markings used, in millimetres (mm);

l_{30} is the length between measurement points at 20 °C, 30 % relative humidity, corrected when necessary for the effect of the markings used, in millimetres (mm);

$\Delta l_{65,85}$ is the relative change in length for a change of the relative humidity from 65 % to 85 %, in millimetres per metre (mm/m);

$\Delta l_{65,30}$ is the relative change in length for a change of the relative humidity from 65 % to 30 %, in millimetres per metre (mm/m);

7.3 Change in thickness

For each test piece, calculate the change in thickness for each of the three points according to equations (3) and (4). The final result for the test piece is the mean value for all three measured points rounded off to the nearest 0,1 %.

$$\Delta t_{65,85} = \frac{t_{85} - t_{65}}{t_{65}} \times 100 \quad (3)$$

$$\Delta t_{65,30} = \frac{t_{30} - t_{65}}{t_{65}} \times 100 \quad (4)$$

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where

t_{85} is the thickness at 20 °C, 85 % relative humidity, corrected when necessary for the effect of the markings used, in millimetres (mm);

t_{65} is the thickness at 20 °C, 65 % relative humidity, corrected when necessary for the effect of the markings used, in millimetres (mm);

t_{30} is the thickness at 20 °C, 30 % relative humidity, corrected when necessary for the effect of the markings used, in millimetres (mm);

$\Delta t_{65, 85}$ is the relative change in thickness for a change of the relative humidity from 65 % to 85 %, in percent (%);

$\Delta t_{65, 30}$ is the relative change in thickness for a change of the relative humidity from 65 % to 30 %, in percent (%).

7.4 Calculation

For each panel, calculate the mean value and the standard deviations for moisture content and changes of length and thickness.

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;

— anvil diameter of the micrometer (thickness measurement);

— test results expressed as stated in Clause 7;

— all deviations from this International Standard.

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