BRITISH STANDARD

BS EN
318:2002

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

The European Standard EN 318:2002 has the status of a British Standard

ICS 79.060.01

National foreword

This British Standard is the official English language version of EN 318:2002. It supersedes BS EN 318:1993 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/541, Wood based panels, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

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This British Standard, having been prepared under the direction of the Building and Civil Engineering Sector Policy and Strategy Committee, was published under the authority of the Standards Policy and Strategy Committee on 11 April 2002

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EUROPEAN STANDARD

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EN 318

March 2002

ICS 79.060.01

Supersedes EN 318:1993

English version

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

Holzwerkstoffe - Bestimmung von Maßänderungen in Verbindung mit Änderungen der relativen Luftfeuchte

This European Standard was approved by CEN on 24 February 2002.

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EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 318:2002 E

Contents

Foreword

This document (EN 318:2002) has been prepared by Technical Committee CEN/TC 112 "Wood-based panels", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2002, and conflicting national standards shall be withdrawn at the latest by September 2002.

This document supersedes EN 318:1993.

Compared to the version EN 318:1993 the following modifications have been made:

a) The scope has been extended from fibre boards to wood-based panels

b) The conditioning procedure has been modified

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

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

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 322, *Wood-based panels — Determination of moisture content.*

EN 326-1, *Wood-based panels — Sampling, cutting and inspection — Part 1: Sampling and cutting of test pieces and expression of test results.*

3 Principle

Because variations in relative humidity affect the moisture content of a panel and result in changes to its dimensions, test pieces are measured after conditioning to different levels of relative humidity.

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 % relative humidity and 85 % relative humidity in adsorption and 65 % relative humidity and 30 % relative humidity in desorption.

4 Apparatus

4.1 Balance

Balance as described in EN 322.

4.2 Measuring instruments for length and thickness

Instruments for measuring length and thickness with an accuracy of ± 0,01 mm. An example of a 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

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

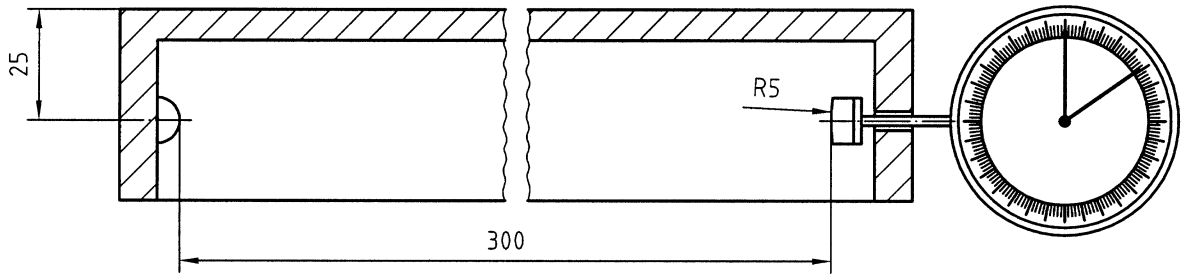


Figure 1 — Example of length measuring equipment

4.5 Drying cabinet

Ventilated drying oven, capable of being controlled at (103 ± 2) °C.

4.6 Hygrometer

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

4.7 Thermometer

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

5 Test pieces

The normal dimensions of test pieces are (300 ± 2) mm × (50 ± 2) mm × t (panel thickness) but longer test pieces may be used. From each panel, two sets of four test pieces shall be cut in each panel direction to give 16 test pieces per panel in total. The general conditions for sampling of the test pieces shall be in accordance with EN 326-1.

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.

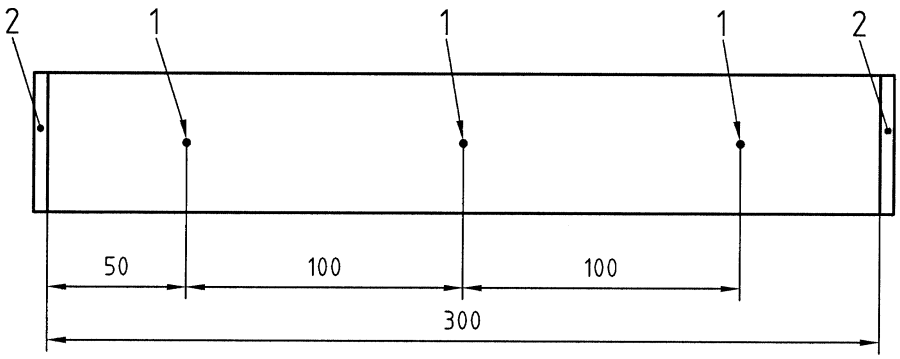
6.1.2 Thickness measuring points

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 is 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 reference systems may be used if proven to give correct results.

Dimensions in millimetres



Key

1 Ink mark
2 Glass plate

Figure 2 — Example of a suitable 300 mm long test piece with glass plates

6.2 Conditioning

The two sets of test pieces will be treated separately and each 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 (No.)	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 to be 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 Measurements

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. 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;

— 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 the measurements have to be performed in the conditioning atmosphere or within 5 minutes after the test pieces have been taken out from the climate chamber.

6.4 Drying

After the test, the test pieces shall be dried according to EN 322 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 EN 322 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 moisture content according to EN 322 is not relevant and could give misleading results.

7.2 Change in length

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

$$\delta l_{65,\,85} = \frac{l_{85} - l_{65}}{l_{65}} \cdot 1\,000 \quad \text{(using set 1 results)} \tag{1}$$

$$\delta l_{65,30} = \frac{l_{30} - l_{65}}{l_{65}} \cdot 1\,000 \quad \text{(using set 2 results)} \tag{2}$$

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;

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;

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

$\delta\, l_{65,\,85}$ is the relative change of length for a change of the relative humidity from 65 % to 85 %, in millimetres per metre;

$\delta\, l_{65,\,30}$ is the relative change of length for a change of the relative humidity from 65 % to 30 %, in millimetres per metre.

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 %.

$$\delta t_{65,\,85} = \frac{t_{85} - t_{65}}{t_{65}} \cdot 1\,00 \quad \text{(using set 1 results)} \tag{3}$$

$$\delta t_{65,30} = \frac{t_{30} - t_{65}}{t_{65}} \cdot 1\,00 \quad \text{(using set 2 results)} \tag{4}$$

where

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

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

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

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

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

7.4 Panel results

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

8 Test report

According to EN 326-1.

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