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High-pressure decorative laminates — Sheets made from thermosetting resins —

Part 2: Determination of properties

AMENDMENT 8: Dimensional stability

Stratifiés décoratifs haute pression — Plaques à base de résines thermodurcissables —

Partie 2: Détermination des caractéristiques

AMENDEMENT 8: Stabilité dimensionnelle

Reference number
ISO 4586-2:1997/Amd.8:2002(E)

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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.

Amendment 8 to ISO 4586-2:1997 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 11, *Products*.

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High-pressure decorative laminates — Sheets made from thermosetting resins —

Part 2: Determination of properties

AMENDMENT 8: Dimensional stability

Page 1

Update the normative references clause (Clause 2) as follows:

Replace ISO 4586-1:1995 by ISO 4586-1:1997 (same title).

Replace ISO 6506:1981 by ISO 6506-1:1999, *Metallic materials — Brinell hardness test — Part 1: Test method*.

Pages 7 to 9

Replace Clause 9 “Dimensional stability at elevated temperature” and Clause 10 “Dimensional stability at 20 °C” by the following clauses:

9 Dimensional stability at elevated temperature

9.1 Principle

The test measures the lateral dimensional changes of specimens from the laminate under test over an extreme range of relative humidities at elevated temperatures.

9.2 Apparatus

9.2.1 Circulating-air oven, capable of being maintained at (70 ± 2) °C.

9.2.2 High-humidity conditioning chamber, with an atmosphere of relative humidity within the range 90 % to 95 % and at a temperature of (40 ± 2) °C.

9.2.3 Standard-atmosphere conditioning chamber, with a standard atmosphere of (23 ± 2) °C and relative humidity (50 ± 5) %.

9.2.4 Caliper gauge or other suitable means for measuring length, with a measurement range of at least 150 mm, graduated to provide a reading accuracy of 0,01 mm. Centering points are recommended but are not essential.

9.2.5 Fixture, to maintain specimens from thin laminates in a flat position while measurements are taken. A suitable fixture is shown in Figure 2.

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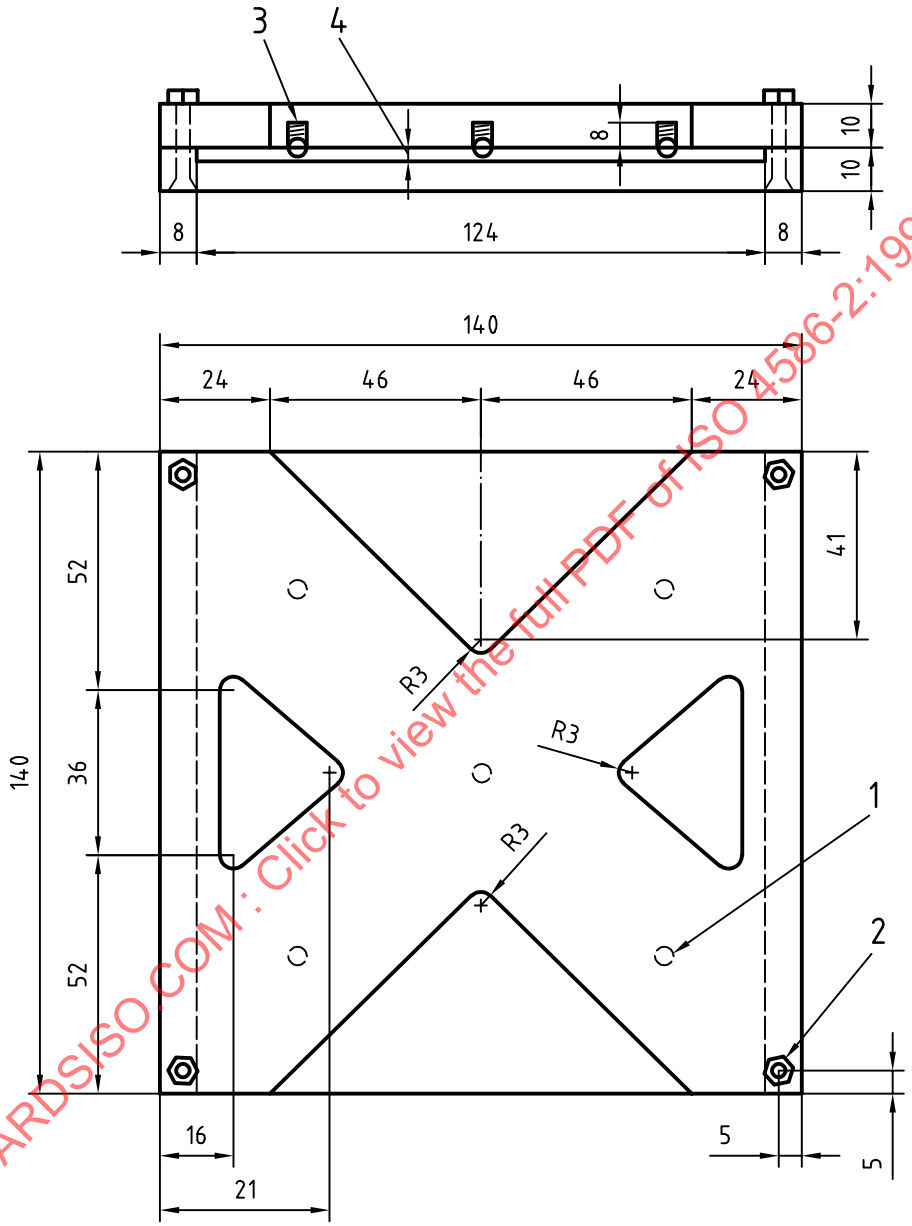
9.2.6 Centre-punch and hammer (optional), suitable for making a small locating indentation in the surface of the test specimen.

9.2.7 Steel rule, graduated in 0,5 mm divisions.

9.2.8 Desiccator, of suitable size.

Dimensions in millimetres



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Key

1 3 mm steel ball and spring
2 (3 × 22) mm bolt and nut
3 Suitable spring to maintain specimen in flat position
4 3-mm-wide slot

Figure 2 — Fixture to maintain the test specimen in position (see 9.2.5 and 10.2.5)

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9.3 Test specimens

Cut four specimens (120 ± 1) mm square from the sheet under test. The edges shall be smooth and free from cracks.

Use two specimens for the dry-heat test and two for the high-humidity test.

Before making the first measurements, all specimens shall be kept for at least 72 h in a standard atmosphere of (23 ± 2) °C and (50 ± 5) % relative humidity.

9.4 Procedure

9.4.1 General

All measurements of length shall be made to the nearest 0,02 mm. Measurements shall be made within 5 min after removal of the specimens from the conditioning atmosphere or the desiccator (9.2.8).

The specimen shall be kept flat when making length measurements. For thin laminates, a suitable fixture such as that shown in Figure 2 shall be used.

With each specimen, use the steel rule (9.2.7) to locate the point midway between two adjacent corners and 10 mm in from the corresponding edge. Mark this point, using a centre-punch (9.2.6) for instance. Repeat this for the other three sides of each specimen.

As an alternative to marking the measurement points by punching, they may be scribed or marked on the surface of the specimen in some other suitable way.

9.4.2 Dry-heat test

Taking two specimens, measure the distances between opposite marks (across the centres of the specimens) to the nearest 0,02 mm in both the machine direction and the transverse direction. Any suitable means (see 9.2.4) may be used to measure the distances between the marks. If a centre-punch has been used to mark the measurement points, measure the distances using a caliper gauge with its points positioned in opposite locating indentations.

If the machine direction is not known, carry out flexural-strength tests on specimens taken at various angles. The highest value will usually be given by the specimen cut parallel to the machine direction.

Place both specimens in the oven (9.2.1) maintained at (70 ± 2) °C. At the end of 24 h, remove the specimens and allow them to cool to ambient temperature in the desiccator (9.2.8) for 1 h, then re-measure the distances between the marks.

9.4.3 High-humidity test

Taking the remaining two specimens, measure the distances between opposite marks in both the machine direction and transverse direction. Place both specimens in the high-humidity conditioning chamber (9.2.2) at (40 ± 2) °C and a relative humidity within the range 90 % to 95 %. After (96 ± 4) h, remove each specimen, wipe it free of surface water with a cloth, and immediately re-measure the distances between the marks.

9.5 Expression of results

Calculate the change in measured length as a percentage of the corresponding initial measured length.

Calculate the mean percentage change in machine-direction length and transverse-direction length for each of the two sets of specimens (i.e. the dry-heat and high-humidity sets) to the nearest 0,05 %.

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Calculate the cumulative dimensional change for each direction of the sheet. This change is the sum of the mean absolute percentage changes in each of the dry-heat and high-humidity tests if the changes are in opposite directions. If the changes are in the same direction, the larger of the two average changes shall be taken as the cumulative dimensional change. The absolute figure shall be reported.

An example of results (using measurements in the transverse direction) is shown in Table 1.

Table 1 — An example of dimensional stability at elevated temperature

Dry-heat test			
	Specimen 1	**Specimen 2**	**Mean**
Initial distance (mm)	100,28	99,89	
Final distance (mm)	99,83	99,52	
Change (mm)	– 0,45	– 0,37	
Change (%)	– 0,45	– 0,37	– 0,41
			– 0,41 rounded to the nearest 0,05 = – 0,40 %
High-humidity test			
	Specimen 1	**Specimen 2**	**Mean**
Initial distance (mm)	100,11	99,74	
Final distance (mm)	100,63	100,49	
Change (mm)	+ 0,52	+ 0,75	
Change (%)	+ 0,52	+ 0,75	+ 0,64
			+ 0,64 rounded to the nearest 0,05 = + 0,65 %

The movements in the two tests are in opposite directions, therefore the cumulative dimensional change in the transverse direction is equal to 0,40 % + 0,65 % = 1,05 %.

9.6 Test report

The test report shall include the following information:

a) a reference to this part of ISO 4586;

b) the name, type and nominal thickness of the product;

c) the cumulative dimensional change for the machine direction;

d) the cumulative dimensional change for the transverse direction;

e) any deviation from the method specified;

f) the date of the test.

10 Dimensional stability at ambient temperature

10.1 Principle

The test measures the lateral dimensional changes of specimens from the laminate under test over an extreme range of relative humidities at ambient temperature.

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10.2 Apparatus

10.2.1 High-humidity conditioning chamber, with an atmosphere of relative humidity (90 ± 3) % and a temperature of (23 ± 2) °C.

10.2.2 Low-humidity conditioning chamber, with an atmosphere of relative humidity (15 ± 5) % and a temperature of (23 ± 2) °C.

NOTE The low-humidity chamber may be set up to operate either mechanically or chemically to control the temperature at (23 ± 2) °C and to maintain (15 ± 5) % relative humidity. One way of maintaining the relative humidity at this level is by using a saturated solution of lithium chloride ($LiCl \cdot H_2O$) placed in a tray within the chamber.

10.2.3 Standard-atmosphere conditioning chamber, with an atmosphere of relative humidity (50 ± 5) % and a temperature of (23 ± 2) °C.

10.2.4 Caliper gauge or other suitable means for measuring length, with a measurement range of at least 150 mm, graduated to provide a reading accuracy of 0,01 mm. Centering points are recommended but are not essential.

10.2.5 Fixture, to maintain specimens from thin laminates in a flat position while measurements are taken. A suitable fixture is shown in Figure 2.

10.2.6 Centre-punch and hammer (optional), suitable for making a small locating indentation in the surface of the test specimen.

10.2.7 Steel rule, graduated in 0,5 mm divisions.

10.3 Test specimens

Cut two specimens (120 ± 1) mm square from the sheet under test. The edges shall be smooth and free from cracks.

Before making the first measurements, the specimens shall be kept for at least 72 h in a standard atmosphere of (23 ± 2) °C and (50 ± 5) % relative humidity.

10.4 Procedure

All measurements of length shall be made to the nearest 0,02 mm. Measurements shall be made within 5 min after removal of the specimens from the conditioning atmosphere.

The specimen shall be kept flat when making length measurements. For thin laminates, a suitable fixture such as that shown in Figure 2 shall be used.

With each specimen, use the steel rule (10.2.7) to locate the point midway between two adjacent corners and 10 mm in from the corresponding edge. Mark this point, using a centre-punch (10.2.6) for instance. Repeat this for the other three sides of each specimen.

As an alternative to marking the measurement points by punching, they may be scribed or marked on the surface of the specimen in some other suitable way.

Place both specimens in the high-humidity chamber (10.2.1), positioned so that air can circulate freely around them.

After (96 ± 4) h, remove both specimens from the chamber and immediately measure the distances between opposite marks (across the centres of the specimens) to the nearest 0,02 mm in both the machine direction and the transverse direction. Any suitable means (see 9.2.4) may be used to measure the distances between the marks. If a centre-punch has been used to mark the measurement points, measure the distances using a

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