
**High-pressure decorative laminates
(HPL, HPDL) — Sheets based on
thermosetting resins (Usually called
Laminates) —**

Part 2:

Determination of properties

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*Stratifiés décoratifs haute pression (HPL, HPDL) — Plaques à base de
résines thermodurcissables (communément appelées stratifiés) —*

Partie 2: Détermination des caractéristiques

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2. www.iso.org/directives

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received. www.iso.org/patents

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is ISO/TC 61, *Plastics*, Subcommittee SC 11, *Products*.

ISO 4586 consists of the following parts, under the general title *Plastics — High-Pressure Decorative Laminates (HPL, HPDL) — Sheet based on Thermosetting Resins (Usually called Laminates)*:

- Part 1: *Introduction and General Information*
- Part 2: *Determination of Properties*
- Part 3: *Classification and Specifications for Laminates less than 2 mm Thick Intended for Bonding to Supporting Substrates*
- Part 4: *Classification and Specifications for Compact Laminates of Thickness 2 mm and Greater*
- Part 5: *Classification and Specifications for Flooring Grade Laminates less than 2 mm Thick Intended for Bonding to Supporting Substrates*
- Part 6: *Classification and Specifications for Exterior-Grade Compact Laminates of Thickness 2 mm and Greater*
- Part 7: *Classification and Specifications for Design Laminates*
- Part 8: *Classification and Specifications for Alternative Core Laminates*

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High-pressure decorative laminates (HPL, HPDL) — Sheets based on thermosetting resins (Usually called Laminates) —

Part 2: Determination of properties

1 Scope

This part of ISO 4586 specifies the methods of test for determination of the properties of High-Pressure Decorative Laminates (HPL, HPDL) as defined in [Clause 3](#). These methods are primarily intended for testing the sheets specified from ISO 4586-3 to ISO 4586-8[8] to[13].

In an effort to harmonize ISO 4586 with other High-Pressure Decorative Laminate standards, multiple methods may be published that demonstrate similar properties. In these instances, the same test method title is given and is annotated as either “Method A” or “Method B”. This is the case in the following tests: Edge Squareness - 8/9, Dry Heat - 17/18 Dimensional Stability at Elevated Temperatures - 19/20, Dimensional Stability at Ambient Temperature - 21/22, Staining - 30/31, Lightfastness - 32/33, Cigarette Burns - 36/37, Formability - 38/39, and Blistering - 40/41. In these instances, either method may be utilized in testing. Compliance to both methods is not required. While these tests are similar they are by no means identical and results of one method do not necessarily correspond to the results of the accompanying test. In these situations consult the documentation in specific sections of ISO 4586 for performance requirements. Each specific method has performance requirements particular to that method for individual grades of high-pressure decorative laminate.

The precision of the test methods specified in [Clauses 5, 6, 7, 8, 9, 10, 13, 14, 16, 19, 20, 21, 22, 24, 25, 26, 40, and 41](#) of this part of ISO 4586 is not known because inter-laboratory data are not available. When inter-laboratory data are obtained, precision statements will be added to the test methods at the following revision. As all the other test methods have an end point determination based on subjective judgement, it is not meaningful to make a statement of precision in these cases.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 62, *Plastics — Determination of water absorption*

ISO 178, *Plastics — Determination of flexural properties*

ISO 291, *Plastics — Standard atmospheres for conditioning and testing*

ISO 3668, *Paints and varnishes -- Visual comparison of the colour of paints*

ISO 4892-1, *Plastics — Methods of exposure to laboratory light sources — Part 1: General guidance*

ISO 4892-2, *Plastics — Methods of exposure to laboratory light sources — Part 2: Xenon-arc lamps*

ISO 4892-3, *Plastics — Methods of exposure to laboratory light sources - Part 3: Fluorescent UV lamps*

ISO 6506-1, *Metallic materials — Brinell hardness test — Part 1: Test method*

ISO 9352, *Plastics — Determination of resistance to wear by abrasive wheels*

ISO 9370, *Plastics — Instrumental determination of radiant exposure in weathering tests — General guidance and basic test method*

EN 312, *Particleboards — Specifications*

EN 316, *Wood fibreboards — Definition, classification and symbols*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 High-Pressure Decorative Laminate(s)

HPL

HPDL

sheet(s) consisting of layers of cellulosic fibrous material (normally paper) impregnated with thermosetting resins and bonded together by the high pressure process described below

3.2 High-Pressure Process

simultaneous application of heat (temperature ≥ 120 °C) and high specific pressure (≥ 5 MPa), to provide flowing and subsequent curing of the thermosetting resins to obtain a homogeneous non-porous material with increased density ($\geq 1,35$ g/cm³), and with the required surface finish

Note 1 to entry: This is a general definition of high-pressure decorative laminate(s). More specific product definitions can be found from ISO 4586-3 to ISO 4586-8 [8] to [13].

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4 Assessment of appearance

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4.1 Principle

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Laminates shall be inspected for surface appearance under standardised conditions of lighting and viewing.

4.2 Apparatus

4.2.1 Horizontal inspection table, of height approximately 700 mm and large enough to accommodate the largest sheets to be inspected.

4.2.2 Overhead white fluorescent lights, of colour temperature approximately 5 000 K and giving an intensity of 800 lx to 1 000 lx over the whole area of the largest sheets to be inspected. A convenient distance of the lights from the inspection table is approximately 1,5 m.

4.3 Test specimen

The specimen shall be the laminate under test, as supplied by the manufacturer.

4.4 Procedure

Place the laminate, decorative face uppermost, on the inspection table. Wipe it free of any loose contamination with a soft cloth, using a suitable cleaning agent if necessary. Inspect it from the distance required by the relevant part of ISO 4586 for defects such as smudges, smears, fingerprints, scratches, foreign particles, damage or any other form of blemish evident within the decorative surface.

The inspector shall use normal vision, corrected if necessary.

4.5 Test report

The test report shall include the following information:

- a) a reference to this part of ISO 4586, i.e ISO 4586-2:2015;
- b) name, type and nominal thickness of the product;
- c) size of the laminate under test;
- d) viewing distance;
- e) total area of spot-type defects in square millimetres;
- f) total length of hair-like defects in millimetres;
- g) any deviation from the specified test method;
- h) date of the test.

5 Determination of thickness

5.1 Principle

The thickness of a laminate is measured using a micrometer or a dial gauge indicator.

5.2 Apparatus

5.2.1 Thickness gauge, (ratchet-type micrometer or dial gauge indicator), having two flat parallel measuring surfaces of diameter 6 mm and capable of being read to 0,01 mm.

When the thickness of a decorative laminate is being measured, the two surfaces shall exert a pressure of 10 to 100 kPa upon each other.

5.3 Test specimen

The specimen shall be the laminate under test, as supplied by the manufacturer.

5.4 Procedure

Check the gauge for accuracy and then determine the thickness of the laminate to the nearest 0,01 mm. The thickness shall be measured at the centre of each edge, at a distance of at least 20 mm from the edge of the sheet.

5.5 Test report

The test report shall include the following information:

- a) a reference to this part of ISO 4586, i.e ISO 4586-2:2015;
- b) name, type and nominal thickness of the product;
- c) all values measured;
- d) any deviation from the specified test method;
- e) date of the test.

6 Determination of length and width

6.1 Principle

Measuring the length and width of the laminate using a metal tape or rule.

6.2 Apparatus

6.2.1 Steel tape or rule, of sufficient length to measure the greatest dimension of the laminate, and graduated to allow a reading accuracy of 1 mm.

6.3 Test specimen

The specimen shall be the laminate under test, as supplied by the manufacturer.

6.4 Procedure

Apply the steel tape or rule (see 6.2) to each edge of the laminate in turn, on a line approximately 25 mm from and parallel to the edge. Measure the length on each edge to the nearest 1 mm.

6.5 Expression of results

The arithmetical means of the pairs of length and width measurements shall be calculated and expressed to the nearest 1 mm as the length and width of the laminate.

6.6 Test report

The test report shall include the following information:

- a) a reference to this part of ISO 4586, i.e. ISO 4586-2:2015;
- b) name, type and nominal thickness of the product;
- c) length and width values;
- d) any deviation from the specified test method;
- e) date of the test.

7 Determination of edge straightness

7.1 Principle

Applying a metal straightedge to the edge of the laminate and measuring the deviation of the sheet edge from the metal straightedge using a steel rule.

7.2 Apparatus

7.2.1 Metal straightedge, of 1 000 mm length.

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

7.3 Test specimen

The specimen shall be the laminate under test, as supplied by the manufacturer.

7.4 Procedure

Apply the metal straightedge (see 7.2.1) to each edge of the laminate in turn, and use the steel rule (see 7.2.2) to measure the maximum deviation of the edge of the laminate from the metal straightedge (x in Figure 1) to the nearest 0,5 mm.

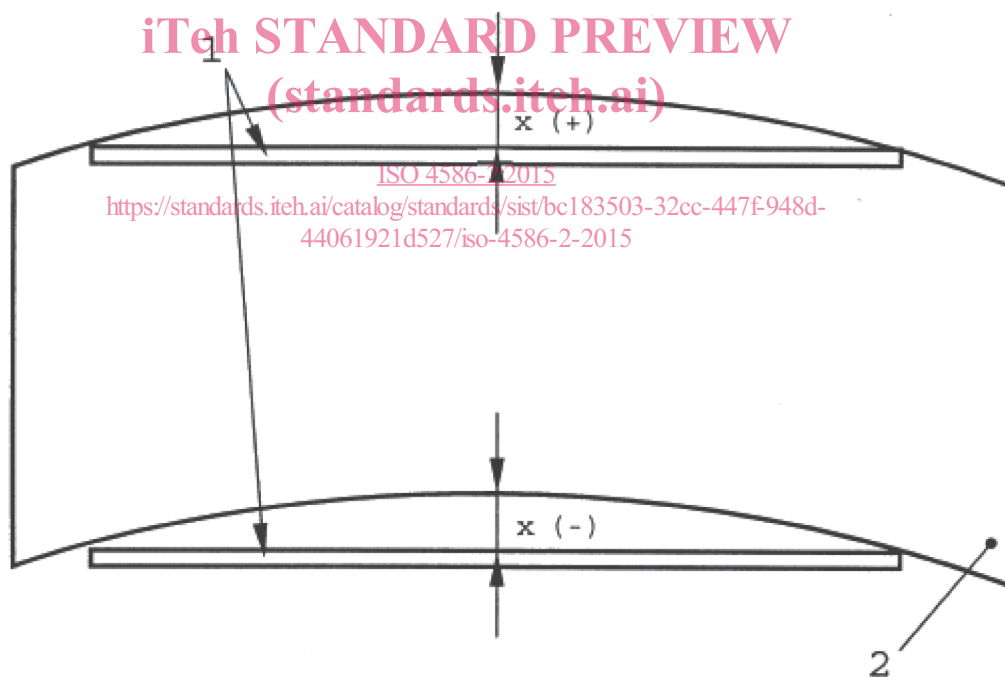
7.5 Expression of results

The maximum deviation from the metal straightedge shall be recorded for each of the four edges. Results shall be designated (+) if the edge is convex, and (-) if the edge is concave.

7.6 Test report

The test report shall include the following information:

- a) a reference to this part of ISO 4586, i.e ISO 4586-2:2015;
- b) name, type and nominal thickness of the product;
- c) test result for each of the four edges;
- d) any deviation from the specified test method;
- e) date of the test.



Key

- 1 metal straightedge
- 2 laminate

Figure 1 — Edge straightness measurement