
**High-pressure decorative laminates —
Composite elements —**

Part 2:

**Specifications for composite elements
with wood-based substrates for interior
use**

Stratifiés décoratifs haute pression — Éléments composites —

*Partie 2: Spécifications des éléments composites avec substrats à base
de bois pour l'usage intérieur*



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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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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.

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 13894-2 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 11, *Products*.

ISO 13894 consists of the following parts, under the general title *High-pressure decorative laminates — Composite elements*:

- *Part 1: Test methods*
- *Part 2: Specifications for composite elements with wood-based substrates for interior use*

High-pressure decorative laminates — Composite elements —

Part 2:

Specifications for composite elements with wood-based substrates for interior use

1 Scope

This part of ISO 13894 describes the general properties of composite elements surfaced, and possibly edged, with high-pressure decorative laminate (HPDL) as defined in Clause 3. The composite elements specified in this part of ISO 13894 consist of HPDL sheet material adhesively bonded to one or both sides of a wood-based substrate, and are intended for normal interior use.

Requirements for special applications, e.g. where the product is subjected to extreme conditions of heat or moisture, are not part of this part of ISO 13894, although Part 1 of this International Standard describes test methods for additional properties which may be applicable to such applications (see ISO 13894-1:2000, Subclause 3.1, Note 3).

Test methods and performance levels for special applications shall be agreed between customer and supplier. Information concerning test methods for special applications is given in Annex A.

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 1096, *Plywood — Classification*

ISO 4586-1:2004, *High-pressure decorative laminates — Sheets made from thermosetting resins — Part 1: Classification and specifications*

ISO 13894-1:2000, *High-pressure decorative laminates — Composite elements — Part 1: Test methods*

ISO 17064, *Wood-based panels — Fibreboard, particleboard and oriented strand board (OSB) — Vocabulary*

3 Terms and definitions

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

3.1

high-pressure decorative laminate (HPDL) composite element with wood-based substrate

composite board produced by adhesively bonding high-pressure decorative laminate (HPDL) sheet material to one or both sides of a wood-based substrate

3.2

high-pressure decorative laminate(s)

HPDL

HPL

See Definition 3.1 in ISO 4586-1:2004.

3.3

wood-based substrate

particleboard, oriented-strand board, fibreboard (ISO 17064) or plywood (ISO 1096)

NOTE Solid timber and blockboard are not suitable substrates for HPDL.

3.4

board

composite board in the manufacturer's standard sheet size, possibly with one or two sides having postformed edges

3.5

panel

composite panel cut to a specified size, with finished edges

4 Requirements

All composite elements for normal interior use shall meet the requirements for every property for which a value or range is specified in Clause 5.

Annex A contains details of other tests which may be applicable for special applications, and may be applied subject to agreement between customer and supplier. The typical performance values included in Annex A are for information only, and are not requirements of this part of ISO 13894.

5 Properties

5.1 Appearance

5.1.1 General

See ISO 13894-1:2000, Clause 5.

5.1.2 Decorative surfaces

The laminate on the decorative surface or surfaces of the composite element shall comply with ISO 4586-1:2004, Subclause 6.4.1.

5.1.3 Fabrication defects

5.1.3.1 Surface ripple (telegraphing)

Slight surface ripple is permissible if only visible at certain viewing angles.

5.1.3.2 Bumps and indentations

Bumps and indentations are not allowed in the surface(s) or postformed edges of cut-to-size panels. Such defects may be accepted in full-size boards, however, if agreed between customer and supplier.

5.1.3.3 Cracks

Cracks in the surface(s), and especially in postformed edges, are not allowed in cut-to-size panels. Cracks, especially near the edges, may be accepted in full-size boards, however, if agreed between customer and supplier.

5.1.3.4 Adhesive smears

Adhesive smears that cannot be easily removed are not allowed in cut-to-size panels. Such defects may be accepted in full size boards, however, if agreed between customer and supplier.

5.2 Dimensional tolerances

5.2.1 General

The dimensional tolerance requirements for HPDL wood-based composite elements are given in 5.2.2 to 5.2.5.

For test methods, see ISO 13894-1:2000, Clause 6.

5.2.2 Boards

See Table 1.

Table 1 — Dimensional tolerance requirements for boards

Dimensions in millimetres

	Test method in ISO 13894-1	Boards with unfinished edges	Boards with sawcut edges		Boards with milled edges	
			Width 0 mm to 1 000 mm	Width > 1 000 mm	Width 0 mm to 500 mm	Width > 500 mm
Length and width	6.1	$\pm 5,0^a$	$\pm 2,0$	$\pm 3,0$	$\pm 0,5$	$\pm 0,5$ for 500 mm, with a further 0,05 mm for each additional 100 mm
Edge straightness	6.2	—	$\pm 0,5^b$	$\pm 0,5^b$	$\pm 0,5^b$	$\pm 0,5^b$
Edge squareness	6.3	—	$\leq 2,0^b$	$\leq 2,0^b$	$\leq 2,0^b$	$\leq 2,0^b$
^a Tolerances on length and width apply to the dimensions of the substrate.						
^b Values are in mm per 1 000 mm of measured length.						

5.2.3 Panels

See Table 2.

Table 2 — Dimensional tolerance requirements for panels

Dimensions in millimetres

	Test method ISO 13894-1	Square-edged elements with finished edges		Postformed elements with one or both sides formed in one direction	
		0 mm to 500 mm	> 500 mm	0 mm to 500 mm	> 500 mm
Length and width	6.1	$\pm 2,0$	$\pm 0,5$ for 500 mm, with a further 0,05 mm for each additional 100 mm	$\pm 0,5$	$\pm 0,5$ for 500 mm, with a further 0,05 mm for each additional 100 mm
Edge straightness	6.2	$\pm 0,5^a$	$\pm 0,5^a$	$\pm 0,5^a$	$\pm 0,5^a$
Edge squareness	6.3	$\leq 2,0^a$	$\leq 2,0^a$	$\leq 2,0^a$	$\leq 2,0^a$
^a Values are in mm per 1 000 mm of measured length.					

5.2.4 Thickness tolerances for boards and panels

For test method, see ISO 13894-1:2000, Subclause 6.4.

Tolerances:

One side of element faced with laminate: Nominal thickness $\pm 0,4$ mm

Both sides of element faced with laminate: Nominal thickness $\pm 0,5$ mm

5.2.5 Deviation from flatness

5.2.5.1 General

The deviation-from-flatness values given (in mm) in Tables 3 and 4 apply only to elements that are of thickness ≥ 16 mm and are not mechanically fixed in the final installation.

For test method, see ISO 13894-1:2000, Clause 7.

5.2.5.2 Composite elements of thickness 16 mm to 22 mm

See Table 3.

Table 3 — Maximum permissible deviation from flatness, for composite elements of thickness 16 mm to 22 mm

Length or width of element, x mm	Maximum deviation viewed from face side ^a
$x \leq 300$	0,5 mm
$300 < x \leq 500$	0,8 mm
$500 < x \leq 600$	0,9 mm
$600 < x \leq 700$	1,1 mm
$700 < x \leq 800$	1,3 mm
$800 < x \leq 900$	1,6 mm
$900 < x \leq 1\,000$	2,0 mm
$1\,000 < x \leq 2\,000$	2,0 mm/metre ^b

^a Numerous factors, including changes in temperature and relative humidity such as are encountered on building sites, may cause boards and panels to bow and twist irreversibly. This requirement is therefore only applicable at the time of delivery.

^b For elements of dimensions greater than 1 000 mm, measurements shall be made using a bow gauge of 1 000 mm length.

5.2.5.3 Composite elements of thickness > 22 mm but < 40 mm

See Table 4.

Table 4 — Maximum permissible deviation from flatness of composite elements of thickness > 22 mm but < 40 mm

Length or width of element, x mm	Maximum concave or convex deviation viewed from face side ^a	
	HPDL on one side	HPDL on both sides
$x \leq 600$	0,9 mm	0,7 mm
$600 < x \leq 700$	1,1 mm	0,8 mm
$700 < x \leq 800$	1,3 mm	1,0 mm
$800 < x \leq 900$	1,6 mm	1,2 mm
$900 < x \leq 1\,000$	2,0 mm	1,5 mm
$1\,000 < x \leq 5\,000$	2,0 mm/metre	2,0 mm/metre ^b

^a Numerous factors, including changes in temperature and relative humidity such as are encountered on building sites, may cause boards and panels to bow and twist irreversibly. This requirement is therefore only applicable at the time of delivery.

^b For elements of dimensions greater than 1 000 mm, measurements shall be made using a bow gauge of 1 000 mm length.

5.3 Surface bond strength

For test method, see ISO 13894-1:2000, Clause 9.

Requirement: Not less than 1,0 MPa

5.4 Perpendicular tensile strength

The perpendicular tensile strength test is used to determine the weakest layer of the composite element.

For test method, see ISO 13894-1:2000, Clause 10.

Requirements:

For elements of thickness $x \leq 22$ mm: Not less than 0,35 MPa

For elements of thickness $22 \text{ mm} < x \leq 34$ mm: Not less than 0,25 MPa

For elements of thickness $34 \text{ mm} < x \leq 40$ mm: Not less than 0,20 MPa

5.5 Glue-line quality

For test method, see ISO 13894-1:2000, Clause 8.

The composite element complies with the requirements of this part of ISO 13894 if both test specimens achieve rating 5 as defined in Subclause 8.5 of ISO 13894-1:2000.

If one or both test specimens only achieve rating 3, then the element is deemed to meet the requirements of this part of ISO 13894 provided that, for each specimen, the back of the separated laminate is covered uniformly with wooden particles over at least 50 % of the bonded surface.

If one or both test specimens only achieve rating 1, then the element does not comply with the requirements of this part of ISO 13894.

5.6 Substrate protection against water vapour (thickness swell)

For test method, see ISO 13894-1:2000, Clause 14.

Requirement: Maximum swelling of both test specimens 0,1 mm

5.7 Surface impact resistance

5.7.1 Test method

For test method, see ISO 13894-1:2000, Clauses 17 and 18.

5.7.2 Large-diameter ball

Requirements:

Minimum drop height: 600 mm

Maximum indentation diameter: 10 mm

5.7.3 Small-diameter ball

Requirement: Minimum spring force 15 N

Annex A (informative)

Optional properties

A.1 General

Clause 5 of this part of ISO 13894 specifies performance requirements for HPDL wood-based composite elements for general interior use. The additional tests described in this annex may be applicable for special applications, and may be applied subject to agreement between customer and supplier. The typical performance values are included only for information and guidance.

A.2 Resistance to axial withdrawal of wood screws (screw-holding)

For test method, see ISO 13894-1:2000, Clause 15.

Table A.1 — Axial withdrawal of wood screws

Thickness of element, x	Typical face screw-holding value	Typical edge screw-holding value
$x \leq 15$ mm	100 N/mm	Not applicable
$15 \text{ mm} < x \leq 20$ mm	1 500 N	500 N
$20 \text{ mm} < x$	1 000 N	500 N

A.3 Resistance to elevated temperature (short-term exposure)

For test method, see ISO 13894-1:2000, Clause 11.

This test determines the temperature resistance of components made from HPDL composite elements with respect to glue joints, safety edges, sealing strips, synthetic resin fillers and plastic sections, which may be in close proximity to cooking ranges or ovens.

Typical performance:

After 1 h at 80 °C, there should be no glue-line failure at the edges (postformed or square-edged), or damage to the thermoplastic sealing or the safety edges.

After 1 h at 100 °C, there should be no deterioration of the HPDL (e.g. cracks or colour changes), and no visible glue-line failure or deterioration of synthetic resin filler.

A.4 Resistance to elevated temperature (long-term exposure)

For test method, see ISO 13894-1:2000, Clause 12.

This test determines the behaviour of elements that are exposed to high temperatures (e.g. windowsills, radiator covers).

Typical performance:

No visible changes such as glue line failure, colour change or cracking of the HPDL, safety edges or sealing strips.

A.5 Resistance to water vapour

For test method, see ISO 13894-1:2000, Clause 13.

This test determines the sealing qualities of the backing liner and edge joints, when exposed to water vapour (e.g. in situations such as kitchen worktops and kitchen cupboard doors situated above dishwashing machines and hob units).

Typical performance:

Some swelling in the joint and surface areas of the chipboard may occur during the test (particularly with paper backing on worktops) but, providing the swelling is slight, failure during actual use is unlikely to occur.

Nevertheless, additional protective measures are recommended for composite elements installed directly above dishwashing machines and hob units.

A.6 Flexural strength/flexural modulus of elasticity

For test method, see ISO 16978, *Wood-based panels — Determination of modulus of elasticity in bending and of bending strength*.

Flexural strength gives an indication of the maximum load-carrying capacity of elements, whilst flexural modulus relates to flexibility and the amount of deflection under load.

With composite elements, flexural properties depend on the construction (i.e. whether HPDL is applied to one or both sides), the thickness of HPDL plus substrate and, to a lesser extent, the type of adhesive used. In general, elements with HPDL on both sides are significantly stronger and more rigid than elements with HPDL on one side only as well as the substrate with no HPDL surfacing.

Typical performance (particle board substrate):

- a) Fine-faced wood particle board, 18 mm to 20 mm nominal thickness and density 650 kg/m³:

Flexural strength: 15 MPa

Flexural modulus: 2 500 MPa

- b) Composite element consisting of fine-faced wood particle board, 18 mm to 20 mm nominal thickness and density 650 kg/m³, with 0,7 mm thick HPDL bonded with urea-formaldehyde adhesive (10 % filler) to both sides of the substrate:

Flexural strength: 35 MPa

Flexural modulus: 4 500 MPa