INTERNATIONAL STANDARD

ISO 13894-2

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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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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	± 5,0 [a]	± 2,0	± 3,0	± 0,5	± 0,5 for 500 mm, with a further 0,05 mm for each additional 100 mm
Edge straightness	6.2	—	± 0,5 [b]	± 0,5 [b]	± 0,5 [b]	± 0,5 [b]
Edge squareness	6.3	—	⩽ 2,0 [b]	⩽ 2,0 [b]	⩽ 2,0 [b]	⩽ 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	± 2,0	± 0,5 for 500 mm, with a further 0,05 mm for each additional 100 mm	± 0,5	± 0,5 for 500 mm, with a further 0,05 mm for each additional 100 mm
Edge straightness	6.2	± 0,5 [a]	± 0,5 [a]	± 0,5 [a]	± 0,5 [a]
Edge squareness	6.3	⩽ 2,0 [a]	⩽ 2,0 [a]	⩽ 2,0 [a]	⩽ 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 ± 0,4 mm

Both sides of element faced with laminate: Nominal thickness ± 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]
$x \leqslant 300$	0,5 mm
$300 < x \leqslant 500$	0,8 mm
$500 < x \leqslant 600$	0,9 mm
$600 < x \leqslant 700$	1,1 mm
$700 < x \leqslant 800$	1,3 mm
$800 < x \leqslant 900$	1,6 mm
$900 < x \leqslant 1\,000$	2,0 mm
$1\,000 < x \leqslant 2\,000$	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
$x \leqslant 600$	0,9 mm	0,7 mm
$600 < x \leqslant 700$	1,1 mm	0,8 mm
$700 < x \leqslant 800$	1,3 mm	1,0 mm
$800 < x \leqslant 900$	1,6 mm	1,2 mm
$900 < x \leqslant 1\,000$	2,0 mm	1,5 mm
$1\,000 < x \leqslant 5\,000$	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 $x \leqslant 22$ mm: Not less than 0,35 MPa

For elements of thickness 22 mm $< x \leqslant 34$ mm: Not less than 0,25 MPa

For elements of thickness 34 mm $< x \leqslant 40$ 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
$x \leqslant 15$ mm	100 N/mm	Not applicable
15 mm $< x \leqslant$ 20 mm	1 500 N	500 N
20 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/m^3:

   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/m^3, 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

A.7 Continuous-load capability

For test method, see ISO 13894-1:2000, Clause 16.

This test provides information concerning the rigidity of the element under conditions of continuous load, and is therefore important for office or kitchen furniture applications such as shelving.

The performance requirements depend very much on the final application, and values should be agreed between customer and supplier.

A.8 Water resistance (edge swell)

For test method, see ISO 13894-1:2000, Clause 19.

This test is important for wood-based composite elements which may be used in wet areas. It shows the quality of the edge sealing, or the moisture-resistance of the substrate.

Typical edge swell (particle board substrates):

a) Interior-grade particle board, 18 mm to 20 mm nominal thickness and density 650 kg/m^3, faced on both sides with 0,7 mm HPDL, with exposed edges (i.e. no sealing or edging strip):

   Edge swell value after 24 h test duration: 15 %

b) Moisture-resistant particle board, 18 mm to 20 mm nominal thickness and density 700 kg/m^3, faced on both sides with 0,7 mm HPDL, with exposed edges (i.e. no sealing or edging strip):

   Edge swell value after 24 h test duration: 5 %

c) Moisture-resistant particle board, 18 mm to 20 mm nominal thickness and density 700 kg/m^3, faced on both sides with 0,7 mm HPDL, edged with polyester edging strip bonded with polyurethane hot-melt adhesive:

   Edge swell value after 24 h test duration: 2 %

Annex B
(informative)

Reaction to fire

Although it is possible to produce special qualities of HPDL composite elements with defined reaction to fire, fire performance will depend on the type and thickness of laminate and substrate, and the type of adhesive used. The manufacturer of the elements should therefore be contacted for information on fire performance, and details of certifications held.

The requirements for reaction to fire are determined by the application and/or the fire regulations of the country in which the material is to be used.

At present, it is not possible, with any test, to predict compliance with all national and other requirements. No test is therefore included in this specification, and reference must be made to those other requirements when appropriate.

A selection of a suitable test or tests for inclusion in this part of ISO 13894 will be considered when appropriate International Standards specifying fire tests have been agreed upon.

Annex C
(informative)

Formaldehyde emission

Surfacing both sides of wood-based substrates with HPDL significantly reduces the level of formaldehyde emission, compared to the corresponding unfaced substrate.

In many countries, there are legal requirements concerning formaldehyde emission levels, and test methods and maximum limits depend on the relevant national regulations.

ICS 83.140.20

Price based on 11 pages