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

Part 5:
Classification and specifications for flooring grade laminates less than 2 mm thick intended for bonding to supporting substrates

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

Partie 5: Classification et spécifications des stratifiés pour revêtement de sol d'épaisseur inférieure à 2 mm à être collés sur des supports

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Foreword

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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

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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*.

This first edition of ISO 4586-5:2015 cancels and replaces (ISO 4586-1:2004), which has been technically revised.

ISO 4586 consists of the following parts, under the general title *Plastics — High-Pressure Decorative Laminates (HPL, HPDL) — Sheets 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*

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

Part 5: **Classification and specifications for flooring grade laminates less than 2 mm thick intended for bonding to supporting substrates**

1 Scope

This part of ISO 4586 applies to five classes of flooring grade laminates less than 2 mm thick intended for bonding to supporting substrates, to produce HPL (HPDL) flooring elements. For laminate floor covering applications they meet the surface property requirements specified in EN 13329[2].

High-pressure decorative flooring laminates are characterized by their high resistance to abrasion, aesthetic qualities and durability. They have good hygienic and anti-static properties and are easy to clean and maintain.

The requirements in this document apply only to the high-pressure laminate, and additional properties will need to be specified in order to define the functional performance of the finished flooring product.

ISO 4586-2 specifies the methods of test relevant to this part of ISO 4586.

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.

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 4586-2, *High-pressure decorative laminates (HPL, HPDL) — Sheets based on thermosetting resins (Usually called Laminates) — Part 2: Determination of properties*

ISO 10874, *Resilient, textile and laminate floor coverings — Classification*

ISO 1183-1, *Plastics — Methods for determining the density of non-cellular plastics — Part 1: Immersion method, liquid pyknometer method and titration method*

3 Terms and definitions

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

3.1
High-Pressure Decorative Compact 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

Note 1 to entry: The surface layer(s) on one or both sides, having decorative colours or designs, are typically impregnated with melamine based resins. The core layers are typically impregnated with phenolic based resins.

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 (≥ 1,35 g/cm^3), 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 in ISO 4586-3 to ISO 4586-8.

4 Classification, designation and coding

The classification system makes reference to ISO 10874 (level of use) in combination with the abrasion class (AC) given by a numerical rating of 1 to 5 defining the level of abrasion resistance, 5 being the highest and 1 the lowest performance.

Table 1 shows how the five abrasion classes of flooring grade laminate relate to level of use and some examples of typical applications.

Flooring grade laminates are specified according to abrasion class (e.g. HPL/ISO 4586-5/AC1).

Table 1 — Classification system and typical applications

ISO 10874:2009 classification	Level of use	Description	Examples of applications	Abrasion class
21	Moderate domestic	Residential areas with low or intermittent use	Bedrooms	AC1
22	General domestic	Residential areas with medium use	Living rooms entrance halls	AC2
23	Heavy domestic	Residential areas with intense use	Living rooms entrance halls	AC3
31	Moderate commercial	Commercial areas with low or intermittent use	Hotel rooms small offices hotels boutiques	
32	General commercial	Commercial areas with medium use	Classrooms small offices hotel boutiques	AC4
33	Heavy commercial	Commercial areas with heavy use	Corridors department stores schools multipurpose halls open plan offices	AC5

5 Requirements

5.1 Compliance

Laminates classified in Table 1 shall meet all appropriate requirements specified in 5.2, 5.3, and 5.4. This applies to both full-size sheets and cut-to-size panels.

5.2 Inspection requirements

5.2.1 General

Inspection shall be carried out in accordance with ISO 4586-2, Test Method 4 at a distance of 1,5 m.

5.2.2 Colour and pattern

When inspected in daylight or D65 standard illuminate and again under tungsten illuminate F, there shall be no significant difference between the corresponding colour reference sample held by the supplier and the specimen under test.

NOTE Where colour and surface finish are critical, it is recommended that sheets be checked for colour and surface-finish compatibility before fabrication or installation.

5.2.3 Surface finish

When inspected at different viewing angles, there shall be no significant difference between the corresponding surface-finish reference sample held by the supplier and the specimen under test.

NOTE Where colour and surface finish are critical, it is recommended that sheets be checked for colour and surface-finish compatibility before fabrication or installation.

5.2.4 Reverse side

The reverse side of sheets shall be suitable for adhesive bonding (e.g. sanded). In the case of sanded backs, slight chatter marks are permitted.

5.2.5 Visual inspection

The following inspection requirements are intended as a general guide, indicating the minimum acceptable quality for laminates. It should be noted that only a small percentage of sheets in a batch (the level to be agreed with the customer) should contain defects of the minimum acceptable level.

5.2.5.1 Surface quality

The following surface defects are permissible:

— Dirt, spots and similar surface defects.

The admissible size of such defects is based on a maximum contamination area equivalent to 1,0 mm^2/m^2 of laminate and is proportional to the sheet size under inspection.

The total admissible area of contamination may be concentrated in one spot or dispersed over an unlimited amount of smaller defects.

— Fibres, hairs and scratches

The admissible size of defects is based on a maximum contamination length equivalent to 10 mm/m^2 of laminate and is proportional to the sheet size under inspection.

The total admissible length of contamination may be concentrated in one defect or dispersed over an unlimited amount of smaller defects.

5.2.5.2 Edge quality

Visual defects (e.g. moisture marks, lack of gloss, corner damage, etc.) can be present on all four edges of the laminate, providing the defect-free length and width are at least the nominal size minus 10 mm.

5.3 Dimensional tolerance requirements

Dimensional tolerance requirements are specified in Table 2.

Table 2 — Dimensional tolerances

Property	Test Method (ISO 4586-2, Clause No.)	Requirement
Thickness	5	0,5 ≤ d ≤ 1,0 mm: ± 0,10 mm maximum variation 1,0 < d < 2,0 mm: ± 0,15 mm maximum variation (where d = nominal thickness)
Length and width[a]	6	+10 mm/−0 mm
Straightness of edges[a]	7	1,5 mm/m maximum deviation
Squareness[a] (Method A) or	8	1,5 mm/m maximum deviation
Squareness[a] (Method B)	9	< 6 mm
Flatness[b]	10	60 mm/m maximum deviation

[a] Tolerances for cut-to-size panels shall be agreed between supplier and purchaser.

[b] Provided that the laminates are stored in the manner and conditions recommended by the manufacturer they shall comply with the flatness requirements specified in Table 2 when measured in accordance with ISO 4586-2:2015, Clause 10.

5.4 Test requirements

5.4.1 General requirements

General requirements are specified in Table 3.

Table 3 — General requirements

Property	Test Method (ISO 4586-2) Clause no. unless otherwise stated)	Property or attribute	Unit (max. or min.)	Level of use according to ISO 10874				
				21	22	23/31	32	33
Abrasion class Abrasion resistance	12	Abrasion resistance initial point (IP)	Revolutions (min)	AC1 900	AC2 1 800	AC3 2 500	AC4 4 000	AC5 6 500
Resistance to water vapour	14	Appearance	Rating (min)	4	4	4	4	4
Dimensional stability at elevated temperature (Method A) or	19	Cumulative dimension change	% (max) d < 1 mm L[c] T[d] 1 ≤ d < 2 mm L[c] T[d] (where d = nominal thickness)	 0,65 1,15 0,45 0,90	 0,65 1,15 0,45 0,90	 0,65 1,15 0,45 0,90	 0,65 1,15 0,45 0,90	 0,65 1,15 0,45 0,90
Dimensional stability at elevated temperature (Method B)	20	Cumulative dimension change	% (max) d < 1 mm L[c] T[d] 1 ≤ d < 2 mm L[c] T[d] (where d = nominal thickness)	 1,10 1,40 0,45 0,90	 1,10 1,40 0,45 0,90	 1,10 1,40 0,45 0,90	 1,10 1,40 0,45 0,90	 1,10 1,40 0,45 0,90
Impact resistance[a] By small diameter ball[b]	24	Spring force	N (min)	20	20	20	20	20
By large diameter ball	26	Drop height Indentation diameter	mm (min) mm (max)	1 600 10	1 600 10	1 600 10	1 600 10	1 600 10
Resistance to staining (Method A) or	30	Appearance	Rating (min) groups 1 and 2 group 3	 5 4	 5 4	 5 4	 5 4	 5 4

[a] These requirements equate to Impact Class IC3 in EN 13329.

[b] The test is carried out with the laminate bonded to 6 mm ± 0.3 mm thick dry process fibreboard (MDF) of density 850 ± 50 kg/m³ as defined in EN 316,[1] using PVAc adhesive.

[c] L = in the longitudinal (or machine) direction of the fibrous sheet material (normally the direction of the longest dimension of the laminate).

[d] T = in the cross — longitudinal (cross - machine) direction of the fibrous sheet material (at right angles to direction L).