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High-pressure decorative laminates (HPL) - Sheets based on thermosetting resins (Usually called Laminates) - Part 4: Classification and specifications for Compact laminates of thickness 2 mm and greater.

Dekorative Hochdruck-Schichtpressstoffplatten (HPL) - Platten auf Basis härtbarer Harze (Schichtpressstoffe) - Teil 4: Klassifizierung und Spezifikationen für Kompakt-Schichtpressstoffe mit einer Dicke von 2 mm und größer

Stratifiés décoratifs haute pression (HPL) - Plaques a base de résines thermodurcissables (communément appelées stratifiés) - Partie 4 : Classification et spécifications des stratifiés compacts d'épaisseur égale ou supérieure a 2 mm

**Ta slovenski standard je istoveten z: EN 438-4:2005**

**ICS:**

83.140.20 Šæ å æ ^Á || z ^ Laminated sheets

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English version

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This European Standard was approved by CEN on 16 August 2004.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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## Foreword

This document (EN 438-4:2005) has been prepared by Technical Committee CEN/TC 249 "Plastics", the secretariat of which is held by IBN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 2005, and conflicting national standards shall be withdrawn at the latest by July 2005.

This document supersedes EN 438-1:1991 and EN 438-2:1991.

This Standard consists of the following parts:

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: *Compact laminate and HPL composite panels for internal and external wall and ceiling finishes*

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

**EN 438-4:2005 (E)****1 Scope**

This Part of EN 438 specifies performance requirements for two types of Compact laminate (defined in Clause 4) of thickness 2 mm or greater intended for interior use.

High-pressure decorative Compact laminates are characterised by their aesthetic qualities, strength, durability and functional performance. Compact HPL sheets are available in a wide variety of colours, patterns and surface finishes; they are extremely strong, and resistant to wear, impact, scratching, moisture, heat and staining; and possess good hygienic and anti-static properties, being easy to clean and maintain.

EN 438-2 specifies the methods of test relevant to this part of EN 438.

**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.

EN 438-2, *High-pressure decorative laminates (HPL) — Sheets based on thermosetting resins (Usually called Laminates) — Part 2: Determination of properties*

EN 12721:1997, *Furniture — Assessment of surface resistance to wet heat (ISO 4211-2:1993 modified)*

EN ISO 178:2003, *Plastics — Determination of flexural properties (ISO 178:2001)*

EN ISO 527-2:1996, *Plastics — Determination of tensile properties — Part 2: Test conditions for moulding and extrusion plastics (ISO 527-2:1993 including Corr 1:1994)*

EN ISO 1183-1:2004, *Plastics — Methods for determining the density of non-cellular plastics - Part 1: Immersion method, liquid pycnometer method and titration method (ISO 1183-1:2004)*

**3 Term and definition**

For the purposes of this document, the following term and definition applies.

**3.1****high-pressure decorative compact laminate(s) (HPL)**

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

The high pressure process is defined as the simultaneous application of heat (temperature  $\geq 120$  °C) and high specific pressure ( $\geq 5$  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/cm<sup>3</sup>), and with the required surface finish.

## 4 Material types and classification system

**4.1 General** Compact laminates are defined using a three letter classification system as shown in Table 1.

**Table 1 – Compact laminate classification system**

FIRST LETTER	SECOND LETTER	THIRD LETTER
C (COMPACT GRADE)	G (GENERAL PURPOSE)	S (STANDARD GRADE) or F (FLAME-RETARDANT GRADE)

**4.2 Type CGS** Standard grade decorative Compact laminates. Specified as HPL/EN438-4/CGS.

**4.3 Type CGF** Decorative Compact laminates with improved fire retardance similar to type CGS but also meeting special requirements of specified tests which may vary according to the application (e.g. construction, marine, transport) and the country of use (see Clause 6.3.2 and Annex B). Specified as HPL/EN438-4/CGF.

Other laminates having special characteristics are also available but these products are outside the scope of this part of the standard.

## 5 Characteristics and applications

HPL Compact laminates have the following characteristics:

- Attractive aesthetic qualities
- High mechanical strength
- Durability (high resistance to impact, wear and scratching)
- Good dimensional stability
- High resistance to the effects of water, steam, heat and frost
- Non-corrosive
- Good colour fastness
- Easy to clean and maintain (good anti-graffiti properties)
- Hygienic
- Good chemical resistance
- No dust attraction
- Ease of installation
- Good fire performance

Typical applications include wall cladding, partitions, doors, cubicles, lockers, laboratory bench tops, and various self-supporting components in construction, marine and transport industries.

When Compact laminates are self-supporting they are ready for installation and only require cutting to size, drilling, etc. to suit the application.

**EN 438-4:2005 (E)****6 Requirements****6.1 Compliance**

Compact laminate types CGS and CGF shall meet all appropriate requirements specified in clauses 6.2, 6.3, and 6.4. This applies to both full-size sheets and cut-to-size panels.

**6.2 Inspection requirements****6.2.1 General**

Inspection shall be carried out in accordance with EN 438-2, Test Method 4 at a distance of 1,5 m.

**6.2.2 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.

**6.2.3 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.

**6.2.4 Visual inspection**

The following inspection requirements are intended as a general guide, indicating the minimum acceptable quality for each decorative face of a laminate supplied as a full-size sheet.

Cut-to-size panels and certain applications involving full-size sheets may call for special quality requirements which can be negotiated between supplier and purchaser; in such cases the following requirements may be used as a basis for agreement.

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.

It may be agreed between purchaser and supplier that the visual quality standard applies to one decorative face only.

**6.2.4.1 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<sup>2</sup>/m<sup>2</sup> 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<sup>2</sup> 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.

#### 6.2.4.2 Edge quality

Edge chipping up to 3 mm on each side is permissible.

### 6.3 Dimensional tolerance requirements

Dimensional tolerance requirements are specified in Table 2.

**Table 2 — Dimensional tolerances**

Property	Test method (EN 438-2, Clause no.)	Requirement
Thickness	5	2,0 ≤ t < 3,0 mm: ± 0,20 mm maximum variation 3,0 ≤ t < 5,0 mm: ± 0,30 mm maximum variation 5,0 ≤ t < 8,0 mm: ± 0,40 mm maximum variation 8,0 ≤ t < 12,0 mm: ± 0,50 mm maximum variation 12,0 ≤ t < 16,0 mm: ± 0,60 mm maximum variation 16,0 ≤ t < 20,0 mm: ± 0,70 mm maximum variation 20,0 ≤ t < 25,0 mm: ± 0,80 mm maximum variation 25,0 ≤ t To be agreed between supplier and customer. (where t = nominal thickness)
Flatness <sup>a)</sup>	9	2,0 ≤ t < 6,0 mm: 8,0 mm/m maximum deviation 6,0 ≤ t < 10,0 mm: 5,0 mm/m maximum deviation 10,0 ≤ t : 3,0 mm/m maximum deviation (where t = nominal thickness)
Length and width <sup>b)</sup>	6	+ 10 mm / -0 mm
Straightness of edges <sup>b)</sup>	7	1,5 mm/m maximum deviation
Squareness. <sup>b)</sup>	8	1,5 mm/m maximum deviation

<sup>a)</sup> 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 EN 438-2, Clause 9. The flatness values specified in Table 2 apply to laminates with two decorative faces. Limits for laminates with one face sanded shall be agreed between supplier and customer.

<sup>b)</sup> Tolerances for cut-to-size panels shall be agreed between supplier and purchaser.

### 6.4 Test requirements

#### 6.4.1 General requirements

General requirements are specified in Table 3.