



BSI Standards Publication

High-pressure decorative laminates (HPL) — Sheets based on thermosetting resins (usually called laminates)

Part 1: Introduction and general information

National foreword

This British Standard is the UK implementation of EN 438-1:2016. It supersedes BS EN 438-1:2005 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PRI/76, Laminated sheet for decorative purposes.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Published by BSI Standards Limited 2016

ISBN 978 0 580 87153 5

ICS 83.140.20

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 29 February 2016.

Amendments/corrigenda issued since publication

Date	Text affected
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EUROPEAN STANDARD

EN 438-1

NORME EUROPÉENNE

EUROPÄISCHE NORM

February 2016

ICS 83.140.20

Supersedes EN 438-1:2005

English Version

High-pressure decorative laminates (HPL) - Sheets based on thermosetting resins (usually called laminates) - Part 1: Introduction and general information

Stratifiés décoratifs haute pression (HPL) - Plaques à base de résines thermodurcissables (communément appelées stratifiés) - Partie 1: Introduction et informations générales

Dekorative Hochdruck-Schichtpressstoffplatten (HPL) - Platten auf Basis härtpbarer Harze (Schichtpressstoffe) - Teil 1: Einleitung und allgemeine Informationen

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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European foreword

This document (EN 438-1:2016) has been prepared by Technical Committee CEN/TC 249 "Plastics", the secretariat of which is held by NBN.

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of an identical text or by endorsement, at the latest by August 2016, and conflicting national standards shall be withdrawn at the latest by August 2016.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 438-1:2005.

EN 438, *High-pressure decorative laminates (HPL) — Sheets based on thermosetting resins (usually called laminates)*, 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*
- *Part 8: Classification and specifications for design laminates*
- *Part 9: Classification and specifications for alternative core laminates*

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1 Scope

This part of EN 438 gives an overview of the standard, and provides guidance in the selection and application of test methods and specifications contained in EN 438-2, EN 438-3, EN 438-4, EN 438-5, EN 438-6, EN 438-7, EN 438-8 and EN 438-9.

This European Standard is applicable to high-pressure decorative laminate(s) (HPL) produced by using a high pressure process.

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.

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

EN 438-3, *High-pressure decorative laminates (HPL) — Sheets based on thermosetting resins (usually called laminates) — Part 3: Classification and specifications for laminates less than 2 mm thick intended for bonding to supporting substrates*

EN 438-4, *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.*

EN 438-5, *High-pressure decorative laminates (HPL) — 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*

EN 438-6, *High-pressure decorative laminates (HPL) — Sheets based on thermosetting resins (usually called laminates) — Part 6: Classification and specifications for Exterior-grade Compact laminates of thickness 2 mm and greater*

EN 438-7, *High-pressure decorative laminates (HPL) — Sheets based on thermosetting resins (usually called laminates) — Part 7: Compact laminate and HPL composite panels for internal and external wall and ceiling finishes*

EN 438-8, *High-pressure decorative laminates (HPL) — Sheets based on thermosetting resins (usually called laminates) — Part 8: Classification and specifications for design laminates*

EN 438-9, *High-pressure decorative laminates (HPL) — Sheets based on thermosetting resins (usually called laminates) — Part 9: Classification and specifications for alternative core laminates*

EN 13329, *Laminate floor coverings — Elements with a surface layer based on aminoplastic thermosetting resins — Specifications, requirements and test methods*

3 Terms and definitions

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

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

sheet(s) consisting of decorative surface layer(s) and core layers bonded together by a high pressure process

Note 1 to entry: Typical values for the high pressure process are a temperature of ≥ 120 °C and a pressure of ≥ 5 MPa.

3.2 **surface layer**

upper decorative layer consisting in one or more sheets of fibrous material (usually paper) impregnated with aminoplastic thermosetting resins (usually melamine based resins) or other curable resins or other decorative design surfaces such as metal foils, wood-veneers and textiles, etc. which are not necessarily treated with thermosetting resin

Note 1 to entry: The surface layers can appear on one or both side(s) of the laminate(s). In case of one-sided laminates, the back of the sheet(s) may be made suitable for adhesive bonding to a substrate.

3.3 **core layer**

fibrous material (usually paper) impregnated with thermosetting resins (usually phenolic based resins) or other curable resins, eventually reinforced by metal layer(s) or metal mesh(es) and others which are not necessarily treated with thermosetting resin

4 Guidance in the use of the standard

4.1 Description of parts

EN 438-2 specifies the methods of test that shall be used to determine the performance of HPL products in their various internal and external application fields, e.g. construction, transport, furniture, flooring, etc. The test methods have been specifically developed for testing HPL.

It should be noted that not all test methods apply to all types of HPL. For example Test 11, Resistance to Abrasion, applies only to flooring grade laminates; while Test 10, Resistance to Surface Wear, applies to all types of HPL except flooring grade laminates. It is therefore important to read the scope of the test method to determine whether it is applicable to a particular HPL product.

EN 438-3, EN 438-4, EN 438-5, EN 438-6, EN 438-8 and EN 438-9 specify the performance requirements for different types of high-pressure decorative laminates. Each of these parts is independent of the others, and only requires reference to EN 438-2 for details of the appropriate test methods.

EN 438-3 applies to laminates less than 2 mm thick intended for bonding to supporting substrates to produce HPL composite panels. Classification systems and performance requirements are specified for heavy duty, horizontal and vertical grades of laminate, in standard, postforming and flame-retardant qualities.

EN 438-4 applies to Compact laminates of thickness 2 mm and greater, in standard and flame-retardant qualities, intended for interior applications.

EN 438-5 applies to flooring grade laminates less than 2 mm thick intended for bonding to supporting substrates, to produce HPL flooring elements. As 'laminate floor coverings' they meet the requirements of EN 13329.

EN 438-6 applies to Exterior-grade Compact laminates of thickness 2 mm and greater, and specifies requirements for standard and flame-retardant laminates for use in moderate and severe outdoor conditions.

EN 438-7 is the harmonised standard covering the essential requirements specified in Construction Products Regulation for Internal and External Wall and Ceiling Finishes.

EN 438-8 applies to design laminates (pearlescent, wood veneer and metal surfaces). Classification system and performance requirements are specified for thin and compact laminates.

EN 438-9 applies to alternative core laminates (coloured and metal reinforced cores). Classification system and performance requirements are specified for thin and compact laminates.

4.2 Applications

Table 1 below shows how the different parts of the standard relate to various fields of application.

Table 1 — Applicable fields

Application	Part 3	Part 4	Part 5	Part 6	Part 8	Part 9
Construction (internal)	•	•			•	•
Construction (external)				•		
Transport	•	•			•	•
Furniture	•	•			•	•
Flooring			•			

5 Product classification systems

EN 438-3, EN 438-4, EN 438-5, EN 438-6, EN 438-8 and EN 438-9 include product classification systems. While each of these systems is different, they contain some common elements as follows:

Main classifications:

H denotes **Horizontal grade**

V denotes **Vertical grade**

C denotes **Compact laminate**

E denotes **Exterior grade**

AC denotes **Abrasion Class** for flooring grade

A denotes **Pearlescent laminate**

M denotes **Metal laminate**

W denotes **Wood veneer laminate**

B denotes **Coloured core laminate**

R denotes **Metal reinforced core laminate**

T denotes **Thin laminate < 2 mm**

Sub-classifications:

D denotes **Heavy duty or severe use**

G denotes **General purpose or moderate use**

S denotes **Standard grade**

F denotes **Flame-retardant grade**

P denotes **Postforming grade**

In Part 5, the classification system AC1 to AC6 has been adopted as these classes relate directly to the corresponding product abrasion classes in EN 13329.

Annex A (informative)

Addendum relating to hygienic, health and safety information for laminates intended for interior use

A.1 Cleanability

Because they are easy to clean and maintain, high-pressure decorative laminates are suitable for use in hygienic applications such as hospitals, pharmacies, food processing areas, abattoirs, clean rooms, etc. For routine cleaning, wiping the surface with water and mild detergent is usually sufficient, but more severe methods such as hosing down with hot water or steam cleaning can be used where required by the application. Solvents such as white spirit, acetone or cellulose thinners can also be used (e.g. for graffiti removal) as they will not affect the laminate.

For the non melamine surface laminate cleaning, the manufacturer should be contacted.

A.2 Hygiene

When used in hospitals and surgeries, HPL melamine and other curable resin surfaces can be disinfected using any of the common disinfectants such as Ethanol 70 %, Formalin 1 % to 5 %, p-chlorine-m-cresol 0,3 %, Chloramine T 1 % to 5 %, Alkylbenzyltrimethylammonium chloride 0,1 %. High-pressure decorative laminates show a high resistance to fungal and bacterial growth, when tested in accordance with EN ISO 846.

A.3 Contact with foodstuffs

When determination of the overall and specific migration is carried out in accordance with the test method shown below, the following results are typical of those for HPL melamine and other suitable curable resin surfaces:

Overall migration	< 10 mg/dm ²
Specific migration (formaldehyde)	< 2,5 mg/dm ²

Test methods - Methods for the examination of consumer goods, basic rules for the determination of the migration in simulant solvents corresponding to the Commission Regulation (Eu) No 10/2011 of 14 January 2011 and according to the Parts of the EN 1186.

Conditions 24 h at 40 °C

Test simulants	acetic acid with a mass fraction of 3 % ethanol with a volume fraction of 10 % ethanol with a volume fraction of 95 %
Test procedure	one-sided contact

A.4 Dangerous substances

Pentachlorophenol, asbestos, halogens or heavy metals (Antimony, Barium, Cadmium, Chromium III and VI, Lead, Mercury, Selenium) are not used for the production of HPL.

Bibliography

- [1] EN ISO 846, *Plastics — Evaluation of the action of microorganisms (ISO 846)*
- [2] EN 1186-1, *Materials and articles in contact with foodstuffs — Plastics — Part 1: Guide to the selection of conditions and test methods for overall migration*
- [3] EN 1186-2, *Materials and articles in contact with foodstuffs — Plastics — Part 2: Test methods for overall migration into olive oil by total immersion*
- [4] EN 1186-3, *Materials and articles in contact with foodstuffs — Plastics — Part 3: Test methods for overall migration into aqueous food simulants by total immersion*
- [5] EN 1186-4, *Materials and articles in contact with foodstuffs — Plastics — Part 4: Test methods for overall migration into olive oil by cell*
- [6] EN 1186-5, *Materials and articles in contact with foodstuffs — Plastics — Part 5: Test methods for overall migration into aqueous food simulants by cell*
- [7] EN 1186-6, *Materials and articles in contact with foodstuffs — Plastics — Part 6: Test methods for overall migration into olive oil using a pouch*
- [8] EN 1186-7, *Materials and articles in contact with foodstuffs — Plastics — Part 7: Test methods for overall migration into aqueous food simulants using a pouch*
- [9] EN 1186-8, *Materials and articles in contact with foodstuffs — Plastics — Part 8: Test methods for overall migration into olive oil by article filling*
- [10] EN 1186-9, *Materials and articles in contact with foodstuffs — Plastics — Part 9: Test methods for overall migration into aqueous food simulants by article filling*
- [11] EN 1186-10, *Materials and articles in contact with foodstuffs — Plastics — Part 10: Test methods for overall migration into olive oil (modified method for use in cases where incomplete extraction of olive oil occurs)*
- [12] EN 1186-11, *Materials and articles in contact with foodstuffs — Plastics — Part 11: Test methods for overall migration into mixtures of ¹⁴C-labelled synthetic triglycerides*
- [13] EN 1186-12, *Materials and articles in contact with foodstuffs — Plastics — Part 12: Test methods for overall migration at low temperatures*
- [14] EN 1186-13, *Materials and articles in contact with foodstuffs — Plastics — Part 13: Test methods for overall migration at high temperatures*
- [15] EN 1186-14, *Materials and articles in contact with foodstuffs — Plastics — Part 14: Test methods for 'substitute tests' for overall migration from plastics intended to come into contact with fatty foodstuffs using test media iso-octane and 95 % ethanol*
- [16] EN 1186-15, *Materials and articles in contact with foodstuffs — Plastics — Part 15: Alternative test methods to migration into fatty food simulants by rapid extraction into iso-octane and/or 95 % ethanol*

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BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

