

This is a preview of "BS EN 438-2:2016". [Click here to purchase the full version from the ANSI store.](#)

BS EN 438-2:2016



BSI Standards Publication

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

Part 2: Determination of properties

bsi.

...making excellence a habit.™

This is a preview of "BS EN 438-2:2016". [Click here to purchase the full version from the ANSI store.](#)

This British Standard is the UK implementation of EN 438-2:2016. It supersedes BS EN 438-2:2005 which is withdrawn.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.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2016. Published by BSI Standards Limited 2016

ISBN 978 0 580 87157 3

ICS 83.140.20

Compliance with a British Standard cannot confer immunity from legal obligations.

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

Amendments issued since publication

Date	Text affected
------	---------------

This is a preview of "BS EN 438-2:2016". [Click here to purchase the full version from the ANSI store.](#)

EUROPÄISCHE NORM

February 2016

ICS 83.140.20

Supersedes EN 438-2:2005

English Version

High-pressure decorative laminates (HPL) - Sheets based on thermosetting resins (usually called laminates) - Part 2: Determination of properties

Stratifiés décoratifs haute pression (HPL) - Plaques à base de résines thermodurcissables (communément appelées stratifiés) - Partie 2: Détermination des propriétés

Dekorative Hochdruck-Schichtpressstoffplatten (HPL) - Platten auf Basis härubarer Harze (Schichtpressstoffe) - Teil 2: Bestimmung der Eigenschaften

This European Standard was approved by CEN on 13 December 2015.

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 CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents	Page
European foreword	8
1 Scope	9
2 Normative references	9
3 Terms and definitions	10
4 Assessment of appearance	10
4.1 Principle	10
4.2 Apparatus	10
4.3 Test specimen	10
4.4 Procedure	10
4.5 Test report	11
5 Determination of thickness	11
5.1 Principle	11
5.2 Apparatus	11
5.3 Test specimen	11
5.4 Procedure	11
5.5 Test report	11
6 Determination of length and width	12
6.1 Principle	12
6.2 Apparatus	12
6.3 Test specimen	12
6.4 Procedure	12
6.5 Expression of results	12
6.6 Test report	12
7 Determination of edge straightness	12
7.1 Principle	12
7.2 Apparatus	12
7.3 Test specimen	13
7.4 Procedure	13
7.5 Expression of results	13
7.6 Test report	13
8 Determination of edge squareness	14
8.1 Principle	14
8.2 Apparatus	14
8.3 Test specimen	14
8.4 Procedure	14
8.5 Expression of results	14
8.6 Test report	14
9 Determination of flatness	15
9.1 Principle	15
9.2 Apparatus	15
9.3 Test specimens	15

This is a preview of "BS EN 438-2:2016". [Click here to purchase the full version from the ANSI store.](#)

9.4	Procedure.....	15
9.5	Expression of results.....	15
9.6	Test report.....	16
10	Resistance to surface wear.....	16
10.1	Principle.....	16
10.2	Materials.....	16
10.3	Apparatus.....	17
10.4	Test specimens.....	18
10.5	Preparation of specimens and abrasive paper.....	19
10.6	Procedure.....	19
10.6.1	Preparation of abrasive wheels.....	19
10.6.2	Calibration of abrasive paper.....	19
10.6.3	Abrasion of specimen.....	19
10.7	Expression of results.....	20
10.8	Test report.....	20
11	Resistance to abrasion (flooring grade laminates).....	20
12	Resistance to immersion in boiling water.....	21
12.1	Principle.....	21
12.2	Apparatus.....	21
12.3	Test specimens.....	21
12.4	Procedure.....	21
12.5	Expression of results.....	22
12.5.1	Calculation.....	22
12.5.2	Surface rating scale.....	22
12.5.3	Edge rating scale.....	23
12.6	Test report.....	23
13	Substrate protection against water vapour.....	23
13.1	Principle.....	23
13.2	Apparatus.....	23
13.3	Test specimens.....	23
13.4	Procedure.....	24
13.5	Expression of results.....	24
13.6	Test report.....	24
14	Resistance to water vapour.....	25
14.1	Principle.....	25
14.2	Apparatus.....	25
14.3	Test specimen.....	25
14.4	Procedure.....	25
14.5	Expression of results.....	26
14.6	Test report.....	26
15	Resistance to wet conditions (Exterior grade laminates).....	27
15.1	Principle.....	27
15.2	Apparatus.....	27
15.3	Test specimens.....	28
15.4	Procedure.....	28
15.5	Expression of results.....	28
15.5.1	Calculation.....	28
15.5.2	Visual examination.....	28

This is a preview of "BS EN 438-2:2016". [Click here to purchase the full version from the ANSI store.](#)

15.6	Test report.....	29
16	Resistance to dry heat	29
16.1	Principle	29
16.2	Apparatus and materials	30
16.3	Test specimen	31
16.4	Test procedure.....	31
16.5	Examination of the test specimen.....	32
16.6	Expression of results.....	32
16.7	Test report.....	32
17	Dimensional stability at elevated temperature	33
17.1	Principle	33
17.2	Apparatus	33
17.3	Test specimens	33
17.4	Procedure	33
17.5	Expression of results.....	34
17.6	Test report.....	34
18	Resistance to wet heat	35
18.1	Principle	35
18.2	Apparatus and materials	35
18.3	Test specimens	36
18.4	Procedure	36
18.5	Expression of results.....	37
18.6	Test report.....	37
19	Resistance to climatic shock (exterior grade laminates)	37
19.1	Principle	37
19.2	Apparatus	37
19.3	Test specimens	38
19.4	Procedure	38
19.5	Expression of results.....	39
19.5.1	Flexural strength and modulus of elasticity in flexure.....	39
19.5.2	Appearance.....	39
19.6	Test report.....	39
20	Resistance to impact by small-diameter ball	40
20.1	Principle	40
20.2	Materials.....	40
20.3	Apparatus	40
20.4	Test specimens	43
20.5	Calibration of the impact tester.....	43
20.6	Procedure	44
20.7	Expression of results.....	45
20.8	Test report.....	45
21	Resistance to impact by large diameter ball	45
21.1	Principle	45
21.2	Materials.....	46
21.3	Apparatus	46
21.4	Test specimens	46
21.5	Procedure	46

This is a preview of "BS EN 438-2:2016". [Click here to purchase the full version from the ANSI store.](#)

21.6	Expression of results.....	48
21.7	Test report.....	49
22	Resistance to impact by large diameter ball (flooring grade laminates).....	49
22.1	Principle.....	49
22.2	Materials.....	49
22.3	Apparatus.....	49
22.4	Test specimens.....	50
22.5	Procedure.....	50
22.6	Expression of results.....	50
22.7	Test report.....	50
23	Resistance to cracking under stress (laminates ≤ 2 mm thick).....	51
23.1	Principle.....	51
23.2	Apparatus.....	51
23.3	Test specimens.....	51
23.4	Procedure.....	53
23.5	Expression of results.....	53
23.6	Test report.....	54
24	Resistance to crazing (Compact laminates).....	55
24.1	Principle.....	55
24.2	Apparatus.....	55
24.3	Test specimens.....	55
24.4	Procedure.....	55
24.5	Expression of results.....	55
24.6	Test report.....	56
25	Resistance to scratching.....	57
25.1	Principle.....	57
25.2	Materials.....	57
25.3	Apparatus.....	57
25.4	Calibration of apparatus.....	59
25.5	Test specimen.....	59
25.6	Procedure.....	59
25.7	Expression of results.....	63
25.8	Test report.....	63
26	Resistance to staining.....	63
26.1	Principle.....	63
26.2	Staining agents.....	63
26.3	Apparatus and Materials.....	65
26.4	Test specimens.....	66
26.5	Test procedure.....	66
26.6	Examination of the test panel.....	67
26.7	Assessment of results.....	67
26.8	Test report.....	68
27	Light fastness (Xenon arc).....	68
27.1	Principle.....	68
27.2	Apparatus.....	68
27.3	Test specimen.....	69
27.4	Procedure.....	69

This is a preview of "BS EN 438-2:2016". [Click here to purchase the full version from the ANSI store.](#)

27.5	Assessment and expression of results	69
27.6	Test report.....	70
28	Resistance to UV light (Exterior grade laminates)	70
28.1	Principle	70
28.2	Apparatus	70
28.3	Test specimens	70
28.4	Procedure	71
28.5	Evaluation and expression of results	71
28.5.1	General.....	71
28.5.2	Contrast.....	71
28.5.3	Appearance.....	71
28.6	Test report.....	71
29	Resistance to artificial weathering (Exterior grade laminates).....	72
29.1	Principle	72
29.2	Apparatus	72
29.3	Test specimens	73
29.4	Procedure	73
29.5	Examination and expression of results	73
29.5.1	General.....	73
29.5.2	Contrast.....	73
29.5.3	Appearance.....	74
29.6	Test report.....	74
30	Determination of the microscratch resistance.....	74
30.1	Principle	74
30.2	Terms and definitions.....	74
30.3	Apparatus and materials	75
30.4	Assembly and maintenance of the Martindale tester	77
30.5	Method for checking the Lissajous figure.....	77
30.6	Preparation and conditioning	77
30.6.1	Preparation.....	77
30.6.2	Test surface.....	78
30.7	Test procedure.....	78
30.7.1	General.....	78
30.7.2	Testing	78
30.8	Classification of the image after scratching according to procedure B.....	79
30.9	Test report.....	80
31	Formability (Method A)	81
31.1	Principle	81
31.2	Apparatus	81
31.3	Test specimens	82
31.4	Procedure	82
31.4.1	Calibration of test apparatus.....	82
31.4.2	Test procedure	83
31.5	Test report.....	84
32	Formability (Method B)	84
32.1	Principle	84
32.2	Apparatus	85
32.3	Test specimens	85

This is a preview of "BS EN 438-2:2016". [Click here to purchase the full version from the ANSI store.](#)

32.4	Procedure	86
32.5	Test report.....	87
33	Resistance to blistering (Method A)	88
33.1	Principle	88
33.2	Apparatus	88
33.3	Test specimens	88
33.4	Procedure	88
33.4.1	Calibration of test apparatus.....	88
33.4.2	Test procedure.....	88
33.5	Test report.....	88
34	Resistance to blistering (Method B)	89
34.1	Principle	89
34.2	Apparatus	89
34.3	Test specimens	89
34.4	Procedure	89
34.4.1	General	89
34.4.2	Calibration of test apparatus.....	89
34.4.3	Test procedure.....	89
34.5	Test report.....	89
Annex A (informative) Surface finish and colour influence on surface evaluations		91
Annex B (informative) Calibration and maintenance of abrasion equipment		92
B.1	General	92
B.2	Apparatus.....	92
B.3	Procedure.....	92
B.3.1	Bearing Wear	92
B.3.2	Shaft Wear	92
B.3.3	Alignment.....	93
Annex C (normative) Measurement of shore A hardness.....		96

This is a preview of "BS EN 438-2:2016". [Click here to purchase the full version from the ANSI store.](#)

European foreword

This document (EN 438-2:2016) 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 438-2:2005.

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*

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

This is a preview of "BS EN 438-2:2016". [Click here to purchase the full version from the ANSI store.](#)

1 Scope

This European Standard specifies the methods of test for determination of the properties of high-pressure decorative laminates as defined in Clause 3. These methods are primarily intended for testing the sheets specified in EN 438-3, EN 438-4, EN 438-5, EN 438-6, EN 438-8, and EN 438-9.

The precision of the test methods, specified in this European Standard, is not known because inter-laboratory data are not yet available. When inter-laboratory data will be obtained, precision statements will be added to the test method at the following revision. For those test methods having an end point determination based on subjective judgement, it is not meaningful to make a statement of precision.

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 204, *Classification of thermoplastic wood adhesives for non-structural applications*

EN 312, *Particleboards — Specifications*

EN 316, *Wood fibre boards — Definition, classification and symbols*

EN 438-1, *High-pressure decorative laminates (HPL) — Sheets based on thermosetting resins (usually called laminates) — Part 1: Introduction and general information*

EN ISO 62, *Plastics — Determination of water absorption (ISO 62)*

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

EN ISO 291, *Plastics — Standard atmospheres for conditioning and testing (ISO 291)*

EN ISO 2813, *Paints and varnishes — Determination of gloss value at 20°, 60° and 85° (ISO 2813)*

EN ISO 3668, *Paints and varnishes — Visual comparison of the colour of paints (ISO 3668)*

EN ISO 4287, *Geometrical product specifications (GPS) — Surface texture: Profile method — Terms, definitions and surface texture parameters (ISO 4287)*

EN ISO 4288, *Geometrical product specifications (GPS) — Surface texture: Profile method — Rules and procedures for the assessment of surface texture (ISO 4288)*

EN ISO 4892-1, *Plastics — Methods of exposure to laboratory light sources — Part 1: General guidance (ISO 4892-1)*

EN ISO 4892-2:2013, *Plastics — Methods of exposure to laboratory light sources — Part 2: Xenon-arc lamps (ISO 4892-2:2013)*

EN ISO 4892-3, *Plastics — Methods of exposure to laboratory light sources — Part 3: Fluorescent UV lamps (ISO 4892-3)*

EN ISO 6506-1, *Metallic materials — Brinell hardness test — Part 1: Test method (ISO 6506-1)*

EN ISO 12945-2, *Textiles — Determination of fabric propensity to surface fuzzing and to pilling — Part 2: Modified Martindale method (ISO 12945-2)*