



SLOVENSKI STANDARD
SIST EN 438-2:2016/A1:2019
01-marec-2019

**Dekoratívni visokotlačni laminati (HPL) - Plošče na osnovi duromernih smol - 2.
del: Ugotavljanje lastnosti - Dopnilo A1**

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

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

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

Ta slovenski standard je istoveten z: EN 438-2:2016/A1:2018

ICS:

83.140.20 Laminatne plošče Laminated sheets

SIST EN 438-2:2016/A1:2019 **en,fr,de**

ITeh STANDARD PREVIEW
(standards.iteh.ai)

Full standard:
<https://standards.iteh.ai/catalog/standards/sist/7ca0197c-7e6b-40ac-a260-a97bc75221b1/sist-en-438-2-2016-a1-2019>

EUROPEAN STANDARD

EN 438-2:2016/A1

NORME EUROPÉENNE

EUROPÄISCHE NORM

December 2018

ICS 83.140.20

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 härthbarer Harze (Schichtpressstoffe) - Teil 2: Bestimmung der Eigenschaften

This amendment A1 modifies the European Standard EN 438-2:2016; it was approved by CEN on 5 October 2018.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for inclusion of this amendment into the relevant 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 amendment 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, Serbia, 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: Rue de la Science 23, B-1040 Brussels

Contents	Page
European foreword	10
1 Scope	11
2 Normative references	11
3 Terms and definitions	12
4 Assessment of appearance	12
4.1 Principle	12
4.2 Apparatus	12
4.3 Test specimen	12
4.4 Procedure	12
4.5 Test report	13
5 Determination of thickness	13
5.1 Principle	13
5.2 Apparatus	13
5.3 Test specimen	13
5.4 Procedure	13
5.5 Test report	14
6 Determination of length and width	14
6.1 Principle	14
6.2 Apparatus	14
6.3 Test specimen	14
6.4 Procedure	14
6.5 Expression of results	14
6.6 Test report	14
7 Determination of edge straightness	15
7.1 Principle	15
7.2 Apparatus	15
7.3 Test specimen	15
7.4 Procedure	15
7.5 Expression of results	15
7.6 Test report	16
8 Determination of edge squareness	16
8.1 Principle	16
8.2 Apparatus	16

8.3	Test specimen.....	16
8.4	Procedure	16
8.5	Expression of results.....	17
8.6	Test report.....	17
9	Determination of flatness	17
9.1	Principle	17
9.2	Apparatus.....	17
9.3	Test specimens.....	18
9.4	Procedure	18
9.5	Expression of results.....	18
9.6	Test report.....	18
10	Resistance to surface wear	18
10.1	Principle	18
10.2	Materials.....	18
10.3	Apparatus.....	19
10.3.1	Abrasion resistance testing machine.....	19
10.4	Test specimens.....	21
10.5	Preparation of specimens and abrasive paper.....	21
10.6	Procedure	21
10.6.1	Preparation of abrasive wheels.....	21
10.6.2	Calibration of abrasive paper	21
10.6.3	Abrasion of specimen	21
10.7	Expression of results.....	22
10.8	Test report.....	22
11	Resistance to abrasion (flooring grade laminates)	23
12	Resistance to immersion in boiling water	23
12.1	Principle	23
12.2	Apparatus.....	23
12.3	Test specimens.....	23
12.4	Procedure	24
12.5	Expression of results.....	24
12.5.1	Calculation.....	24
12.5.2	Surface rating scale	25
12.5.3	Edge rating scale.....	25
12.6	Test report.....	25
13	Substrate protection against water vapour.....	25

EN 438-2:2016+A1:2018 (E)

13.1	Principle	25
13.2	Apparatus	26
13.3	Test specimens.....	26
13.4	Procedure	26
13.5	Expression of results	27
13.6	Test report.....	27
14	Resistance to water vapour	27
14.1	Principle.....	27
14.2	Apparatus	28
14.3	Test specimen.....	28
14.4	Procedure	28
14.5	Expression of results	28
14.6	Test report.....	28
15	Resistance to wet conditions (Exterior grade laminates).....	30
15.1	Principle.....	30
15.2	Apparatus	30
15.3	Test specimens.....	30
15.4	Procedure	30
15.5	Expression of results	30
15.5.1	Calculation.....	30
15.5.2	Visual examination.....	31
15.6	Test report.....	31
16	Resistance to dry heat.....	32
16.1	Principle.....	32
16.2	Apparatus and materials.....	32
16.3	Test specimen.....	34
16.4	Test procedure.....	34
16.5	Examination of the test specimen	34
16.6	Expression of results	34
16.7	Test report.....	35
17	Dimensional stability at elevated temperature.....	35
17.1	Principle.....	35
17.2	Apparatus	35
17.3	Test specimens.....	36
17.4	Procedure	36
17.5	Expression of results	36

17.6	Test report.....	37
18	Resistance to wet heat.....	37
18.1	Principle	37
18.2	Apparatus and materials.....	38
18.3	Test specimens.....	38
18.4	Procedure	39
18.5	Expression of results.....	39
18.6	Test report.....	40
19	Resistance to climatic shock (exterior grade laminates)	40
19.1	Principle	40
19.2	Apparatus.....	40
19.3	Test specimens.....	41
19.4	Procedure	41
19.5	Expression of results.....	42
19.5.1	Flexural strength and modulus of elasticity in flexure	42
19.5.2	Appearance	42
19.6	Test report.....	42
20	Resistance to impact by small-diameter ball.....	42
20.1	Principle	42
20.2	Materials.....	43
20.3	Apparatus.....	43
20.4	Test specimens.....	46
20.5	Calibration of the impact tester.....	46
20.6	Procedure	47
20.7	Expression of results.....	48
20.8	Test report.....	48
21	Resistance to impact by large diameter ball	48
21.1	Principle	48
21.2	Materials.....	49
21.3	Apparatus.....	49
21.4	Test specimens.....	49
21.5	Procedure	49
21.6	Expression of results.....	51
21.7	Test report.....	52
22	Resistance to impact by large diameter ball (flooring grade laminates)	52
22.1	Principle	52

EN 438-2:2016+A1:2018 (E)

22.2	Materials	52
22.3	Apparatus	52
22.4	Test specimens.....	53
22.5	Procedure	53
22.6	Expression of results	53
22.7	Test report.....	53
23	Resistance to cracking under stress (laminates ≤ 2 mm thick)	54
23.1	Principle.....	54
23.2	Apparatus	54
23.3	Test specimens.....	54
23.4	Procedure	56
23.5	Expression of results	56
23.6	Test report.....	57
24	Resistance to crazing (Compact laminates)	58
24.1	Principle.....	58
24.2	Apparatus	58
24.3	Test specimens.....	58
24.4	Procedure	58
24.5	Expression of results	58
24.6	Test report.....	59
25	Resistance to scratching.....	60
25.1	Principle.....	60
25.2	Materials	60
25.3	Apparatus	60
25.4	Calibration of apparatus.....	62
25.5	Test specimen.....	62
25.6	Procedure	62
25.7	Expression of results	66
25.8	Test report.....	66
26	Resistance to staining.....	66
26.1	Principle.....	66
26.2	Staining agents.....	66
26.3	Apparatus and Materials.....	68
26.3.1	Discs.....	68
26.3.2	Glass Petri dish	68
26.3.3	Tweezers.....	68

26.3.4	Absorbent paper or tissue	68
26.3.5	Cleaning cloth	68
26.3.6	Diffuse light source.....	68
26.4	Test specimens.....	69
26.5	Test procedure.....	69
26.6	Examination of the test panel	70
26.7	Assessment of results	70
26.8	Test report.....	71
27	Light fastness (Xenon arc)	71
27.1	Principle	71
27.2	Apparatus.....	71
27.3	Test specimen.....	72
27.4	Procedure	72
27.5	Assessment and expression of results.....	73
27.6	Test report.....	73
28	Resistance to UV light (Exterior grade laminates).....	73
28.1	Principle	73
28.2	Apparatus.....	73
28.3	Test specimens.....	73
28.4	Procedure	74
28.5	Evaluation and expression of results.....	74
28.5.1	General.....	74
28.5.2	Contrast	74
28.5.3	Appearance	74
28.6	Test report.....	74
29	Resistance to artificial weathering (Exterior grade laminates)	75
29.1	Principle	75
29.2	Apparatus.....	75
29.3	Test specimens.....	76
29.4	Procedure	76
29.5	Examination and expression of results.....	76
29.5.1	General.....	76
29.5.2	Contrast	77
29.5.3	Appearance	77
29.6	Test report.....	77
30	Determination of the microscratch resistance.....	77

EN 438-2:2016+A1:2018 (E)

30.1	Principle.....	77
30.2	Terms and definitions.....	77
30.3	Apparatus and materials.....	78
30.3.1	Martindale tester.....	78
30.3.2	Holder for scrub material.....	78
30.3.3	Diffuse light source.....	78
30.3.4	Reflectometer.....	78
30.3.5	Positioning device.....	79
30.4	Assembly and maintenance of the Martindale tester.....	80
30.5	Method for checking the Lissajous figure.....	80
30.6	Preparation and conditioning.....	81
30.6.1	Preparation.....	81
30.6.2	Test surface.....	81
30.7	Test procedure.....	81
30.7.1	General.....	81
30.7.2	Testing.....	81
30.8	Classification of the image after scratching according to procedure B.....	83
30.9	Test report.....	84
31	Formability (Method A).....	84
31.1	Principle.....	84
31.2	Apparatus.....	84
31.3	Test specimens.....	85
31.4	Procedure.....	85
31.4.1	Calibration of test apparatus.....	85
31.4.2	Test procedure.....	86
31.5	Test report.....	87
32	Formability (Method B).....	87
32.1	Principle.....	87
32.2	Apparatus.....	88
32.3	Test specimens.....	88
32.4	Procedure.....	89
32.5	Test report.....	90
33	Resistance to blistering (Method A).....	91
33.1	Principle.....	91
33.2	Apparatus.....	91
33.3	Test specimens.....	91

33.4	Procedure	91
33.4.1	Calibration of test apparatus	91
33.4.2	Test procedure.....	91
33.5	Test report.....	91
34	Resistance to blistering (Method B).....	92
34.1	Principle	92
34.2	Apparatus.....	92
34.3	Test specimens.....	92
34.4	Procedure	92
34.4.1	General.....	92
34.4.2	Calibration of test apparatus	92
34.4.3	Test procedure.....	92
34.5	Test report.....	92
	Annex A (informative) Surface finish and colour influence on surface evaluations	94
	Annex B (informative) Calibration and maintenance of abrasion equipment	95
	Annex C (normative) Measurement of shore A hardness.....	99

iTeh STANDARD PREVIEW
 (standards.iteh.ai)
 Full standard:
<https://standards.iteh.ai/catalog/standards/sist/en-438-2-2016-a1-2018>
 40ac-a260-a97bc75221bf/sist-en-438-2-2016-a1-2018

EN 438-2:2016+A1:2018 (E)**European foreword**

This document (EN 438-2:2016+A1:2018) 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 June 2019, and conflicting national standards shall be withdrawn at the latest by June 2019.

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

This document includes Amendment 1 approved by CEN on 28 August 2018.

This document supersedes A1 EN 438-2:2016. A1

The start and finish of text introduced or altered by amendment is indicated in the text by tags A1 A1.

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, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This document 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

[A1] The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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. **[A1]**

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)*