

DIN EN 438-2:2019-03 (E)

High-pressure decorative laminates (HPL) - Sheets based on thermosetting resins (usually called laminates) - Part 2: Determination of properties (includes Amendment A1:2018)

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
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
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
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