Deutsches Institut für Bautechnik

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Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

Designated according to Article 29 of Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment)

European Technical Assessment 13/0247 of 2 February 2018

English translation prepared by DIBt – Original version in German language

General Part

Technical Assessment Body issuing the European Technical Assessment:	Deutsches Institut für Bautechnik
Trade name of the construction product	ORALITE® 6910 Brilliant Grade, originally dyed
Product family to which the construction product belongs	Microprismatic retro-reflective sheetings
Manufacturer	ORAFOL Europe GmbH Orafolstraße 2 16515 Oranienburg DEUTSCHLAND
Manufacturing plant	ORAFOL Europe GmbH Orafolstraße 2 16515 Oranienburg Deutschland
This European Technical Assessment contains	17 pages including 4 annexes which form an integral part of this assessment
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	EAD 120001-01-0106
This version replaces	ETA-13/0247 issued on 17 May 2013

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Specific Part

1 Technical description of the product

The product consists of retro-reflective sheeting on the basis of microprisms, which consist of optical elements, where the retro-reflection is created by total internal reflection on prisms. The microprisms are moulded in a transparent polymer enclosed in air capsules and provided with an adhesive, which can connect the sheeting with a substrate. The sheeting has a smooth surface and a regular structure visible on the surface forming the air capsules and serving to identify the orientation.

The product is delivered as reflective sheeting, the types of which are stated in Table 1.

Trade name	Component	Colour/Code		Properties
"ORALITE® 6910 Brilliant Grade, originally dyed"	Self-adhesive retro-reflective sheeting on the basis of microprisms	White Yellow Red Blue Green Brown	6910-010 6910-020 6910-030 6910-050 6910-060 6910-080	Sheeting thickness (without protective paper and adhesive): 0,23 mm Dimension of the roll: 1,22 m x 50 m, or customized

Tab. 1: Types of reflective sheeting "ORALITE® 6910 Brilliant Grade, originally dyed"

The indications of the manufacturer regarding the definition of the colours comply with the colour boxes of the CIE system (according to class CR2 of EN 12899-1) and are shown in Table 2.

Colour		Daylight chromaticity				Luminance factors
		1	2	3	4	
White	x y	0,305 0,315	0,335 0,345	0,325 0,355	0,295 0,325	≥ 0,27
Yellow	x y	0,494 0,505	0,470 0,480	0,513 0,437	0,545 0,454	≥ 0,16
Red	x y	0,735 0,265	0,700 0,250	0,610 0,340	0,660 0,340	≥ 0,03
Blue	x y	0,130 0,090	0,160 0,090	0,160 0,140	0,130 0,140	≥ 0,01
Green	x y	0,110 0,415	0,170 0,415	0,170 0,500	0,110 0,500	≥ 0,03
Brown	x y	0,455 0,397	0,523 0,429	0,479 0,373	0,558 0,394	$0,03 \leq \beta \leq 0,09$

Tab. 2: Daylight chromaticity and luminance factors according to the indications of the manufacturer which comply with class CR2 of EN 12899-1

2 Specification of the intended use in accordance with the applicable European Assessment Document

The construction product described here is used to manufacture signal aspects of fixed, vertical traffic signs (see also EN 12899-1:2007). The further intended applications are all other traffic signs and traffic installations, route guidance with retro-reflective elements and variable message signs.

However, the intended use excludes the manufacture of road marking elements according to EN 1436. The intended sign support material is aluminium, galvanised steel, polycarbonate or other materials. Tests within the framework of this assessment were carried out on aluminium-based samples.

The performances given in section 3 are only valid if the conditions laid down in the accompanying product data sheets and in the processing instructions given by the manufacturer have been respected throughout the production, processing, packaging, transport and storage of "ORALITE® 6910 Brilliant Grade, originally dyed" (essential specifications acc. to manufacturer's instructions are given in Annex 4).

The verifications and assessment methods as well as the product information of the manufacturer on which this European Technical Assessment is based lead to the assumption of a working life of this product of at least 10 years. The indications given on the working life cannot be interpreted as a guarantee given by the manufacturer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3 Performance of the product and references to the methods used for its assessment

3.1 Safety and accessibility in use (BWR 4)

For the preparation of the specimens, the test pieces of the reflective sheeting were applied by the manufacturer on a plane aluminium plate with a thickness of 2,0 mm (± 0,05 mm).

Essential characteristic	Performance
Visibility of "ORALITE® 6910 Brilliant Grade, originally dyed"	
Daylight chromaticity and luminance factors	See Annex 1
Night-time colour	No performance assessed
Coefficient of retro-reflection and rotational symmetry	See Annex 2
Durability of "ORALITE® 6910 Brilliant Grade, originally dyed"	
Impact resistance	Passed according to EN 12899-1
Temperature resistance	No performance assessed
Visibility after artificial weathering	Superseded by natural weathering
Visibility after natural weathering	See Annex 3
Adhesion	No performance assessed

4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

In accordance with EAD No 120001-01-0106, the applicable European legal act is: Decision 96/579/EC.

The system to be applied is: 1

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

6 Reference list

This European Technical Assessment is based on the following test report:

- Test report No. V4-047/2012 of 15 July 2016 by Federal Highway Research Institute (Bundesanstalt für Straßenwesen - BASt) on the testing of microprismatic reflective sheetings

Issued in Berlin on 2 February 2018 by Deutsches Institut für Bautechnik

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beglaubigt:
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Deutsches Institut für Bautechnik DIBt

Annex 1

Daylight chromaticity and luminance factors according to clause 2.2.1 of the EAD

Colour	Sample	x	y	β
White	1	0,315	0,332	0,43
	2	0,315	0,332	0,43
	3	0,314	0,332	0,43
Yellow	1	0,532	0,461	0,26
	2	0,532	0,461	0,26
	3	0,533	0,461	0,26
Red	1	0,673	0,304	0,03
	2	0,671	0,304	0,03
	3	0,673	0,304	0,03
Blue	1	0,154	0,112	0,03
	2	0,154	0,111	0,03
	3	0,153	0,112	0,03
Green	1	0,139	0,444	0,06
	2	0,140	0,443	0,06
	3	0,141	0,440	0,06
Brown	1	0,494	0,398	0,04
	2	0,495	0,399	0,04
	3	0,494	0,398	0,04

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Annex 2

Coefficient of retro-reflection and rotational symmetry according to clause 2.2.3 of the EAD

Coefficient of retro-reflection for "White" (Part 1)

		Colour		White Single test result of each sample			Average of the three samples tested
		Sample		1	2	3	
α	β_1	β_2	ε				
0,1°	5°	0°	0°	1333	1197	1041	1190
	15°			1166	1032	896	1031
	20°			1010	896	785	897
	30°			564	532	493	530
	40°			345	319	293	319
0,2°	5°			742	688	618	683
	15°			684	656	602	647
	20°			627	607	561	598
	30°			435	423	395	418
	40°			299	279	257	278
0,33°	5°			319	318	301	313
	15°			315	347	331	331
	20°			308	344	326	326
	30°			246	256	240	247
	40°			218	202	189	203
0,5°	5°			339	310	280	310
	15°			298	273	246	272
	20°			278	258	233	256
	30°			114	124	118	119
	40°			112	112	108	111
1,0°	5°			69	68	76	71
	15°			75	72	82	76
	20°			77	76	88	80
	30°			45	46	48	46
	40°			35	35	35	35
1,5°	5°			16,8	19,1	20	18,6
	15°			17,6	19,0	19,7	18,8
	20°			15,6	17,2	17,4	16,7
	30°			13,7	13,7	13,4	13,6
	40°			12,0	12,7	12,7	12,5
2°	5°			8,4	8,2	8,2	8,3
	15°			9,0	9,6	9,4	9,3
	20°			8,6	8,9	8,9	8,8
	30°			3,9	4,9	4,7	4,5
	40°			4,5	5,3	4,7	4,8

Coefficient of retro-reflection started at ε=0° [cd m^{-2} lx^{-1}]

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Coefficient of retro-reflection for "Yellow" (Part 2)

Colour				Yellow Single test result of each sample			Average of the three samples tested
Sample				1	2	3	
α	β_1	β_2	ε				
0,1°	5°	0°	0°	1256	1186	1252	1231
	15°			1098	1048	1105	1084
	20°			957	921	969	949
	30°			552	545	575	557
	40°			333	337	353	341
0,2°	5°			747	704	738	730
	15°			686	654	686	675
	20°			622	602	629	618
	30°			431	431	447	436
	40°			285	293	301	293
0,33°	5°			330	316	323	323
	15°			338	324	329	330
	20°			331	317	322	323
	30°			250	255	257	254
	40°			195	208	208	204
0,5°	5°			322	310	314	315
	15°			300	278	284	287
	20°			289	266	272	276
	30°			124	123	124	124
	40°			97	111	105	104
1,0°	5°			48	59	53	53
	15°			54	61	57	57
	20°			53	61	58	57
	30°			39	38	38	38
	40°			38	34	37	36
1,5°	5°			16,6	14,4	15,2	15,4
	15°			13,4	13,3	13,6	13,4
	20°			13,6	12,5	12,6	12,9
	30°			13,6	13,2	12,7	13,2
	40°			8,9	10,0	8,4	9,1
2°	5°			7,1	6,9	7,0	7,0
	15°			9,6	7,8	9,3	8,9
	20°			8,5	7,2	8,5	8,1
	30°			4,0	3,4	3,3	3,6
	40°			3,2	3,8	2,9	3,3

Coefficient of retro-reflection started at ε=0° [cd m^{-2} lx^{-1}]

ORALITE® 6910 Brilliant Grade, originally dyed

Coefficient of retro-reflection and rotational symmetry according to clause 2.2.3 of the EAD

Annex 2

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Coefficient of retro-reflection for "Red" (Part 3)

Colour / Sample				Red Single test result of each sample			Average of the three samples tested
α	β_1	β_2	ε	1	2	3	
0,1°	5°	0°	0°	292	221	281	265
	15°			254	191	246	230
	20°			221	166	214	200
	30°			127	103	126	119
	40°			78	62	77	72
0,2°	5°			180	145	177	167
	15°			164	135	161	153
	20°			149	123	147	140
	30°			103	85	102	97
	40°			69	55	68	64
0,33°	5°			76	72	78	75
	15°			77	76	77	77
	20°			77	73	75	75
	30°			65	56	63	61
	40°			51	43	51	48
0,5°	5°			67	58	65	63
	15°			62	53	59	58
	20°			60	51	56	56
	30°			31	29	30	30
	40°			29	26	29	28
1,0°	5°			18,5	26	22	22
	15°			18,0	24	20	21
	20°			18,2	24	20	21
	30°			11,7	11,5	11,9	11,7
	40°			7,9	6,8	8,1	7,6
1,5°	5°			5,2	5,4	5,0	5,2
	15°			4,1	5,7	4,8	4,9
	20°			4,0	5,2	4,4	4,5
	30°			3,6	3,9	3,9	3,8
	40°			3,4	3,7	3,5	3,5
2°	5°			2,1	2,4	2,2	2,2
	15°			2,3	2,3	2,2	2,3
	20°			2,1	2,3	2,0	2,1
	30°			0,9	1,4	1,0	1,1
	40°			0,9	1,1	0,9	1,0

Coefficient of retro-reflection started at ε=0° [cd m^{-2} lx^{-1}]

ORALITE® 6910 Brilliant Grade, originally dyed

Coefficient of retro-reflection and rotational symmetry according to clause 2.2.3 of the EAD

Annex 2

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Coefficient of retro-reflection for "Blue" (Part 4)

				Colour	Blue Single test result of each sample			Average of the three samples tested
				Sample	1	2	3	
α	β_1	β_2	ε					
0,1°	5°	0°	0°		106	114	106	109
	15°				95	100	89	95
	20°				84	87	77	83
	30°				50	50	44	48
	40°				30	30	26	29
0,2°	5°				59	59	59	59
	15°				56	54	54	55
	20°				52	50	49	50
	30°				37	37	33	36
	40°				24	24	21	23
0,33°	5°				35	35	37	36
	15°				30	30	35	32
	20°				28	28	31	29
	30°				18,8	18,4	18,0	18
	40°				15,3	15,4	13,5	14,7
0,5°	5°				36	37	35	36
	15°				29	30	28	29
	20°				26	27	25	26
	30°				9,3	9,1	9,4	9,3
	40°				6,8	6,8	6,4	6,7
1,0°	5°				4,7	4,4	4,5	4,5
	15°				4,4	4,6	4,3	4,4
	20°				4,7	5,0	4,6	4,8
	30°				2,4	2,6	2,5	2,5
	40°				2,8	2,7	2,6	2,7
1,5°	5°				1,5	1,4	1,7	1,5
	15°				1,2	1,2	1,4	1,3
	20°				1,1	1,1	1,4	1,2
	30°				0,7	0,7	0,9	0,8
	40°				0,6	0,5	0,6	0,6
2°	5°				1,1	1,1	1,1	1,1
	15°				0,7	0,6	0,7	0,7
	20°				0,7	0,7	0,8	0,7
	30°				0,4	0,3	0,4	0,4
	40°				0,4	0,4	0,4	0,4

Coefficient of retro-reflection started at ε=0° [cd m^{-2} lx^{-1}]

ORALITE® 6910 Brilliant Grade, originally dyed	Annex 2
Coefficient of retro-reflection and rotational symmetry according to clause 2.2.3 of the EAD	

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Coefficient of retro-reflection for "Green" (Part 5)

Colour / Sample				Green Single test result of each sample			Average of the three samples tested
α	β_1	β_2	ε	1	2	3	
0,1°	5°	0°	0°	266	284	308	286
	15°			225	242	258	242
	20°			193	205	222	207
	30°			105	101	126	111
	40°			60	54	73	62
0,2°	5°			139	147	164	150
	15°			130	132	154	139
	20°			119	118	142	126
	30°			79	74	97	83
	40°			50	45	62	52
0,33°	5°			66	65	74	68
	15°			68	60	79	69
	20°			65	57	77	66
	30°			44	38	55	46
	40°			34	29	42	35
0,5°	5°			68	73	77	73
	15°			57	62	64	61
	20°			52	56	59	56
	30°			21	18,4	26	22
	40°			16,5	14,0	21	17,2
1,0°	5°			9,5	10,0	10,7	10,1
	15°			10,3	10,9	12,1	11,1
	20°			11,2	11,5	13,1	11,9
	30°			7,7	7,5	8,9	8,0
	40°			6,4	6,2	7,7	6,8
1,5°	5°			3,6	3,3	3,8	3,6
	15°			2,8	2,6	3,1	2,8
	20°			2,5	2,2	2,9	2,5
	30°			2,2	1,9	2,6	2,2
	40°			1,8	2,1	2,0	2,0
2°	5°			1,7	1,8	1,8	1,8
	15°			1,6	1,4	1,7	1,6
	20°			1,6	1,5	1,7	1,6
	30°			0,8	0,7	0,9	0,8
	40°			1,0	1,2	1,1	1,1

Coefficient of retro-reflection started at ε=0° [cd m^{-2} lx^{-1}]

ORALITE® 6910 Brilliant Grade, originally dyed

Coefficient of retro-reflection and rotational symmetry according to clause 2.2.3 of the EAD

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Coefficient of retro-reflection for "Brown" (Part 6)

		Colour		Brown Single test result of each sample			Average of the three samples tested
		Sample		1	2	3	
α	β_1	β_2	ε				
0,1°	5°	0°	0°	180	179	189	183
	15°			151	151	160	154
	20°			127	129	136	131
	30°			65	73	77	72
	40°			36	43	45	41
0,2°	5°			104	108	111	108
	15°			92	97	100	96
	20°			81	87	90	86
	30°			51	58	62	57
	40°			31	37	39	36
0,33°	5°			42	48	46	45
	15°			42	49	50	47
	20°			40	48	49	46
	30°			30	35	38	34
	40°			22	26	29	26
0,5°	5°			44	45	46	45
	15°			38	40	40	39
	20°			35	37	38	37
	30°			14,2	16,8	17,8	16,3
	40°			12,0	14,3	15,4	13,9
1,0°	5°			7,2	9,6	7,7	8,2
	15°			7,9	10,0	8,9	8,9
	20°			8,4	10,3	9,8	9,5
	30°			5,8	6,7	6,6	6,4
	40°			3,7	4,5	4,5	4,2
1,5°	5°			2,4	2,8	2,4	2,5
	15°			1,4	2,4	1,8	1,9
	20°			1,3	2,2	1,7	1,7
	30°			1,9	1,9	2,1	2,0
	40°			1,7	1,7	1,7	1,7
2°	5°			1,2	1,4	1,3	1,3
	15°			1,1	1,2	1,2	1,2
	20°			0,8	1,0	0,9	0,9
	30°			0,5	0,6	0,6	0,6
	40°			0,7	0,5	0,6	0,6

Coefficient of retro-reflection started at ε=0° [cd m^{-2} lx^{-1}]

ORALITE® 6910 Brilliant Grade, originally dyed

Coefficient of retro-reflection and rotational symmetry according to clause 2.2.3 of the EAD

Annex 2

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Rotational symmetry

α	β1	β2	Colour Sample ε	White 1	White 2	White 3
0,33	5	0	-75	353	365	343
			-50	384	335	294
			-25	334	297	270
			0*	319	318	301
			25	305	301	300
			50	285	281	290
			Ratio	**1,35**	**1,30**	**1,27**

* Rotational symmetry started at ε=0° [cd m^{-2} lx^{-1}]

α	β1	β2	Colour Sample ε	Blue 1	Blue 2	Blue 3
0,33	5	0	-75	30	31	31
			-50	29	31	29
			-25	28	28	27
			0*	35	35	37
			25	31	33	33
			50	22	24	23
			Ratio	**1,59**	**1,46**	**1,61**

* Rotational symmetry started at ε=0° [cd m^{-2} lx^{-1}]

α	β1	β2	Colour Sample ε	Yellow 1	Yellow 2	Yellow 3
0,33	5	0	-75	293	285	308
			-50	329	333	347
			-25	337	325	331
			0*	330	316	323
			25	239	256	246
			50	192	209	191
			Ratio	**1,76**	**1,59**	**1,82**

* Rotational symmetry started at ε=0° [cd m^{-2} lx^{-1}]

α	β1	β2	Colour Sample ε	Green 1	Green 2	Green 3
0,33	5	0	-75	74	73	79
			-50	69	77	80
			-25	57	66	68
			0*	66	65	74
			25	65	64	71
			50	58	59	64
			Ratio	**1,30**	**1,31**	**1,25**

* Rotational symmetry started at ε=0° [cd m^{-2} lx^{-1}]

α	β1	β2	Colour Sample ε	Red 1	Red 2	Red 3
0,33	5	0	-75	76	67	74
			-50	90	65	88
			-25	84	64	82
			0*	76	72	78
			25	61	67	64
			50	52	59	52
			Ratio	**1,73**	**1,22**	**1,69**

* Rotational symmetry started at ε=0° [cd m^{-2} lx^{-1}]

α	β1	β2	Colour Sample ε	Brown 1	Brown 2	Brown 3
0,33	5	0	-75	48	46	51
			-50	56	51	57
			-25	49	47	49
			0*	42	48	46
			25	33	40	37
			50	29	30	29
			Ratio	**1,93**	**1,70**	**1,97**

* Rotational symmetry started at ε=0° [cd m^{-2} lx^{-1}]

ORALITE® 6910 Brilliant Grade, originally dyed

Coefficient of retro-reflection and rotational symmetry according to clause 2.2.3 of the EAD

Annex 2

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Annex 3

Visibility after natural weathering according to clause 2.2.6 of the EAD
Daylight chromaticity and luminance factors after natural weathering

Colour	Sample	x	y	β
White	1	0,311	0,330	0,44
	2	0,311	0,329	0,44
	3	0,311	0,329	0,44
Yellow	1	0,530	0,458	0,27
	2	0,529	0,458	0,27
	3	0,528	0,459	0,27
Red	1	0,640	0,300	0,03
	2	0,644	0,300	0,03
	3	0,642	0,300	0,03
Blue	1	0,150	0,116	0,04
	2	0,149	0,118	0,04
	3	0,148	0,117	0,04
Green	1	0,152	0,427	0,08
	2	0,152	0,427	0,07
	3	0,152	0,426	0,07
Brown	1	0,482	0,396	0,04
	2	0,480	0,395	0,04
	3	0,483	0,396	0,04

Coefficients of retro-reflection after natural weathering for "White"

Colour				White Single test result of each sample			Average of the three samples tested
Sample				1	2	3	
α	β_1	β_2	ε				
0,2°	5°	0°	0°	828	819	842	830
	30°			509	486	502	499
0,33°	5°			388	398	374	387
	30°			306	297	304	302
1,0°	5°			71	79	59	70
	30°			47	46	44	46

Coefficient of retro-reflection after natural weathering started at ε=0° [cd m^{-2} lx^{-1}]

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Coefficients of retro-reflection after natural weathering for "Yellow"

Colour / Sample				Yellow Single test result of each sample			Average of the three samples tested
α	β_1	β_2	ε	1	2	3	
0,2°	5°	0°	0°	677	631	640	649
	30°			421	407	379	402
0,33°	5°			299	288	289	292
	30°			252	239	233	241
1,0°	5°			58	58	51	56
	30°			37	34	36	36

Coefficient of retro-reflection after natural weathering started at ε=0° [cd m^{-2} lx^{-1}]

Coefficients of retro-reflection after natural weathering for "Red"

Colour / Sample				Red Single test result of each sample			Average of the three samples tested
α	β_1	β_2	ε	1	2	3	
0,2°	5°	0°	0°	168	151	162	160
	30°			103	85	92	93
0,33°	5°			81	66	72	73
	30°			68	53	57	59
1,0°	5°			25	21	22	23
	30°			11,5	10,6	11,0	11,0

Coefficient of retro-reflection after natural weathering started at ε=0° [cd m^{-2} lx^{-1}]

Coefficients of retro-reflection after natural weathering for "Blue"

Colour / Sample				Blue Single test result of each sample			Average of the three samples tested
α	β_1	β_2	ε	1	2	3	
0,2°	5°	0°	0°	64	50	53	56
	30°			38	29	31	33
0,33°	5°			37	34	34	35
	30°			21	16,9	15,8	17,9
1,0°	5°			3,8	5,4	5,3	4,8
	30°			2,4	2,5	2,4	2,3

Coefficient of retro-reflection after natural weathering started at ε=0° [cd m^{-2} lx^{-1}]

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Coefficients of retro-reflection after natural weathering for "Green"

Colour / Sample				Green Single test result of each sample			Average of the three samples tested
α	β_1	β_2	ε	1	2	3	
0,2°	5°	0°	0°	150	143	151	148
	30°			89	85	91	88
0,33°	5°			72	68	74	71
	30°			51	46	52	50
1,0°	5°			9,0	9,9	9,7	9,5
	30°			7,4	7,2	7,8	7,5

Coefficient of retro-reflection after natural weathering started at ε=0° [cd m^{-2} lx^{-1}]

Coefficients of retro-reflection after natural weathering for "Brown"

Colour / Sample				Brown Single test result of each sample			Average of the three samples tested
α	β_1	β_2	ε	1	2	3	
0,2°	5°	0°	0°	111	110	111	111
	30°			58	63	59	60
0,33°	5°			47	52	49	49
	30°			35	40	37	37
1,0°	5°			8,8	10,4	9,2	9,5
	30°			5,8	6,5	5,8	6,0

Coefficient of retro-reflection after natural weathering started at ε=0° [cd m^{-2} lx^{-1}]

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Annex 4

Essential specifications concerning manufacturing, packaging, transport and storage according to manufacturer's instruction

Application

The envisaged substrates are aluminium, galvanized steel, polycarbonate or other.

Surfaces to which the material will be applied must be thoroughly cleaned from dust, grease or any contamination, which could affect the adhesion of the material. Freshly lacquered or painted surfaces should be completely cured. The compatibility of selected lacquers and paints should be tested by the user, prior to application of the material.

For the application of the retro-reflective film and its additional components described in Chapter 1 detailed information have been published by the manufacturer. In the following, only the most important aspects of the application are given:

Cutting, die cutting, plotting

The product can be cut by means of a commercial stack cutter. The holding-down clamp should be set to very low pressure and, as an additional measure, the film be protected from compression. It is recommended to limit the stacking height at 40 sheets to 50 sheets.

Commercial cutting plotters with tangential blades, preferably of the flatbed type, should be used as plotter systems.

Adhesive bonding and laminating

The self-adhesive retro-reflective material can only be used for dry application.

Bonding should not be carried out at air and material temperatures of less than 15 °C. The optimum bonding temperature is about 21 °C. The films should be stored for a period of at least 48 hours in the premises designated for their processing.

In order to achieve good adhesion of the films, the substrate must be dry and free of dust, oil, fats, silicon or other contamination. If the substrate needs to be treated with a solvent, the next processing step cannot be carried out until the solvent is completely evaporated. When bonding films to metallic substrates, slight grinding of the surfaces is advantageous.

When several film webs need to be bonded side by side, they should always overlap. Depending on the format, the overlap should be 3 mm to 5 mm. Please make sure that a right side of the film web is always bonded to a left side, thus ensuring the uniform orientation of the film's honeycomb structure.

Packaging, transport and storage

The product should be stored in a cool and dry place (temperature range from 20 °C to 24 °C; relative air humidity of 40 % to 60 %) that is protected from direct sunlight.

Rolled material should be handled and stored in the original carton. The rolls have standard spacers that prevent contact between the roll surface and the carton and thus the formation of pressure marks and surface damage. Please make sure that partly processed rolls, too, are never stored or handled without spacer.

When making the rolls available for processing, it is advisable to use a horizontal suspension system (such as a paternoster system or a rack). Even if the rolls are stored in a vertical, freestanding position, a negative influence on the film's characteristics is generally not expected. Here again, it is crucial to place the roll on the spacer so as to avoid breakage of the edges. In practice it was shown, however, that this type of storage complicates the handling of the films.

Blank or printed film sheets are supplied in cartons that have been designed especially for the sheet dimensions, 50 sheets per carton. If the sheets are stored outside the carton, please make sure to put individual sheets on a flat and stable support so that they do not adjoin or overlap at the edges. Sheets may be stacked. In order to limit the weight load, not more than 40 sheets to 50 sheets should be stacked.

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