

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
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European Technical Assessment

ETA-13/0248
of 2 February 2018

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General Part

Technical Assessment Body issuing the
European Technical Assessment:

Deutsches Institut für Bautechnik

Trade name of the construction product

ORALITE® 6910 Brilliant Grade screen printed with
ORALITE® 5018 Screen Printing Ink

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

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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	Self-adhesive retro-reflective sheeting on the basis of microprisms	White	6910-010	Sheeting thickness (without protective paper and adhesive): 0,23 mm Dimension of the roll: 1,22 m x 50 m, or customized
ORALITE® 5018 Screen Printing Ink	Screen printing ink	Yellow	5018-020	Fast-curing solvent- containing single component system Consumption: approx. 800 ml / 55 m ² , closed surface
		Red	5018-030	
		Orange	5018-035	
		Blue	5018-050	
		Green	5018-060	
		Brown	5018-080	

Tab. 1: Types of reflective sheeting "ORALITE® 6910 Brilliant Grade screen printed with ORALITE® 5018 Screen Printing Ink"

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	
Yellow	x	0,494	0,470	0,513	0,545	≥ 0,16
	y	0,505	0,480	0,437	0,454	
Red	x	0,735	0,700	0,610	0,660	≥ 0,03
	y	0,265	0,250	0,340	0,340	
Orange*	x	0,610	0,535	0,506	0,570	≥ 0,14
	y	0,390	0,375	0,404	0,429	
Blue	x	0,130	0,160	0,160	0,130	≥ 0,01
	y	0,090	0,090	0,140	0,140	
Green	x	0,110	0,170	0,170	0,110	≥ 0,03
	y	0,415	0,415	0,500	0,500	
Brown	x	0,455	0,523	0,479	0,558	0,03 ≤ β ≤ 0,09
	y	0,397	0,429	0,373	0,394	

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

* The daylight chromaticity and luminance factor of "Orange" comply with class CR1 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 screen printed with ORALITE® 5018 Screen Printing Ink" (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.

English translation prepared by DIBt

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 ($\pm 0,05$ mm).

Essential characteristic	Performance
Visibility of "ORALITE® 6910 Brilliant Grade screen printed with ORALITE® 5018 Screen Printing Ink"	
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 screen printed with ORALITE® 5018 Screen Printing Ink"	
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
- Test report No. V4-048/2012 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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English translation prepared by DIBt

Annex 1

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

Colour	Sample	x	y	β
Yellow	1	0,503	0,478	0,33
	2	0,505	0,476	0,33
	3	0,506	0,476	0,33
Red	1	0,661	0,322	0,05
	2	0,660	0,321	0,05
	3	0,661	0,322	0,05
Orange	1	0,578	0,402	0,19
	2	0,576	0,403	0,19
	3	0,579	0,401	0,19
Blue	1	0,137	0,112	0,03
	2	0,137	0,115	0,04
	3	0,137	0,116	0,04
Green	1	0,147	0,441	0,10
	2	0,149	0,441	0,10
	3	0,147	0,442	0,10
Brown	1	0,511	0,410	0,05
	2	0,509	0,411	0,05
	3	0,510	0,411	0,05

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ORALITE® 6910 Brilliant Grade screen printed with ORALITE® 5018 Screen Printing Ink

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

Annex 1

English translation prepared by DIBt

Annex 2

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

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

Colour				Yellow			Average of the three samples tested
Sample				Single test result of each sample			
α	β_1	β_2	ε	1	2	3	
0,1°	5°	0°	0°	1125	1030	1125	1093
	15°			994	880	980	951
	20°			869	772	853	831
	30°			507	487	489	494
	40°			316	300	301	306
0,2°	5°	0°	0°	643	604	634	627
	15°			598	573	586	586
	20°			550	530	539	540
	30°			391	387	383	387
	40°			270	260	260	263
0,33°	5°	0°	0°	281	292	274	282
	15°			284	315	284	294
	20°			280	307	280	289
	30°			222	234	224	227
	40°			186	184	185	185
0,5°	5°	0°	0°	296	284	300	293
	15°			266	241	266	258
	20°			251	223	251	242
	30°			106	112	110	109
	40°			93	97	97	96
1,0°	5°	0°	0°	43	56	38	46
	15°			52	61	47	53
	20°			53	64	50	56
	30°			34	36	34	35
	40°			33	32	30	32
1,5°	5°	0°	0°	13,3	11,8	11,6	12,2
	15°			10,8	11,1	9,5	10,5
	20°			9,0	10,1	8,7	9,3
	30°			8,6	9,9	11,1	9,9
	40°			7,6	7,4	8,4	7,8
2°	5°	0°	0°	4,8	4,7	4,6	4,7
	15°			6,5	6,2	6,4	6,4
	20°			5,9	5,3	5,7	5,6
	30°			2,4	2,6	2,4	2,5
	40°			2,8	2,5	3,4	2,9

Coefficient of retro-reflection started at $\varepsilon=0^\circ$ [$\text{cd m}^{-2} \text{lx}^{-1}$]

ORALITE® 6910 Brilliant Grade screen printed with ORALITE® 5018 Screen Printing Ink

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

Annex 2

English translation prepared by DIBt

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

Colour				Red			Average of the three samples tested
α	β_1	Sample		Single test result of each sample			
		β_2	ϵ	1	2	3	
0,1°	5°			342	320	326	329
				300	272	287	286
				261	236	251	249
				153	140	147	147
				94	85	91	90
0,2°	5°			206	196	199	200
				190	179	184	184
				173	162	167	167
				122	114	117	118
				81	74	79	78
0,33°	5°			90	89	88	89
				92	96	89	92
				90	93	88	90
				73	73	72	73
				58	55	60	58
0,5°	5°	0°	0°	91	86	88	88
				80	77	79	79
				75	72	74	74
				36	37	35	36
				31	31	32	31
1,0°	5°			15,5	19,0	16,7	17,1
				18,1	21	18,7	19,3
				18,4	22	18,5	19,6
				12,5	12,1	11,9	12,2
				10,7	9,1	9,3	9,7
1,5°	5°			5,2	4,3	5,4	5,0
				3,8	3,6	3,4	3,6
				3,5	3,8	3,3	3,5
				4,0	3,8	3,7	3,8
				3,0	3,0	3,1	3,0
2°	5°			2,2	2,1	2,1	2,1
				2,7	2,3	2,4	2,5
				2,1	1,8	1,9	1,9
				0,9	1,1	0,9	1,0
				0,9	1,0	1,0	1,0

Coefficient of retro-reflection started at $\epsilon=0^\circ$ [$\text{cd m}^{-2} \text{lx}^{-1}$]

ORALITE® 6910 Brilliant Grade screen printed with ORALITE® 5018 Screen Printing Ink

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

Annex 2

English translation prepared by DIBt

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

Colour				Orange			Average of the three samples tested
Sample				Single test result of each sample			
α	β_1	β_2	ϵ	1	2	3	
0,1°	5°			634	629	536	600
	15°			559	548	473	527
	20°			487	471	415	458
	30°			286	265	245	265
	40°			176	159	149	161
0,2°	5°			371	359	332	354
	15°			347	330	309	329
	20°			318	300	281	300
	30°			225	209	194	209
	40°			153	139	131	141
0,33°	5°			158	147	153	153
	15°			160	149	150	153
	20°			158	147	145	150
	30°			132	122	116	123
	40°			109	101	96	102
0,5°	5°			156	155	140	150
	15°			136	136	120	131
	20°	0°	0°	128	127	112	122
	30°			60	56	54	57
	40°			57	55	53	55
1,0°	5°			32	31	45	36
	15°			34	34	44	37
	20°			35	35	43	38
	30°			22	21	22	22
	40°			18,1	15,8	15,2	16,4
1,5°	5°			7,4	7,1	8,2	7,6
	15°			7,0	6,8	8,2	7,3
	20°			6,2	6,0	7,4	6,5
	30°			6,5	7,0	7,1	6,9
	40°			5,1	5,4	5,4	5,3
2°	5°			3,6	3,5	3,8	3,6
	15°			4,3	3,8	3,8	4,0
	20°			3,7	3,4	3,5	3,5
	30°			1,4	1,4	1,5	1,4
	40°			1,5	1,7	1,5	1,6

Coefficient of retro-reflection started at $\epsilon=0^\circ$ [$\text{cd m}^{-2} \text{lx}^{-1}$]

ORALITE® 6910 Brilliant Grade screen printed with ORALITE® 5018 Screen Printing Ink

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

Annex 2

English translation prepared by DIBt

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

Colour				Blue			Average of the three samples tested
Sample				Single test result of each sample			
α	β_1	β_2	ε	1	2	3	
0,1°	5°	0°	0°	161	154	170	162
	15°			142	134	148	141
	20°			125	117	129	124
	30°			72	65	77	71
	40°			44	39	45	43
0,2°	5°			80	74	88	81
	15°			76	69	85	77
	20°			71	64	79	71
	30°			52	46	57	52
	40°			36	32	38	35
0,33°	5°			41	38	45	41
	15°			39	36	46	40
	20°			37	35	45	39
	30°			27	24	31	27
	40°			23	21	24	23
0,5°	5°	45	43	44	44		
	15°	37	38	37	37		
	20°	34	35	35	35		
	30°	13,0	12,1	14,8	13,3		
	40°	10,3	9,6	11,2	10,4		
1,0°	5°	5,2	4,5	4,7	4,8		
	15°	5,9	5,6	5,2	5,6		
	20°	6,8	6,3	5,8	6,3		
	30°	3,4	3,3	3,5	3,4		
	40°	3,8	3,5	4,1	3,8		
1,5°	5°	1,5	1,7	1,9	1,7		
	15°	1,3	1,4	1,4	1,4		
	20°	1,3	1,2	1,4	1,3		
	30°	0,9	0,8	1,0	0,9		
	40°	0,7	0,8	0,8	0,8		
2°	5°	1,1	1,2	1,1	1,1		
	15°	0,7	0,6	0,8	0,7		
	20°	0,8	0,8	0,9	0,8		
	30°	0,4	0,4	0,5	0,4		
	40°	0,4	0,5	0,5	0,5		

Coefficient of retro-reflection started at $\varepsilon=0^\circ$ [$\text{cd m}^{-2} \text{lx}^{-1}$]

ORALITE® 6910 Brilliant Grade screen printed with ORALITE® 5018 Screen Printing Ink

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 "Green" (Part 5)

Colour				Green			Average of the three samples tested
Sample				Single test result of each sample			
α	β_1	β_2	ϵ	1	2	3	
0,1°	5°			404	367	399	390
	15°			359	326	349	345
	20°			315	287	304	302
	30°			181	165	170	172
	40°			110	99	100	103
0,2°	5°			220	207	216	214
	15°			208	194	202	201
	20°			192	179	185	185
	30°			135	123	126	128
	40°			92	83	85	87
0,33°	5°			98	96	96	97
	15°			93	90	91	91
	20°			91	86	88	88
	30°			70	64	66	67
	40°			62	56	57	58
0,5°	5°	0°	0°	104	98	104	102
	15°			93	88	93	91
	20°			87	81	87	85
	30°			33	31	31	32
	40°			29	27	28	28
1,0°	5°			16,9	19,2	16,4	17,5
	15°			17,9	19,9	17,7	18,5
	20°			18,5	20	18,4	19,0
	30°			12,0	12,2	11,8	12,0
	40°			11,5	10,9	10,5	11,0
1,5°	5°			4,7	5,1	4,8	4,9
	15°			4,9	5,3	4,5	4,9
	20°			4,4	4,6	4,0	4,3
	30°			3,0	3,0	2,8	2,9
	40°			2,6	2,6	2,9	2,7
2°	5°			2,9	3,0	2,8	2,9
	15°			2,5	2,6	2,3	2,5
	20°			2,8	2,8	2,5	2,7
	30°			1,2	1,2	1,2	1,2
	40°			1,2	1,1	1,3	1,2

Coefficient of retro-reflection started at $\epsilon=0^\circ$ [$\text{cd m}^{-2} \text{lx}^{-1}$]

ORALITE® 6910 Brilliant Grade screen printed with ORALITE® 5018 Screen Printing Ink

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

Annex 2

English translation prepared by DIBt

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

Colour		Sample		Brown			Average of the three samples tested
				Single test result of each sample			
α	β_1	β_2	ε	1	2	3	
0,1°	5°			399	369	359	376
	15°			342	311	312	322
	20°			292	268	270	277
	30°			158	157	152	156
	40°			91	91	91	91
0,2°	5°			227	219	208	218
	15°			206	203	190	200
	20°			185	184	173	181
	30°			124	126	120	123
	40°			79	80	79	79
0,33°	5°			92	98	87	92
	15°			93	103	86	94
	20°			92	101	84	92
	30°			73	78	69	73
	40°			57	58	56	57
0,5°	5°	0°	0°	99	92	90	94
	15°			87	79	79	82
	20°			81	74	73	76
	30°			34	37	32	34
	40°			31	32	30	31
1,0°	5°			17,0	20	19,8	18,9
	15°			18,4	20	19,8	19,4
	20°			19,0	21	20	20
	30°			12,6	13,1	12,9	12,9
	40°			9,0	9,6	9,4	9,3
1,5°	5°			4,9	5,0	4,6	4,8
	15°			4,1	4,8	5,0	4,6
	20°			3,8	4,7	4,6	4,4
	30°			4,1	4,2	4,1	4,1
	40°			3,4	3,2	3,1	3,2
2°	5°			2,4	2,5	2,6	2,5
	15°			2,7	2,8	2,7	2,7
	20°			2,4	2,4	2,4	2,4
	30°			1,0	1,4	1,0	1,1
	40°			1,2	1,1	1,0	1,1

Coefficient of retro-reflection started at $\varepsilon=0^\circ$ [$\text{cd m}^{-2} \text{lx}^{-1}$]

ORALITE® 6910 Brilliant Grade screen printed with ORALITE® 5018 Screen Printing Ink

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

Annex 2

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Rotational symmetry

Colour Sample				Yellow		
α	β_1	β_2	ε	1	2	3
0,33	5	0	-75	287	282	288
			-50	318	278	336
			-25	298	255	306
			0*	281	292	274
			25	237	251	221
			50	204	197	190
			Ratio	1,56	1,48	1,77

* Rotational symmetry started at $\varepsilon=0^\circ$ [$\text{cd m}^{-2} \text{lx}^{-1}$]

Colour Sample				Blue		
α	β_1	β_2	ε	1	2	3
0,33	5	0	-75	39	41	41
			-50	42	42	40
			-25	37	37	37
			0*	41	38	45
			25	41	37	41
			50	34	34	34
			Ratio	1,24	1,24	1,32

* Rotational symmetry started at $\varepsilon=0^\circ$ [$\text{cd m}^{-2} \text{lx}^{-1}$]

Colour Sample				Red		
α	β_1	β_2	ε	1	2	3
0,33	5	0	-75	95	90	92
			-50	106	97	102
			-25	97	90	96
			0*	90	89	88
			25	70	69	69
			50	56	53	62
			Ratio	1,89	1,83	1,65

* Rotational symmetry started at $\varepsilon=0^\circ$ [$\text{cd m}^{-2} \text{lx}^{-1}$]

Colour Sample				Green		
α	β_1	β_2	ε	1	2	3
0,33	5	0	-75	96	89	100
			-50	103	92	103
			-25	93	88	93
			0*	98	96	96
			25	95	96	96
			50	82	85	89
			Ratio	1,26	1,13	1,16

* Rotational symmetry started at $\varepsilon=0^\circ$ [$\text{cd m}^{-2} \text{lx}^{-1}$]

Colour Sample				Orange		
α	β_1	β_2	ε	1	2	3
0,33	5	0	-75	163	174	141
			-50	179	192	149
			-25	162	164	148
			0*	158	147	153
			25	134	130	141
			50	111	119	127
			Ratio	1,61	1,61	1,20

* Rotational symmetry started at $\varepsilon=0^\circ$ [$\text{cd m}^{-2} \text{lx}^{-1}$]

Colour Sample				Brown		
α	β_1	β_2	ε	1	2	3
0,33	5	0	-75	103	96	97
			-50	117	98	104
			-25	104	92	91
			0*	92	98	87
			25	77	82	78
			50	69	64	67
			Ratio	1,70	1,53	1,55

* Rotational symmetry started at $\varepsilon=0^\circ$ [$\text{cd m}^{-2} \text{lx}^{-1}$]

ORALITE® 6910 Brilliant Grade screen printed with ORALITE® 5018 Screen Printing Ink

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

Annex 2

English translation prepared by DIBt

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
Yellow	1	0,497	0,480	0,34
	2	0,498	0,480	0,35
	3	0,497	0,480	0,34
Red	1	0,641	0,320	0,05
	2	0,643	0,320	0,05
	3	0,642	0,320	0,05
Orange	1	0,557	0,410	0,20
	2	0,555	0,410	0,20
	3	0,556	0,410	0,20
Blue	1	0,139	0,125	0,04
	2	0,139	0,126	0,04
	3	0,139	0,126	0,04
Green	1	0,153	0,451	0,11
	2	0,153	0,450	0,11
	3	0,153	0,450	0,11
Brown	1	0,492	0,404	0,05
	2	0,491	0,403	0,05
	3	0,488	0,403	0,06

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°	604	561	586	584	
				344	340	349	344	
0,33°	5°	0°	0°	275	271	268	271	
	30°			207	199	212	206	
1,0°	5°	0°	0°	44	72	46	54	
	30°			33	35	34	34	

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

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Visibility after natural weathering according to clause 2.2.6 of the EAD

Annex 3

English translation prepared by DIBt

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

Colour				Red			Average of the three samples tested
Sample				Single test result of each sample			
α	β_1	β_2	ε	1	2	3	
0,2°	5°	0°	0°	169	176	157	167
	30°			102	98	95	98
0,33°	5°	0°	0°	74	79	71	75
	30°			65	62	59	62
1,0°	5°	0°	0°	14,0	15,2	19,2	16,1
	30°			10,5	10,8	10,5	10,6

Coefficient of retro-reflection after natural weathering started at $\varepsilon=0^\circ$ [$\text{cd m}^{-2} \text{lx}^{-1}$]

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

Colour				Orange			Average of the three samples tested
Sample				Single test result of each sample			
α	β_1	β_2	ε	1	2	3	
0,2°	5°	0°	0°	399	432	396	409
	30°			236	260	255	250
0,33°	5°	0°	0°	177	194	176	182
	30°			147	165	166	159
1,0°	5°	0°	0°	31	36	37	35
	30°			23	24	18,3	22

Coefficient of retro-reflection after natural weathering started at $\varepsilon=0^\circ$ [$\text{cd m}^{-2} \text{lx}^{-1}$]

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

Colour				Blue			Average of the three samples tested
Sample				Single test result of each sample			
α	β_1	β_2	ε	1	2	3	
0,2°	5°	0°	0°	68	61	67	65
	30°			44	39	40	41
0,33°	5°	0°	0°	34	34	36	35
	30°			23	21	22	22
1,0°	5°	0°	0°	4,4	4,3	4,4	4,4
	30°			2,9	2,9	2,9	2,9

Coefficient of retro-reflection after natural weathering started at $\varepsilon=0^\circ$ [$\text{cd m}^{-2} \text{lx}^{-1}$]

ORALITE® 6910 Brilliant Grade screen printed with ORALITE® 5018 Screen Printing Ink

Visibility after natural weathering according to clause 2.2.6 of the EAD

Annex 3

English translation prepared by DIBt

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

Colour				Green			Average of the three samples tested
Sample				Single test result of each sample			
α	β_1	β_2	ϵ	1	2	3	
0,2°	5°			167	189	169	175
	30°			104	115	102	107
0,33°	5°	0°	0°	88	92	81	87
	30°			59	66	55	60
1,0°	5°			15,5	13,6	14,1	14,4
	30°			9,4	10,1	9,2	9,6

Coefficient of retro-reflection after natural weathering started at $\epsilon=0^\circ$ [$\text{cd m}^{-2} \text{lx}^{-1}$]

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

Colour				Brown			Average of the three samples tested
Sample				Single test result of each sample			
α	β_1	β_2	ϵ	1	2	3	
0,2°	5°			215	189	182	195
	30°			128	103	107	113
0,33°	5°	0°	0°	92	90	84	89
	30°			80	66	63	70
1,0°	5°			16,0	23	22	20
	30°			11,3	11,5	12,2	11,7

Coefficient of retro-reflection after natural weathering started at $\epsilon=0^\circ$ [$\text{cd m}^{-2} \text{lx}^{-1}$]

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ORALITE® 6910 Brilliant Grade screen printed with ORALITE® 5018 Screen Printing Ink

Visibility after natural weathering according to clause 2.2.6 of the EAD

Annex 3

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.

ORALITE® 6910 Brilliant Grade screen printed with ORALITE® 5018 Screen Printing Ink

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

Annex 4