

Approval body for construction products  
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and  
Laender Governments



## European Technical Assessment

**ETA-13/0251**  
**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 and  
laminated with ORALITE® 5090 Anti-Dew Film

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 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
ORALITE® 5090 Anti-Dew Film	Transparent protective laminate	Transparent	5090-000	Sheeting thickness: 0,06 mm Roll measurements: 1,22 m x 50 m, or customized dimensions

Tab. 1: Types of reflective sheeting "ORALITE® 6910 Brilliant Grade originally dyed and laminated with ORALITE® 5090 Anti-Dew Film"

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	0,305	0,335	0,325	0,295	≥ 0,27
	y	0,315	0,345	0,355	0,325	
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	
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

## 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 and laminated with ORALITE® 5090 Anti-Dew Film" (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
<b>Visibility of "ORALITE® 6910 Brilliant Grade originally dyed and laminated with ORALITE® 5090 Anti-Dew Film"</b>	
Daylight chromaticity and luminance factors	See Annex 1
Night-time colour	No performance assessed
Coefficient of retro-reflection and rotational symmetry	See Annex 2
<b>Durability of "ORALITE® 6910 Brilliant Grade originally dyed and laminated with ORALITE® 5090 Anti-Dew Film"</b>	
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. V4-048/2012 of 15 July 2016 by Federal Highway Research Institute (Bundesanstalt für Straßenwesen - BASt) on the testing of microprismatic reflective sheetings
- Test report No. V4-049/2012 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:*  
Petrik

## Annex 1

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

Colour	Sample	x	y	$\beta$
White	1	0,315	0,333	0,42
	2	0,315	0,333	0,42
	3	0,315	0,333	0,42
Yellow	1	0,532	0,462	0,26
	2	0,532	0,462	0,26
	3	0,532	0,462	0,26
Red	1	0,676	0,303	0,03
	2	0,678	0,303	0,03
	3	0,675	0,304	0,03
Blue	1	0,154	0,110	0,03
	2	0,153	0,111	0,03
	3	0,153	0,109	0,03
Green	1	0,139	0,440	0,06
	2	0,139	0,441	0,06
	3	0,139	0,441	0,06
Brown	1	0,493	0,399	0,04
	2	0,494	0,399	0,04
	3	0,493	0,397	0,04

ORALITE® 6910 Brilliant Grade originally dyed and laminated with ORALITE® 5090 Anti-Dew Film

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

Annex 1

**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		Sample		White			Average of the three samples tested
				Single test result of each sample			
$\alpha$	$\beta_1$	$\beta_2$	$\varepsilon$	1	2	3	
0,1°	5°	0°	0°	1431	1569	1634	1545
	15°			1236	1345	1435	1339
	20°			1073	1166	1254	1164
	30°			647	693	724	688
	40°			390	422	453	422
0,2°	5°			844	883	917	881
	15°			804	835	853	831
	20°			740	772	785	766
	30°			516	550	561	542
	40°			341	366	389	365
0,33°	5°			388	385	375	383
	15°			421	424	383	409
	20°			415	424	384	408
	30°			314	331	319	321
	40°			248	261	271	260
0,5°	5°	355	394	388	379		
	15°	318	345	348	337		
	20°	303	326	331	320		
	30°	149	160	146	152		
	40°	137	141	139	139		
1,0°	5°	78	56	62	65		
	15°	81	67	69	72		
	20°	84	73	72	76		
	30°	51	51	49	50		
	40°	37	41	41	40		
1,5°	5°	20	16,5	17,0	17,8		
	15°	23	14,9	16,7	18,2		
	20°	21	15,0	15,4	17,1		
	30°	15,8	16,5	14,1	15,5		
	40°	13,2	12,8	12,1	12,7		
2°	5°	8,2	7,0	7,9	7,7		
	15°	10,1	9,4	10,0	9,8		
	20°	9,2	8,6	11,6	9,8		
	30°	4,8	4,7	3,5	4,3		
	40°	4,2	5,5	4,2	4,6		

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

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ORALITE® 6910 Brilliant Grade originally dyed and laminated with ORALITE® 5090 Anti-Dew Film

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

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 2)

Colour				Yellow			Average of the three samples tested
Sample				Single test result of each sample			
$\alpha$	$\beta_1$	$\beta_2$	$\varepsilon$	1	2	3	
0,1°	5°	0°	0°	1421	1168	1460	1350
	15°			1236	1012	1272	1173
	20°			1082	890	1111	1028
	30°			643	555	656	618
	40°			393	339	402	378
0,2°	5°			801	720	844	788
	15°			742	672	774	729
	20°			684	620	711	672
	30°			493	443	509	482
	40°			334	295	343	324
0,33°	5°			340	348	356	348
	15°			358	364	373	365
	20°			356	356	371	361
	30°			279	272	292	281
	40°			226	215	232	224
0,5°	5°			364	308	361	344
	15°			329	277	333	313
	20°			313	264	320	299
	30°			132	132	139	134
	40°			110	117	115	114
1,0°	5°	37	81	44	54		
	15°	50	81	54	62		
	20°	55	81	56	64		
	30°	39	44	40	41		
	40°	40	34	40	38		
1,5°	5°	13,5	15,4	14,1	14,3		
	15°	12,7	19,2	14,0	15,3		
	20°	11,9	17,7	13,4	14,3		
	30°	12,3	12,9	12,6	12,6		
	40°	7,8	10,3	8,0	8,7		
2°	5°	5,5	7,1	5,9	6,2		
	15°	9,3	8,6	9,1	9,0		
	20°	8,5	7,5	8,0	8,0		
	30°	2,6	4,0	2,7	3,1		
	40°	2,2	2,9	2,3	2,5		

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

ORALITE® 6910 Brilliant Grade originally dyed and laminated with ORALITE® 5090 Anti-Dew Film

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

Annex 2



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

Colour				Red			Average of the three samples tested
$\alpha$	$\beta_1$	Sample		Single test result of each sample			
		$\beta_2$	$\varepsilon$	1	2	3	
0,1°	5°			320	310	264	298
				277	266	227	257
				240	230	199	223
				138	135	129	134
				85	82	79	82
0,2°	5°			193	191	170	185
				176	174	160	170
				160	157	148	155
				111	109	106	109
				74	72	70	72
0,33°	5°			78	78	79	78
				81	80	87	83
				80	79	86	82
				68	67	69	68
				54	52	53	53
0,5°	5°	0°	0°	73	70	64	69
				67	64	57	63
				64	62	55	60
				32	31	34	32
				30	29	31	30
1,0°	5°			16,4	14,9	25	18,8
				16,5	15,1	26	19,2
				17,1	15,8	27	20
				12,3	12,3	13,2	12,6
				8,9	8,7	8,1	8,6
1,5°	5°			5,0	5,4	4,4	4,9
				4,2	4,0	4,2	4,1
				4,0	4,1	4,0	4,0
				3,9	3,9	3,7	3,8
				3,2	3,4	3,6	3,4
2°	5°			2,1	2,4	2,1	2,2
				2,5	3,1	2,2	2,6
				2,1	2,6	1,9	2,2
				0,9	1,1	1,1	1,0
				0,9	1,0	1,0	1,0

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

ORALITE® 6910 Brilliant Grade originally dyed and laminated with ORALITE® 5090 Anti-Dew Film

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

Annex 2

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

Colour				Blue			Average of the three samples tested
Sample				Single test result of each sample			
$\alpha$	$\beta_1$	$\beta_2$	$\varepsilon$	1	2	3	
0,1°	5°			113	123	127	121
	15°			96	105	108	103
	20°			83	90	92	88
	30°			48	52	51	50
	40°			28	30	29	29
0,2°	5°			66	69	67	67
	15°			60	64	62	62
	20°			55	57	56	56
	30°			37	39	39	38
	40°			23	25	25	24
0,33°	5°			42	41	37	40
	15°			40	40	37	39
	20°			36	36	34	35
	30°			21	22	22	22
	40°			15,8	16,6	16,3	16,2
0,5°	5°			39	39	37	38
	15°			33	32	30	32
	20°	0°	0°	29	29	28	29
	30°			10,8	10,8	10,5	10,7
	40°			7,8	7,6	7,8	7,7
1,0°	5°			6,0	4,8	4,3	5,0
	15°			5,4	4,6	4,5	4,8
	20°			5,4	4,9	4,8	5,0
	30°			3,0	2,7	2,7	2,8
	40°			2,7	2,8	2,6	2,7
1,5°	5°			1,7	1,7	1,6	1,7
	15°			1,8	1,4	1,4	1,5
	20°			2,0	1,5	1,4	1,6
	30°			1,2	1,0	1,1	1,1
	40°			0,6	0,6	0,6	0,6
2°	5°			1,1	1,0	1,0	1,0
	15°			0,8	0,7	0,7	0,7
	20°			0,8	0,8	0,8	0,8
	30°			0,4	0,4	0,4	0,4
	40°			0,4	0,4	0,4	0,4

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

ORALITE® 6910 Brilliant Grade originally dyed and laminated with ORALITE® 5090 Anti-Dew Film

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

Annex 2

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

Colour				Green			Average of the three samples tested
Sample				Single test result of each sample			
$\alpha$	$\beta_1$	$\beta_2$	$\epsilon$	1	2	3	
0,1°	5°			328	340	306	325
	15°			284	290	259	278
	20°			247	248	222	239
	30°			137	133	124	131
	40°			79	77	73	76
0,2°	5°			174	172	172	173
	15°			162	159	157	159
	20°			148	145	142	145
	30°			101	100	96	99
	40°			66	65	62	64
0,33°	5°			76	74	82	77
	15°			73	74	83	77
	20°			71	74	79	75
	30°			53	54	55	54
	40°			43	44	43	43
0,5°	5°			80	85	79	81
	15°			69	72	69	70
	20°	0°	0°	64	67	64	65
	30°			24	25	26	25
	40°			19,4	21	21	21
1,0°	5°			10,1	9,0	12,9	10,7
	15°			11,4	11,0	13,6	12,0
	20°			12,4	12,3	13,6	12,8
	30°			8,8	8,7	8,5	8,7
	40°			8,1	7,6	7,4	7,7
1,5°	5°			3,5	3,4	4,1	3,7
	15°			2,7	2,6	4,2	3,2
	20°			2,4	2,4	4,2	3,0
	30°			2,4	2,5	3,1	2,7
	40°			2,3	2,3	2,0	2,2
2°	5°			1,8	1,6	2,2	1,9
	15°			1,4	1,4	2,1	1,6
	20°			1,6	1,6	2,0	1,7
	30°			0,7	0,7	1,0	0,8
	40°			1,1	1,2	0,9	1,1

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

ORALITE® 6910 Brilliant Grade originally dyed and laminated with ORALITE® 5090 Anti-Dew Film

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

Annex 2

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

Colour				Brown			Average of the three samples tested
$\alpha$	$\beta_1$	Sample		Single test result of each sample			
		$\beta_2$	$\varepsilon$	1	2	3	
0,1°	5°			170	175	192	179
				146	146	159	150
				124	123	136	128
				67	64	77	69
				38	37	46	40
0,2°	5°			102	106	114	107
				92	93	102	96
				82	81	91	85
				53	50	62	55
				34	32	40	35
0,33°	5°			44	45	49	46
				43	43	52	46
				41	40	50	44
				32	30	39	34
				25	23	29	26
0,5°	5°	0°	0°	43	42	47	44
				36	36	41	38
				33	33	38	35
				14,6	13,6	18,5	15,6
				13,4	12,2	15,8	13,8
1,0°	5°			9,5	10,2	8,1	9,3
				9,1	9,7	9,6	9,5
				9,3	9,7	10,1	9,7
				5,7	6,0	6,3	6,0
				3,8	3,9	4,4	4,0
1,5°	5°			2,3	2,6	2,3	2,4
				1,4	1,6	1,7	1,6
				1,4	1,4	1,8	1,5
				1,9	1,8	2,0	1,9
				1,7	1,9	1,5	1,7
2°	5°			1,3	1,3	1,2	1,3
				1,1	1,1	1,2	1,1
				0,8	0,9	0,9	0,9
				0,4	0,5	0,6	0,5
				0,6	0,7	0,5	0,6

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

ORALITE® 6910 Brilliant Grade originally dyed and laminated with ORALITE® 5090 Anti-Dew Film

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

Annex 2

Rotational symmetry

Colour Sample					White		
$\alpha$	$\beta_1$	$\beta_2$	$\varepsilon$		1	2	3
0,33	5	0	-75		363	404	383
			-50		351	420	448
			-25		342	380	407
			0*		388	385	375
			25		347	318	322
			50		292	270	274
			<b>Ratio</b>				<b>1,33</b>

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

Colour Sample					Blue		
$\alpha$	$\beta_1$	$\beta_2$	$\varepsilon$		1	2	3
0,33	5	0	-75		29	32	30
			-50		27	31	32
			-25		29	31	30
			0*		42	41	37
			25		35	34	32
			50		22	24	25
			<b>Ratio</b>				<b>1,91</b>

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

Colour Sample					Yellow		
$\alpha$	$\beta_1$	$\beta_2$	$\varepsilon$		1	2	3
0,33	5	0	-75		351	286	332
			-50		389	296	389
			-25		355	303	379
			0*		340	348	356
			25		268	298	267
			50		217	224	215
			<b>Ratio</b>				<b>1,79</b>

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

Colour Sample					Green		
$\alpha$	$\beta_1$	$\beta_2$	$\varepsilon$		1	2	3
0,33	5	0	-75		76	81	69
			-50		83	91	73
			-25		75	77	68
			0*		76	74	82
			25		70	67	72
			50		63	61	55
			<b>Ratio</b>				<b>1,32</b>

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

Colour Sample					Red		
$\alpha$	$\beta_1$	$\beta_2$	$\varepsilon$		1	2	3
0,33	5	0	-75		83	79	80
			-50		95	88	77
			-25		86	83	74
			0*		78	78	79
			25		62	59	71
			50		51	47	61
			<b>Ratio</b>				<b>1,86</b>

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

Colour Sample					Brown		
$\alpha$	$\beta_1$	$\beta_2$	$\varepsilon$		1	2	3
0,33	5	0	-75		43	43	51
			-50		52	51	58
			-25		48	49	52
			0*		44	45	49
			25		37	39	36
			50		30	33	27
			<b>Ratio</b>				<b>1,73</b>

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

ORALITE® 6910 Brilliant Grade originally dyed and laminated with ORALITE® 5090 Anti-Dew Film

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

Annex 2

**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	0,312	0,329	0,44
	2	0,311	0,329	0,44
	3	0,312	0,330	0,43
Yellow	1	0,534	0,461	0,26
	2	0,534	0,461	0,27
	3	0,534	0,461	0,27
Red	1	0,677	0,302	0,03
	2	0,679	0,301	0,03
	3	0,678	0,301	0,03
Blue	1	0,147	0,111	0,03
	2	0,147	0,113	0,03
	3	0,146	0,111	0,03
Green	1	0,137	0,439	0,06
	2	0,137	0,442	0,06
	3	0,139	0,438	0,06
Brown	1	0,499	0,406	0,04
	2	0,500	0,404	0,04
	3	0,500	0,405	0,04

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

Colour				White			Average of the three samples tested
α	Sample			Single test result of each sample			
	β <sub>1</sub>	β <sub>2</sub>	ε	1	2	3	
0,2°	5°	0°	0°	897	820	908	875
	30°			595	500	570	555
0,33°	5°	0°	0°	404	364	385	384
	30°			368	291	331	330
1,0°	5°	0°	0°	63	81	63	69
	30°			50	48	47	48

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

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

Colour				Yellow			Average of the three samples tested
Sample				Single test result of each sample			
$\alpha$	$\beta_1$	$\beta_2$	$\varepsilon$	1	2	3	
0,2°	5°			749	740	738	742
	30°			480	484	484	483
0,33°	5°	0°	0°	326	319	320	322
	30°			287	282	286	285
1,0°	5°			62	60	50	57
	30°			40	40	36	39

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 "Red"

Colour				Red			Average of the three samples tested
Sample				Single test result of each sample			
$\alpha$	$\beta_1$	$\beta_2$	$\varepsilon$	1	2	3	
0,2°	5°			196	188	183	189
	30°			119	113	107	113
0,33°	5°	0°	0°	89	81	77	82
	30°			78	73	67	73
1,0°	5°			24	23	19,8	22
	30°			12,7	10,7	11,2	11,5

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			
$\alpha$	$\beta_1$	$\beta_2$	$\epsilon$	1	2	3	
0,2°	5°	0°	0°	71	67	63	67
	30°			43	42	41	42
0,33°	5°			40	42	35	39
	30°			24	23	22	23
1,0°	5°			4,4	3,8	3,0	3,7
	30°			2,8	2,8	2,5	2,7

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 "Green"

Colour				Green			Average of the three samples tested
Sample				Single test result of each sample			
$\alpha$	$\beta_1$	$\beta_2$	$\epsilon$	1	2	3	
0,2°	5°	0°	0°	171	152	162	162
	30°			99	88	107	98
0,33°	5°			83	69	84	79
	30°			57	50	69	59
1,0°	5°			10,6	10,1	9,8	10,2
	30°			8,4	7,8	7,2	7,8

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			
$\alpha$	$\beta_1$	$\beta_2$	$\epsilon$	1	2	3	
0,2°	5°	0°	0°	119	132	142	131
	30°			68	73	73	71
0,33°	5°			52	56	60	56
	30°			41	45	41	42
1,0°	5°			11,0	7,6	7,7	8,8
	30°			6,4	7,1	9,0	7,5

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

ORALITE® 6910 Brilliant Grade originally dyed and laminated with ORALITE® 5090 Anti-Dew Film

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 originally dyed and laminated with ORALITE® 5090 Anti-Dew Film

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

Annex 4

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