

Approval body for construction products  
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and  
Laender Governments



## European Technical Assessment

ETA-15/0106  
of 1 February 2016

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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 laminated with  
ORALITE® 5061 Transparent Film and with ORALITE®  
5095 Anti Graffiti 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

11 pages including 3 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

European Assessment Document (EAD)  
120001-00-0106

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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® 5061 Transparent Film	Colour laminate	Yellow	5061-020	Sheeting thickness: 0,075 mm Dimension of the roll: 1,22 m x 50 m or customized
		Red	5061-030	
		Blue	5061-050	
		Green	5061-060	
		Brown	5061-080	
ORALITE® 5095 Anti Graffiti Film	Transparent protective laminate	Transparent	5095-000	Sheeting thickness: 0,025 mm Dimension of the roll: 1,22 m x 50 m or customized

Tab. 1: Types of reflective sheeting "ORALITE® 6910 Brilliant Grade laminated with ORALITE® 5061 Transparent Film and with ORALITE® 5095 Anti-Graffiti 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	
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	
Green	x	0,110	0,170	0,170	0,110	≥ 0,03
	y	0,415	0,415	0,500	0,500	
Blue	x	0,130	0,160	0,160	0,130	≥ 0,01
	y	0,090	0,090	0,140	0,140	
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 laminated with ORALITE® 5061 Transparent Film and with ORALITE® 5095 Anti Graffiti Film.

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 ( $\pm 0,05$  mm).

Essential characteristic	Performance
<b>Visibility of ORALITE® 6910 Brilliant Grade laminated with ORALITE® 5061 Transparent Film and with ORALITE® 5095 Anti Graffiti 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 laminated with ORALITE® 5061 Transparent Film and with ORALITE® 5095 Anti Graffiti Film</b>	
Impact resistance	Passed according to EN 12899-1
Temperature resistance	No performance assessed
Visibility after artificial weathering	See Annex 3
Visibility after natural weathering	No performance assessed
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 120001-00-0106, the applicable European legal act is: Decision 96/579/EC.

The system(s) 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:

- Interims test report No. V4-049/2012 of 12 September 2013 by Federal Highway Research Institute (BAST) on the testing of microprismatic reflective sheetings

Issued in Berlin on 1 February 2016 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	$\beta$
Yellow	1	0,531	0,461	0,30
	2	0,531	0,461	0,30
	3	0,530	0,462	0,30
Red	1	0,663	0,309	0,04
	2	0,663	0,309	0,04
	3	0,664	0,309	0,04
Blue	1	0,152	0,105	0,03
	2	0,152	0,104	0,03
	3	0,152	0,104	0,03
Green	1	0,135	0,416	0,07
	2	0,135	0,416	0,07
	3	0,135	0,415	0,07
Brown	1	0,489	0,395	0,05
	2	0,490	0,396	0,05
	3	0,488	0,395	0,05

ORALITE® 6910 Brilliant Grade laminated with ORALITE® 5061 Transparent Film and with ORALITE® 5095 Anti Graffiti 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 (Part 1)

Colour Sample		Yellow			Red			Blue		
$\alpha$	$\beta_1$ $\beta_2$ $\epsilon$	1	2	3	1	2	3	1	2	3
0,1	5	1148	1157	1123	366	348	343	121	114	125
	15	1012	987	1000	317	299	296	104	96	103
	20	885	856	878	273	259	254	89	81	87
	30	518	521	516	156	151	140	48	44	47
	40	322	316	322	94	91	84	27	24	25
0,2	5	668	699	665	224	220	207	68	62	66
	15	622	654	620	204	201	187	62	57	62
	20	573	598	570	184	181	168	56	51	56
	30	406	420	402	127	123	113	36	33	36
	40	280	278	278	84	80	75	23	21	21
0,33	5	299	335	309	93	96	85	34	33	33
	15	294	351	298	96	98	86	31	32	33
	20	288	340	288	95	96	85	29	30	32
	30	236	260	230	79	77	70	19,1	18,4	19,8
	40	201	204	196	62	59	56	15,1	13,8	14,6
0,5	5	299	301	298	86	81	83	34	32	32
	15	253	259	258	78	74	74	30	27	27
	20	233	242	239	75	72	70	28	25	25
	30	107	126	108	38	38	34	9,3	9,1	9,3
	40	106	115	104	35	34	32	7,3	6,8	7,4
1,0	5	73	73	80	19,0	22	18,1	5,0	4,7	3,8
	15	76	74	81	19,4	22	19,1	5,0	4,7	4,0
	20	78	77	82	19,7	21	19,5	5,0	4,8	4,3
	30	41	41	43	13,0	13,2	11,9	2,9	2,7	2,7
	40	32	32	35	9,3	8,9	8,2	2,7	2,5	2,4
1,5	5	12,2	13,9	14,1	5,3	5,8	5,0	1,8	1,8	1,7
	15	14,0	15,5	16,8	3,9	4,1	3,5	1,4	1,5	1,3
	20	12,5	14,9	14,7	3,8	4,1	3,4	1,2	1,5	1,2
	30	12,8	13,8	12,8	4,1	3,9	3,9	0,8	1,0	0,9
	40	9,6	9,4	9,8	3,9	4,1	3,5	0,8	0,7	0,7
2,0	5	6,2	5,8	6,6	2,1	2,2	2,0	1,2	1,1	1,0
	15	6,7	7,4	7,0	2,5	2,5	2,3	0,7	0,8	0,7
	20	6,3	6,7	6,7	2,1	2,2	1,9	0,7	0,9	0,8
	30	2,7	3,9	2,9	1,0	1,1	0,8	0,3	0,4	0,4
	40	3,1	3,0	2,8	1,1	1,2	1,0	0,4	0,4	0,5

ORALITE® 6910 Brilliant Grade laminated with ORALITE® 5061 Transparent Film and with ORALITE® 5095 Anti Graffiti Film

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

Annex 2

Coefficient of retro-reflection (Part 2)

$\alpha$	Colour Sample			Green			Brown		
	$\beta_1$	$\beta_2$	$\varepsilon$	1	2	3	1	2	3
0,1	5			296	229	250	140	144	146
	15			261	206	209	117	123	123
	20			228	184	179	100	105	105
	30			131	113	102	57	60	60
	40			76	69	59	33	34	34
0,2	5			163	142	147	84	89	89
	15			154	134	135	77	81	81
	20			141	124	121	70	73	73
	30			97	87	79	47	49	49
	40			63	59	50	29	30	30
0,33	5			75	74	78	38	41	41
	15			72	66	77	42	44	44
	20			68	61	71	41	43	42
	30			51	48	46	30	31	31
	40			42	41	35	22	23	23
0,5	5			76	66	69	37	38	38
	15			66	57	60	32	34	33
	20	0	0	61	53	55	30	32	31
	30			24	21	23	15,2	15,8	15,3
	40			19,4	21	17,9	12,9	13,4	13,1
1,0	5			11,4	17,3	15,2	8,0	9,1	8,7
	15			11,7	17,1	14,7	8,4	9,2	8,8
	20			12,0	17,2	15,3	8,6	9,2	9,0
	30			7,0	8,1	8,3	4,9	5,2	5,2
	40			7,6	6,4	6,5	3,5	3,6	3,6
1,5	5			2,9	3,8	3,8	2,1	2,3	2,2
	15			2,8	4,1	4,4	1,7	2,1	1,8
	20			2,6	3,6	4,3	1,6	2,0	1,7
	30			1,9	2,4	2,4	1,6	1,7	1,6
	40			1,5	1,7	1,6	1,4	1,4	1,4
2,0	5			1,9	2,1	2,0	1,1	1,2	1,2
	15			1,5	1,7	1,9	1,0	1,1	1,1
	20			1,7	1,8	1,7	0,8	0,9	0,8
	30			0,6	0,7	0,9	0,5	0,5	0,5
	40			0,7	0,7	0,7	0,5	0,5	0,5

ORALITE® 6910 Brilliant Grade laminated with ORALITE® 5061 Transparent Film and with ORALITE® 5095 Anti Graffiti Film

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

Annex 2



Rotational symmetry

Colour Sample				Yellow			Red			Blue		
				1	2	3	1	2	3	1	2	3
$\alpha$	$\beta_1$	$\beta_2$	$\varepsilon$									
0,33	5	0	-75	301	304	294	98	91	103	27	27	31
			-50	364	322	349	119	107	121	31	30	32
			-25	322	313	318	111	106	104	32	28	29
			0	299	335	309	93	96	85	34	33	33
			25	301	311	312	77	82	74	34	31	33
			50	269	247	272	66	72	73	27	24	29
<b>Ratio</b>				<b>1,35</b>	<b>1,36</b>	<b>1,28</b>	<b>1,80</b>	<b>1,49</b>	<b>1,66</b>	<b>1,26</b>	<b>1,38</b>	<b>1,14</b>

Colour Sample				Green			Brown			
				1	2	3	1	2	3	
$\alpha$	$\beta_1$	$\beta_2$	$\varepsilon$							
0,33	5	0	-75	69	54	61	44	44	44	
			-50	73	58	61	47	47	47	
			-25	72	62	62	41	42	42	
			0	75	74	78	38	41	41	
			25	75	79	81	33	38	38	
			50	63	70	65	30	35	34	
<b>Ratio</b>				<b>1,19</b>	<b>1,46</b>	<b>1,33</b>	<b>1,57</b>	<b>1,34</b>	<b>1,38</b>	

ORALITE® 6910 Brilliant Grade laminated with ORALITE® 5061 Transparent Film and with ORALITE® 5095 Anti Graffiti Film

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

Annex 2

**Annex 3**

Visibility after accelerated artificial weathering according to clause 2.2.6 of the EAD

Daylight chromaticity and luminance factors after accelerated artificial weathering

Colour	Sample	x	y	$\beta$
Yellow	1	0,525	0,461	0,35
	2	0,525	0,481	0,35
	3	0,525	0,461	0,35
Red	1	0,650	0,310	0,04
	2	0,647	0,310	0,04
	3	0,650	0,309	0,04
Blue	1	0,148	0,130	0,05
	2	0,148	0,132	0,05
	3	0,148	0,129	0,05
Green	1	0,138	0,427	0,08
	2	0,139	0,427	0,08
	3	0,141	0,427	0,08
Brown	1	0,497	0,396	0,05
	2	0,503	0,397	0,05
	3	0,496	0,398	0,05

ORALITE® 6910 Brilliant Grade laminated with ORALITE® 5061 Transparent Film and with ORALITE® 5095 Anti Graffiti Film

Visibility after accelerated artificial weathering according to clause 2.2.6 of the EAD

Annex 3

Coefficients of retro-reflection after accelerated artificial weathering (Part 1)

		Colour Sample				Yellow			Red			Blue		
$\alpha$	$\beta_1$	$\beta_2$	$\varepsilon$		1	2	3	1	2	3	1	2	3	
0,2	5	0	0		371	382	349	130	93	112	49	45	33	
	30				243	241	233	78	56	69	32	29	23	
0,33	5				196	195	186	58	43	50	32	30	28	
	30				143	136	138	47	34	41	17,7	15,1	12,7	
1,0	5				42	42	46	15	13,2	12,7	4,7	4,6	4,7	
	30				23	22	21	8,7	5,9	7,1	2,5	2,5	1,9	

Coefficients of retro-reflection after accelerated artificial weathering (Part 2)

		Colour Sample				Green			Brown		
$\alpha$	$\beta_1$	$\beta_2$	$\varepsilon$		1	2	3	1	2	3	
0,2	5	0	0		92	97	87	67	42	70	
	30				55	59	55	39	27	38	
0,33	5				51	52	51	32	21	34	
	30				29	31	29	23	16,2	23	
1,0	5				9,9	12,3	9,5	7,9	6,1	8,7	
	30				4,1	4,2	3,7	4,2	2,8	4,2	

ORALITE® 6910 Brilliant Grade laminated with ORALITE® 5061 Transparent Film and with ORALITE® 5095 Anti Graffiti Film

Visibility after accelerated artificial weathering according to clause 2.2.6 of the EAD

Annex 3