

Approval body for construction products  
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and  
Laender Governments



## European Technical Assessment

**ETA-15/0107**  
**of 1 February 2016**

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 digitally printed with  
ORALITE® 5019 UV Digital Printing Ink and with  
ORALITE® 5061 Transparent 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

The European Technical Assessment is issued by the Technical Assessment Body in its official language. Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and shall be identified as such.

Communication of this European Technical Assessment, including transmission by electronic means, shall be in full. However, partial reproduction may only be made with the written consent of the issuing Technical Assessment Body. Any partial reproduction shall be identified as such.

This European Technical Assessment may be withdrawn by the issuing Technical Assessment Body, in particular pursuant to information by the Commission in accordance with Article 25(3) of Regulation (EU) No 305/2011.

## 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®	Printing ink for digital printing system	Yellow	5019-020	UV-Light drying ink for Inkjet digital printing system
		Red	5019-030	
		Orange	5019-035	
		Blue	5019-050	
		Green	5019-060	
		Brown	5019-080	
ORALITE® 5061	Transparent protective laminate	Transparent	5061-000	Sheeting thickness: 0,075 mm Dimension of the roll: 1,22 m x 50 m or customized

Tab. 1: Types of reflective sheeting "ORALITE® 6910 Brilliant Grade digitally printed with ORALITE® 5019 UV Digital Printing Ink and with ORALITE® 5061 Transparent 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	
Orange*	x	0,610	0,535	0,506	0,570	≥ 0,14
	y	0,390	0,375	0,404	0,429	
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

\* Class CR1 of EN 12899-1 for Orange

## 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 digitally printed with Oralite® 5019 UV Digital Printing Ink and with Oralite® 5061 Transparent 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.

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 (± 0,05 mm).

Essential characteristic	Performance
<b>Visibility of "Oralite® 6910 Brilliant Grade digitally printed with Oralite® 5019 UV Digital Printing Ink and with Oralite® 5061 Transparent 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 digitally printed with Oralite® 5019 UV Digital Printing Ink and with Oralite® 5061 Transparent 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. V3-018/2013 of 26 February 2014 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

Dr.-Ing. Karsten Kathage  
Head of Department

*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	0,489	0,464	0,31
	2	0,489	0,464	0,31
	3	0,489	0,464	0,31
Red	1	0,620	0,336	0,11
	2	0,619	0,335	0,11
	3	0,619	0,336	0,11
Orange	1	0,555	0,409	0,19
	2	0,555	0,410	0,19
	3	0,555	0,410	0,19
Blue	1	0,150	0,134	0,04
	2	0,150	0,133	0,04
	3	0,156	0,141	0,04
Green	1	0,133	0,422	0,06
	2	0,133	0,423	0,06
	3	0,132	0,424	0,06
Brown	1	0,501	0,368	0,07
	2	0,502	0,368	0,07
	3	0,502	0,367	0,07

ORALITE® 6910 Brilliant Grade digitally printed with ORALITE® 5019 UV Digital Printing Ink and with ORALITE® 5061 Transparent 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)

$\alpha$	Colour Sample				Yellow			Red			Orange		
	$\beta_1$	$\beta_2$	$\epsilon$		1	2	3	1	2	3	1	2	3
0,1	5				527	509	509	156	147	143	425	405	418
	15				462	435	438	135	126	123	359	341	350
	20				403	375	380	118	108	106	305	290	297
	30				211	187	192	59	52	52	147	138	140
	40				120	106	111	33	29	30	81	78	77
0,2	5				340	325	329	107	100	99	273	262	264
	15				309	287	292	96	88	87	238	227	230
	20				277	255	260	85	77	77	208	198	201
	30				169	149	155	49	43	43	119	111	112
	40				105	92	97	30	26	26	71	68	68
0,33	5				222	216	218	72	69	67	169	166	168
	15				201	192	194	64	60	59	151	149	149
	20				179	170	173	57	53	52	134	130	130
	30				110	98	103	34	30	31	78	74	73
	40				78	68	72	23	19,9	21	53	51	50
0,5	5				230	225	224	74	73	70	173	168	176
	15				195	186	186	62	59	57	143	140	144
	20	0	0		170	161	162	53	50	49	124	121	123
	30				72	67	69	23	21	21	51	49	49
	40				50	44	47	15,5	13,6	14,3	34	33	32
1,0	5				89	88	89	39	38	38	64	65	63
	15				85	83	83	36	34	34	60	60	59
	20				82	79	79	33	32	32	57	57	57
	30				40	39	39	15,5	14,4	14,7	28	27	27
	40				30	29	30	10,5	9,9	9,8	21	19,8	20
1,5	5				28	28	29	15,6	15,6	15,8	18,8	20	18,2
	15				29	29	29	15,3	15,2	15,4	19,5	21	19,0
	20				28	28	29	14,6	14,2	14,5	19,0	19,6	18,5
	30				17,5	17,8	17,9	8,1	7,6	7,8	11,9	11,4	11,6
	40				14,1	13,5	13,8	6,1	5,6	5,7	9,3	8,8	8,8
2,0	5				10,4	10,5	10,9	6,5	6,6	6,7	7,2	7,7	7
	15				10,7	10,9	11,2	6,3	6,4	6,7	7,5	7,9	7,2
	20				10,7	10,9	11,2	6,2	6,3	6,5	7,4	7,7	7,0
	30				6,9	7,4	7,6	3,8	3,8	3,9	4,9	5,1	4,8
	40				6,7	6,7	6,9	3,4	3,2	3,3	4,5	4,2	4,3

ORALITE® 6910 Brilliant Grade digitally printed with ORALITE® 5019 UV Digital Printing Ink and with ORALITE® 5061 Transparent 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			Blue			Green			Brown		
	$\beta_1$	$\beta_2$	$\epsilon$	1	2	3	1	2	3	1	2	3
0,1	5			62	63	62	114	111	111	161	162	158
	15			53	54	53	97	95	95	139	138	136
	20			45	47	46	84	81	81	120	119	117
	30			23	24	23	42	40	41	60	58	57
	40			12,8	13,2	12,9	23	22	23	33	32	32
0,2	5			39	38	39	72	69	69	110	108	105
	15			34	34	34	63	61	62	98	95	93
	20			30	31	30	56	54	54	86	84	82
	30			17,8	18,1	18	33	32	32	49	47	46
	40			11	11,2	11	20	19,4	19,6	29	28	28
0,33	5			29	30	29	52	51	51	71	72	70
	15			25	25	25	45	44	44	63	63	61
	20			22	22	22	39	39	38	56	56	54
	30			11,6	11,6	11,7	21	21	21	33	32	31
	40			7,9	7,9	7,9	14,6	14,3	14,3	22	21	21
0,5	5			28	30	28	51	51	50	70	75	72
	15			23	25	23	42	42	41	59	62	60
	20	0	0	20	22	20	37	37	36	51	53	51
	30			8,4	8,7	8,6	15,1	15,0	15,0	22	22	21
	40			5,3	5,3	5,3	9,5	9,4	9,4	14,5	13,9	13,7
1,0	5			10,8	10,6	10,7	19,3	19,1	18,6	33	33	32
	15			9,9	9,9	9,8	17,9	17,8	17,3	30	30	30
	20			9,3	9,4	9,3	16,9	16,8	16,4	28	28	28
	30			4,5	4,6	4,6	7,8	7,8	7,6	13,1	13,1	12,9
	40			3,3	3,5	3,4	5,8	5,8	5,8	8,9	9,1	9,1
1,5	5			3,6	3,6	3,6	6,2	6,2	5,9	12,1	11,7	11,5
	15			3,3	3,2	3,2	5,9	5,9	5,7	11,6	11,5	11,2
	20			3,3	3,2	3,2	5,9	6,0	5,7	11,0	10,9	10,6
	30			1,9	1,9	1,9	3,4	3,5	3,4	6,0	6,2	6,1
	40			1,6	1,7	1,6	2,6	2,7	2,7	4,6	4,6	4,6
2,0	5			1,6	1,6	1,6	2,4	2,5	2,4	4,8	4,6	4,5
	15			1,3	1,3	1,3	2,2	2,2	2,2	4,5	4,3	4,3
	20			1,3	1,3	1,3	2,2	2,3	2,2	4,3	4,2	4,1
	30			0,9	0,8	0,9	1,4	1,5	1,4	2,6	2,7	2,6
	40			0,8	0,9	0,9	1,3	1,4	1,4	2,3	2,4	2,3

ORALITE® 6910 Brilliant Grade digitally printed with ORALITE® 5019 UV Digital Printing Ink and with ORALITE® 5061 Transparent 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			Orange		
$\alpha$	$\beta_1$	$\beta_2$	$\epsilon$	1	2	3	1	2	3	1	2	3
0,33	5	0	-75	206	201	200	67	65	64	161	156	163
			-50	219	213	215	71	67	66	172	162	169
			-25	210	202	204	69	65	65	163	153	158
			0	222	216	218	72	69	67	169	166	168
			25	202	199	199	66	64	62	152	151	153
			50	180	176	175	61	58	57	137	131	137
			<b>Ratio</b>	<b>1,23</b>	<b>1,23</b>	<b>1,25</b>	<b>1,18</b>	<b>1,19</b>	<b>1,18</b>	<b>1,26</b>	<b>1,27</b>	<b>1,23</b>

Colour Sample				Blue			Green			Brown		
$\alpha$	$\beta_1$	$\beta_2$	$\epsilon$	1	2	3	1	2	3	1	2	3
0,33	5	0	-75	28	28	28	47	46	45	64	66	65
			-50	28	28	28	47	47	46	67	68	67
			-25	26	27	26	46	45	45	67	67	65
			0	29	30	29	52	51	51	71	72	70
			25	28	28	28	48	47	47	64	64	63
			50	26	26	26	43	43	43	58	60	57
			<b>Ratio</b>	<b>1,12</b>	<b>1,15</b>	<b>1,12</b>	<b>1,21</b>	<b>1,19</b>	<b>1,19</b>	<b>1,22</b>	<b>1,20</b>	<b>1,23</b>

**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	0,469	0,471	0,35
	2	0,469	0,471	0,35
	3	0,467	0,471	0,35
Red	1	0,601	0,331	0,11
	2	0,601	0,331	0,11
	3	0,601	0,331	0,11
Orange	1	0,533	0,419	0,22
	2	0,532	0,420	0,22
	3	0,533	0,419	0,21
Blue	1	0,149	0,148	0,05
	2	0,149	0,148	0,05
	3	0,149	0,147	0,05
Green	1	0,134	0,369	0,07
	2	0,136	0,362	0,07
	3	0,137	0,359	0,07
Brown	1	0,486	0,386	0,08
	2	0,486	0,386	0,08
	3	0,487	0,386	0,08

ORALITE® 6910 Brilliant Grade digitally printed with ORALITE® 5019 UV Digital Printing Ink and with ORALITE® 5061 Transparent Film

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

Annex 3

English translation prepared by DIBt

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

		Colour Sample				Yellow			Red			Orange		
$\alpha$	$\beta_1$	$\beta_2$	$\varepsilon$		1	2	3	1	2	3	1	2	3	
0,2	5	0	0		398	397	391	101	97	100	318	289	311	
	30				200	199	188	48	46	47	156	142	153	
0,33	5				261	266	266	70	68	68	201	184	198	
	30				131	132	124	32	31	32	101	93	101	
1,0	5				93	94	97	39	38	38	68	68	68	
	30				42	43	44	15,1	14,7	14,8	31	30	31	

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

		Colour Sample				Blue			Green			Brown		
$\alpha$	$\beta_1$	$\beta_2$	$\varepsilon$		1	2	3	1	2	3	1	2	3	
0,2	5	0	0		38	42	44	74	76	71	100	106	104	
	30				18,8	20	21	34	38	32	48	48	48	
0,33	5				31	33	34	59	58	57	69	72	72	
	30				12,1	13,0	13,4	22	24	21	32	32	32	
1,0	5				10,4	10,3	10,6	18,6	19,6	19	32	31	31	
	30				4,3	4,4	4,5	7,6	8,6	7,8	12,3	12,2	12,3	

electronic copy of the eta by dibt: eta-15/0107

ORALITE® 6910 Brilliant Grade digitally printed with ORALITE® 5019 UV Digital Printing Ink and with ORALITE® 5061 Transparent Film

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

Annex 3