

Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-15/0105
of 28 January 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 laminated 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

European Technical Assessment

ETA-15/0105

English translation prepared by DIBt

Page 2 of 11 | 28 January 2016

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This European Technical Assessment may be withdrawn by the issuing Technical Assessment Body, in particular pursuant to information by the Commission in accordance with Article 25(3) of Regulation (EU) No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® 5061 Transparent Film	Colour laminate	Transparent Yellow Red Blue Green Brown 5061-000 5061-020 5061-030 5061-050 5061-060 5061-080	Sheeting thickness: 0,075 mm Dimension of the roll: 1,22 m x 50 m or customized

Table 1: Types of reflective sheeting "ORALITE® 6910 Brilliant Grade laminated 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.

European Technical Assessment**ETA-15/0105**

English translation prepared by DIBt

Page 4 of 11 | 28 January 2016

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

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
Visibility characteristics of "ORALITE® 6910 Brilliant Grade laminated with ORALITE® 5061 Transparent Film"	
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 laminated with ORALITE® 5061 Transparent Film"	
Impact resistance	passed acc. to EN 12899-1
Temperature resistance	No performance assessed
Visibility after accelerated 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 European Technical Assessment EAD 120001-00-0106 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 European Assessment Document

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

6 Reference list

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

- Interims test report No. V4-047/2012 of 20 February 2013 by Federal Highway Research Institute (BASt) on the testing of microprismatic reflective sheetings
- Interims test report No. V4-048/2012 of 20 February 2013 by Federal Highway Research Institute (BASt) on the testing of microprismatic reflective sheetings
- 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 28 January 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	β
White	1	0,313	0,330	0,46
	2	0,312	0,329	0,46
	3	0,313	0,330	0,46
Yellow	1	0,531	0,462	0,30
	2	0,531	0,462	0,30
	3	0,531	0,462	0,30
Red	1	0,670	0,310	0,04
	2	0,666	0,310	0,04
	3	0,668	0,310	0,04
Blue	1	0,152	0,105	0,03
	2	0,152	0,103	0,03
	3	0,152	0,104	0,03
Green	1	0,135	0,415	0,07
	2	0,135	0,415	0,07
	3	0,135	0,415	0,07
Brown	1	0,495	0,397	0,04
	2	0,492	0,397	0,05
	3	0,495	0,397	0,04

Annex 2

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

Coefficient of retro-reflection (Part 1)

α	β_1	β_2	ε	White			Yellow			Red		
				1	2	3	1	2	3	1	2	3
0,1	5	1698	1580	1625	1111	1116	1107	305	298	334		
		1410	1390	1392	985	982	980	262	264	289		
		1209	1220	1197	860	858	853	226	234	247		
		681	704	650	489	484	480	129	143	134		
		411	429	381	299	299	293	77	88	80		
	0,2	953	919	887	656	645	650	194	200	201		
		860	856	808	609	600	602	177	187	181		
		776	783	731	557	550	550	159	170	162		
		532	539	496	381	379	376	106	116	108		
		352	363	323	259	260	255	68	77	71		
0,33	5	404	417	390	286	277	283	88	97	81		
		420	405	387	280	274	278	92	96	81		
		411	391	378	273	271	271	90	92	80		
		313	303	279	218	219	216	68	72	65		
		244	244	218	184	186	182	52	57	53		
	0,5	408	398	424	276	278	279	74	72	79		
		348	347	365	245	241	246	69	63	70		
		323	327	341	230	224	232	67	59	66		
		149	144	137	100	100	101	34	33	31		
		124	118	106	96	99	98	30	32	30		
1,0	5	56	69	52	63	62	66	24	32	19		
		70	69	60	67	66	69	23	32	20		
		77	71	66	68	69	70	23	31	20		
		47	44	41	40	39	40	13,1	14,9	12,1		
		44	45	40	31	30	31	8,4	9,4	8,1		
	1,5	14,6	16,2	15,7	14,1	12,6	13,9	5,9	6,4	5,0		
		12,8	15,4	17,3	14,4	13,1	15,3	5,8	5,1	3,5		
		14,5	15,2	17,1	12,3	11,6	13,6	5,1	4,6	3,2		
		16,3	14,4	15,7	10,3	11,2	11,8	3,6	3,4	3,7		
		10,2	9,6	9,0	9,4	9,4	9,6	4,0	4,0	3,5		
2,0	5	6,8	7,6	6,7	6,5	6,1	6,5	2,4	2,4	2,0		
		9,1	10,0	9,1	6,9	6,5	6,9	2,3	2,2	2,2		
		8,6	10,0	9,5	6,6	6,3	6,7	2,1	2,0	1,8		
		4,5	3,6	3,2	2,8	2,6	2,9	1,4	0,9	0,7		
		3,5	3,2	3,4	2,7	3,1	2,7	1,0	1,0	1,0		

ORALITE® 6910 Brilliant Grade laminated 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)

α	β_1	β_2	ε	Colour Sample		Blue			Green			Brown		
				1	2	3	1	2	3	1	2	3	1	2
0,1	5	0,1	0,1	103	112	123	266	274	279	160	118	160		
	15			87	97	102	225	232	248	138	99	138		
	20			74	84	87	194	201	216	118	84	118		
	30			43	47	50	116	122	123	65	50	65		
	40			24	27	28	68	71	74	38	28	38		
	5		0,2	62	62	69	152	156	148	96	74	95		
	15			57	56	65	144	149	138	87	69	86		
	20			51	51	59	131	137	128	78	62	77		
	30			33	34	38	90	95	90	52	41	52		
	40			21	22	23	58	61	62	33	25	34		
0,33	5	0,33	0,33	38	34	38	77	73	67	43	37	42		
	15			36	29	37	78	77	63	42	40	41		
	20			32	27	34	74	75	61	40	38	40		
	30			18,9	17,4	21	52	54	46	31	27	31		
	40			14,3	14,4	15,5	41	42	40	24	19,1	25		
	5		0,5	34	36	35	69	69	71	43	34	43		
	15			29	30	29	59	58	63	37	29	36		
	20			26	27	26	55	54	58	34	27	33		
	30			9,4	8,7	9,7	24	24	22	14,7	13,5	14,5		
	40			7,3	6,7	7,5	21	21	18	13,2	11,8	13,4		
1,0	5	1,0	1,0	6,1	5,2	4,3	11,6	10,3	10,8	10,4	10,7	9,9		
	15			5,7	5,2	4,4	12,1	11,4	12,2	10,3	10,5	10,1		
	20			5,8	5,3	4,8	12,8	12,6	12,9	10,3	10,5	10,4		
	30			3,2	3,0	2,9	7,7	7,5	7,7	6,2	5,1	6,0		
	40			2,4	2,8	2,6	6,6	6,7	7,8	4,3	3,2	4,1		
	5		1,5	1,9	1,6	1,7	3,5	3,4	3,2	2,6	2,3	2,4		
	15			1,8	1,4	1,3	3,4	3,1	3,2	2,2	2,1	1,9		
	20			1,9	1,3	1,3	3,6	3	2,8	2,0	2,0	1,8		
	30			1,0	0,8	0,8	2,4	2,3	1,5	1,9	1,8	1,9		
	40			0,7	0,6	0,6	1,6	1,4	1,4	1,4	1,4	1,4		
2,0	5	2,0	2,0	1,1	1,1	1,0	1,8	1,7	1,9	1,4	1,2	1,3		
	15			0,9	0,7	0,7	1,8	1,7	1,5	1,2	1,0	1,1		
	20			0,8	0,8	0,8	1,8	1,8	1,7	1,0	0,9	0,9		
	30			0,4	0,4	0,4	0,9	0,7	0,8	0,5	0,5	0,4		
	40			0,4	0,4	0,4	0,7	0,7	0,7	0,4	0,5	0,5		

ORALITE® 6910 Brilliant Grade laminated 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				White			Yellow			Red		
α	β_1	β_2	ε	1	2	3	1	2	3	1	2	3
0,33	5	0	-75	412	414	450	306	315	305	89	74	100
			-50	452	419	434	318	340	326	89	79	109
			-25	403	389	375	290	295	295	85	88	94
			0	404	417	390	286	277	283	88	97	81
			25	314	329	300	265	256	258	77	87	70
			50	258	249	259	242	237	234	65	73	67
Ratio				1,75	1,68	1,74	1,31	1,43	1,39	1,37	1,33	1,63

Colour Sample				Blue			Green			Brown		
α	β_1	β_2	ε	1	2	3	1	2	3	1	2	3
0,33	5	0	-75	25	27	29	66	67	65	42	38	44
			-50	23	28	28	61	62	71	48	36	51
			-25	26	29	28	60	59	63	45	34	46
			0	38	34	38	77	73	67	43	37	42
			25	36	32	35	71	68	68	37	35	36
			50	24	23	26	55	56	57	30	30	31
Ratio				1,65	1,48	1,46	1,40	1,30	1,25	1,60	1,27	1,65

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	β
White	1	0,315	0,334	0,50
	2	0,315	0,334	0,51
	3	0,315	0,334	0,49
Yellow	1	0,527	0,460	0,34
	2	0,529	0,460	0,33
	3	0,529	0,460	0,33
Red	1	0,663	0,310	0,04
	2	0,661	0,310	0,04
	3	0,661	0,310	0,04
Blue	1	0,148	0,118	0,05
	2	0,148	0,119	0,05
	3	0,148	0,119	0,05
Green	1	0,138	0,423	0,08
	2	0,138	0,425	0,08
	3	0,138	0,425	0,08
Brown	1	0,499	0,399	0,05
	2	0,499	0,399	0,05
	3	0,500	0,399	0,05

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

Colour	White	Yellow			Red				
		1	2	3	1	2	3	1	2
Sample									
α	β_1	β_2	ε						
0,2	5			762	741	712	357	420	372
	30			503	446	352	236	271	243
0,33	5	0	0	456	431	390	185	202	191
	30			303	277	203	139	155	145
1,0	5			64	58	55	48	48	52
	30			43	40	37	22	21	23

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

Colour	Blue			Green			Brown		
	1	2	3	1	2	3	1	2	3
Sample									
α	β_1	β_2	ε						
0,2	5			38	40	42	120	105	116
	30			23	24	28	80	68	73
0,33	5	0	0	26	28	29	62	56	60
	30			11,7	12,8	14,7	43	35	39
1,0	5			5,3	6,6	4,7	8,6	9,2	8,9
	30			2,1	2,2	2,1	5,7	5,0	5,2

ORALITE® 6910 Brilliant Grade laminated with ORALITE® 5061 Transparent Film

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

Annex 3