

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-15/0104
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 originally dyed and
laminated with Oralite® 5095 Anti Graffiti Film

Product family
to which the construction product belongs

Microprismatic retro-reflective sheeting

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 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® 5095 Anti Graffiti Film	Transparent overlay film	Transparent	5095-000	Sheeting thickness: 0,025 mm Dimension of the roll: 1,22 m x 50 m, or customized

Table 1: Types of reflective sheeting "ORALITE® 6910 Brilliant Grade originally dyed and laminated 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 factor
		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	
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 originally dyed and laminated 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.

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 characteristics of "ORALITE® 6910 Brilliant Grade originally dyed and laminated with ORALITE® 5095 Anti Graffiti 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 originally dyed and laminated with ORALITE® 5095 Anti Graffiti 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 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 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	0,314	0,331	0,43
	2	0,314	0,331	0,43
	3	0,314	0,331	0,43
Yellow	1	0,531	0,461	0,26
	2	0,531	0,461	0,26
	3	0,530	0,462	0,27
Red	1	0,662	0,303	0,03
	2	0,664	0,303	0,03
	3	0,661	0,303	0,03
Blue	1	0,154	0,112	0,03
	2	0,154	0,112	0,03
	3	0,154	0,112	0,03
Green	1	0,143	0,441	0,06
	2	0,143	0,441	0,06
	3	0,144	0,440	0,07
Brown	1	0,490	0,397	0,04
	2	0,488	0,395	0,04
	3	0,488	0,397	0,04

Oralite® 6910 Brilliant Grade originally dyed and laminated 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)

α	β_1	Colour Sample		White			Yellow			Red			
				1	2	3	1	2	3	1	2	3	
0,1				5	1449	1487	1483	1326	1426	1315	289	303	216
				15	1238	1268	1265	1172	1236	1111	245	264	186
				20	1082	1098	1100	1034	1077	948	212	229	164
				30	670	638	665	611	629	505	132	137	108
				40	408	388	400	380	382	299	78	82	65
0,2				5	849	840	856	788	824	754	190	196	144
				15	808	788	810	727	754	672	174	179	135
				20	749	724	745	668	690	602	157	162	125
				30	532	505	525	475	489	396	110	111	91
				40	354	335	347	327	326	258	70	72	59
0,33				5	392	371	384	353	361	332	90	87	74
				15	421	400	413	353	370	337	94	88	79
				20	415	393	403	346	359	327	91	85	76
				30	320	298	312	277	278	235	72	69	60
				40	252	239	243	228	224	182	54	54	45
0,5	0	0		5	359	363	361	340	362	345	69	67	59
				15	311	318	311	304	324	310	62	62	52
				20	295	299	292	289	307	294	60	61	50
				30	150	142	145	131	134	120	36	33	30
				40	137	127	130	117	112	96	32	30	28
1,0				5	73	63	65	67	49	45	27	22	28
				15	79	69	71	71	58	53	26	21	28
				20	87	76	78	72	62	56	27	20	28
				30	51	48	49	41	40	37	12,6	12,8	12,1
				40	42	41	41	38	41	35	7,9	8,9	7,4
1,5				5	17,8	17,6	16,5	13,7	14,1	14,6	4,6	6,4	4,6
				15	17,3	16,7	15,8	14,1	15,3	14,4	4,4	4,8	4,7
				20	16,8	16,0	15,8	12,7	14,1	15,9	4,6	4,7	4,6
				30	14,6	14,3	15,1	12,2	12,3	13,6	3,7	3,6	4,0
				40	11,9	12,0	11,1	9,2	8,2	8,4	3,7	3,6	3,7
2,0				5	7,1	7,4	7,3	5,9	5,8	6,3	2,1	2,2	2,2
				15	9,1	9,4	9,4	7,0	8,2	9,3	2,2	2,6	2,2
				20	8,7	8,7	9,0	6,6	7,9	7,7	2,2	2,4	2,1
				30	4,4	4,8	4,6	2,6	2,7	4,2	1,3	1,0	1,1
				40	3,7	4,6	4,0	2,7	2,3	3,0	1,0	1,0	1,0

Oralite® 6910 Brilliant Grade originally dyed and laminated 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)

α	Colour Sample			Blue			Green			Brown		
	β_1	β_2	ε	1	2	3	1	2	3	1	2	3
0,1	5			117	133	132	248	282	262	154	157	153
	15			101	114	111	217	240	219	129	132	129
	20			88	99	95	187	207	187	110	114	111
	30			49	55	52	96	115	102	58	65	65
	40			28	32	29	53	65	57	34	36	37
0,2	5			64	68	68	130	152	137	97	96	93
	15			59	62	63	121	141	129	86	88	86
	20			54	57	57	110	129	117	75	79	77
	30			36	40	39	70	87	78	47	53	53
	40			23	26	24	44	55	48	30	32	32
0,33	5			33	37	35	63	73	66	45	45	44
	15			30	34	36	58	74	69	42	48	47
	20			28	32	34	55	71	67	39	45	45
	30			18,7	21	21	37	47	45	28	33	33
	40			15,2	16,7	15,9	29	36	34	22	24	24
0,5	5	0	0	35	40	36	69	72	69	40	42	41
	15			30	33	29	59	60	57	33	36	35
	20			27	29	26	53	55	52	30	33	32
	30			9,2	10,1	10,2	18,0	23	22	13,3	16,0	15,9
	40			7,1	7,5	7,7	14,0	17,2	17,5	12,2	13,3	13,6
1,0	5			4,1	3,7	3,4	11,7	11,0	10,4	12,7	10,3	10,5
	15			4,3	4,3	3,8	12,0	11,8	11,0	11,4	10,5	10,4
	20			4,5	4,9	4,2	12,3	12,7	11,8	11	10,8	10,7
	30			2,4	2,4	2,4	7,5	8,4	7,8	5,7	6,0	6,0
	40			2,5	2,8	2,5	6,1	7,1	6,2	3,5	3,7	3,8
1,5	5			1,4	1,4	1,5	3,4	3,8	3,6	2,8	2,2	2,2
	15			1,1	1,1	1,1	2,8	3,0	2,9	1,8	1,8	1,8
	20			1,0	1,0	1,1	2,3	2,8	2,7	1,7	1,7	1,7
	30			0,7	0,7	0,9	1,9	2,5	2,4	1,9	2,0	1,8
	40			0,6	0,5	0,6	2,1	2,0	2,0	1,8	1,6	1,5
2,0	5			1,0	0,9	0,9	1,8	1,8	1,8	1,5	1,3	1,3
	15			0,6	0,6	0,6	1,4	1,7	1,6	1,2	1,2	1,1
	20			0,7	0,7	0,7	1,4	1,7	1,7	1,0	0,9	0,9
	30			0,3	0,3	0,3	0,7	0,9	0,9	0,5	0,6	0,5
	40			0,4	0,3	0,4	1,1	1,1	1,2	0,7	0,7	0,6

Oralite® 6910 Brilliant Grade originally dyed and laminated with Oralite® 5095 Anti Graffiti Film

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

Annex 2

English translation prepared by DIBt

Rotational symmetry

Colour Sample				White			Yellow			Red		
				1	2	3	1	2	3	1	2	3
0,33	5	0	-75	390	405	394	319	346	328	77	73	73
			-50	417	437	407	405	405	381	91	87	74
			-25	382	378	372	385	382	351	91	91	71
			0	392	371	384	353	361	332	90	87	74
			25	373	357	366	313	291	269	80	71	76
			50	312	311	311	249	209	209	64	56	71
			Ratio	1,34	1,41	1,31	1,63	1,94	1,82	1,42	1,63	1,07

Colour Sample				Blue			Green			Brown		
				1	2	3	1	2	3	1	2	3
0,33	5	0	-75	29	33	32	69	72	77	40	43	46
			-50	31	36	35	73	73	74	48	48	48
			-25	31	33	31	58	63	59	47	44	42
			0	33	37	35	63	73	66	45	45	44
			25	32	34	33	74	78	72	46	44	46
			50	25	26	27	71	66	72	40	35	39
			Ratio	1,32	1,42	1,30	1,28	1,24	1,31	1,20	1,37	1,23

Oralite® 6910 Brilliant Grade originally dyed and laminated 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	β
White	1	0,315	0,332	0,50
	2	0,315	0,332	0,50
	3	0,315	0,332	0,49
Yellow	1	0,526	0,465	0,31
	2	0,526	0,464	0,30
	3	0,526	0,464	0,31
Red	1	0,650	0,301	0,03
	2	0,654	0,303	0,03
	3	0,647	0,301	0,03
Blue	1	0,150	0,120	0,04
	2	0,150	0,117	0,04
	3	0,149	0,119	0,04
Green	1	0,145	0,414	0,07
	2	0,147	0,413	0,07
	3	0,145	0,415	0,07
Brown	1	0,491	0,399	0,04
	2	0,492	0,399	0,04
	3	0,489	0,398	0,04

Oralite® 6910 Brilliant Grade originally dyed and laminated with Oralite® 5095 Anti Graffiti Film

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

Annex 3

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

		Colour Sample				White			Yellow			Red		
α	β_1	β_2	ε		1	2	3	1	2	3	1	2	3	
0,2	5	0	0		435	377	482	443	379	434	171	170	175	
	30			285	249	324	285	230	282	97	95	100		
0,33	5			254	224	269	209	188	206	76	73	76		
	30			157	136	193	163	126	160	64	57	62		
1,0	5			51	51	54	46	54	44	15,2	19,5	12,5		
	30			25	20	28	24	21	23	10,8	11,5	11,4		

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

		Colour Sample				Blue			Green			Brown		
α	β_1	β_2	ε		1	2	3	1	2	3	1	2	3	
0,2	5	0	0		37	45	36	158	160	152	111	116	111	
	30			25	28	22	89	88	85	56	61	60		
0,33	5			26	28	27	75	77	70	46	50	49		
	30			13,2	14,3	12,5	49	48	47	33	38	37		
1,0	5			4,0	3,6	5,8	8,4	8,6	8,8	6,6	7,7	7,4		
	30			1,8	1,8	1,8	7,6	7,7	8,3	6,0	6,8	6,7		

Oralite® 6910 Brilliant Grade originally dyed and laminated with Oralite® 5095 Anti Graffiti Film

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

Annex 3