

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

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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 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

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
		Yellow	6910-020	
		Red	6910-030	
		Blue	6910-050	
		Green	6910-060	
		Brown	6910-080	
ORALITE® 5090 Anti Dew Film	Transparent protective laminate	Transparent	5090-000	Sheeting thickness: 0,06 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® 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 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). 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.

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® 5090 Anti Dew 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® 5090 Anti Dew 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. V4-048/2012 of 20 February 2013 by Federal Highway Research Institute (BAST) on the testing of microprismatic reflective sheetings
- 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

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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	0,315	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 (Part 1)

α	Colour Sample				White			Yellow			Red		
	β_1	β_2	ϵ		1	2	3	1	2	3	1	2	3
0,1	5				1431	1569	1634	1421	1168	1460	320	310	264
	15				1236	1345	1435	1236	1012	1272	277	266	227
	20				1073	1166	1254	1082	890	1111	240	230	199
	30				647	693	724	643	555	656	138	135	129
	40				390	422	453	393	339	402	85	82	79
0,2	5				844	883	917	801	720	844	193	191	170
	15				804	835	853	742	672	774	176	174	160
	20				740	772	785	684	620	711	160	157	148
	30				516	550	561	493	443	509	111	109	106
	40				341	366	389	334	295	343	74	72	70
0,33	5				388	385	375	340	348	356	78	78	79
	15				421	424	383	358	364	373	81	80	87
	20				415	424	384	356	356	371	80	79	86
	30				314	331	319	279	272	292	68	67	69
	40				248	261	271	226	215	232	54	52	53
0,5	5				355	394	388	364	308	361	73	70	64
	15				318	345	348	329	277	333	67	64	57
	20	0	0		303	326	331	313	264	320	64	62	55
	30				149	160	146	132	132	139	32	31	34
	40				137	141	139	110	117	115	30	29	31
1,0	5				78	56	62	37	81	44	16,4	14,9	25
	15				81	67	69	50	81	54	16,5	15,1	26
	20				84	73	72	55	81	56	17,1	15,8	27
	30				51	51	49	39	44	40	12,3	12,3	13,2
	40				37	41	41	40	34	40	8,9	8,7	8,1
1,5	5				20	16,5	17	13,5	15,4	14,1	5,0	5,4	4,4
	15				23	14,9	16,7	12,7	19,2	14,0	4,2	4,0	4,2
	20				21	15,0	15,4	11,9	17,7	13,4	4,0	4,1	4,0
	30				15,8	16,5	14,1	12,3	12,9	12,6	3,9	3,9	3,7
	40				13,2	12,8	12,1	7,8	10,3	8,0	3,2	3,4	3,6
2,0	5				8,2	7,0	7,9	5,5	7,1	5,9	2,1	2,4	2,1
	15				10,1	9,4	10,0	9,3	8,6	9,1	2,5	3,1	2,2
	20				9,2	8,6	11,6	8,5	7,5	8,0	2,1	2,6	1,9
	30				4,8	4,7	3,5	2,6	4,0	2,7	0,9	1,1	1,1
	40				4,2	5,5	4,2	2,2	2,9	2,3	0,9	1,0	1,0

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 (Part 2)

α	β_1	Colour Sample		Blue			Green			Brown			
		β_2	ϵ	1	2	3	1	2	3	1	2	3	
0,1	5			113	123	127	328	340	306	170	175	192	
	15			96	105	108	284	290	259	146	146	159	
	20			83	90	92	247	248	222	124	123	136	
	30			48	52	51	137	133	124	67	64	77	
	40			28	30	29	79	77	73	38	37	46	
0,2	5			66	69	67	174	172	172	102	106	114	
	15			60	64	62	162	159	157	92	93	102	
	20			55	57	56	148	145	142	82	81	91	
	30			37	39	39	101	100	96	53	50	62	
	40			23	25	25	66	65	62	34	32	40	
0,33	5			42	41	37	76	74	82	44	45	49	
	15			40	40	37	73	74	83	43	43	52	
	20			36	36	34	71	74	79	41	40	50	
	30			21	22	22	53	54	55	32	30	39	
	40			15,8	16,6	16,3	43	44	43	25	23	29	
0,5	5		0	0	39	39	37	80	85	79	43	42	47
	15				33	32	30	69	72	69	36	36	41
	20				29	29	28	64	67	64	33	33	38
	30				10,8	10,8	10,5	24	25	26	14,6	13,6	18,5
	40				7,8	7,6	7,8	19,4	21	21	13,4	12,2	15,8
1,0	5				6	4,8	4,3	10,1	9,0	12,9	9,5	10,2	8,1
	15				5,4	4,6	4,5	11,4	11,0	13,6	9,1	9,7	9,6
	20				5,4	4,9	4,8	12,4	12,3	13,6	9,3	9,7	10,1
	30				3,0	2,7	2,7	8,8	8,7	8,5	5,7	6,0	6,3
	40				2,7	2,8	2,6	8,1	7,6	7,4	3,8	3,9	4,4
1,5	5				1,7	1,7	1,6	3,5	3,4	4,1	2,3	2,6	2,3
	15				1,8	1,4	1,4	2,7	2,6	4,2	1,4	1,6	1,7
	20				2,0	1,5	1,4	2,4	2,4	4,2	1,4	1,4	1,8
	30				1,2	1,0	1,1	2,4	2,5	3,1	1,9	1,8	2,0
	40				0,6	0,6	0,6	2,3	2,3	2,0	1,7	1,9	1,5
2,0	5				1,1	1,0	1,0	1,8	1,6	2,2	1,3	1,3	1,2
	15				0,8	0,7	0,7	1,4	1,4	2,1	1,1	1,1	1,2
	20				0,8	0,8	0,8	1,6	1,6	2,0	0,8	0,9	0,9
	30				0,4	0,4	0,4	0,7	0,7	1,0	0,4	0,5	0,6
	40				0,4	0,4	0,4	1,1	1,2	0,9	0,6	0,7	0,5

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			Yellow			Red		
				1	2	3	1	2	3	1	2	3
α	β_1	β_2	ϵ									
0,33	5	0	-75	363	404	383	351	286	332	83	79	80
			-50	351	420	448	389	296	389	95	88	77
			-25	342	380	407	355	303	379	86	83	74
			0	388	385	375	340	348	356	78	78	79
			25	347	318	322	268	298	267	62	59	71
			50	292	270	274	217	224	215	51	47	61
			Ratio	1,33	1,56	1,64	1,79	1,55	1,81	1,86	1,87	1,31

Colour Sample				Blue			Green			Brown		
				1	2	3	1	2	3	1	2	3
α	β_1	β_2	ϵ									
0,33	5	0	-75	29	32	30	76	81	69	43	43	51
			-50	27	31	32	83	91	73	52	51	58
			-25	29	31	30	75	77	68	48	49	52
			0	42	41	37	76	74	82	44	45	49
			25	35	34	32	70	67	72	37	39	36
			50	22	24	25	63	61	55	30	33	27
			Ratio	1,91	1,71	1,48	1,32	1,49	1,49	1,73	1,55	2,15

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 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	0,51
Yellow	1	0,530	0,464	0,29
	2	0,530	0,464	0,29
	3	0,530	0,464	0,29
Red	1	0,665	0,299	0,02
	2	0,664	0,298	0,02
	3	0,663	0,296	0,2
Blue	1	0,149	0,116	0,04
	2	0,149	0,116	0,04
	3	0,149	0,117	0,04
Green	1	0,142	0,417	0,06
	2	0,142	0,418	0,06
	3	0,142	0,419	0,06
Brown	1	0,491	0,400	0,04
	2	0,493	0,400	0,04
	3	0,492	0,400	0,04

Oralite® 6910 Brilliant Grade originally dyed and laminated with Oralite® 5090 Anti Dew 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	405	443	393	567	569	513	165	160	136
	30			261	298	278	371	343	331	98	92	80
0,33	5	0	0	232	247	242	260	261	234	73	69	63
	30			141	174	166	211	191	184	63	60	52
1,0	5			56	65	56	37	40	46	14,7	12,0	15,2
	30			21	24	23	31	31	30	10,3	9,7	9,9

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	49	47	43	195	181	175	128	121	121
	30			29	29	27	108	95	100	70	67	68
0,33	5	0	0	34	32	28	90	96	87	58	52	55
	30			15,6	15,7	13,5	60	54	57	42	39	41
1,0	5			5,1	5,0	3,9	8,8	11,6	9,2	7,5	6,5	8,4
	30			2,0	2,3	2,1	8,7	9,0	8,3	7,0	6,6	6,9

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

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

Annex 3