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European Technical Assessment

ETA 18/0xxx – version 01
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General Part

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011: **Technický a skúšobný ústav stavebný, n. o.**

Trade name of the construction product

MNTECH microprismatic retro-reflective sheetings:
RS-3000 High Intensity Grade Series
RS-7000 Premium Grade Series

Product family to which the construction product belongs

Product area code: 23
Micro-prismatic retro-reflective sheeting

Manufacturer

Miraenanotech Global Co. Ltd.
16, Gwahaksaneop1-ro, Oksan-Myeon,
Heungdoek-gu, Cheongju-si, Chungbuk 28122
Republic of Korea
<http://www.mntechglobal.com>

Manufacturing plant

Miraenanotech Global Co. Ltd.
16, Gwahaksaneop1-ro, Oksan-Myeon,
Heungdoek-gu, Cheongju-si, Chungbuk 28122
Republic of Korea

This European Technical Assessment contains

16 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

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This version replaces

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Specific part

1 Technical description of the product

MNTECH microsmatic retro-reflective sheeting consists of microprismatic retro-reflective elements formed in a transparent synthetic resin, sealed and backed with a pressure sensitive adhesive to form a durable bond to the sign substrates. The sheetings have a smooth surface and regular structure visible on the surface. **The diamond shape of the sealing patterns identifies the machine direction.**

The product supplied as a coloured micro-prismatic retro-reflective sheetings without clear overlay film are shown in the following Table 1:

Table 1 – Micro-prismatic retro-reflective sheetings without clear overlay film

Trade name	Colours/code	Characteristics
RS-3000 High Intensity Grade Series	White RS-3000 Yellow RS-3001 Orange RS-3002 Blue RS-3003 Green RS-3004 Red RS-3005 Brown RS-3006	Thickness (without protective paper and adhesive): ? mm Dimensions of the roll: ? m × ? m or customized dimensions
RS-7000 Premium Grade Series	White RS-7000 Fluorescent Yellow-Green RS-7012	Thickness (without protective paper and adhesive): ? mm Dimensions of the roll: ? m × ? m or customized dimensions

Each colour of the sheetings is specified by a colour box in the CIE-system with defined 4 colour coordinates (x,y) and luminance factor β based on the specifications given by the manufacturer – see Table 2.

Question: The values listed in the first table above are taken from your Product data sheet. But they are not identical to the values given in EN 12899-1 (the colour boxes are larger) see the second table below. Which of values do you want to declare in ETA? In case that the values according to EN 12899-1, they should also be added to your Technical Data Sheets.

Table 2 –Daylight chromaticity (colour box coordinates x, y) and luminance factor β in CIE 1931 diagram of a new product – specifications given by the manufacturer:

Colour	Chromaticity Coordinates				Luminance Factor β	
		1	2	3		4
White	x	0,303	0,368	0,340	0,274	$\geq 0,27$
	y	0,300	0,366	0,393	0,329	
Yellow	x	0,498	0,557	0,479	0,438	0,15 to 0,45
	y	0,412	0,442	0,520	0,472	
Orange	x	0,558	0,636	0,570	0,506	0,10 to 0,30
	y	0,352	0,364	0,429	0,404	
Blue	x	0,140	0,244	0,190	0,065	0,01 to 0,1
	y	0,035	0,210	0,255	0,216	
Green	x	0,026	0,166	0,286	0,207	0,03 to 0,12
	y	0,399	0,364	0,446	0,771	
Red	x	0,648	0,735	0,629	0,565	0,025 to 0,15
	y	0,351	0,265	0,281	0,346	
Brown	x	0,455	0,523	0,479	0,558	0,01 to 0,09
	y	0,397	0,429	0,373	0,394	
Fluorescent Yellow-Green	x	0,387	0,369	0,428	0,460	$\geq 0,20$
	y	0,610	0,546	0,496	0,540	

Table 2 –Daylight chromaticity (colour box coordinates x, y) and luminance factor β in CIE 1931 diagram of a new product – specifications given by the manufacturer:

Colour	Chromaticity Coordinates				Luminance Factor β	
		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	
Orange	x	0,610	0,535	0,506	0,570	$\geq 0,16$
	y	0,390	0,375	0,404	0,429	
Blue	x	0,130	0,160	0,160	0,130	$\geq 0,01$
	y	0,090	0,090	0,140	0,140	
Green	x	0,110	0,170	0,170	0,110	$\geq 0,03$
	y	0,415	0,415	0,500	0,500	
Red	x	0,735	0,700	0,610	0,660	$\geq 0,03$
	y	0,265	0,250	0,340	0,340	
Brown	x	0,455	0,523	0,479	0,558	0,03 to 0,09
	y	0,397	0,429	0,373	0,394	
Fluorescent Yellow-Green	x	0,387	0,369	0,428	0,460	$\geq 0,20$
	y	0,610	0,546	0,496	0,540	

Note: The values from Table 1 except Fluorescent Yellow-Green and Orange are in accordance with the chromaticity coordinates as well as with the luminance factor according to class CR2 as defined in EN 12899-1: 2007, Clause 4.1.

2 Specification of the intended use(s) in accordance with the applicable European Assessment Document (hereinafter EAD)

2.1 Intended use(s)

The construction product is used to manufacture sign faces for traffic signs according to EN 12899-1.

The intended use includes, for example:

- retro-reflective signs (see also EN 12899-1);
- road delineators with retro-reflective devices (see also EN 12899-3);
- variable message signs (see also EN 12966-1+A1).

The intended use excludes road-markings as defined in EN 1436. The envisage substrate is aluminium, galvanized steel, polycarbonate or other.

2.2. Working life/Durability

The assumed working life of the product is 10 years respectively 3 years for orange when installed in the works, provided that microprismatic retro-reflective sheeting is subject to appropriate installation. These provisions are based upon the current state of the art and the available knowledge and experience.

The indications given as to the working life of the construction product cannot be interpreted as a guarantee neither given by the product manufacturer or his representative nor by EOTA nor by the Technical Assessment Body issuing an ETA, but are regarded only as a means for expressing the expected economically reasonable working life of the product.

2.3 Manufacturing

The European Technical Assessment is issued for the product on the basis of agreed data/information, deposited with the Technical Assessment Body – Technický a skúšobný ústav stavebný, n. o., which identifies the product that has been assessed and judged. Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to the Technical Assessment Body – Technický a skúšobný ústav

stavebný, n. o. before the changes are introduced. The Technical Assessment Body – Technický a skúšobný ústav stavebný, n. o. will decide whether or not such changes affect the ETA and consequently the validity of the CE marking on the basis of the ETA and if so whether further assessment or alternations to the ETA shall be necessary.

Concerning product packaging, transport, storage, maintenance, replacement and repair it is the responsibility of manufacturer to undertake the appropriate measures and to advise his clients on the packaging, transport, storage, maintenance, replacement and repair of the product as he considers necessary.

The performances given in Section 3 are only valid, if the conditions laid down in the accompanying product data sheets and in the processing instruction given by the manufacturer have been respected throughout the production, processing, packaging, transport and storage of the product under this ETA.

Further information is given in Annex C.

3 Performance of the product and references to the methods used for its assessment

The performance of products is summarized in Table 2. The specific test condition were in accordance with Annex 1 of EAD 120001-01-0106.

Table 3 – Performance of the products

Product-types: RS-3000 Series RS-7000 Series		Intended use: Sign faces for traffic signs according to EN 12899-1	
No.	Essential characteristic	References to the methods used for assessment	Performance
Basic Works Requirement 4: Safety and accessibility in use			
Visibility characteristics			
1	Daylight chromaticity	2.2.1, EAD 120001-01-0106	Chromaticity coordinates (x, y) (-) See Annexes A and B
2	Luminance factor	2.2.1, EAD 120001-01-0106	β (-) See Annexes A and B
3	Night-time colour	2.2.2, EAD 120001-01-0106	No performance assessed
4	Coefficient of retro-reflection	2.2.3, EAD 120001-01-0106	R_A (cd.lx ⁻¹ .m ⁻²) See Annexes A and B
	4.1 Rotational symmetry	2.2.3, EAD 120001-01-0106	Ratio (-) See Annexes A and B
Durability			
5	Impact resistance	2.2.4, EAD 120001-01-0106	No cracking, no delamination from substrate
6	Temperature resistance	2.2.5, EAD 120001-01-0106	No performance assessed
7	Visibility after accelerated artificial weathering		
	7.1 Daylight chromaticity after accelerated artificial weathering	2.2.6.1, 2.2.6.3, 2.2.1 EAD 120001-01-0106	Chromaticity coordinates (x, y) (-) See Annexes A and B
	7.2 Luminance factor after accelerated artificial weathering	2.2.6.1, 2.2.6.3, 2.2.1 EAD 120001-01-0106	β (-) See Annexes A and B
	7.3 Coefficient of retro-reflection after accelerated artificial weathering	2.2.6.1, 2.2.6.4, 2.2.3 EAD 120001-01-0106	R_A (cd.lx ⁻¹ .m ⁻²) See Annexes A and B
8	Visibility after natural weathering	2.2.6.2, 2.2.1, 2.2.3 EAD 120001-01-0106	No performance assessed
9	Adhesion	2.2.7, EAD 120001-01-0106	No performance assessed
NOTE	BWRs 1, 2, 3, 5, 6 and 7 are not specified, see EAD 120001-01-0106.		

4 ASSESSMENT AND VERIFICATION OF CONSTANCY OF PERFORMANCE (HEREINAFTER AVCP) SYSTEM applied, with reference to its legal base

4.1 System of assessment and verification of constancy of performance

According to the European Commission Decision 96/579/EC, the AVCP system (further described in Annex V to Regulation (EU) No. 305/2011) applies 1.

Table 3 – System of assessment and verification of constancy of performance applicable to microprismatic retro-reflective sheeting

Product(s)	Intended use(s)	Level(s) or class(es)	System(s) of assessment and verification of constancy of performance
Road traffic signs and traffic control devices installed permanently for vehicular and pedestrian uses: permanent traffic signs	For circulation areas	Any	1

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

5.1 Tasks and responsibilities of the manufacturer

The cornerstones of the actions to be undertaken by the manufacturer of the product in the procedure of assessment and verification of constancy of performance are laid down in Clause 3.2 of the EAD 120001-01-0106.

5.2 Tasks and responsibilities of the notified body

The cornerstones of the actions to be undertaken by the notified body in the procedure of assessment and verification of constancy of performance for microprismatic retro-reflective sheetings are laid down in Clause 3.3 of the EAD 120001-01-0106.

Technický a skúšobný ústav stavebný, n. o.

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On behalf of the Technický a skúšobný ústav stavebný, n. o.

Bratislava, dd mm 2018

prof. Ing. Zuzana Sternová, PhD.
Head of Technical Assessment Body

Annexes

Annex A: **RS-3000 Series**

Daylight chromaticity and Luminance factor, Coefficient of retro-reflection and Rotational symmetry, Visibility after accelerated artificial weathering - Daylight chromaticity and Luminance factor, Visibility after accelerated artificial weathering - Coefficient of retro-reflection

Annex B – **RS-7000 Series**

Daylight chromaticity and Luminance factor, Coefficient of retro-reflection and Rotational symmetry, Visibility after accelerated artificial weathering - Daylight chromaticity and Luminance factor, Visibility after accelerated artificial weathering - Coefficient of retro-reflection

Annex C – Recommendations on installation

Table A.1 – Daylight chromaticity and Luminance factor

Colour	Chromaticity Coordinates (-)			Luminance Factor β (-)	
	Test results of three test specimens				
RS-3000 White	x	0,310	0,310	0,310	0,51
	y	0,330	0,330	0,330	0,49
RS-3001 Yellow	x	0,535	0,536	0,535	0,28
	y	0,459	0,458	0,459	0,28
RS-3002 Orange	x	0,577	0,578	0,579	0,17
	y	0,379	0,378	0,378	0,17
RS-3003 Blue	x	0,148	0,148	0,147	0,04
	y	0,111	0,112	0,112	0,04
RS-3004 Green	x	0,131	0,133	0,133	0,08
	y	0,446	0,446	0,446	0,08
RS-3005 Red	x	0,673	0,671	0,674	0,06
	y	0,313	0,313	0,313	0,06
RS-3006 Brown	x	0,487	0,492	0,492	0,04
	y	0,397	0,399	0,399	0,04

Table A.2 – Daylight chromaticity and Luminance factor after accelerated artificial weathering

Colour	Chromaticity Coordinates (-)			Luminance Factor β (-)	
	Test results of three test specimens				
RS-3000 White	x	0,309	0,308	0,308	0,51
	y	0,328	0,328	0,327	0,50
RS-3001 Yellow	x	0,537	0,536	0,535	0,27
	y	0,460	0,460	0,461	0,27
RS-3002 Orange	x	0,554	0,561	0,557	0,19
	y	0,394	0,392	0,393	0,18
RS-3003 Blue	x	0,144	0,144	0,145	0,05
	y	0,114	0,117	0,115	0,05
RS-3004 Green	x	0,130	0,132	0,132	0,08
	y	0,448	0,452	0,450	0,09
RS-3005 Red	x	0,666	0,668	0,665	0,07
	y	0,314	0,314	0,314	0,06
RS-3006 Brown	x	0,502	0,503	0,502	0,04
	y	0,403	0,404	0,403	0,04

NOTE Test results obtained on test specimens of dimensions (5,5 x 11) cm, for temperature measurement was used non-insulated black panel thermometer.

RS-3000 Series

A.1 Daylight chromaticity and Luminance factor
A.2 Daylight chromaticity and Luminance factor after accelerated artificial weathering

Annex A
of European Technical
Assessment
ETA 18/0xxx

Table A.3 - Coefficient of retro-reflection

Geometry of measurements, Rotation angle $\varepsilon = 0^\circ$		Coefficient of retro-reflection R_A (cd.lx ⁻¹ .m ²).						
		- Type of sheetings and test results of three specimens						
Observation Angle α	Entrance Angle β_1 ($\beta_2 = 0^\circ$)	RS-3000 White	RS-3001 Yellow	RS-3002 Orange	RS-3003 Blue	RS-3004 Green	RS-3005 Red	RS-3006 Brown
0,1°	5°	1256	984	395	111	291	219	143
		1328	982	419	113	241	205	125
		1272	1018	408	111	282	207	124
	15°	1100	855	331	92	260	198	118
		1179	885	355	97	207	190	108
		1111	892	350	91	258	183	107
	20°	1073	822	312	87	247	190	90
		1143	871	334	90	202	185	85
		1048	853	329	84	253	177	85
	30°	862	645	232	67	182	142	31
		901	672	257	63	165	145	34
		763	616	248	63	200	143	30
	40°	384	268	104	30	64	52	10,4
		387	237	115	23	74	56	12,2
		287	213	103	28	75	65	10,0
0,2°	5°	746	624	224	63	199	142	72
		774	626	238	62	168	137	64
		740	649	239	62	191	130	64
	15°	609	516	188	47	155	123	62
		638	520	203	49	124	118	58
		616	523	203	46	153	111	57
	20°	582	491	183	44	143	118	51
		609	500	197	45	113	114	49
		577	491	195	43	144	107	48
	30°	507	416	154	36	109	95	23
		527	410	173	35	96	95	25
		480	385	166	36	117	94	22
	40°	296	211	82	22	47	42	9,0
		298	185	92	16,6	55	46	10,6
		224	166	82	20	55	53	8,5
0,33°	5°	814	715	243	71	227	157	70
		805	737	264	69	203	161	68
		814	746	272	69	218	150	68
	15°	511	442	151	45	140	93	65
		505	435	161	42	125	94	65
		477	435	166	41	138	91	65
	20°	397	341	118	35	108	72	58
		386	333	124	31	97	73	57
		362	326	130	31	109	70	57
	30°	228	200	72	17,4	52	44	13,8
		223	182	82	15,2	49	44	15,7
		219	174	81	16,0	58	44	13,4
	40°	160	118	47	9,7	23	25	6,7
		159	100	52	7,4	27	27	8,1
		123	90	46	9,4	27	32	6,4
0,5°	5°	529	408	208	31	111	106	58
		565	424	222	30	93	104	56
		507	398	209	28	108	110	55
	15°	432	346	147	27	93	85	53
		436	366	154	26	79	86	52
		385	341	154	24	98	87	51
	20°	389	307	125	25	85	71	49
		385	326	129	25	74	75	48
		335	300	133	22	92	74	48

To be continued

RS-3000 Series

A.3 Coefficient of retro-reflection

Annex A
of European Technical
Assessment
ETA 18/0xxx

Table A.3 (concluded)

Geometry of measurements, Rotation angle $\varepsilon = 0^\circ$		Coefficient of retro-reflection R_A ($\text{cd.lx}^{-1}.\text{m}^{-2}$).						
		- Type of sheetings and test results of three specimens						
Observation Angle α	Entrance Angle β_1 ($\beta_2 = 0^\circ$)	RS-3000 White	RS-3001 Yellow	RS-3002 Orange	RS-3003 Blue	RS-3004 Green	RS-3005 Red	RS-3006 Brown
0,5°	30°	205	161	58	16,3	45	32	7,9
		195	160	61	13,9	46	34	8,9
		167	140	65	13,8	52	35	7,9
	40°	51	42	15,2	3,1	6,9	8,6	4,5
		48	32	16,7	2,2	10,3	9,5	5,7
		39	27	16,2	2,9	8,8	12,3	4,3
1,0°	5°	59	46	28	6,0	19,3	14,8	6,0
		54	54	27	5,2	16,4	17,0	6,2
		47	43	30	5,4	21	15,1	6,3
	15°	39	40	22	3,2	10,2	8,8	7,2
		37	35	23	2,5	9,3	9,3	7,2
		31	28	26	3,0	11,0	10,5	7,4
	20°	33	39	18,4	2,6	8,6	7,7	7,4
		31	28	19,8	2,2	8,5	8,2	7,3
		29	25	24	2,8	9,1	9,3	7,7
	30°	36	33	14,5	3,0	8,6	7,1	2,2
		37	29	15,0	2,3	8,6	7,7	2,2
		33	26	16,4	2,9	8,4	7,2	2,2
40°	19,1	17,8	7,2	1,2	3,8	3,7	0,6	
	19,0	14,8	7,5	1,1	4,0	4,1	0,7	
	18,2	14,2	7,7	1,1	3,9	4,8	0,6	
1,5°	5°	15,4	12,5	9,2	1,2	4,1	3,9	2,2
		16,1	13,2	9,5	1,1	3,9	4,6	2,0
		15,1	12,2	9,5	1,2	3,9	3,8	2,2
	15°	12,6	10,2	6,3	1,0	2,8	2,9	1,7
		12,1	10,2	6,7	0,8	2,9	3,2	1,7
		11,9	10,1	7,2	0,9	2,9	3,0	1,8
	20°	11,2	10,5	5,2	1,0	3,2	2,2	1,6
		10,5	9,4	5,6	0,9	3,1	2,6	1,6
		10,3	8,9	6,2	0,9	3,3	2,4	1,7
	30°	11,3	8,9	4,3	0,7	2,7	2,0	1,2
		10,8	9,5	4,7	0,6	2,3	2,1	1,2
		10,9	8,1	4,8	0,7	2,9	2,2	1,2
40°	11,0	7,8	3,7	0,6	1,4	1,8	0,5	
	14,1	7,7	4,0	0,6	1,5	2,0	0,5	
	10,3	7,3	3,6	0,5	1,6	1,9	0,5	
2,0°	5°	6,7	5,8	3,0	0,6	1,5	1,4	0,8
		6,8	5,5	3,1	0,6	1,6	1,7	0,7
		6,5	4,9	3,2	0,6	1,5	1,2	0,8
	15°	4,9	4,0	2,4	0,4	1,1	0,9	0,8
		4,9	3,8	2,5	0,4	1,2	1,0	0,7
		4,5	3,5	2,5	0,4	1,1	1,0	0,8
	20°	4,9	4,1	2,5	0,3	1,1	1,0	0,8
		4,7	4,2	2,7	0,3	1,1	1,0	0,8
		4,6	3,5	2,6	0,4	1,1	1,0	0,7
	30°	4,4	4,3	2,3	0,4	1,0	0,8	0,4
		4,1	3,5	2,2	0,3	1,2	0,9	0,3
		4,1	3,3	2,4	0,4	1,1	0,9	0,3
40°	2,9	2,2	1,0	0,2	0,8	0,6	0,3	
	3,3	2,4	1,0	0,2	0,6	0,5	0,3	
	3,4	2,4	0,9	0,2	0,7	0,5	0,3	

RS-3000 Series
A.3 Coefficient of retro-reflection
**Annex A
of European Technical
Assessment
ETA 18/0xxx**

Table A.4 - Rotational symmetry

Colour	Coefficient of retro-reflection R_A ($\text{cd.lx}^{-1}.\text{m}^{-2}$)							Ratio between min. and max. R_A
	Geometry of measurements $\alpha = 0,33^\circ, \beta_1 = 5^\circ (\beta_2 = 0^\circ)$							
	ε	-75°	-50°	-25°	0°	+25°	+50°	
RS-3000 White	Test results of three specimens	795	496	579	814	611	429	1,90 : 1
		790	471	538	805	604	434	1,85 : 1
		727	421	533	814	608	387	2,10 : 1
RS-3001 Yellow	Test results of three specimens	555	354	466	715	559	342	2,09 : 1
		639	406	490	737	545	350	2,11 : 1
		562	345	475	746	570	337	2,21 : 1
RS-3002 Orange	Test results of three specimens	207	131	161	243	203	155	1,85 : 1
		219	143	178	264	208	153	1,85 : 1
		223	142	182	272	220	154	1,92 : 1
RS-3003 Blue	Test results of three specimens	79	58	56	71	61	59	1,41 : 1
		81	54	53	69	59	48	1,69 : 1
		70	52	53	69	57	47	1,49 : 1
RS-3004 Green	Test results of three specimens	166	129	152	227	194	138	1,76 : 1
		174	134	149	203	167	117	1,74 : 1
		189	143	152	218	177	131	1,66 : 1
RS-3005 Red	Test results of three specimens	115	69	97	157	120	67	2,34 : 1
		116	71	98	161	126	75	2,27 : 1
		121	70	93	150	129	70	2,14 : 1
RS-3006 Brown	Test results of three specimens	66	66	69	70	71	72	1,09 : 1
		67	62	62	68	71	74	1,19 : 1
		66	63	65	68	70	71	1,13 : 1

Table A.5 – Coefficient of retro-reflection after accelerated artificial weathering

Geometry of measurements, Rotation angle $\varepsilon = 0^\circ$		Coefficient of retro-reflection R_A ($\text{cd.lx}^{-1}.\text{m}^{-2}$).						
		- Type of sheetings and test results of three specimens						
Observation Angle α	Entrance Angle β_1 ($\beta_2 = 0^\circ$)	RS-3000 White	RS-3001 Yellow	RS-3002 Orange	RS-3003 Blue	RS-3004 Green	RS-3005 Red	RS-3006 Brown
0,33°	5°	679	474	13,4	47	158	76	32
		632	505	13,3	50	150	93	35
		591	467	13,5	47	144	96	32
	30°	166	142	4,5	10,1	34	26	8,3
		175	142	4,1	10,5	32	31	8,3
		176	124	4,3	10,7	27	32	8,2
1,0°	5°	47	35	5,7	2,7	12,7	9,2	4,6
		49	42	5,3	3,1	10,2	10,4	5,0
		49	35	6,0	2,5	9,1	12,4	5,0
	30°	31	28	2,9	2,1	6,4	6,1	1,2
		37	30	2,7	2,4	6,5	6,3	1,2
		36	24	2,9	2,3	5,0	7,2	1,4

NOTE Test results obtained on test specimens of dimensions (5,5 x 11) cm, for temperature measurement was used non-insulated black panel thermometer.

RS-3000 Series
A.4 Rotational symmetry
A.5 Coefficient of retro-reflection after accelerated artificial weathering
**Annex A
of European Technical
Assessment
ETA 18/0xxx**

Table B.1 – Daylight chromaticity and Luminance factor

Colour	Chromaticity Coordinates (-)			Luminance Factor β (-)	
	Test results of three test specimens				
RS-7000 White	x	0,309	0,309	0,309	0,46
	y	0,329	0,329	0,330	0,47 0,47
RS-7012 Fluorescent Yellow-Green	x	0,407	0,407	0,407	0,81
	y	0,569	0,569	0,569	0,81 0,82

Table B.2 – Daylight chromaticity and Luminance factor after accelerated artificial weathering

Colour	Chromaticity Coordinates (-)			Luminance Factor β (-)	
	Test results of three test specimens				
RS-7000 White	x	0,309	0,308	0,309	0,50
	y	0,328	0,326	0,328	0,47 0,49
RS-7012 Fluorescent Yellow-Green	x	0,423	0,424	0,422	0,63
	y	0,535	0,537	0,532	0,65 0,62

NOTE Test results obtained on test specimens of dimensions (5,5 x 11) cm, for temperature measurement was used non-insulated black panel thermometer.

RS-7000 Series

B.1 Daylight chromaticity and Luminance factor
B.2 Daylight chromaticity and Luminance factor after accelerated artificial weathering

Annex B
of European Technical
Assessment
ETA 18/0xxx

Table B.3 - Coefficient of retro-reflection

Geometry of measurements, Rotation angle $\varepsilon = 0^\circ$		Coefficient of retro-reflection R_A (cd.lx ⁻¹ .m ⁻²).					
		- Type of sheetings and test results of three specimens					
Observation Angle α	Entrance Angle β_1 ($\beta_2 = 0^\circ$)	RS-7000 White			RS-7012 Fluorescent Yellow-Green		
0,1°	5°	703	672	753	647	579	638
	15°	491	448	525	502	440	509
	20°	434	392	464	462	410	473
	30°	317	293	338	357	323	368
	40°	140	125	147	160	131	161
0,2°	5°	361	345	375	354	328	361
	15°	260	238	275	290	269	298
	20°	248	224	263	281	262	288
	30°	218	201	233	246	227	253
	40°	111	99	117	127	106	128
0,33°	5°	438	421	491	379	348	387
	15°	213	202	234	219	194	230
	20°	157	148	171	172	159	181
	30°	109	103	115	122	116	125
	40°	65	57	66	73	62	73
0,5°	5°	405	354	369	356	347	370
	15°	223	203	226	240	213	255
	20°	178	166	187	196	173	210
	30°	83	85	90	94	85	101
	40°	22	20	23	25	22	25
1,0°	5°	42	42	39	60	62	67
	15°	33	42	34	49	44	56
	20°	31	43	33	40	37	45
	30°	26	28	26	27	26	28
	40°	9,2	8,8	9,6	12,7	9,0	12,9
1,5°	5°	12,0	11,5	12,2	19,5	21	23
	15°	9,5	9,4	9,3	13,8	12,5	15,1
	20°	9,0	9,6	9,1	10,9	10,2	11,7
	30°	11,6	11,5	11,2	10,8	10,3	10,9
	40°	4,6	4,0	4,8	4,8	5,0	5,1
2,0°	5°	5,1	5,0	5,0	7,4	7,8	8,0
	15°	4,1	4,1	4,2	5,2	5,5	5,5
	20°	4,5	4,2	4,4	5,4	6,1	5,8
	30°	4,3	4,5	4,2	5,0	4,5	5,4
	40°	2,1	1,9	2,1	2,2	2,2	2,3

RS-7000 Series

B.3 Coefficient of retro-reflection

**Annex B
of European Technical
Assessment
ETA 18/0xxx**

Table B.4 Rotational symmetry

Colour	Coefficient of retro-reflection R_A (cd.lx ⁻¹ .m ⁻²)							Ratio between min. and max. R_A
	Geometry of measurements $\alpha = 0,33^\circ, \beta_1 = 5^\circ (\beta_2 = 0^\circ)$							
	ϵ	-75°	-50°	-25°	0°	+25°	+50°	
RS-7000 White	Test results of three specimens	400	312	332	438	359	274	1,60 : 1
		387	279	320	421	361	280	1,51 : 1
		424	292	358	491	412	284	1,73 : 1
RS-7012 Fluorescent Yellow-Green	Test results of three specimens	288	216	270	379	313	215	1,76 : 1
		271	200	248	348	287	198	1,76 : 1
		288	214	278	387	320	211	1,83 : 1

Table B.5 – Coefficient of retro-reflection after accelerated artificial weathering

Geometry of measurements, Rotation angle $\epsilon = 0^\circ$		Coefficient of retro-reflection R_A (cd.lx ⁻¹ .m ⁻²). - Type of sheetings and test results of three specimens					
Observation Angle α	Entrance Angle β_1 ($\beta_2 = 0^\circ$)	RS-7000 White			RS-7012 Fluorescent Yellow-Green		
0,33°	5°	103	123	106	225	215	242
	30°	28	36	33	59	53	61
1,0°	5°	24	25	26	27	26	27
	30°	12,1	12,5	13,0	13,3	13,0	14,6

NOTE Test results obtained on test specimens of dimensions (5,5 x 11) cm, for temperature measurement was used non-insulated black panel thermometer.

RS-7000 Series

B.4 Rotational symmetry

B.5 Coefficient of retro-reflection after accelerated artificial weathering

**Annex B
of European Technical
Assessment
ETA 18/0xxx**

Please could you add the basic information about instalation of your products . Below is an example from another ETA

EXAMPLE!!!!

Design

The envisage substrate are aluminium, galvanized steel, polycarbonate or other.

Surfaces to which the material will be applied must be thoroughly cleaned from dust, grease or any contamination, which could affect the adhesion of the material. Freshly lacquered or painted surfaces should be completely cured. The compatibility of selected lacquers and paints should be tested by the user, prior to application of the material.

The product shall comply with characteristics of the national regulations.

Application

For the application of the retro-reflective film detailed information have been published by the manufacturer. In the following only some most important aspects of the application:

Cutting, die cutting, plotting

Product can be cut by means of a commercial stack cutter. The holding-down clamp should be set to very low pressure and, as an additional measure, the film be protected from compression. It is recommended limiting the stacking height 40 sheets to 50 sheets.

Commercial cutting plotters with tangential blades, preferably of the flatbed type, should be used as plotter systems.

Adhesive bonding and laminating

The self-adhesive reflective material can only be used for dry application.

Bonding should not be carried out at air and material temperatures of less than 15 °C. The optimum bonding temperature is about 21 °C. The films should be stored for a period of at least 48 hours in the premises designated for their processing.

In order to achieve good adhesion of the films, the substratum must be dry and free of dust, oil, fats, silicon or other contamination. If the substratum needs to be treated with a solvent, the next processing step cannot be carried out until the solvent is completely evaporated. When bonding films to metallic substrata, slight grinding of the surfaces is advantageous.

When several film webs need to be bonded side by side, they should always overlap. Depending on the format, the overlap should be 3 mm to 5 mm. Please make sure that a right side of the film web is always bonded to a left side, thus ensuring the uniform orientation of the film's honeycomb structure.

Packaging, transport and storage

xxxx should be stored in a cool and dry place that is protected from direct sunlight. It is recommended temperatures ranging from 20 °C to 24 °C and relative air humidity of 40 % to 60 %.

Rolled material should be handled and stored in the original carton. The rolls have standard spacers that prevent contact between the roll surface and the carton and thus the formation of pressure marks and surface damage. Please make sure that partly processed rolls, too, are never stored or handled without spacer.

When making the rolls available for processing, it is advisable to use a horizontal suspension system (such as a paternoster system or a rack). Even if the rolls are stored in a vertical, freestanding position, a negative influence on the film's characteristics is generally not expected. Here again, it is crucial to place the roll on the spacer so as to avoid breakage of the edges. In practice it was shown, however, that this type of storage complicates the handling of the films. Blank or printed film sheets are supplied in cartons that have been designed especially for the sheet dimensions, 50 sheets per carton. If the sheets are stored outside the carton, please make sure to put individual sheets on a flat and stable support so that they do not adjoin or overlap at the edges. Sheets may be stacked. In order to limit the weight load, not more than 40 sheets to 50 sheets should be stacked.

It is the responsibility of the manufacturer(s) to ensure that these provisions are easily accessible to the concerned people.

Recommendation on installation

Annex C
of European Technical
Assessment
ETA 18/0xxx

STANDARDS

Regulation (EU) No. 305/2011 of the European Parliament and of the council of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/ECC

EAD 120001-01-0106	Microprismatic retro-reflective sheetings
EN 1436	Road marking materials. Road marking performance for road users
EN 12899-1	Fixed, vertical road traffic signs. Part 1: Fixed signs
EN 12899-3	Fixed, vertical road traffic signs. Part 3: Delineator posts and retroreflectors
EN 12966-1+A1	Road vertical signs. Variable message traffic signs. Part 1: Product standard