

Declaration of Performance/ Leistungserklärung 3M Diamond Grade DG³

Construction Product Code / Bezeichnung des Bauproduktes

Microprismatic Retroreflective Sheeting

1. 3M Diamond Grade DG³ Series 4000
2. 3M Diamond Grade DG³ Series 4000 + 3M Electrocut Film Series 1170
3. 3M Diamond Grade DG³ Series 4000 printed with 3M Process Colour Series 880 I or N
4. 3M Diamond Grade DG³ Series 4000 + 3M Piezo Inkjet Ink Series 8800UV + 3M Electrocut Film 1170
5. 3M Diamond Grade DG³ Series 4000 + 3M Piezo Inkjet Ink Series 8800UV + 3M Dew Resistant Overlay Film 1180
6. 3M Diamond Grade DG³ Series 4000 + 3M Dew Resistant Overlay Film 1180
7. 3M Diamond Grade DG³ Series 4000 + 3M Premium Protective Overlay Film 1160
8. 3M Diamond Grade DG³ 4090 + 3M Electrocut Film 1176 with or without 3M Protective Overlay Film
9. 3M Diamond Grade DG³ Series 4000 + 3M Piezo Inkjet Ink Series 8800UV + 3M Premium Protective Overlay Film 1160
10. 3M Diamond Grade DG³ Series 4000 + 3M Electrocut Film Series 1170 + 3M Dew Resistant Overlay Film 1180
11. 3M Diamond Grade DG³ 4081&4091 + 3M™ Piezo Inkjet Ink Series 8800UV + 3M™ Electrocut Film 1170
12. 3M Diamond Grade Translucent DG³ 4090T + 3M Electrocut Film Series 1170
13. 3M Diamond Grade Translucent DG³ 4090T printed with 3M Process Colour Series 880 I or N

Intended Use / Verwendungszweck

The construction product is used to manufacture sign faces for permanent traffic signs. The intended use includes, for example:

- Retro-reflective signs, retro-reflective and transilluminated signs (see also EN 12899-1)
- Variable message signs (see also EN 12966-1)

Das Bauprodukt wird für die Herstellung von Signalbildern von ortsfesten, vertikalen Verkehrszeichen verwendet. Der Verwendungszweck schließt z.B. ein:

- Retroreflektierende Verkehrszeichen, retroreflektierende und innenbeleuchtete Verkehrszeichen (siehe EN 12899-1)
- Wechselverkehrszeichen (siehe EN 12966-1)

Manufacturer / Hersteller



3M Deutschland GmbH
Carl-Schurz-Str.1
D – 41453 Neuss

Assessment and Verification of Constancy of Performance / Bewertung und Überprüfung der Leistungsbeständigkeit

System 1

StrAus-Zert, notified body 0913, Fleyer Str. 204, D-58097 Hagen performs the continuous surveillance, assessment and evaluation of the factory production control under system 1 and issued the certificate of constancy of performance 0913-CPR-2018 / 04.

/

StrAus-Zert, notifizierte Stelle Nr. 0913, Fleyer Str. 204, D-58097 Hagen führt die laufende Überwachung, Beurteilung und Anerkennung der werkseigenen Produktionskontrolle nach System 1 durch und hat das Zertifikat der Leistungsbeständigkeit 0913-CPR-2018 / 04 ausgestellt.

UBAtc, Rue du Lombard 42, B-1000 Brussels, performed the initial type testing and initial inspection of the factory and the FPC under system 1 and issued ETA 18/0405.

/

UBAtc, Rue du Lombard 42, B-1000 Brussels, führte die Erstprüfung und Erstinspektion des Werks und der werkseigenen Produktionskontrolle nach System 1 durch und hat ETA 18/0405 ausgestellt.

Declared Performance / erklärte Leistung (ETA 18/0405)

Safety in Use / Nutzungssicherheit

Essential Characteristics / Wesentliche Merkmale	Performance / Leistung	Technical Specification / Technische Spezifikation
Visibility Characteristics		
Daytime Colour and Luminance Factor	Table 1.2 (see Amendment)	EAD 120001-01-0106 (sept 2016) ETA 18/0405
Coefficient of Retroreflection	Table A.1, A.2, A.3 (see Amendment)	
Rotational Symmetry	Ratio > 1:2.5	
Durability		
Temperature Resistance (only combination 1-3 of above product code list)	85% - 115% at 80°C	EAD 120001-01-0106 (sept 2016) ETA 18/0405
Impact Resistance	No apparent cracking or delamination	
Daytime Colour and Luminance Factor:	Table 1.3 (see Amendment)	
Coefficient of Retroreflection	Values > 80% of Table A.1, A.2, A.3 (see Amendment)	

The performance of the construction product identified above is in conformity with the declared performance. This declaration of performance is issued under the sole responsibility of the manufacturer. /

Die Leistung des oben genannten Bauproduktes entspricht der erklärten Leistung. Verantwortlich für die Erstellung dieser Leistungserklärung ist allein der Hersteller.

Neuss, August 2020

ppa. Dr. Chris Howitt
Technical Director
3M EMEA Area

Amendment to the Declaration of Performance '3M Diamond Grade DG³'

This declaration covers the product 'Microprismatic retroreflective sheeting'. Sign plates or complete assemblies of fixed vertical road traffic signs according to EN 12899-1:2007 can be manufactured with the following products and product combinations, according to ETA 18/0405 and respective Evaluation Reports.

Components	Trade name	Colours/code	Characteristics
Microprismatic retro-reflective sheeting	3M™ Diamond Grade™ DG ³ Reflective Sheeting Series 4000	White 4090	Thickness: 0,32 – 0,49 mm Rolls in various length and width
		White Translucent 4090T	
		Red 4092	
		Yellow 4091	
		Green 4097	
		Blue 4095	
		Fluorescent Yellow 4081	
		Fluorescent Orange 4084	
		Fluorescent Yellow Green 4083	
Overlay film	3M™ Electrocut Film Series 1170	Clear 1170	Combined Thickness: 0,549 mm Rolls in various length and width
		Yellow 1171	
		Red 1172	
		Blue 1175	
		Worboys (Dark) Green 1176	
		Green 1177	
Process colour	3M™ Process Colour Series 880 I or N	Brown 1179	20 - 25 m²/l
		Yellow 884 I or N	
		Blue 883 I or N	
		Green 888 I or N	
		Red 882 I or N	
Process colour for digital printing	3M™ Piezo Inkjet Ink Series 8800 UV	Dark Green 886 I or N	18 - 20 m²/l
		Yellow	
		Red	
		Blue	
		Green	
Overlay film	3M™ Premium Protective Overlay Film 1160	Brown	Combined Thickness: 0,549 mm Rolls in various length and width
		Clear	
Overlay film	3M™ Dew Resistant Overlay Film 1180	Clear	Combined Thickness: 0,549 mm Rolls in various length and width
		Clear	
Overlay film	3M™ Protective Overlay Film 1150	Clear	Combined Thickness: 0,549 mm Rolls in various length and width
		Clear	

Table 1.1: Complete set of Micro-prismatic retro-reflective sheeting covered by this ETA

Colours		Chromaticity Coordinates				Luminance Factor B
		1	2	3	4	
White	x	0.305	0.335	0.325	0.295	≥ 0.40
Tolerance Sphere*	y	0.315	0.345	0.355	0.325	
White Translucent	x	0.305	0.335	0.325	0.295	≥ 0.27
Tolerance Sphere*	y	0.315	0.345	0.355	0.325	
Yellow	x	0.494	0.470	0.513	0.545	≥ 0.24
Tolerance Sphere*	y	0.505	0.480	0.437	0.454	
Yellow Translucent	x	0.494	0.470	0.513	0.545	≥ 0.16
Tolerance Sphere*	y	0.505	0.480	0.437	0.454	
Red	x	0.735	0.700	0.610	0.660	≥ 0.03
Tolerance Sphere*	y	0.265	0.250	0.340	0.340	
Red on Yellow, Fluorescent Yellow or Fluorescent Yellow Green	x	0.735	0.700	0.610	0.660	≥ 0.03
Tolerance Sphere*	y	0.265	0.250	0.340	0.340	
Blue	x	0.130	0.160	0.160	0.130	≥ 0.01
Tolerance Sphere*	y	0.090	0.090	0.140	0.140	
Green	x	0.110	0.170	0.170	0.110	≥ 0.03
Tolerance Sphere*	y	0.415	0.415	0.500	0.500	
Orange	x	0.631	0.560	0.506	0.570	≥ 0.14
Tolerance Sphere	y	0.369	0.360	0.404	0.429	
Brown	x	0.455	0.523	0.479	0.558	0.03-0.09
Tolerance Sphere*	y	0.397	0.429	0.373	0.394	
Grey	x	0.305	0.335	0.325	0.295	0.11-0.18
Tolerance Sphere*	y	0.315	0.345	0.355	0.325	
Dark Green	x	0.313	0.313	0.248	0.127	0.01-0.07
Tolerance Sphere	y	0.682	0.453	0.409	0.557	
Fluorescent yellow reference	x	0.521	0.557	0.479	0.454	≥ 0.38
	y	0.424	0.442	0.520	0.491	
Fluorescent orange reference	x	0.595	0.645	0.570	0.531	≥ 0.25
	y	0.351	0.355	0.429	0.414	
Fluorescent yellow green reference	x	0.387	0.460	0.438	0.376	≥ 0.70
	y	0.610	0.540	0.508	0.568	

* Chromaticity Coordinates are similar to EN 12899-1:2007 Class CR2

Table 1.2: Manufacturer's specification for initial daylight chromaticity and luminance factor

Colours		Chromaticity Coordinates				Luminance Factor β
		1	2	3	4	
White	x	0.355	0.305	0.285	0.335	≥ 0.40
Tolerance Sphere*	y	0.355	0.305	0.325	0.375	
White Translucent	x	0.355	0.305	0.285	0.335	≥ 0.27
Tolerance Sphere*	y	0.355	0.305	0.325	0.375	
Yellow	x	0.545	0.487	0.427	0.465	≥ 0.24
Tolerance Sphere*	y	0.454	0.423	0.483	0.534	
Yellow Translucent	x	0.545	0.487	0.427	0.465	≥ 0.16
Tolerance Sphere*	y	0.454	0.423	0.483	0.534	
Red	x	0.735	0.674	0.569	0.655	≥ 0.03
Tolerance Sphere*	y	0.265	0.236	0.341	0.345	
Red on Yellow, Fluorescent Yellow or Fluorescent Yellow Green	x	0.735	0.674	0.569	0.655	≥ 0.03
Tolerance Sphere*	y	0.265	0.236	0.341	0.345	
Blue	x	0.078	0.150	0.210	0.137	≥ 0.01
Tolerance Sphere*	y	0.171	0.220	0.160	0.038	
Green	x	0.007	0.248	0.177	0.026	≥ 0.03
Tolerance Sphere*	y	0.703	0.409	0.362	0.399	
Orange	x	0.631	0.560	0.506	0.570	≥ 0.14
Tolerance Sphere	y	0.369	0.360	0.404	0.429	
Brown	x	0.455	0.523	0.479	0.558	0.03-0.09
Tolerance Sphere*	y	0.397	0.429	0.373	0.394	
Grey	x	0.350	0.300	0.285	0.335	0.11-0.18
Tolerance Sphere*	y	0.360	0.310	0.325	0.375	
Dark Green	x	0.313	0.313	0.248	0.127	0.01-0.07
Tolerance Sphere*	y	0.682	0.453	0.409	0.557	
Fluorescent yellow reference	x	0.521	0.557	0.479	0.454	≥ 0.38
	y	0.424	0.442	0.520	0.491	
Fluorescent orange reference	x	0.595	0.645	0.570	0.531	≥ 0.25
	y	0.351	0.355	0.429	0.414	
Fluorescent yellow green reference	x	0.387	0.460	0.438	0.376	≥ 0.70
	y	0.610	0.540	0.508	0.568	

* Chromaticity Coordinates are similar to EN 12899-1:2007 Class CR1

Table 1.3: Manufacturer's specification for daylight chromaticity and luminance factor 'in-use'

Geometry of measurement		Colour								
α	$\beta_1 (\beta_2 = 0)$	White	Yellow	Red	Green	Dark Green ‡	Blue	Brown ‡	Orange	Grey ‡
20'	+5°	300	195	60	30	24	19	9	150	150
	+20°	240	155	48	24	19	16	7.2	120	120
	+30°	165	110	33	17	13	11	5.0	83	82
	+40°	30	20	6	3	2.4	2	#	15	15
1°	+5°	35	23	7	3.5	2.8	2.5	1.1	18	17
	+20°	30	20	6	3	2.4	2	#	15	15
	+30°	20	13	4	2	1.6	1.5	#	10	10
	+40°	3.5	2	1	#	#	#	#	2	1.8
1.5°	+5°	15	10	3	1.5	1.2	1	#	7.5	7.5
	+20°	13	8	2.5	1	1.0	#	#	6.5	6.5
	+30°	9	6	2	#	#	#	#	4.5	4.5
	+40°	1.5	1	#	#	#	#	#	1	#
‡ Indicates additional colours required by UK national legislation										
# Indicates "Value greater than zero but not significant or applicable"										
NOTE Coloured areas of signs created by digital or screen printing or using overlay film will need to meet 70 % of the values in the table.										

Table A.1

Manufacturer's Specification for the Minimum Initial Coefficient of Retro-reflection R_A value
(see UK National Annex to EN 12899-1:2007 Class R3B-UK; DIN 67520:2013-10 Class RA 3B;
Önorm V 2050:2006-01-01 Typ 3; TLP VZ Class RA3)

Table NA.1C — Minimum coefficient of retroreflection for high-performance materials (Class R3C-UK) (unit: $\text{cdlx}^{-1}\text{m}^{-2}$)

Geometry of measurement		Colour								
α	$\beta_1 (\beta_2 = 0)$	White	Yellow	Red	Green	Dark Green	Blue	Brown	Fluorescent Yellow	Fluorescent Orange
0.2°	+5°	580	435	87	58	42	26	17	350	175
	+30°	220	165	33	22	16	10	7	130	66
0.33°	+5°	300	250	75	35	29	17	10	180	90
	+30°	140	128	30	18	11	7	5	90	42
0.5°	+5°	420	315	63	42	21	19	13	250	125
	+30°	150	110	23	15	7.5	7	5	90	45
1.0°	+5°	120	90	18	12	6	5	4	72	36
	+30°	45	34	7	5	2	2	1	27	14
NOTE 1 When material is sampled, processed and tested per manufacturer's Declaration of Performance and EAD 120001-00-0106, Section 2.2.3.										
NOTE 2 The requirements of Class R3C-UK are based on ASTM Type XI.										

Table A.2

Manufacturer's Specification for the Minimum Initial Coefficient of Retro-reflection R_A value
(see UK National Annex to EN 12899-1:2007 Class R3C-UK; Coloured areas of signs created by digital or screen printing will need to meet 70% of the values in the table)

Geometry of measurements		Colour							
α	β_1 ($\beta_2 = 0$)	White	Yellow	Red	Blue	Green	Fluorescent yellow	Fluorescent orange	Fluorescent Yellow Green
0.1°	+5°	850	550	170	55	85			
	+20°	600	390	120	40	60			
	+30°	425	275	85	28	40			
	+40°	200	140	40	10	20			
0.2°	+5°	625	400	125	40	60		200	375
	+15°	350	270	90	20	35		175	
	+20°	450	290	90	30	45			
	+30°	325	210	65	20	30		120	200
	+40°	160	112	32	8	16		80	36
0.33°	+5°	425	275	85	28	40		150	270
	+15°	250	200	65	15	25		130	
	+20°	300	195	60	20	30			
	+30°	225	145	45	15	20		90	140
	+40°	110	77	22	5.5	11		60	24
1.0°	+5°	80	65	20	5	10		7.5	70
	+15°	60	45	16	3.5	7		5	
	+20°								
	+30°	50	40	13	2.5	5		2.5	43
	+40°	15	13	4	1	2		2.5	9

Table A.3

Manufacturer's Specification for the Minimum Initial Coefficient of Retro-reflection R_A value
(see Belgium PTV Nr. 662: Class PTV-3A; PTV-3B; PTV-3C; DIN 67520:2013-10 Class RA 3A;
Coloured areas of signs created by digital or screen printing will need to meet 70% of the values in the table)