

# Declaration of Performance/ Leistungserklärung 3M Diamond Grade DG<sup>3</sup> DS

## *Construction Product Code / Bezeichnung des Bauproduktes*

### Microprismatic Retroreflective Sheeting

1. 3M Diamond Grade DG<sup>3</sup> Prismatic Digital Sheeting 4090DS + 3M Piezo Inkjet Ink + 3M Protective Overlay Film 1170
2. 3M Diamond Grade DG<sup>3</sup> Prismatic Digital Sheeting 4090DS + 3M Piezo Inkjet Ink + 3M Protective Overlay Film 1170 + 3M Premium Protective Overlay Film 1160

## *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-2017/04.

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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-2017/04 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 17/0490 on the basis of EAD 120001-01-0106.

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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 17/0490 auf der Basis von EAD 120001-01-0106 ausgestellt.

*Declared Performance / erklärte Leistung (ETA 17/0490 Version 02)*

Safety in Use / Nutzungssicherheit

Essential Characteristics / Wesentliche Merkmale	Performance / Leistung	Technical Specification / Technische Spezifikation
<b>Visibility Characteristics</b>		
Daylight Chromaticity and Luminance Factor	Table 1.2 (see Amendment)	EAD 120001-01-0106 (sept 2016) ETA 17/0490 Version 2
Coefficient of Retro-reflection	Table A.1, A.2, A.3 (see Amendment)	
Rotational Symmetry	Ratio > 1:2.5	
<b>Durability</b>		
Impact Resistance	No apparent cracking or delamination	EAD 120001-01-0106 (sept 2016) ETA 17/0490 Version 2
<b>Visibility after accelerated artificial weathering</b>		
Daylight Chromaticity and Luminance Factor	Table 1.3 (see Amendment)	
Coefficient of Retro-reflection	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, November 2021



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3M EMEA Area

## Amendment to the Declaration of Performance '3M Diamond Grade DG<sup>3</sup> DS'

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 17/0490 and respective Evaluation Reports.

<i>Components</i>	<i>Trade name</i>	<i>Colours/code</i>
Micro-prismatic retro-reflective sheeting	3M™ Diamond Grade™ DG <sup>3</sup> Prismatic Digital Sheeting 4090DS	White 4090DS
Process Colour for digital printing	3M™ Piezo Inkjet Ink Series 8800UV or 8900 UV	Yellow Red Blue Green Orange Brown Grey Dark Green
Overlay Film	3M™ Protective Overlay Film	Clear 1170
Overlay Film	3M™ Dew Resistant Overlay Film	1180 I
Overlay Film	3M™ Premium Protective Overlay Film	1160

Colours	Chromaticity Coordinates				Luminance Factor $\beta$	
	1	2	3	4		
White	x	0.305	0.335	0.325	0.295	$\geq 0.40$
Tolerance Sphere	y	0.315	0.345	0.355	0.325	
Yellow	x	0.494	0.470	0.513	0.545	$\geq 0.24$
Tolerance Sphere	y	0.505	0.480	0.437	0.454	
Red	x	0.735	0.700	0.610	0.660	$\geq 0.03$
Tolerance Sphere	y	0.265	0.250	0.340	0.340	
Blue	x	0.130	0.160	0.160	0.130	$\geq 0.01$
Tolerance Sphere	y	0.090	0.090	0.140	0.140	
Green	x	0.110	0.170	0.170	0.110	$\geq 0.03$
Tolerance Sphere	y	0.415	0.415	0.500	0.500	
Orange	x	0.631	0.560	0.506	0.570	$\geq 0.14$
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	

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

Colours	Chromaticity Coordinates				Luminance Factor $\beta$	
	1	2	3	4		
White	x	0.355	0.305	0.285	0.335	$\geq 0.40$
Tolerance Sphere	y	0.355	0.305	0.325	0.375	
Yellow	x	0.545	0.487	0.427	0.465	$\geq 0.24$
Tolerance Sphere	y	0.454	0.423	0.483	0.534	
Red	x	0.735	0.674	0.569	0.655	$\geq 0.03$
Tolerance Sphere	y	0.265	0.236	0.341	0.345	
Blue	x	0.078	0.150	0.210	0.137	$\geq 0.01$
Tolerance Sphere	y	0.171	0.220	0.160	0.038	
Green	x	0.007	0.248	0.177	0.026	$\geq 0.03$
Tolerance Sphere	y	0.703	0.409	0.362	0.399	
Orange	x	0.631	0.560	0.506	0.570	$\geq 0.14$
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	

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

Geometry of measurement		Colour								
$\alpha$	$\beta_1 (\beta_2 = 0)$	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								
$\alpha$	$\beta_1 (\beta_2 = 0)$	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				
$\alpha$	$\beta_1$ ( $\beta_2 = 0$ )	White	Yellow	Red	Blue	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
	+15°	350	270	90	20	35
	+20°	450	290	90	30	45
	+30°	325	210	65	20	30
0.33°	+5°	425	275	85	28	40
	+15°	250	200	65	15	25
	+20°	300	195	60	20	30
	+30°	225	145	45	15	20
1.0°	+40°	110	77	22	5.5	11
	+5°	80	65	20	5	10
	+15°	60	45	16	3.5	7
	+20°					
	+30°	50	40	13	2.5	5
	+40°	15	13	4	1	2

**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)