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UBAtc Assessment Operator:
COPRO
Z.1 Researchpark, Kranenberg 190
B-1731 ZELLIK (Asse)
www.copro.eu – info@copro.eu

**Technical Assessment Body issuing the European Technical Assessment: UBAtc.
UBAtc has been designated according to Article 29 of Regulation (EU) No 305/2011 and is member of EOTA (European Organisation for Technical Assessment)**

Trade name of the construction product:	3M™ Diamond Grade™ DG³ Series 4000 with and without various combinations of process colour and overlay film
Product family to which the construction product belongs:	Microprismatic retro-reflective sheetings
Manufacturer:	3M Deutschland GmbH Carl Schurz Strasse 1 D- 41453- Neuss - Deutschland
Manufacturing plant(s):	3M Deutschland GmbH Plant Hilden Düsseldorfer Str. 121-125 D-40705 Hilden 3M Innovation Singapore Pte Ltd. 2 Tuas Link 4 Singapore 63732 1SG – Singapore 3M Brownwood 4501 Highway 377 South Brownwood, Texas 76801 USA
Website:	www.3m.com
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of:	European Assessment Document (EAD): 120001-01-0106 September 2016
This version replaces:	European Technical Approvals 11/0521 and 11/0522 and 13/0303, all issued on 27 June 2013
This European Technical Assessment contains:	44 pages, without any annexes

European Organisation for Technical Assessment

Legal bases and general conditions

1 This European Technical Assessment is issued by UBAtc (Union belge pour l'Agrément technique de la construction, i.e. Belgian Union for technical Approval in construction), in accordance with:

- Regulation (EU) No 305/2011[1] 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/EEC
- Commission Implementing Regulation (EU) No 1062/2013[2] of 30 October 2013 on the format of the European Technical Assessment for construction products
- European Assessment Document (EAD) : 120001-00-0106

2 Under the provisions of Regulation (EU) No 305/2011, UBAtc is not authorized to check whether the provisions of this European Technical Assessment are met once the ETA has been issued.

3 The responsibility for the conformity of the performances of the products with this European Technical Assessment and the suitability of the products for the intended use remains with the holder of the European Technical Assessment.

4 Depending on the applicable Assessment and verification of constancy of performance (AVCP) system, (a) notified body(ies) may carry out third-party tasks in the process of assessment and verification of constancy of performance under this Regulation once the European Technical Assessment has been issued.

5 This European Technical Assessment allows the manufacturer of the construction product covered by this ETA to draw up a declaration of performance for the construction product.

6 CE marking should be affixed to all construction products for which the manufacturer has drawn up a declaration of performance.

7 This European Technical Assessment is not to be transferred to other manufacturers, agents of manufacturers, or manufacturing plants other than those indicated on page 1 of this European Technical Assessment.

8 The European Technical Assessment holder confirms to guarantee that the product(-s) to which this assessment relates, is/are produced and marketed in accordance with and comply with all applicable legal and regulatory provisions, including, without limitation, national and European legislation on the safety of products and services. The ETA-holder shall notify the UBAtc immediately in writing of any circumstance affecting the aforementioned guarantee. This assessment is issued under the condition that the aforementioned guarantee by the ETA-holder will be continuously observed.

9 According to Article 11(6) of Regulation (EU) No 305/2011, when making a construction product available on the market, the manufacturer shall ensure that the product is accompanied by instructions and safety information in a language determined by the Member State concerned which can be easily understood by users. These instructions and safety information should fully correspond with the technical information about the product and its intended use, which the manufacturer has submitted to the responsible Technical Assessment Body for the issuing of the European Technical Assessment.

10 Pursuant to Article 11(3) of Regulation (EU) No 305/2011, manufacturers shall adequately take into account changes in the product-type and in the applicable harmonised technical specifications. Therefore, when the contents of the issued European Technical Assessment do not any longer correspond to the product-type, the manufacturer should refrain from using this European Technical Assessment as the basis for their declaration of performance.

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13 Subject to the application introduced, this European Technical Assessment is issued in English and may be issued by the UBAtc in its official languages. The translations correspond fully to the English reference version circulated in EOTA.

14 This European Technical Assessment was issued by UBAtc on 21 June 2018. The document replaces ETA 11/0521, ETA 11/0522 and ETA 13/0303. Compared with those documents, 3M Process Colour Series 4700 is no longer covered by this ETA and the assessment results after artificial weathering have been replaced with natural (3 year) weathering.

[1] OJEU, L 88 of 2011/04/04

[2] OJEU, L 289 of 2013/10/31

Technical Provisions

1 Description of the construction product

1.1 General

The product consists of a microprismatic retro-reflective sheeting made of optical prismatic lenses 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 sheeting has a smooth surface with a distinctive interlocking seal pattern and may or may not have orientation marks, visible from the face.

The product is supplied as a single coloured sheet whose trade name is “3M™ Diamond Grade™ DG³ Reflective Sheeting Series 4000”, or with various combinations of Process Colour and Overlay Film as outlined in table 1.1.

3M™ Process Colour Series 880I and 880N are variations of the same basic ink formulations. Both ink series use identical pigments. The difference between 880I and 880N is the solvent package, providing different drying characteristics. 3M sells and markets both ink series as equal alternatives with the same durability and warranty provisions. The basis for this ETA has been generated with version 880I.

1.2 Components of “3M™ Diamond Grade™ DG³ Series 4000” and Combinations with Process Colour and Overlay Film

An overview of the complete set of components of “3M™ Diamond Grade™ DG3 Series 4000”, and combinations with Process Colour and Overlay Film is presented in Table 1.1. The mixing ratio of the Piezo Inkjet Ink for the various traffic colours has been deposited with UBAtc.

The manufacturer's specification of the initial daylight chromaticity and luminance factor is given in table 1.2 by means of a colour box in the 1931 CIE (2°) system.

The manufacturer's specification of the daylight chromaticity and luminance factor 'in-use' (or after the durability test) is given in table 1.3 by means of a colour box in the 1931 CIE (2°) system.

Components	Trade name	Colours/code		Characteristics
Microprismatic retro-reflective sheeting	3M™ Diamond Grade™ DG³ 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	
		Brown	1179	
Process colour	3M™ Process Colour Series 880 I or N	Yellow	884 I or N	20 - 25 m²/l
		Blue	883 I or N	
		Green	888 I or N	
		Red	882 I or N	
		Dark Green	886 I or N	
Process colour for digital printing	3M™ Piezo Inkjet Ink Series 8800 UV	Yellow Red Blue Green Brown		18 - 20 m²/l
Overlay film	3M™ Premium Protective Overlay Film 1160	Clear		Combined Thickness: 0,549 mm Rolls in various length and width
Overlay film	3M™ Dew Resistant Overlay Film 1180	Clear		Combined Thickness: 0,549 mm Rolls in various length and width
Overlay film	3M™ Protective Overlay Film 1150	Clear		Combined Thickness: 0,549 mm Rolls in various length and width

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

Colours		Chromaticity Coordinates				Luminance Factor ß
		1	2	3	4	
White *Tolerance Sphere**	x y	0.305 0.315	0.335 0.345	0.325 0.355	0.295 0.325	≥ 0.40
White Translucent *Tolerance Sphere**	x y	0.305 0.315	0.335 0.345	0.325 0.355	0.295 0.325	≥ 0.27
Yellow *Tolerance Sphere**	x y	0.494 0.505	0.470 0.480	0.513 0.437	0.545 0.454	≥ 0.24
Yellow Translucent *Tolerance Sphere**	x y	0.494 0.505	0.470 0.480	0.513 0.437	0.545 0.454	≥ 0.16
Red *Tolerance Sphere**	x y	0.735 0.265	0.700 0.250	0.610 0.340	0.660 0.340	≥ 0.03
Red on Yellow, Fluorescent Yellow or Fluorescent Yellow Green *Tolerance Sphere**	x y	0.735 0.265	0.700 0.250	0.610 0.340	0.660 0.340	≥ 0.03
Blue *Tolerance Sphere**	x y	0.130 0.090	0.160 0.090	0.160 0.140	0.130 0.140	≥ 0.01
Green *Tolerance Sphere**	x y	0.110 0.415	0.170 0.415	0.170 0.500	0.110 0.500	≥ 0.03
Orange *Tolerance Sphere*	x y	0.631 0.369	0.560 0.360	0.506 0.404	0.570 0.429	≥ 0.14
Brown *Tolerance Sphere**	x y	0.455 0.397	0.523 0.429	0.479 0.373	0.558 0.394	0.03-0.09
Grey *Tolerance Sphere**	x y	0.305 0.315	0.335 0.345	0.325 0.355	0.295 0.325	0.11-0.18
Dark Green *Tolerance Sphere*	x y	0.313 0.682	0.313 0.453	0.248 0.409	0.127 0.557	0.01-0.07
Fluorescent yellow reference	x y	0.521 0.424	0.557 0.442	0.479 0.520	0.454 0.491	≥ 0.38
Fluorescent orange reference	x y	0.595 0.351	0.645 0.355	0.570 0.429	0.531 0.414	≥ 0.25
Fluorescent yellow green reference	x y	0.387 0.610	0.460 0.540	0.570 0.429	0.376 0.568	≥ 0.70
* 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 ß
		1	2	3	4	
White ***Tolerance Sphere****	**x** **y**	0.355 0.355	0.305 0.305	0.285 0.325	0.335 0.375	*≥ 0.40*
White Translucent ***Tolerance Sphere****	**x** **y**	0.355 0.355	0.305 0.305	0.285 0.325	0.335 0.375	*≥ 0.27*
Yellow ***Tolerance Sphere****	**x** **y**	0.545 0.454	0.487 0.423	0.427 0.483	0.465 0.534	*≥ 0.24*
Yellow Translucent ***Tolerance Sphere****	**x** **y**	0.545 0.454	0.487 0.423	0.427 0.483	0.465 0.534	*≥ 0.16*
Red ***Tolerance Sphere****	**x** **y**	0.735 0.265	0.674 0.236	0.569 0.341	0.655 0.345	*≥ 0.03*
Red on Yellow, Fluorescent Yellow or Fluorescent Yellow Green Tolerance Sphere*	**x** **y**	0.735 0.265	0.674 0.236	0.569 0.341	0.655 0.345	*≥ 0.03*
Blue ***Tolerance Sphere****	**x** **y**	0.078 0.171	0.150 0.220	0.210 0.160	0.137 0.038	*≥ 0.01*
Green **Tolerance Sphere***	**x** **y**	0.007 0.703	0.248 0.409	0.177 0.362	0.026 0.399	*≥ 0.03*
Orange ***Tolerance Sphere***	**x** **y**	0.631 0.369	0.560 0.360	0.506 0.404	0.570 0.429	*≥ 0.14*
Brown ***Tolerance Sphere****	**x** **y**	*0.455* *0.397*	*0.523* *0.429*	*0.479* *0.373*	*0.558* *0.394*	*0.03-0.09*
Grey **Tolerance Sphere***	**x** **y**	0.350 0.360	0.300 0.310	0.285 0.325	0.335 0.375	*0.11-0.18*
Dark Green ***Tolerance Sphere****	**x** **y**	*0.313* *0.682*	*0.313* *0.453*	*0.248* *0.409*	*0.127* *0.557*	*0.01-0.07*
Fluorescent yellow reference	**x** **y**	*0.521* *0.424*	*0.557* *0.442*	*0.479* *0.520*	*0.454* *0.491*	*≥ 0.38*
Fluorescent orange reference	**x** **y**	*0.595* *0.351*	*0.645* *0.355*	*0.570* *0.429*	*0.531* *0.414*	*≥ 0.25*
Fluorescent yellow green reference	**x** **y**	*0.387* *0.610*	*0.460* *0.540*	*0.570* *0.429*	*0.376* *0.568*	*≥ 0.70*
* 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'

2 Information on the intended use of the construction product

2.1 Intended uses

The construction product is used to manufacture sign faces for traffic signs.

The intended use includes, for example:
- retro-reflective signs,
- retro-reflective and trans-illuminated signs,
- trans-illuminated traffic bollards,
- road delineators with retro-reflective devices,
- variable message signs.

The envisaged substrates or structures are commonly, but not only, based on aluminium, galvanised steel or processed polymers. The test specimens for this ETA have been prepared on smooth aluminium panels, according to EAD 120001-01-0106, Annex 1.

The assumed intended working life of the product is 12 years, provided that it is subjected to appropriate use and maintenance. The indications given as to the working life of the product cannot be interpreted as a guarantee given by the manufacturer or by the Technical Assessment Body.

2.2 Assumptions under which the fitness of the product(s) for the intended use was favourably assessed

2.2.1 Manufacturing directives

The "3M Diamond Grade DG3 series 4000" and combinations with Process Colour and Overlay Film, shall correspond, as far as their composition and manufacturing process is concerned, to the products subject to the assessment tests. A manufacturing process has been deposited with UBAtc.

2.2.2 Installation

2.2.2.1 General

It is the responsibility of the ETA-holder to guarantee that the information about design and installation of the systems as described in clause 1.1 of this ETA, are effectively communicated to the concerned people. This information may be given using reproductions of the respective parts of this ETA. Besides, all the data concerning the execution shall be indicated clearly on the packaging and or the enclosed instruction sheets using one or several illustrations.

In any case, it is suitable to comply with national regulations and particularly concerning national traffic code.

Only the components described in clause 1 of this ETA may be used for the systems.

2.2.2.2 Design

Users are urged to carefully evaluate all substrates for adhesion and sign durability. "3M Diamond Grade DG³ Series 4000" is designed primarily for application to flat substrates. Most clean, smooth, relatively non-porous, flat, rigid, weather resistant surfaces are satisfactory for proper application of Diamond Grade sheeting. Those found to be most reliable and durable are properly prepared aluminium sheets and extrusions. Users are urged to carefully evaluate all other substrates for adhesion and sign durability, including impact resistance.

2.2.2.3 Application

"3M™ Diamond Grade™ DG³ Series 4000"

The recognition and preparation of the substrate as well as the generalities about the application of this product series, which is fully described in the current version of the ETA-holder catalogue, its technical bulletins and web site www.3M.com, shall be carried out in compliance with national regulations, if any.

"3M Diamond Grade DG³ Series 4000" incorporates a pressure sensitive adhesive and shall be applied to the sign substrate at room temperature (18°C) or higher by any of the following methods: mechanical squeeze roll applicator, hand squeeze roll applicator, hand application. If the heater is needed to warm to the minimum application temperature of 18°C, it shall be directed at the substrate only.

Users are urged to carefully evaluate all substrates for adhesion and sign durability. "3M Diamond Grade DG³ Series 4000" is designed primarily for application to flat substrates. Sign failures caused by the substrate due to improper surface preparation are not the responsibility of the ETA-holder.

3M™ Diamond Grade™ Translucent DG³ 4090T"

3M™ Diamond Grade™ Translucent DG³ Reflective Sheeting Series 4090T is a wide angle prismatic lens translucent reflective sheeting designed for the production of trans-illuminated (internally illuminated) traffic signs.

Users are urged to carefully evaluate all substrates for adhesion and sign durability. "3M Diamond Grade Translucent DG³ 4090T" shall be applied to properly prepared flat transparent/translucent substrate according to 3M recommendations. Sign failures caused by the substrate due to improper surface preparation are not the responsibility of the ETA-holder.

3M™ Electrocut Film Series 1170

Electrocut film shall be stored in a cool, dry area 18-24°C and 30 – 50 % RH, and shall be used within one year from date of purchase.

These overlay films have a transparent film release liner designed to aid the cutting process and the removal of the film weed after cutting. It is recommended that inside radius corner fonts be used when cutting film. Moreover the ETA-holder recommends the following steps:

- Adjust knife pressure to cut cleanly through the film without cutting into the liner. A 30° blade works best. Spacing between the letters or numbers should be adjusted to the aesthetic preference of the user. Consult the operating manual for instructions on how to regulate spacing. Do not cut at high speed on variable speed machines.
- Avoid sharp bends when cutting and handling film as this may cause film to release from the liner.
- After cutting is complete, lay sheets flat, face to face, back to back. Always store sheets in this manner until the sheeting has been weeded and transfer tape has been applied.
- Use a stripping tool designed for weeding films that has a blunt (not sharp) edge.
- After weeding is complete, store sheets flat, face to face, and back to back, until transfer tape has been applied.

- Transfer tape may be applied either by hand using a plastic squeegee or through a hand squeeze roll laminator. If applying the transfer tape by hand, care shall be taken to always squeeze from the center to the outside in all directions.

Series 1170 film may be applied to the sheeting either before or after the sheeting has been applied to a substrate. The use of hand squeeze roll laminator is recommended to ensure satisfactory results. Use the "split liner method" – Start in the middle of the sheet and remove half the liner to ensure proper alignment.

After Series 1170 film and sheeting have been applied, remove the transfer tape by carefully removing the tape at as low angle as possible

- When the application tape has been removed, re-roll the sign through the laminator to ensure good adhesion. Adequate pressure is a key factor relating to the ultimate strength and durability of the sheeting - to - substrate adhesion.
- A clean cutting blade is required. To remove the adhesive build up use soft cloth damped with mineral spirits, isopropyl alcohol or 3M™ Adhesive Remover.

3M™ Process Colour Series 880 I or N

3M Process Colour Series 880 I and 880 N are variations of the same basic ink formulations. Both ink series use identical pigments. The difference between 880I and 880N is the solvent package, providing different drying characteristics.

Series I inks should not be blended with Series N inks. Both Series should not be blended with any other series process colours by 3M or any other manufacturer.

For screen processing, the equipment and set-up are the following: proper colour and durability is achieved by using a high grade polyester, monofilament screen fabric mesh size P.E. 157. Other size screen fabrics do not produce satisfactory colour and durability. Screen printing should be accomplished using the off-contact screening method. Direct contact screen printing should not be used. Be sure that screens, sheeting, plus screening and drying areas are dust, dirt and lint free.

For the mixing and thinning, it is important that the colours and sheeting be brought to normal ambient room temperature and humidity of the screen printing area before processing. Thin sparingly using 3M Thinner of the same series as the process colours. Do not use extenders, drying agents, or other materials, as they will adversely affect performance life.

Air Drying: processed sheeting for air-drying shall be placed on open racks to allow adequate air circulation. High volume fans shall be directed through the racks. Drying times will be increased by high humidity, low temperature, poor air circulation, heavy colour coat, and excessive thinning. Addition of drying agents is not recommended. Processed sheetings shall be air dried for a minimum of 3 hours per colour.

Oven drying: Processed sheeting for oven drying shall be placed on open racks individually with sufficient open space for unobstructed air flow.

All inks should not be stored at elevated temperatures and shall be used within one year after the date of purchase or within the indicated shelf life.

3M™ Piezo Inkjet Ink Series 8800 UV

3M Piezo Ink Jet Ink Series 8800 UV is designed as part of the 3M MCS™ (Matched Component System) for application using the Durst Rho 161TS and 162TS onto 3M Diamond Grade DG³ Series 4000 BEFORE mounting the sheeting onto a sign substrate. These UV-curable inks are durable, weather-resistant, and have excellent colour retention when used in combination with an overlaminate of either 3M Protective Overlay Film 1170 or 3M Dew Resistant Overlay Film 1180 or 3M Premium Protective Overlay Film 1160.

Detailed printing guidelines in order to achieve traffic sign colours according to this ETA may be obtained in the latest Product Bulletin for 3M Piezo Ink Jet Ink Series 8800UV.

Above mentioned overlaminates shall always be applied, following below instructions:

To avoid a silvering artefact (trapped air between ink layer and overlaminate), the lamination process should be conducted under a controlled set of conditions.

Recommended laminator specifications and set-up:
- Roll diameter: max. 350 mm; Roll weight: approximately 80 kg; Roll width: 1400-1600 mm
- Core size: 3 inches; 2 Take-up shafts; 2 Supply shafts
- Heatable top roller: min. 45°C; Pressure: > 8 bar

3M Piezo Ink Jet Ink should not be stored at elevated temperatures. It shall be used within the indicated shelf life.

3M™ Dew Resistant Overlay Film 1180 and 3M™ Premium Protective Overlay Film 1160 and 3M™ Protective Overlay Film 1150

Protective Overlay film shall be stored in a cool, dry area at 18-24°C and 30 – 50 % RH, and shall be used within one year from date of purchase.

Except when used as overlay film in the digital print process, as described above, the application of any Protective Overlay Film is typically done on the finished signface (after the application of the ECF and ink) but PRIOR to the application of frames or sign assembly. The Protective Overlay Film shall be applied using a squeeze roll applicator. The split liner method may be used.

3M Dew Resistant Overlay Film 1180 provides a very sensitive active layer that is prone to contamination and scratches. This active layer is therefore protected by a water-soluble, clear protective coating. This protective coating should remain on the sign as long as possible. Ideally, it should be removed after the traffic sign is erected. If the protective coating is removed before sign erection, precautions have to be taken to prevent any contamination or mechanical damage. Due to the protective coating, it is strongly recommended NOT to overlap the Dew Resistant Overlay Film.

2.3 Recommendations on packaging, transport and storage

The sheeting shall be stored in a cool, dry area, preferably at 18-24°C and 30-50% RH, and should be applied within one year from delivery. Rolls should be stored horizontally in the shipping carton. Partially used rolls should be returned to the shipping carton or suspended horizontally on a rod or pipe through the core.

Unprocessed sheets should be stored flat. Finished signs and applied blanks should be stored on edge.

Package for shipment shall prevent movement and chafing. Store sign packages indoors on edges. Panels or finished signs shall remain dry during shipping and storage. If packaged signs become wet, unpack immediately and allow to dry.

3 Methods and criteria for assessing the performance of the product in relation to essential characteristics of the product

Essential Characteristics of the product Basic Works Requirement 4: Safety and accessibility in use			
No	**Essential Characteristic**	**Clause**	**Product Performance**
	Visibility Characteristics		
1	Daylight Chromaticity and Luminance Factor	3.x.1	Value (average of three samples)
2	Night-time colour	3.x.2	No performance assessed
3	Coefficient of Retro-reflection	3.x.3	Value (average of three samples)
4	Rotational symmetry	3.x.4	Value (Ratio)
	Durability		
5	Impact resistance	3.x.5	EN 12899-1:2007
6	Temperature resistance	3.x.6	Value (average of three samples)
7	Daylight Chromaticity and Luminance Factor after accelerated artificial or natural weathering	3.x.7.1	Value (average of three samples)
8	Coefficient of Retro-reflection after accelerated artificial or natural weathering	3.x.7.2	Value (average of three samples)
9	Adhesion	3.x.8	No performance assessed

3.1 3M™ Diamond Grade™ DG³ Series 4000

3.1.1 Daylight Chromaticity and Luminance Factor

The characteristics of initial daylight chromaticity and luminance factor have been determined according to EAD120001-01-0106, clause 2.2.1

Colours		Chromaticity Coordinates				Luminance Factor ß
		1	2	3	4	
White reference	***x*** ***y***	***0.305*** ***0.315***	***0.335*** ***0.345***	***0.325*** ***0.355***	***0.295*** ***0.325***	***≥ 0.40***
White results	x y	0.316 0.336				0.46
Yellow reference	***x*** ***y***	***0.494*** ***0.505***	***0.470*** ***0.480***	***0.513*** ***0.437***	***0.545*** ***0.454***	***≥ 0.24***
Yellow results	x y	0.528 0.465				0.27
Red reference	***x*** ***y***	***0.735*** ***0.265***	***0.700*** ***0.250***	***0.610*** ***0.340***	***0.660*** ***0.340***	***≥ 0.03***
Red results	x y	0.669 0.316				0.06
Green reference	***x*** ***y***	***0.110*** ***0.415***	***0.170*** ***0.415***	***0.170*** ***0.500***	***0.110*** ***0.500***	***≥ 0.03***
Green results	x y	0.137 0.446				0.08
Blue reference	***x*** ***y***	***0.130*** ***0.090***	***0.160*** ***0.090***	***0.160*** ***0.140***	***0.130*** ***0.140***	***≥ 0.01***
Blue results	x y	0.149 0.107				0.04
Fluorescent yellow reference	***x*** ***y***	***0.521*** ***0.424***	***0.557*** ***0.442***	***0.479*** ***0.520***	***0.454*** ***0.491***	***≥ 0.38***
Fluorescent yellow results	x y	0.519 0.475				0.55
Fluorescent orange reference	***x*** ***y***	***0.595*** ***0.351***	***0.645*** ***0.355***	***0.570*** ***0.429***	***0.531*** ***0.414***	***≥ 0.25***
Fluorescent orange results	x y	0.626 0.366				0.30
Fluorescent yellow/ green reference	***x*** ***y***	***0.387*** ***0.610***	***0.460*** ***0.540***	***0.570*** ***0.429***	***0.376*** ***0.568***	***≥ 0.70***
Fluorescent yellow/ green results	x y	0.414 0.563				0.763

3.1.2 Night-time colour

No performance assessed.

3.1.3 Coefficient of Retro-reflection

The Coefficient of Retro-reflection has been determined according to EAD120001-01-0106, clause 2.2.3. The rotation angle ε has been set to 0° according to the manufacturer's specification. The result of the test is given as average of three samples.

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°	1482	1187	362	88.8	159	715		1482
	+20°	988	800	246	58.8	104	511		988
	+30°	640	527	162	38.0	66.2	352		640
	+40°	331	275	85.0	20.8	34.4	191		331
0.2°	+5°	1000	813	236	63.7	125	483	325	750
	+15°	808	654	194	49.0	97.6	404	267	
	+20°	698	565	168	41.0	82.6			
	+30°	466	384	112	26.1	53.1	252	156	359
	+40°	247	208	58.1	13.4	27.6	141	82.7	193
0.33°	+5°	779	628	170	57.3	107	370	238	579
	+15°	601	480	136	41.5	77.9	295	188	
	+20°	517	411	118	34.0	64.7			
	+30°	339	274	77.5	20.2	40.0	179	109	254
	+40°	175	149	39.8	10.2	20.0	99.2	56.8	133
0.5°	+5°		512	147	85	43			
	+30°		220	61	35.1	17.6			
	+40°		114	30	17.0	8.3			
1.0°	+5°	187	153	46.0	12.7	26.1	102	61.1	137
	+15°	161	135	39.3	11.3	22.4	85.4	53.4	
	+20°	149	126	35.3	10.4	20.4	76.2	47.9	74
	+30°	104	88.4	23.6	7.13	13.7	53.4	31.4	47
	+40°	65.0	53.7	15.0	3.69	8.00	34.2	20.4	65.0
1.5°	+5°	54.0	40.9	12.83	4.14	8.50	31.5	17.1	54.0
	+20°	42.0	32.6	10.06	2.64	5.93	23.7	13.5	42.0
	+30°	39.6	33.3	9.33	2.14	5.08	21.2	12.6	39.6
	+40°	26.1	22.8	5.69	1.53	3.33	15.2	7.90	26.1
2.0°	+5°	16.3	13.0	4.38	0.99	2.64	10.1	5.74	16.3
	+30°	13.6	10.6	3.26	0.79	2.04	7.93	4.56	13.6
	+40°	11.7	9.75	2.86	0.53	1.55	6.82	3.87	11.7

3.1.4 Rotational symmetry

The rotational symmetry has been determined according to EAD120001-01-0106, clause 2.2.3 "rotational symmetry". The rotation angle ε has been set to 0° according to the manufacturer's specification.

Rotational symmetry	
#	Ratio
White	
Average of three Samples	1 : 1,17
Yellow	
Average of three Samples	1 : 1,23
Red	
Average of three Samples	1 : 1,16
Blue	
Average of three Samples	1 : 1,18
Green	
Average of three Samples	1 : 1,17
Fluorescent Yellow Green	
Average of three Samples	1 : 1,16
Fluorescent Yellow	
Average of three Samples	1 : 1,29
Fluorescent Orange	
Average of three Samples	1 : 1,18

3.1.5 Impact resistance

The Impact resistance has been determined according to EAD120001-01-0106, clause 2.2.4.

Sample		Test result
White	4090	No apparent cracking or delamination observed
Yellow	4091	
Red	4092	
Blue	4095	
Green	4097	
Fluorescent Yellow	4081	
Fluorescent Orange	4084	
Fluorescent Yellow Green	4083	

3.1.6 Temperature resistance

The temperature resistance has been determined according to EAD120001-01-0106, clause 2.2.5. The test temperature was 80°C (±2°).

The test result is given as level of coefficient of retro-reflection R_A before and after the temperature treatment. Also the ratio (in percentage) of the coefficient of retroreflection after and before the exposure. The result of the test is given as average of three samples.

Colours	Colour code	R_A Before Exposure	R_A After Exposure	Ratio
White	4090	709	725	102%
Yellow	4091	564	574	102%
Red	4092	157	165	105%
Blue	4095	52	55	104%
Green	4097	124	129	106%
Fluorescent Yellow	4081	337	322	95%
Fluorescent Orange	4084	251	248	99%
Fluorescent Yellow Green	4083	596	599	101%

3.1.7 Visibility after weathering

The natural weathering has been done according to EAD 120001-01-0106, clause 2.2.6.2.

3.1.7.1 Daylight Chromaticity and Luminance Factor after natural weathering

The daylight chromaticity and luminance factor, verified according to EAD120001-01-0106, clause 2.2.1, tested after natural weathering test.

Colours		Chromaticity Coordinates				Luminance Factor ß
		1	2	3	4	
White reference	**x** **y**	**0.355** **0.355**	**0.305** **0.305**	**0.285** **0.325**	**0.335** **0.375**	***≥ 0.40***
White results	x y	0.310 0.330				*0.51*
Yellow reference	***x*** ***y***	**0.545** **0.454**	**0.487** **0.423**	**0.427** **0.483**	**0.465** **0534**	***≥ 0.24***
Yellow results	x y	0.519 0.465				*0.33*
Red reference	***x*** ***y***	**0.735** **0.265**	**0.674** **0.236**	**0.569** **0.341**	**0.655** **0.345**	***≥ 0.03***
Red results	x y	0.636 0.319				*0.07*
Green reference	***x*** ***y***	**0.007** **0.703**	**0.248** **0.409**	**0.177** **0.362**	**0.026** **0.399**	***≥ 0.03***
Green results	x y	0.149 0.431				*0.09*
Blue reference	**x** **y**	**0.078** **0.171**	**0.150** **0.220**	**0.210** **0.160**	**0.137** **0.038**	***≥ 0.01***
Blue results	x y	0.152 0.121				*0.06*
Fluorescent yellow reference	***x*** ***y***	**0.521** **0.424**	**0.557** **0.442**	**0.479** **0.520**	**0.454** **0.491**	***≥ 0.38***
Fluorescent yellow results	x y	0.512 0.475				*0.68*
Fluorescent orange reference	***x*** ***y***	**0.595** **0.351**	**0.645** **0.355**	**0.570** **0.429**	**0.531** **0.414**	***≥ 0.25***
Fluorescent orange result	x y	0.613 0.367				*0.30*
Fluorescent yellow/ green reference	***x*** ***y***	***0.387*** ***0.610***	***0.460*** ***0.540***	***0.570*** ***0.429***	***0.376*** ***0.568***	***≥ 0.70***
Fluorescent yellow/ green results	x y	0.418 0.556				0.83

3.1.7.2 Coefficient of Retro-reflection after natural weathering

The Coefficient of Retro-reflection after natural weathering tests has been determined according to EAD 120001-01-0106, clause 2.2.6.4, with an observation angle α = 0.33° and α = 1.0° and entrance angle β1= 5° and 30°. The rotation angle ε has been set to 0° according to the manufacturer's specification. The result of the test is given as average of three samples.

Colours	Geometry of Measurements			
	α = 0,33° β1 = 5°	α = 0,33° β1 = 30°	α = 1.0° β1 = 5°	α = 1.0° β1 = 30°
White	563	272	131	68
Yellow	474	218	116	60
Red	150	70	36	17.1
Blue	42	17	8.1	3.6
Green	91	38	21	11.5
Fluorescent yellow	348	169	88	43
Fluorescent orange	214	104	47	22
Fluorescent yellow/green	448	213	105	47

3.1.8 Adhesion

No performance assessed

3.2 3M™ Diamond Grade™ DG³ Series + 3M™ Electrocut Film Series 1170

3.2.1 Daylight Chromaticity and Luminance Factor

The characteristics of initial daylight chromaticity and luminance factor have been determined according to EAD120001-01-0106, clause 2.2.1

Colours		Chromaticity Coordinates				Luminance Factor ß
		1	2	3	4	
Yellow reference	***x*** ***y***	***0.494*** ***0.505***	***0.470*** ***0.480***	***0.513*** ***0.437***	***0.545*** ***0.454***	***≥ 0.24***
Yellow on White results	x y	0.533 0.460				0.30
Red reference	***x*** ***y***	***0.735*** ***0.265***	***0.700*** ***0.250***	***0.610*** ***0.340***	***0.660*** ***0.340***	***≥ 0.03***
Red on White results	x y	0.655 0.313				0.04
Green reference	***x*** ***y***	***0.110*** ***0.415***	***0.170*** ***0.415***	***0.170*** ***0.500***	***0.110*** ***0.500***	***≥ 0.03***
Green on White results	x y	0.135 0.439				0.07
Blue reference	***x*** ***y***	***0.130*** ***0.090***	***0.160*** ***0.090***	***0.160*** ***0.140***	***0.130*** ***0.140***	***≥ 0.01***
Blue on White results	x y	0.148 0.109				0.04
Brown reference	***x*** ***y***	***0.455*** ***0.397***	***0.523*** ***0.429***	***0.479*** ***0.373***	***0.558*** ***0.394***	***0.03-0.09***
Brown on White results	x y	0.491 0.397				0.05

3.2.2 Night-time colour

No performance assessed.

3.2.3 Coefficient of Retro-reflection

The Coefficient of Retro-reflection has been determined according to EAD120001-01-0106, clause 2.2.3. The rotation angle ε has been set to 0° according to the manufacturer's specification. The result of the test is given as average of three samples.

Geometry of measurements		Colour				
α	β_1 ($\beta_2 = 0$)	Yellow	Red	Blue	Green	Brown
0.1°	+5°	1088	370	110	208	
	+20°	729	247	76.6	145	
	+30°	475	161	53.8	97.6	
	+40°	250	86	34.4	55.7	
0.2°	+5°	725	238	74.3	139	58.6
	+15°	586	192	57.3	110	
	+20°	504	165	47.9	94.8	
	+30°	335	108	30.1	62.1	23.9
	+40°	181	56.2	15.5	32.5	11.1
0.33°	+5°	555	172	66.8	118	47.7
	+15°	431	136	48.7	88	
	+20°	369	117	39.9	97.6	
	+30°	238	75.4	23.5	46.7	17.2
	+40°	125	38.7	11.3	23.3	7.9
0.5°	+5°	456	143	49.7	90	
	+30°	197	60.2	20.7	40.4	
	+40°	98	29	9.85	20	
1.0°	+5°	138	44.9	14.3	27.7	
	+15°	123	40	12.5	22.7	
	+20°	115	36.5	11.7	20.8	
	+30°	78.9	24.2	8.3	14.4	
	+40°	48.4	15	4.36	9	
1.5°	+5°	41.6	12.2	4.47	9.46	
	+20°	30.1	9.94	3.05	5.95	
	+30°	29.7	9.91	2.71	4.96	
	+40°	20.4	6.32	1.94	3.53	
2.0°	+5°	12.3	4.22	1.42	2.98	1.19
	+30°	10	3.29	1.07	2.07	0.81
	+40°	9.04	3.14	0.77	1.48	0.63

3.2.4 Rotational symmetry

The rotational symmetry has been determined according to EAD120001-01-0106, clause 2.2.3 “rotational symmetry”. The rotation angle ε has been set to 0° according to the manufacturer's specification.

Rotational symmetry	
#	Ratio
Yellow	
Average of three Samples	1 : 1,26
Red on White	
Average of three Samples	1 : 1,24
Blue	
Average of three Samples	1 : 1,25
Green	
Average of three Samples	1 : 1,18
Brown	
Average of three Samples	1 : 1,22

3.2.5 Impact resistance

The Impact resistance has been determined according to EAD120001-01-0106, clause 2.2.4.

Sample	Test result
Yellow	No apparent cracking or delamination observed
Red	
Blue	
Green	
Brown	

3.2.6 Temperature resistance

The temperature resistance has been determined according to EAD120001-01-0106, clause 2.2.5. The test temperature was 80°C (±2°).

The test result is given as level of coefficient of retro-reflection R_A before and after the temperature treatment. Also the ratio (in percentage) of the coefficient of retroreflection after and before the exposure. The result of the test is given as average of three samples.

Colours	R_A Before Exposure	R_A After Exposure	Ratio
Yellow	534	530	99%
Red	163	168	103%
Blue	56.5	60.1	102%
Green	104	106	106%
Brown	38.5	42.8	111%

3.2.7 Visibility after weathering

The natural weathering has been done according to EAD 120001-01-0106, clause 2.2.6.2,

3.2.7.1 Daylight Chromaticity and Luminance Factor after natural weathering

The daylight chromaticity and luminance factor, verified according to EAD120001-01-0106, clause 2.2.1, tested after natural weathering test.

Colours		Chromaticity Coordinates				Luminance Factor ß
		1	2	3	4	
Yellow Reference	***x*** ***y***	***0.545*** ***0.454***	***0.487*** ***0.423***	***0.427*** ***0.483***	***0.465*** ***0.534***	***≥ 0.24***
Yellow on While results	x y	0.520 0.460				*0.32*
Red reference	***x*** ***y***	***0.735*** ***0.265***	***0.674*** ***0.236***	***0.569*** ***0.341***	***0.655*** ***0.345***	***≥ 0.03***
Red on While results	x y	0.602 0.310				*0.04*
Green reference	***x*** ***y***	***0.007*** ***0.703***	***0.248*** ***0.409***	***0.177*** ***0.362***	***0.026*** ***0.399***	***≥ 0.03***
Green on White results	x y	0.152 0.426				*0.09*
Blue reference	***x*** ***y***	***0.078*** ***0.171***	***0.150*** ***0.220***	***0.210*** ***0.160***	***0.137*** ***0.038***	***≥ 0.01***
Blue on White results	x y	0.153 0.122				*0.06*
Brown reference	***x*** ***y***	***0.455*** ***0.397***	***0.523*** ***0.429***	***0.479*** ***0.373***	***0.558*** ***0.394***	***0.03-0.09***
Brown on White results	x y	0.469 0.391				*0.06*

3.2.7.2 Coefficient of Retro-reflection after natural weathering

The Coefficient of Retro-reflection after natural weathering tests has been determined according to EAD 120001-01-0106, clause 2.2.6.4, with an observation angle α = 0.33° and α = 1.0° and entrance angle $\beta 1$= 5° and 30°. The rotation angle ε has been set to 0° according to the manufacturer's specification.

The result of the test is given as average of three samples.

Colours	Geometry of Measurements			
	α = 0,33° $\beta 1$ = 5°	α = 0,33° $\beta 1$ = 30°	α = 1.0° $\beta 1$ = 5°	α = 1.0° $\beta 1$ = 30°
Yellow	516	218	129	75
Red	126	55	32	15.2
Blue	51	20	11.6	5.5
Green	93	39	22	10.2
Brown	49	19.6	11.6	4.8

3.2.8 Adhesion

No performance assessed

3.3 3M™ Diamond Grade™ DG³ Series 4000 printed with 3M™ process colour series 880 I or N

3.3.1 Daylight Chromaticity and Luminance Factor

The characteristics of initial daylight chromaticity and luminance factor have been determined according to EAD120001-01-0106, clause 2.2.1

Colours		Chromaticity Coordinates				Luminance Factor ß
		1	2	3	4	
Yellow Reference	**x** **y**	**0.494** **0.505**	**0.470** **0.480**	**0.513** **0.437**	**0.545** **0.454**	***≥ 0.24***
Yellow on While results	x y	0.518 0.454				*0.27*
Red reference	***x*** ***y***	**0.735** **0.265**	**0.700** **0.250**	**0.610** **0.340**	**0.660** **0.340**	***≥ 0.03***
Red on While results	x y	0.631 0.323				*0.06*
Green reference	***x*** ***y***	**0.110** **0.415**	**0.170** **0.415**	**0.170** **0.500**	**0.110** **0.500**	***≥ 0.03***
Green on White results	x y	0.144 0.433				*0.09*
Blue reference	***x*** ***y***	**0.130** **0.090**	**0.160** **0.090**	**0.160** **0.140**	**0.130** **0.140**	***≥ 0.01***
Blue on White results	x y	0.151 0.138				*0.05*

3.3.2 Night-time colour

No performance assessed.

3.3.3 Coefficient of Retro-reflection

The Coefficient of Retro-reflection has been determined according to EAD120001-01-0106, clause 2.2.3. The rotation angle ε has been set to 0° according to the manufacturer's specification. The result of the test is given as average of three samples.

Geometry of measurements		Colour			
α	β_1 ($\beta_2 = 0$)	Yellow	Red	Blue	Green
0.1°	**+5°**	919	362	142	302
	+20°	597	240	91.7	198
	+30°	379	155	58.3	128
	+40°	193	79.8	31.1	67.3
0.2°	**+5°**	559	225	92.6	191
	+15°	455	182	72.0	152
	+20°	392	156	60.4	129
	+30°	258	103	38.2	85.1
	+40°	134	53.5	20.3	46.2
0.33°	**+5°**	431	168	79	161
	+15°	332	132	58.3	121
	+20°	286	114	48.2	102
	+30°	185	72.8	28.8	63.5
	+40°	92.9	37.2	14.4	38.8
0.5°	**+5°**	373	145	59.3	129
	+30°	153	59.1	25	55.1
	+40°	73.3	28.1	12.2	27.5
1.0°	**+5°**	112	48.3	17.6	40
	+15°	96.3	41.8	15.5	34.1
	+20°	87.7	37.7	15	32.2
	+30°	60.7	25.2	10.9	23.1
	+40°	37.1	15.2	5.67	12.9
1.5°	**+5°**	33.1	12.7	5.7	13.13
	+20°	25.1	9.66	4	8.28
	+30°	23.2	10.1	3.6	7.93
	+40°	14.7	6.30	2.75	5.73
2.0°	**+5°**	10.1	4.59	1.78	3.81
	+30°	8.3	3.16	1.35	2.83
	+40°	6.84	3.11	1.24	2.40

3.3.4 Rotational symmetry

The rotational symmetry has been determined according to EAD120001-01-0106, clause 2.2.3 “rotational symmetry”. The rotation angle ε has been set to 0° according to the manufacturer's specification.

Rotational symmetry	
#	Ratio
Yellow	
Average of three Samples	1 : 1,17
Red	
Average of three Samples	1 : 1,23
Blue	
Average of three Samples	1 : 1,32
Green	
Average of three Samples	1 : 1,24

3.3.5 Impact resistance

The Impact resistance has been determined according to EAD120001-01-0106, clause 2.2.4.

Sample	Test result
Yellow	No apparent cracking or delamination observed
Red	
Blue	
Green	

3.3.6 Temperature resistance

The temperature resistance has been determined according to EAD120001-01-0106, clause 2.2.5. The test temperature was 80°C (±2°).

The test result is given as level of coefficient of retro-reflection R_A before and after the temperature treatment. Also the ratio (in percentage) of the coefficient of retroreflection after and before the exposure. The result of the test is given as average of three samples.

Colours	R_A Before Exposure	R_A After Exposure	Ratio
Yellow	495	493	100%
Red	172	167	97%
Blue	74.9	65.8	88%
Green	170	161	95%

3.3.7 Visibility after weathering

The natural weathering has been done according to EAD 120001-01-0106, clause 2.2.6.2.

3.3.7.1 Daylight Chromaticity and Luminance Factor after natural weathering

The daylight chromaticity and luminance factor, verified according to EAD120001-01-0106, clause 2.2.1, tested after natural weathering test.

Colours		Chromaticity Coordinates				Luminance Factor ß
		1	2	3	4	
Yellow reference	***x*** ***y***	**0.545** **0.454**	**0.487** **0.423**	**0.427** **0.483**	**0.465** **0.534**	***≥ 0.24***
Yellow on White results	x y	0.485 0.457				*0.32*
Red reference	***x*** ***y***	**0.735** **0.365**	**0.674** **0.236**	**0.569** **0.341**	**0.655** **0.345**	***≥ 0.03***
Red 882 on White results	x y	0.602 0.315				*0.05*
Green reference	***x*** ***y***	**0.007** **0.703**	**0.248** **0.409**	**0.177** **0.362**	**0.026** **0.399**	***≥ 0.03***
Green on White results	x y	0.149 0.426				*0.08*
Blue reference	**x** **y**	**0.078** **0.171**	**0.150** **0.220**	**0.210** **0.160**	**0.137** **0.038**	***≥ 0.01***
Blue on White results	x y	0.156 0.149				*0.05*

3.3.7.2 Coefficient of Retro-reflection after natural weathering

The Coefficient of Retro-reflection after natural weathering tests has been determined according to EAD 120001-01-0106, clause 2.2.6.4, with an observation angle α = 0.33° and α = 1.0° and entrance angle β1= 5° and 30°. The rotation angle ε has been set to 0° according to the manufacturer's specification.

The result of the test is given as average of three samples.

Colours	Geometry of Measurements			
	α = 0,33° β1 = 5°	α = 0,33° β1 = 30°	α = 1.0° β1 = 5°	α = 1.0° β1 = 30°
Yellow	470	226	102	50
Red	120	55	32	16.6
Blue	49	21	10.2	4.8
Green	153	66	30	17.2

3.3.8 Adhesion

No performance assessed

3.4 3M™ Diamond Grade™ DG³ Series 4000 + 3M™ Piezo Inkjet Ink Series 8800UV + 3M™ Electrocut Film 1170

3.4.1 Daylight Chromaticity and Luminance Factor

The characteristics of initial daylight chromaticity and luminance factor have been determined according to EAD120001-01-0106, clause 2.2.1

Colours		Chromaticity Coordinates				Luminance Factor ß
		1	2	3	4	
White reference	***x*** ***y***	***0.305*** ***0.315***	***0.335*** ***0.345***	***0.325*** ***0.355***	***0.295*** ***0.325***	***≥ 0.40***
White results	x y	0.314 0.335				0.45
Yellow Reference	***x*** ***y***	**0.494** **0.505**	**0.470** **0.480**	**0.513** **0.437**	**0.545** **0.454**	***≥ 0.24***
Yellow on While results	x y	0.485 0.472				*0.27*
Red reference	***x*** ***y***	**0.735** **0.265**	**0.700** **0.250**	**0.610** **0.340**	**0.660** **0.340**	***≥ 0.03***
Red on While results	x y	0.640 0.330				*0.07*
Green reference	***x*** ***y***	**0.110** **0.415**	**0.170** **0.415**	**0.170** **0.500**	**0.110** **0.500**	***≥ 0.03***
Green on White results	x y	0.160 0.455				*0.07*
Blue reference	***x*** ***y***	**0.130** **0.090**	**0.160** **0.090**	**0.160** **0.140**	**0.130** **0.140**	***≥ 0.01***
Blue on White results	x y	0.143 0.121				*0.04*
Brown reference	**x** **y**	**0.455** **0.397**	**0.523** **0.429**	**0.479** **0.373**	**0.558** **0.394**	***≥ 0.03 – 0.09***
Brown on White results	x y	0.521 0.403				*0.05*

3.4.2 Night-time colour

No performance assessed.

3.4.3 Coefficient of Retro-reflection

The Coefficient of Retro-reflection has been determined according to EAD120001-01-0106, clause 2.2.3. The rotation angle ε has been set to 0° according to the manufacturer's specification. The result of the test is given as average of three samples.

Geometry of measurements		Colour					
α	β_1 ($\beta_2 = 0$)	White	Yellow	Red	Blue	Green	Brown
0.1°	+5°	1248	508	184	86	130	142
	+20°	831	329	118	58	87	95
	+30°	537	206	72	36	55	59
0.2°	+5°	864	350	127	60	90	99
	+20°	608	243	88	42	63	71
	+30°	399	158	56	27	41	46
0.33°	+5°	694	291	102	56	81	80
	+20°	452	183	65	34	50	52
	+30°	279	114	40	21	32	33
	+40°	133	55	19	10.1	15	15.7
1.0°	+5°	162	93	41	15.8	25	29
	+20°	135	75	31	11.4	18.7	22
	+30°	93	53	21	8	13.3	15.5
	+40°	55	30	11.7	5	8	9
1.5°	+5°	51	30	13.7	4.8	8.2	9.8
	+20°	37	25	11.7	3.6	6.3	7.9
	+30°	35	22	9.9	3	5.2	6.5
	+40°	22	14.5	6.3	2.1	3.6	4.4

3.4.4 Rotational symmetry

The rotational symmetry has been determined according to EAD120001-01-0106, clause 2.2.3 "rotational symmetry". The rotation angle ε has been set to 0° according to the manufacturer's specification.

Rotational symmetry	
#	Ratio
White	
Average of three Samples	1 : 1,23
Yellow	
Average of three Samples	1 : 1,13
Red	
Average of three Samples	1 : 1,16
Blue	
Average of three Samples	1 : 1,14
Green	
Average of three Samples	1 : 1,12
Brown	
Average of three Samples	1 : 1,16

3.4.5 Impact resistance

The Impact resistance has been determined according to EAD120001-01-0106, clause 2.2.4.

Sample	Test result
White	No apparent cracking or delamination observed
Yellow	
Red	
Blue	
Green	
Brown	

3.4.6 Temperature resistance

No performance assessed.

3.4.7 Visibility after weathering

The natural weathering has been done according to EAD 120001-01-0106, clause 2.2.6.2.

3.4.7.1 Daylight Chromaticity and Luminance Factor after natural weathering

The daylight chromaticity and luminance factor, verified according to EAD120001-01-0106, clause 2.2.1, tested after natural weathering test.

Colours		Chromaticity Coordinates				Luminance Factor ß
		1	2	3	4	
White reference	***x*** ***y***	***0.305*** ***0.315***	***0.335*** ***0.345***	***0.325*** ***0.355***	***0.295*** ***0.325***	***≥ 0.40***
White results	x y	0.311 0.331				0.46
Yellow reference	*x* *y*	**0.545** **0.454**	**0.487** **0.423**	**0.427** **0.483**	**0.465** **0.534**	***≥ 0.24***
Yellow on White results	x y	0.464 0.479				*0.31*
Red reference	*x* *y*	**0.735** **0.365**	**0.674** **0.236**	**0.569** **0.341**	**0.655** **0.345**	***≥ 0.03***
Red on White results	x y	0.599 0.329				*0.07*
Green reference	*x* *y*	**0.007** **0.703**	**0.248** **0.409**	**0.177** **0.362**	**0.026** **0.399**	***≥ 0.03***
Green on White results	x y	0.171 0.434				*0.08*
Blue reference	x y	**0.078** **0.171**	**0.150** **0.220**	**0.210** **0.160**	**0.137** **0.038**	***≥ 0.01***
Blue on White results	x y	0.149 0.137				*0.05*
Brown reference	***x*** ***y***	***0.455*** ***0.397***	***0.523*** ***0.429***	***0.479*** ***0.373***	***0.558*** ***0.394***	***0.03-0.09***
Brown on White results	x y	0.485 0.395				*0.06*

3.4.7.2 Coefficient of Retro-reflection after natural weathering

The Coefficient of Retro-reflection after natural weathering tests has been determined according to EAD 120001-01-0106, clause 2.2.6.4, with an observation angle α = 0.33° and α = 1.0° and entrance angle β1= 5° and 30°. The rotation angle ε has been set to 0° according to the manufacturer's specification.

The result of the test is given as average of three samples.

Colours	Geometry of Measurements			
	α = 0,33° β1 = 5°	α = 0,33° β1 = 30°	α = 1.0° β1 = 5°	α = 1.0° β1 = 30°
White	634	261	153	82
Yellow	264	114	92	50
Red	98	43	37	19.1
Blue	55	20	13.2	6.9
Green	82	32	25	13.7
Brown	83	36	30	15.8

3.4.8 Adhesion

No performance assessed

3.5 3M™ Diamond Grade™ DG³ Series 4000 + 3M Piezo Inkjet Ink Series 8800UV + 3M Dew Resistant Overlay Film 1180

3.5.1 Daylight Chromaticity and Luminance Factor

The characteristics of initial daylight chromaticity and luminance factor have been determined according to EAD120001-01-0106, clause 2.2.1

Colours		Chromaticity Coordinates				Luminance Factor ß
		1	2	3	4	
White reference	***x*** ***y***	***0.305*** ***0.315***	***0.335*** ***0.345***	***0.325*** ***0.355***	***0.295*** ***0.325***	***≥ 0.40***
White results	x y	0.315 0.337				0.45
Yellow Reference	***x*** ***y***	**0.494** **0.505**	**0.470** **0.480**	**0.513** **0.437**	**0.545** **0.454**	***≥ 0.24***
Yellow on While results	x y	0.486 0.472				*0.28*
Red reference	***x*** ***y***	**0.735** **0.265**	**0.700** **0.250**	**0.610** **0.340**	**0.660** **0.340**	***≥ 0.03***
Red on White results	x y	0.644 0.330				*0.07*
Green reference	***x*** ***y***	**0.110** **0.415**	**0.170** **0.415**	**0.170** **0.500**	**0.110** **0.500**	***≥ 0.03***
Green on White results	x y	0.155 0.461				*0.07*
Blue reference	***x*** ***y***	**0.130** **0.090**	**0.160** **0.090**	**0.160** **0.140**	**0.130** **0.140**	***≥ 0.01***
Blue on White results	x y	0.142 0.118				*0.04*
Brown reference	***x*** ***y***	**0.455** **0.397**	**0.523** **0.429**	**0.479** **0.373**	**0.558** **0.394**	***0.03 – 0.09***
Brown on White results	x y	0.522 0.403				*0.05*

3.5.2 Night-time colour

No performance assessed.

3.5.3 Coefficient of Retro-reflection

The Coefficient of Retro-reflection has been determined according to EAD120001-01-0106, clause 2.2.3. The rotation angle ε has been set to 0° according to the manufacturer's specification. The result of the test is given as average of three samples.

Geometry of measurements		Colour					
α	β_1 ($\beta_2 = 0$)	White	Yellow	Red	Blue	Green	Brown
0.1°	**+5°**	1167	538	196	88	126	144
	+20°	736	348	126	56	81	97
	+30°	471	218	78	35	50	61
0.2°	**+5°**	807	367	133	61	87	100
	+20°	532	256	94	41	59	72
	+30°	346	166	60	26	38	47
0.33°	**+5°**	675	304	103	56	80	81
	+20°	399	145	67	33	47	53
	+30°	240	120	43	20	29	34
	+40°	118	58	20	9.6	13.9	15.8
1.0°	**+5°**	172	97	38	13	23	29
	+20°	149	77	29	10.9	18.8	21
	+30°	101	55	21	7.8	13.1	15
	+40°	55	31	11.8	4.4	7.3	8.8
1.5°	**+5°**	47	30	12.5	4.5	7.7	9.5
	+20°	38	25	10.6	3.3	6.2	7.5
	+30°	40	23	9.2	2.9	5.4	6.2
	+40°	25	14.7	6	2.1	3.6	4.2

3.5.4 Rotational symmetry

The rotational symmetry has been determined according to EAD120001-01-0106, clause 2.2.3 "rotational symmetry". The rotation angle ε has been set to 0° according to the manufacturer's specification.

Rotational symmetry	
#	Ratio
White	
Average of three Samples	1 : 1,26
Yellow	
Average of three Samples	1 : 1,14
Red	
Average of three Samples	1 : 1,20
Blue	
Average of three Samples	1 : 1,16
Green	
Average of three Samples	1 : 1,12
Brown	
Average of three Samples	1 : 1,15

3.5.5 Impact resistance

The Impact resistance has been determined according to EAD120001-01-0106, clause 2.2.4.

Colours	Test result
White	No apparent cracking or delamination observed
Yellow	
Red	
Blue	
Green	
Brown	

3.5.6 Temperature resistance

No performance assessed.

3.5.7 Visibility after weathering

The natural weathering has been done according to EAD 120001-01-0106, clause 2.2.6.2.

3.5.7.1 Daylight Chromaticity and Luminance Factor after natural weathering

The daylight chromaticity and luminance factor, verified according to EAD120001-01-0106, clause 2.2.1, tested after natural weathering test.

Colours		Chromaticity Coordinates				Luminance Factor ß
		1	2	3	4	
White reference	***x*** ***y***	***0.305*** ***0.315***	***0.335*** ***0.345***	***0.325*** ***0.355***	***0.295*** ***0.325***	***≥ 0.40***
White results	x y	0.313 0.331				*0.44*
Yellow reference	*x* *y*	**0.545** **0.454**	**0.487** **0.423**	**0.427** **0.483**	**0.465** **0.534**	***≥ 0.24***
Yellow on White results	x y	0.480 0.477				*0.31*
Red reference	*x* *y*	**0.735** **0.365**	**0.674** **0.236**	**0.569** **0.341**	**0.655** **0.345**	***≥ 0.03***
Red on White results	x y	0.632 0.331				*0.07*
Green reference	*x* *y*	**0.007** **0.703**	**0.248** **0.409**	**0.177** **0.362**	**0.026** **0.399**	***≥ 0.03***
Green on White results	x y	0.156 0.443				*0.07*
Blue reference	x y	**0.078** **0.171**	**0.150** **0.220**	**0.210** **0.160**	**0.137** **0.038**	***≥ 0.01***
Blue on White results	x y	0.142 0.124				*0.04*
Brown reference	***x*** ***y***	***0.455*** ***0.397***	***0.523*** ***0.429***	***0.479*** ***0.373***	***0.558*** ***0.394***	***0.03-0.09***
Brown on White results	x y	0.512 0.392				*0.05*

3.5.7.2 Coefficient of Retro-reflection after natural weathering

The Coefficient of Retro-reflection after natural weathering tests has been determined according to EAD 120001-01-0106, clause 2.2.6.4, with an observation angle α = 0.33° and α = 1.0° and entrance angle β1= 5° and 30°. The rotation angle ε has been set to 0° according to the manufacturer's specification.

The result of the test is given as average of three samples.

Colours	Geometry of Measurements			
	α = 0,33° β1 = 5°	α = 0,33° β1 = 30°	α = 1.0° β1 = 5°	α = 1.0° β1 = 30°
White	684	279	157	80
Yellow	263	132	74	42
Red	90	49	32	17.4
Blue	53	22	10.6	6.0
Green	77	37	19.4	10.1
Brown	53	28	17.4	9.3

3.5.8 Adhesion

No performance assessed

3.6 3M™ Diamond Grade™ DG³ Series 4000 + 3M™ Dew Resistant Overlay Film 1180

3.6.1 Daylight Chromaticity and Luminance Factor

The characteristics of initial daylight chromaticity and luminance factor have been determined according to EAD120001-01-0106, clause 2.2.1

Colours		Chromaticity Coordinates				Luminance Factor ß
		1	2	3	4	
White reference	***x*** ***y***	***0.305*** ***0.315***	***0.335*** ***0.345***	***0.325*** ***0.355***	***0.295*** ***0.325***	***≥ 0.40***
White results	x y	0.315 0.337				0.45
Yellow reference	***x*** ***y***	***0.494*** ***0.505***	***0.470*** ***0.480***	***0.513*** ***0.437***	***0.545*** ***0.454***	***≥ 0.24***
Yellow results	x y	0.528 0.467				0.28
Red reference	***x*** ***y***	***0.735*** ***0.265***	***0.700*** ***0.250***	***0.610*** ***0.340***	***0.660*** ***0.340***	***≥ 0.03***
Red results	x y	0.677 0.315				0.06
Green reference	***x*** ***y***	***0.110*** ***0.415***	***0.170*** ***0.415***	***0.170*** ***0.500***	***0.110*** ***0.500***	***≥ 0.03***
Green results	x y	0.131 0.449				0.08
Blue reference	***x*** ***y***	***0.130*** ***0.090***	***0.160*** ***0.090***	***0.160*** ***0.140***	***0.130*** ***0.140***	***≥ 0.01***
Blue results	x y	0.147 0.107				0.04

3.6.2 Night-time colour

No performance assessed.

3.6.3 Coefficient of Retro-reflection

The Coefficient of Retro-reflection has been determined according to EAD120001-01-0106, clause 2.2.3. The rotation angle ε has been set to 0° according to the manufacturer's specification. The result of the test is given as average of three samples.

Geometry of measurements		Colour				
α	**β_1 (β_2 = 0)**	**White**	**Yellow**	**Red**	**Blue**	**Green**
0.33°	**+5°**	675	507	147	62	122
	+20°	399	338	97	37	72
	+30°	240	209	59	21	41
	+40°	118	97	27	9.5	18.7
1.0°	**+5°**	172	120	40	12.9	28
	+20°	149	91	30	9.5	23
	+30°	101	62	19.5	6.5	15.7
	+40°	55	42	12.4	3.9	8.2
1.5°	**+5°**	47	38	10.8	4.7	9.9
	+20°	38	25	8.8	2.7	6.3
	+30°	40	23	8.4	2.3	5.7
	+40°	25	14.9	4.8	1.6	3.7

3.6.4 Rotational symmetry

The rotational symmetry has been determined according to EAD120001-01-0106, clause 2.2.3 “rotational symmetry”. The rotation angle ε has been set to 0° according to the manufacturer's specification.

Rotational symmetry	
#	Ratio
White	
Average of three Samples	1 : 1,26
Yellow	
Average of three Samples	1 : 1,20
Red	
Average of three Samples	1 : 1,23
Blue	
Average of three Samples	1 : 1,21
Green	
Average of three Samples	1 : 1,21

3.6.5 Impact resistance

The Impact resistance has been determined according to EAD120001-01-0106, clause 2.2.4.

Colours	Test result
White	No apparent cracking or delamination observed
Yellow	
Red	
Blue	
Green	

3.6.6 Temperature resistance

No performance assessed.

3.6.7 Visibility after weathering

The natural weathering has been done according to EAD 120001-01-0106, clause 2.2.6.2.

3.6.7.1 Daylight Chromaticity and Luminance Factor after natural weathering

The daylight chromaticity and luminance factor, verified according to EAD120001-01-0106, clause 2.2.1, tested after natural weathering test.

Colours		Chromaticity Coordinates				Luminance Factor ß
		1	2	3	4	
White reference	**x** **y**	**0.355** **0.355**	**0.305** **0.305**	**0.285** **0.325**	**0.335** **0.375**	***≥ 0.40***
White results	x y	0.313 0.331				*0.44*
Yellow reference	***x*** ***y***	**0.545** **0.454**	**0.487** **0.423**	**0.427** **0.483**	**0.465** **0534**	***≥ 0.24***
Yellow results	x y	0.526 0.460				*0.25*
Red reference	***x*** ***y***	**0.735** **0.265**	**0.674** **0.236**	**0.569** **0.341**	**0.655** **0.345**	***≥ 0.03***
Red results	x y	0.637 0.314				*0.05*
Green reference	***x*** ***y***	**0.007** **0.703**	**0.248** **0.409**	**0.177** **0.362**	**0.026** **0.399**	***≥ 0.03***
Green results	x y	0.143 0.428				*0.08*
Blue reference	***x*** ***y***	**0.078** **0.171**	**0.150** **0.220**	**0.210** **0.160**	**0.137** **0.038**	***≥ 0.01***
Blue results	x y	0.152 0.112				*0.05*

3.6.7.2 Coefficient of Retro-reflection after natural weathering

The Coefficient of Retro-reflection after natural weathering tests has been determined according to EAD 120001-01-0106, clause 2.2.6.4, with an observation angle α = 0.33° and α = 1.0° and entrance angle β1= 5° and 30°. The rotation angle ε has been set to 0° according to the manufacturer's specification.

The result of the test is given as average of three samples.

Colours	Geometry of Measurements			
	α = 0,33° β1 = 5°	α = 0,33° β1 = 30°	α = 1.0° β1 = 5°	α = 1.0° β1 = 30°
White	684	279	157	80
Yellow	482	214	134	68
Red	106	46	41	20
Blue	69	23	13.6	7.3
Green	89	37	23	12.7

3.6.8 Adhesion

No performance assessed

3.7 3M™ Diamond Grade™ DG³ Series 4000 + 3M Premium Protective Overlay Film 1160

3.7.1 Daylight Chromaticity and Luminance Factor

The characteristics of initial daylight chromaticity and luminance factor have been determined according to EAD120001-01-0106, clause 2.2.1

Colours		Chromaticity Coordinates				Luminance Factor ß
		1	2	3	4	
White reference	***x*** ***y***	***0.305*** ***0.315***	***0.335*** ***0.345***	***0.325*** ***0.355***	***0.295*** ***0.325***	***≥ 0.40***
White results	x y	0.314 0.336				0.48
Yellow reference	***x*** ***y***	***0.494*** ***0.505***	***0.470*** ***0.480***	***0.513*** ***0.437***	***0.545*** ***0.454***	***≥ 0.24***
Yellow results	x y	0.528 0.464				0.27
Red reference	***x*** ***y***	***0.735*** ***0.265***	***0.700*** ***0.250***	***0.610*** ***0.340***	***0.660*** ***0.340***	***≥ 0.03***
Red results	x y	0.670 0.315				0.06
Green reference	***x*** ***y***	***0.110*** ***0.415***	***0.170*** ***0.415***	***0.170*** ***0.500***	***0.110*** ***0.500***	***≥ 0.03***
Green results	x y	0.134 0.433				0.08
Blue reference	***x*** ***y***	***0.130*** ***0.090***	***0.160*** ***0.090***	***0.160*** ***0.140***	***0.130*** ***0.140***	***≥ 0.01***
Blue results	x y	0.147 0.109				0.04
Fluorescent yellow reference	***x*** ***y***	***0.521*** ***0.424***	***0.557*** ***0.442***	***0.479*** ***0.520***	***0.454*** ***0.491***	***≥ 0.38***
Fluorescent yellow results	x y	0.518 0.475				0.60

3.7.2 Night-time colour

No performance assessed.

3.7.3 Coefficient of Retro-reflection

The Coefficient of Retro-reflection has been determined according to EAD120001-01-0106, clause 2.2.3. The rotation angle ε has been set to 0° according to the manufacturer's specification. The result of the test is given as average of three samples.

Geometry of measurements		Colour					
α	β_1 ($\beta_2 = 0$)	White	Yellow	Red	Blue	Green	Fluorescent Yellow
0.33°	+5°	572	406	162	56	96	381
	+20°	355	272	113	35	60	260
	+30°	219	171	72	20	36	166
	+40°	106	82	34	8.8	16.8	80
1.0°	+5°	138	111	41	13.4	22	105
	+20°	111	91	31	10.1	16.2	81
	+30°	75	63	22	6.9	10.2	57
	+40°	47	37	14.4	3.7	6.7	34
1.5°	+5°	38	35	11.5	4.9	7.5	32
	+20°	31	26	8.9	3.0	5.2	23
	+30°	29	24	8.1	2.4	4.2	22
	+40°	18.6	15.6	5.1	1.8	2.7	13.6

3.7.4 Rotational symmetry

The rotational symmetry has been determined according to EAD120001-01-0106, clause 2.2.3 “rotational symmetry”. The rotation angle ε has been set to 0° according to the manufacturer's specification.

Rotational symmetry	
#	Ratio
White	
Average of three Samples	1 : 1,22
Yellow	
Average of three Samples	1 : 1,19
Red	
Average of three Samples	1 : 1,22
Blue	
Average of three Samples	1 : 1,18
Green	
Average of three Samples	1 : 1,15
Fluorescent Yellow	
Average of three Samples	1 : 1,17

3.7.5 Impact resistance

The Impact resistance has been determined according to EAD120001-01-0106, clause 2.2.4.

Colours	Test result
White	No apparent cracking or delamination observed
Yellow	
Red	
Blue	
Green	
Fluorescent Yellow	

3.7.6 Temperature resistance

No performance assessed.

3.7.7 Visibility after weathering

The natural weathering has been done according to EAD 120001-01-0106, clause 2.2.6.2.

3.7.7.1 Daylight Chromaticity and Luminance Factor after natural weathering

The daylight chromaticity and luminance factor, verified according to EAD120001-01-0106, clause 2.2.1, tested after natural weathering test.

Colours		Chromaticity Coordinates				Luminance Factor ß
		1	2	3	4	
White reference	***x*** ***y***	**0.355** **0.355**	**0.305** **0.305**	**0.285** **0.325**	**0.335** **0.375**	***≥ 0.40***
White results	x y	0.313 0.334				*0.41*
Yellow reference	***x*** ***y***	**0.545** **0.454**	**0.487** **0.423**	**0.427** **0.483**	**0.465** **0534**	***≥ 0.24***
Yellow results	x y	0.528 0.461				*0.26*
Red reference	***x*** ***y***	**0.735** **0.265**	**0.674** **0.236**	**0.569** **0.341**	**0.655** **0.345**	***≥ 0.03***
Red results	x y	0.644 0.321				*0.05*
Green reference	***x*** ***y***	**0.007** **0.703**	**0.248** **0.409**	**0.177** **0.362**	**0.026** **0.399**	***≥ 0.03***
Green results	x y	0.143 0.424				*0.09*
Blue reference	***x*** ***y***	**0.078** **0.171**	**0.150** **0.220**	**0.210** **0.160**	**0.137** **0.038**	***≥ 0.01***
Blue results	x y	0.149 0.115				*0.05*
Fluorescent yellow reference	***x*** ***y***	**0.521** **0.424**	**0.557** **0.442**	**0.479** **0.520**	**0.454** **0.491**	***≥ 0.38***
Fluorescent yellow results	x y	0.513 0.478				*0.60*

3.7.7.2 Coefficient of Retro-reflection after natural weathering

The Coefficient of Retro-reflection after natural weathering tests has been determined according to EAD 120001-01-0106, clause 2.2.6.4, with an observation angle α = 0.33° and α = 1.0° and entrance angle β1= 5° and 30°. The rotation angle ε has been set to 0° according to the manufacturer's specification.

The result of the test is given as average of three samples.

Colours	Geometry of Measurements			
	α = 0,33° β1 = 5°	α = 0,33° β1 = 30°	α = 1.0° β1 = 5°	α = 1.0° β1 = 30°
White	586	277	156	91
Yellow	464	213	133	75
Red	169	76	49	25
Blue	48	17.6	12.1	6.1
Green	95	38	24	11.6
Fluorescent Yellow	375	172	113	57

3.7.8 Adhesion

No performance assessed

3.8 3M™ Diamond Grade™ DG³ Series 4000 + 3M Electrocut Film 1176 with or without 3M Protective Overlay Film

3.8.1 Daylight Chromaticity and Luminance Factor

The characteristics of initial daylight chromaticity and luminance factor have been determined according to EAD120001-01-0106, clause 2.2.1

Colours		Chromaticity Coordinates				Luminance Factor ß
		1	2	3	4	
Dark Green Reference	***x*** ***y***	***0.313*** ***0.682***	***0.313*** ***0.453***	***0.248*** ***0.409***	***0.127*** ***0.557***	***0.01-0.07***
4090 + 1176	x y	0.190 0.522				*0.04*
Dark Green Reference	***x*** ***y***	***0.313*** ***0.682***	***0.313*** ***0.453***	***0.248*** ***0.409***	***0.127*** ***0.557***	***0.01-0.07***
4090 + 1176 + 1150	x y	0.181 0.531				*0.04*
Dark Green Reference	***x*** ***y***	***0.313*** ***0.682***	***0.313*** ***0.453***	***0.248*** ***0.409***	***0.127*** ***0.557***	***0.01-0.07***
4090 + 1176 + 1160	x y	0.184 0.523				*0.04*
Dark Green Reference	***x*** ***y***	***0.313*** ***0.682***	***0.313*** ***0.453***	***0.248*** ***0.409***	***0.127*** ***0.557***	***0.01-0.07***
4090 + 1176 + 1180	x y	0.185 0.530				*0.04*

3.8.2 Night-time colour

No performance assessed.

3.8.3 Coefficient of Retro-reflection

The Coefficient of Retro-reflection has been determined according to EAD120001-01-0106, clause 2.2.3. The rotation angle ε has been set to 0° according to the manufacturer's specification. The result of the test is given as average of three samples.

Geometry of measurements		Colour			
α	β_1 ($\beta_2 = 0$)	Dark Green 4090+1176	Dark Green 4090+1176 + 1150	Dark Green 4090+1176 + 1160	Dark Green 4090+1176 + 1180
0.1°	**+5°**	103		108	105
	+20°	66.4		70	68.9
	+30°	39.7		42.7	42.5
0.2°	**+5°**	68.5		71.8	69.5
	+20°	47.4		50.2	49.4
	+30°	29		31.3	31.1
0.33°	**+5°**	57.5	49.6	59.9	57.8
	+20°	35.5	29.1	37.5	37.1
	+30°	20.7	17.4	22.3	22.1
	+40°	8.98	7.72	9.87	9.84
1.0°	**+5°**	14.7	15.6	13.4	13.2
	+20°	11.5	11.8	11.1	10.7
	+30°	7.46	7.99	7.29	7.10
	+40°	4.08	4.45	3.97	3.98
1.5°	**+5°**	5.85	5.10	4.71	4.73
	+20°	3.88	4.11	3.08	3.06
	+30°	3.13	3.29	2.68	2.66
	+40°	1.83	2.08	1.64	1.62

3.8.4 Rotational symmetry

The rotational symmetry has been determined according to EAD120001-01-0106, clause 2.2.3 "rotational symmetry". The rotation angle ε has been set to 0° according to the manufacturer's specification.

Rotational symmetry	
#	Ratio
Dark Green 4090 + 1176	
Average of three Samples	1 : 1,2
Dark Green 4090 + 1176 + 1150	
Average of three Samples	1 : 1,1
Dark Green 4090 + 1176 + 1160	
Average of three Samples	1 : 1,1
Dark Green 4090 + 1176 + 1180	
Average of three Samples	1 : 1,1

3.8.5 Impact resistance

The Impact resistance has been determined according to EAD120001-01-0106, clause 2.2.4.

Colours	Test result
Dark Green 4090 + 1176	No apparent cracking or delamination observed
Dark Green 4090 + 1176 + 1150	
Dark Green 4090 + 1176 + 1160	
Dark Green 4090 + 1176 + 1180	

3.8.6 Temperature resistance

No performance assessed.

3.8.7 Visibility after weathering

The natural weathering has been done according to EAD 120001-01-0106, clause 2.2.6.2.

3.8.7.1 Daylight Chromaticity and Luminance Factor after natural weathering

The daylight chromaticity and luminance factor, verified according to EAD120001-01-0106, clause 2.2.1, tested after natural weathering test.

Colours		Chromaticity Coordinates				Luminance Factor ß
		1	2	3	4	
Dark Green Reference	***x*** ***y***	***0.313*** ***0.682***	***0.313*** ***0.453***	***0.248*** ***0.409***	***0.127*** ***0.557***	***0.01-0.07***
4090 + 1176	x y	0.185 0.515				*0.04*
Dark Green Reference	***x*** ***y***	***0.313*** ***0.682***	***0.313*** ***0.453***	***0.248*** ***0.409***	***0.127*** ***0.557***	***0.01-0.07***
4090 + 1176 + 1150	x y	0.181 0.517				*0.03*
Dark Green Reference	***x*** ***y***	***0.313*** ***0.682***	***0.313*** ***0.453***	***0.248*** ***0.409***	***0.127*** ***0.557***	***0.01-0.07***
4090 + 1176 + 1160	x y	0.188 0.486				*0.04*
Dark Green Reference	***x*** ***y***	***0.313*** ***0.682***	***0.313*** ***0.453***	***0.248*** ***0.409***	***0.127*** ***0.557***	***0.01-0.07***
4090 + 1176 + 1180	x y	0.189 0.502				*0.04*

3.8.7.2 Coefficient of Retro-reflection after natural weathering

The Coefficient of Retro-reflection after natural weathering tests has been determined according to EAD 120001-01-0106, clause 2.2.6.4, with an observation angle α = 0.33° and α = 1.0° and entrance angle β1= 5° and 30°. The rotation angle ε has been set to 0° according to the manufacturer's specification.

The result of the test is given as average of three samples.

Colours	Geometry of Measurements			
	α = 0,33° β1 = 5°	α = 0,33° β1 = 30°	α = 1.0° β1 = 5°	α = 1.0° β1 = 30°
4090+1176	55.7	21.1	14.2	6.9
4090+1176+1150	45.6	16	12.3	6.6
4090+1176+1160	58	22	13.7	6.7
4090+1176+1180	56.2	21.4	12.8	6.1

3.8.8 Adhesion

No performance assessed

3.9 3M™ Diamond Grade™ DG³ Series 4000 + 3M™ Piezo Inkjet Ink Series 8800UV + 3M™ Premium Protective Overlay Film 1160

3.9.1 Daylight Chromaticity and Luminance Factor

The characteristics of initial daylight chromaticity and luminance factor have been determined according to EAD120001-01-0106, clause 2.2.1

Colours		Chromaticity Coordinates				Luminance Factor ß
		1	2	3	4	
Yellow Reference	**x** **y**	**0.494** **0.505**	**0.470** **0.480**	**0.513** **0.437**	**0.545** **0.454**	***≥ 0.24***
Yellow on While results	x y	0.485 0.474				*0.30*
Red reference	***x*** ***y***	**0.735** **0.265**	**0.700** **0.250**	**0.610** **0.340**	**0.660** **0.340**	***≥ 0.03***
Red While results	x y	0.639 0.330				*0.07*
Green reference	***x*** ***y***	**0.110** **0.415**	**0.170** **0.415**	**0.170** **0.500**	**0.110** **0.500**	***≥ 0.03***
Green on White results	x y	0.152 0.454				*0.07*
Blue reference	***x*** ***y***	**0.130** **0.090**	**0.160** **0.090**	**0.160** **0.140**	**0.130** **0.140**	***≥ 0.01***
Blue on White results	x y	0.143 0.115				*0.04*
Brown reference	**x** **y**	**0.455** **0.397**	**0.523** **0.429**	**0.479** **0.373**	**0.558** **0.394**	***0.03 – 0.09***
Brown on White results	x y	0.524 0.390				*0.04*
Orange reference	***x*** ***y***	**0.631** **0.369**	**0.560** **0.360**	**0.506** **0.404**	**0.570** **0.429**	***≥ 0.14***
Orange on White results	x y	0.566 0.396				*0.15*

3.9.2 Night-time colour

No performance assessed.

3.9.3 Coefficient of Retro-reflection

The Coefficient of Retro-reflection has been determined according to EAD120001-01-0106, clause 2.2.3. The rotation angle ε has been set to 0° according to the manufacturer's specification. The result of the test is given as average of three samples.

Geometry of measurements		Colour					
α	β_1 ($\beta_2 = 0$)	Yellow	Red	Green	Blue	Brown	Orange
0.33°	+5°	231	97	71	48	49	179
	+20°	151	65	42	29	31	117
	+30°	96	41	26	17.4	19.7	76
	+40°	44	19	12	8.3	9	35
1.0°	+5°	70	34	19.1	10.7	16.6	58
	+20°	54	26	14.6	8.5	12.6	44
	+30°	39	18.8	10.3	6.0	8.9	32
	+40°	24	10.9	6.4	3.7	5.2	20
1.5°	+5°	22	10.8	6.5	3.6	5.7	19.1
	+20°	18.2	9.0	5.1	2.7	4.7	15.1
	+30°	15.2	7.9	4.1	2.2	3.8	12.1
	+40°	10.6	5.4	2.8	1.5	2.5	9.1

3.9.4 Rotational symmetry

The rotational symmetry has been determined according to EAD120001-01-0106, clause 2.2.3 "rotational symmetry". The rotation angle ε has been set to 0° according to the manufacturer's specification.

Rotational symmetry	
#	Ratio
Yellow	
Average of three Samples	1 : 1,19
Red	
Average of three Samples	1 : 1,25
Blue	
Average of three Samples	1 : 1,06
Green	
Average of three Samples	1 : 1,07
Brown	
Average of three Samples	1 : 1,16
Orange	
Average of three Samples	1 : 1,22

3.9.5 Impact resistance

The Impact resistance has been determined according to EAD120001-01-0106, clause 2.2.4.

Colours	Test result
Yellow	No apparent cracking or delamination observed
Red	
Blue	
Green	
Brown	
Orange	

3.9.6 Temperature resistance

No performance assessed

3.9.7 Visibility after weathering

The natural weathering has been done according to EAD 120001-01-0106, clause 2.2.6.2.

3.9.7.1 Daylight Chromaticity and Luminance Factor after natural weathering

The daylight chromaticity and luminance factor, verified according to EAD120001-01-0106, clause 2.2.1, tested after natural weathering test.

Colours		Chromaticity Coordinates				Luminance Factor ß
		1	2	3	4	
Yellow reference	*x* *y*	**0.545** **0.454**	**0.487** **0.423**	**0.427** **0.483**	**0.465** **0.534**	***≥ 0.24***
Yellow on White results	x y	0.476 0.480				*0.31*
Red reference	*x* *y*	**0.735** **0.365**	**0.674** **0.236**	**0.569** **0.341**	**0.655** **0.345**	***≥ 0.03***
Red on White results	x y	0.635 0.332				*0.07*
Green reference	*x* *y*	**0.007** **0.703**	**0.248** **0.409**	**0.177** **0.362**	**0.026** **0.399**	***≥ 0.03***
Green on White results	x y	0.157 0.442				*0.07*
Blue reference	x y	**0.078** **0.171**	**0.150** **0.220**	**0.210** **0.160**	**0.137** **0.038**	***≥ 0.01***
Blue on White results	x y	0.148 0.133				*0.04*
Brown reference	***x*** ***y***	***0.455*** ***0.397***	***0.523*** ***0.429***	***0.479*** ***0.373***	***0.558*** ***0.394***	***0.03-0.09***
Brown on White results	x y	0.520 0.399				*0.05*
Orange reference	***x*** ***y***	**0.631** **0.369**	**0.560** **0.360**	**0.506** **0.404**	**0.570** **0.429**	***≥ 0.14***
Orange on White results	x y	0.555 0.404				*0.15*

3.9.7.2 Coefficient of Retro-reflection after natural weathering

The Coefficient of Retro-reflection after natural weathering tests has been determined according to EAD 120001-01-0106, clause 2.2.6.4, with an observation angle α = 0.33° and β1= 5° and 30°. The rotation angle ε has been set to 0° according to the manufacturer's specification.

The result of the test is given as average of three samples.

Colours	Geometry of Measurements			
	α = 0,33° β1 = 5°	α = 0,33° β1 = 30°	α = 1.0° β1 = 5°	α = 1.0° β1 = 30°
Yellow	268	138	75	41
Red	99	52	35	19.2
Blue	54	23	10.2	5.0
Green	89	43	22	11.4
Brown	72	35	23	11.9
Orange	206	98	64	36

3.9.8 Adhesion

No performance assessed

3.10 3M™ Diamond Grade™ DG³ Series 4000 + 3M™ Electrocut Film Series 1170 + 3M™ Dew Resistant Overlay Film 1180

3.10.1 Daylight Chromaticity and Luminance Factor

The characteristics of initial daylight chromaticity and luminance factor have been determined according to EAD120001-01-0106, clause 2.2.1

Colours		Chromaticity Coordinates				Luminance Factor ß
		1	2	3	4	
Yellow Reference	***x*** ***y***	**0.494** **0.505**	**0.470** **0.480**	**0.513** **0.437**	**0.545** **0.454**	***≥ 0.24***
Yellow on While results	x y	0.530 0.461				*0.30*
Red reference	***x*** ***y***	**0.735** **0.265**	**0.700** **0.250**	**0.610** **0.340**	**0.660** **0.340**	***≥ 0.03***
Red on While results	x y	0.653 0.313				*0.04*
Green reference	***x*** ***y***	**0.110** **0.415**	**0.170** **0.415**	**0.170** **0.500**	**0.110** **0.500**	***≥ 0.03***
Green on White results	x y	0.139 0.436				*0.09*
Blue reference	***x*** ***y***	**0.130** **0.090**	**0.160** **0.090**	**0.160** **0.140**	**0.130** **0.140**	***≥ 0.01***
Blue on White results	x y	0.150 0.112				*0.05*

3.10.2 Night-time colour

No performance assessed.

3.10.3 Coefficient of Retro-reflection

The Coefficient of Retro-reflection has been determined according to EAD120001-01-0106, clause 2.2.3. The rotation angle ε has been set to 0° according to the manufacturer's specification. The result of the test is given as average of three samples.

Geometry of measurements		Colour			
α	**β_1 (β_2 = 0)**	**Yellow**	**Red**	**Green**	**Blue**
0.33°	**+5°**	500	115	97	46
	+20°	336	76	60	28
	+30°	201	44	36	15.4
	+40°	94	19.9	16.4	6.6
1.0°	**+5°**	124	34	22	10.8
	+20°	93	23	16.7	7.8
	+30°	62	13.5	10.8	4.8
	+40°	38	9.0	6.4	2.8
1.5°	**+5°**	38	9.9	8.7	4.4
	+20°	26	6.8	4.8	2.2
	+30°	24	5.9	3.9	1.7
	+40°	13.5	3.1	2.4	1.1

3.10.4 Rotational symmetry

The rotational symmetry has been determined according to EAD120001-01-0106, clause 2.2.3 "rotational symmetry". The rotation angle ε has been set to 0° according to the manufacturer's specification.

Rotational symmetry	
#	Ratio
Yellow	
Average of three Samples	1 : 1,26
Red	
Average of three Samples	1 : 1,32
Blue	
Average of three Samples	1 : 1,13
Green	
Average of three Samples	1 : 1,15

3.10.5 Impact resistance

The Impact resistance has been determined according to EAD120001-01-0106, clause 2.2.4.

Colours	Test result
Yellow	No apparent cracking or delamination observed
Red	
Blue	
Green	

3.10.6 Temperature resistance

No performance assessed.

3.10.7 Visibility after weathering

The natural weathering has been done according to EAD 120001-01-0106, clause 2.2.6.2.

3.10.7.1 Daylight Chromaticity and Luminance Factor after natural weathering

The daylight chromaticity and luminance factor, verified according to EAD120001-01-0106, clause 2.2.1, tested after natural weathering test.

Colours		Chromaticity Coordinates				Luminance Factor ß
		1	2	3	4	
Yellow reference	***x*** ***y***	**0.545** **0.454**	**0.487** **0.423**	**0.427** **0.483**	**0.465** **0.534**	***≥ 0.24***
Yellow on White results	x y	0.529 0.459				*0.29*
Red reference	***x*** ***y***	**0.735** **0.365**	**0.674** **0.236**	**0.569** **0.341**	**0.655** **0.345**	***≥ 0.03***
Red White results	x y	0.630 0.307				*0.04*
Green reference	***x*** ***y***	**0.007** **0.703**	**0.248** **0.409**	**0.177** **0.362**	**0.026** **0.399**	***≥ 0.03***
Green on White results	x y	0.144 0.428				*0.08*
Blue reference	**x** **y**	**0.078** **0.171**	**0.150** **0.220**	**0.210** **0.160**	**0.137** **0.038**	***≥ 0.01***
Blue on White results	x y	0.152 0.116				*0.05*

3.10.7.2 Coefficient of Retro-reflection after natural weathering

The Coefficient of Retro-reflection after natural weathering tests has been determined according to EAD 120001-01-0106, clause 2.2.6.4, with an observation angle $\alpha = 0.33°$ and $\alpha = 1.0°$ and entrance angle $\beta1 = 5°$ and 30°. The rotation angle ε has been set to 0° according to the manufacturer's specification.

The result of the test is given as average of three samples.

Colours	Geometry of Measurements			
	$\alpha = 0,33°$ $\beta1 = 5°$	$\alpha = 0,33°$ $\beta1 = 30°$	$\alpha = 1.0°$ $\beta1 = 5°$	$\alpha = 1.0°$ $\beta1 = 30°$
Yellow	520	206	130	69
Red	126	51	35	17
Blue	69	23	14.1	7.6
Green	124	45	27	13.7

3.10.8 Adhesion

No performance assessed

3.11 3M™ Diamond Grade™ DG³ 4081&4091 + 3M™ Piezo Inkjet Ink Series 8800UV + 3M™ Electrocut Film Film 1170

3.11.1 Daylight Chromaticity and Luminance Factor

The characteristics of initial daylight chromaticity and luminance factor have been determined according to EAD120001-01-0106, clause 2.2.1

Colours		Chromaticity Coordinates				Luminance Factor ß
		1	2	3	4	
Red on Yellow, Fluorescent Yellow or Fluorescent Yellow Green reference	***x*** ***y***	**0.735** **0.265**	**0.700** **0.250**	**0.610** **0.340**	**0.660** **0.340**	***≥ 0.03***
Red on Fluorescent Yellow 4081 results	x y	0.643 0.333				*0.07*
Red on Yellow, Fluorescent Yellow or Fluorescent Yellow Green reference	***x*** ***y***	**0.735** **0.265**	**0.700** **0.250**	**0.610** **0.340**	**0.660** **0.340**	***≥ 0.03***
Red on Yellow 4091 results	x y	0.648 0.329				*0.07*

3.11.2 Night-time colour

No performance assessed.

3.11.3 Coefficient of Retro-reflection

The Coefficient of Retro-reflection has been determined according to EAD120001-01-0106, clause 2.2.3. The rotation angle ε has been set to 0° according to the manufacturer's specification. The result of the test is given as average of three samples.

Geometry of measurements		Colour	
α	β_1 ($\beta_2 = 0$)	Red on Yellow 4091	Red on Fluorescent Yellow 4081
0.33°	**+5°**	82	88
	+20°	54	59
	+30°	34	38
	+40°	15.7	17.3
1.0°	**+5°**	33	33
	+20°	24	25
	+30°	16.4	17.6
	+40°	9.7	10.2
1.5°	**+5°**	10.8	11.0
	+20°	8.8	9.6
	+30°	7.0	7.1
	+40°	4.6	4.9

3.11.4 Rotational symmetry

The rotational symmetry has been determined according to EAD120001-01-0106, clause 2.2.3 “rotational symmetry”. The rotation angle ε has been set to 0° according to the manufacturer's specification.

Rotational symmetry	
#	Ratio
Red on Yellow 4091	
Average of three Samples	1 : 1,27
Red on Fluorescent Yellow 4081	
Average of three Samples	1 : 1,25

3.11.5 Impact resistance

The Impact resistance has been determined according to EAD120001-01-0106, clause 2.2.4.

Colours	Test Result
Red on Yellow 4091	No apparent cracking or delamination observed
Red on Fluorescent Yellow 4081	

3.11.6 Temperature resistance

No performance assessed.

3.11.7 Visibility after weathering

The accelerated artificial weathering has been done according to EAD 120001-01-0106, clause 2.2.6.1, with the use of a (non-insulated) black-panel thermometer.

3.11.7.1 Daylight Chromaticity and Luminance Factor after accelerated artificial weathering

The daylight chromaticity and luminance factor, verified according to EAD120001-01-0106, clause 2.2.1, tested after accelerated artificial weathering.

Colours		Chromaticity Coordinates				Luminance Factor ß
		1	2	3	4	
Red on Yellow, Fluorescent Yellow or Fluorescent Yellow Green reference	***x*** ***y***	**0.735** **0.365**	**0.674** **0.236**	**0.569** **0.341**	**0.655** **0.345**	***≥ 0.03***
Red on Fluorescent Yellow 4081 results	x y	0.627 0.336				*0.07*
Red on Yellow, Fluorescent Yellow or Fluorescent Yellow Green reference	***x*** ***y***	**0.735** **0.365**	**0.674** **0.236**	**0.569** **0.341**	**0.655** **0.345**	***≥ 0.03***
Red on Yellow 4091 results	x y	0.634 0.331				*0.07*

3.11.7.2 Coefficient of Retro-reflection after accelerated artificial weathering

The Coefficient of Retro-reflection after accelerated artificial weathering tests has been determined according to EAD 120001-01-0106, clause 2.2.6.4, with an observation angle α = 0.33° and α = 1.0° and entrance angle $\beta 1$= 5° and 30°. The rotation angle ε has been set to 0° according to the manufacturer's specification.

The result of the test is given as average of three samples.

Colours	Geometry of Measurements			
	α = 0,33° $\beta 1$ = 5°	α = 0,33° $\beta 1$ = 30°	α = 1.0° $\beta 1$ = 5°	α = 1.0° $\beta 1$ = 30°
Red on Yellow 4091	80	34	31	16.0
Red on Fluorescent Yellow 4081	92	39	34	18.1

3.11.8 Adhesion

No performance assessed

3.12 3M™ Diamond Grade™ Translucent DG³ 4090T + 3M™ Electrocut Film Series 1170

3.12.1 Daylight Chromaticity and Luminance Factor

The characteristics of initial daylight chromaticity and luminance factor have been determined according to EAD120001-01-0106, clause 2.2.1

Colours		Chromaticity Coordinates				Luminance Factor ß
		1	2	3	4	
White Translucent reference	***x*** ***y***	***0.305*** ***0.315***	***0.335*** ***0.345***	***0.325*** ***0.355***	***0.295*** ***0.325***	***≥ 0.27***
White results	x y	0.312 0.329				0.32
Yellow Translucent reference	***x*** ***y***	***0.494*** ***0.505***	***0.470*** ***0.480***	***0.513*** ***0.437***	***0.545*** ***0.454***	***≥ 0.16***
Yellow results	x y	0.525 0.465				0.23
Green reference	***x*** ***y***	***0.110*** ***0.415***	***0.170*** ***0.415***	***0.170*** ***0.500***	***0.110*** ***0.500***	***≥ 0.03***
Green results	x y	0.136 0.422				0.06
Blue reference	***x*** ***y***	***0.130*** ***0.090***	***0.160*** ***0.090***	***0.160*** ***0.140***	***0.130*** ***0.140***	***≥ 0.01***
Blue results	x y	0.155 0.115				0.04

3.12.2 Night-time colour

No performance assessed.

3.12.3 Coefficient of Retro-reflection

The Coefficient of Retro-reflection has been determined according to EAD120001-01-0106, clause 2.2.3. The rotation angle ε has been set to 0° according to the manufacturer's specification. The result of the test is given as average of three samples.

Geometry of measurements		Colour			
α	β_1 ($\beta_2 = 0$)	White	Yellow	Green	Blue
0.1°	+5°	1422	1140	203	123
	+20°	896	712	121	72
	+30°	562	446	71	41
	+40°	280	219	34	18.9
0.2°	+5°	902	726	125	74
	+15°	738	592	98	59
	+20°	628	502	81	48
	+30°	406	325	50	29
	+40°	213	168	25	14.0
0.33°	+5°	688	532	109	66
	+15°	524	408	76	45
	+20°	444	345	62	45
	+30°	269	211	35	21
	+40°	134	105	16.2	9.3
1.0°	+5°	187	154	28	16.9
	+15°	166	135	24	14.4
	+20°	160	130	24	14.1
	+30°	110	88	16.1	9.5
	+40°	56	45	7.4	4.3
1.5°	+5°	56	45	9.2	6.3
	+20°	40	34	6.4	4.3
	+30°	44	36	6.3	3.9
	+40°	25	20	3.9	2.4

3.12.4 Rotational symmetry

The rotational symmetry has been determined according to EAD120001-01-0106, clause 2.2.3 "rotational symmetry". The rotation angle ε has been set to 0° according to the manufacturer's specification.

Rotational symmetry	
#	Ratio
White	
Average of three Samples	1 : 1,32
Yellow	
Average of three Samples	1 : 1,33
Blue	
Average of three Samples	1 : 1,54
Green	
Average of three Samples	1 : 1,43

3.12.5 Impact resistance

The Impact resistance has been determined according to EAD120001-01-0106, clause 2.2.4.

Colours	Test result
White	No apparent cracking or delamination observed
Yellow	
Blue	
Green	

3.12.6 Temperature resistance

No performance assessed.

3.12.7 Visibility after weathering

The natural weathering has been done according to EAD 120001-01-0106, clause 2.2.6.2.

3.12.7.1 Daylight Chromaticity and Luminance Factor after natural weathering

The daylight chromaticity and luminance factor, verified according to EAD120001-01-0106, clause 2.2.1, tested after natural weathering test.

Colours		Chromaticity Coordinates				Luminance Factor ß
		1	2	3	4	
White Translucent Reference	***x*** ***y***	***0.305*** ***0.315***	***0.335*** ***0.345***	***0.325*** ***0.355***	***0.295*** ***0.325***	***≥ 0.27***
White results	x y	0.305 0.324				0.41
Yellow Translucent reference	***x*** ***y***	**0.545** **0.454**	**0.487** **0.423**	**0.427** **0.483**	**0.465** **0.534**	***≥ 0.16***
Yellow on White results	x y	0.513 0.459				*0.27*
Green reference	***x*** ***y***	**0.007** **0.703**	**0.248** **0.409**	**0.177** **0.362**	**0.026** **0.399**	***≥ 0.03***
Green on White results	x y	0.154 0.415				*0.07*
Blue reference	x y	**0.078** **0.171**	**0.150** **0.220**	**0.210** **0.160**	**0.137** **0.038**	***≥ 0.01***
Blue on White results	x y	0.158 0.124				*0.05*

3.12.7.2 Coefficient of Retro-reflection after natural weathering

The Coefficient of Retro-reflection after natural weathering tests has been determined according to EAD 120001-01-0106, clause 2.2.6.4, with an observation angle $\alpha = 0.33°$ and $\alpha = 1.0°$ and entrance angle $\beta1 = 5°$ and 30°. The rotation angle ε has been set to 0° according to the manufacturer's specification.

The result of the test is given as average of three samples.

Colours	Geometry of Measurements			
	α = 0,33° β1 = 5°	α = 0,33° β1 = 30°	α = 1.0° β1 = 5°	α = 1.0° β1 = 30°
White	550	230	148	79
Yellow	472	204	132	69
Blue	57	19.1	15.1	8.1
Green	93	33	25	13.8

3.12.8 Adhesion

No performance assessed

3.13 3M™ Diamond Grade™ Translucent DG³ 4090T printed with 3M™ Process Colour Series 880 I or N

3.13.1 Daylight Chromaticity and Luminance Factor

The characteristics of initial daylight chromaticity and luminance factor have been determined according to EAD120001-01-0106, clause 2.2.1

Colours		Chromaticity Coordinates				Luminance Factor ß
		1	2	3	4	
Yellow Translucent reference	***x*** ***y***	***0.494*** ***0.505***	***0.470*** ***0.480***	***0.513*** ***0.437***	***0.545*** ***0.454***	***≥ 0.16***
Yellow results	x y	0.504 0.459				0.20
Green reference	***x*** ***y***	***0.110*** ***0.415***	***0.170*** ***0.415***	***0.170*** ***0.500***	***0.110*** ***0.500***	***≥ 0.03***
Green results	x y	0.150 0.432				0.07
Blue reference	***x*** ***y***	***0.130*** ***0.090***	***0.160*** ***0.090***	***0.160*** ***0.140***	***0.130*** ***0.140***	***≥ 0.01***
Blue results	x y	0.147 0.139				0.04
Dark Green Reference	***x*** ***y***	***0.313*** ***0.682***	***0.313*** ***0.453***	***0.248*** ***0.409***	***0.127*** ***0.557***	***0.01-0.07***
Dark Green results	x y	0.234 0.487				*0.03*

3.13.2 Night-time colour

No performance assessed.

3.13.3 Coefficient of Retro-reflection

The Coefficient of Retro-reflection has been determined according to EAD120001-01-0106, clause 2.2.3. The rotation angle ε has been set to 0° according to the manufacturer's specification. The result of the test is given as average of three samples.

Geometry of measurements		Colour			
α	β_1 ($\beta_2 = 0$)	Yellow	Green	Blue	Dark Green
0.1°	+5°	876	315	143	183
	+20°	548	203	91	109
	+30°	340	127	56	65
	+40°	166	63	27	31
0.2°	+5°	558	196	89	116
	+15°	452	161	73	92
	+20°	384	138	62	76
	+30°	246	90	39	47
	+40°	125	46	20	23
0.33°	+5°	414	169	83	98
	+15°	311	124	59	70
	+20°	261	104	49	57
	+30°	157	62	28	32
	+40°	77	29	13.0	14.6
1.0°	+5°	117	42	20	26
	+15°	105	36	16.6	23
	+20°	99	33	16.6	22
	+30°	64	23	11.5	14.9
	+40°	33	12.5	5.6	6.6
1.5°	+5°	34	14.2	7.4	8.7
	+20°	26	8.5	4.2	5.6
	+30°	27	8.1	4.0	5.7
	+40°	15.0	5.1	2.6	3.4

3.13.4 Rotational symmetry

The rotational symmetry has been determined according to EAD120001-01-0106, clause 2.2.3 "rotational symmetry". The rotation angle ε has been set to 0° according to the manufacturer's specification.

Rotational symmetry	
#	Ratio
Yellow	
Average of three Samples	1 : 1,26
Blue	
Average of three Samples	1 : 1,25
Green	
Average of three Samples	1 : 1,19
Dark Green	
Average of three Samples	1 : 1,32

3.13.5 Impact resistance

The Impact resistance has been determined according to EAD120001-01-0106, clause 2.2.4.

Colours	Test result
Yellow	No apparent cracking or delamination observed
Blue	
Green	
Dark Green	

3.13.6 Temperature resistance

No performance assessed.

3.13.7 Visibility after weathering

The natural weathering has been done according to EAD 120001-01-0106, clause 2.2.6.2.

3.13.7.1 Daylight Chromaticity and Luminance Factor after natural weathering

The daylight chromaticity and luminance factor, verified according to EAD120001-01-0106, clause 2.2.1, tested after natural weathering test.

Colours		Chromaticity Coordinates				Luminance Factor ß
		1	2	3	4	
Yellow Translucent reference	*x* *y*	**0.545** **0.454**	**0.487** **0.423**	**0.427** **0.483**	**0.465** **0.534**	***≥ 0.16***
Yellow on White results	x y	0.456 0.455				*0.28*
Green reference	*x* *y*	**0.007** **0.703**	**0.248** **0.409**	**0.177** **0.362**	**0.026** **0.399**	***≥ 0.03***
Green on White results	x y	0.160 0.419				*0.08*
Blue reference	x y	**0.078** **0.171**	**0.150** **0.220**	**0.210** **0.160**	**0.137** **0.038**	***≥ 0.01***
Blue on White results	x y	0.156 0.160				*0.06*
Dark Green Reference	***x*** ***y***	***0.313*** ***0.682***	***0.313*** ***0.453***	***0.248*** ***0.409***	***0.127*** ***0.557***	***0.01-0.07***
Dark Green on White results	x y	0.236 0.456				*0.04*

3.13.7.2 Coefficient of Retro-reflection after natural weathering

The Coefficient of Retro-reflection after natural weathering tests has been determined according to EAD 120001-01-0106, clause 2.2.6.4, with an observation angle α = 0.33° and α = 1.0° and entrance angle β1= 5° and 30°. The rotation angle ε has been set to 0° according to the manufacturer's specification.

The result of the test is given as average of three samples.

Colours	Geometry of Measurements			
	α = 0,33° β1 = 5°	α = 0,33° β1 = 30°	α = 1.0° β1 = 5°	α = 1.0° β1 = 30°
Yellow	386	156	114	60
Blue	71	24	17.6	9.1
Green	165	61	43	23
Dark Green	101	31	28	14.4

3.13.8 Adhesion

No performance assessed

4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

In accordance with Regulation (EU) N° 305/2011, Article 65, Directive 89/106/EEC is repealed, but references to the repealed Directive shall be construed as references to the Regulation.

The system of assessment and verification of constancy of performance, specified in the Decision of the Commission 1996/579/EC of 1996/06/24[3], as amended by Commission Decision 1999/453/EC of 1999/06/18[4], is specified in the following Table.

Table 2 – System of assessment and verification of constancy of performance

Product(s)	Intended use(s)	Level(s) or class(es)	Assessment and verification of constancy of performance system(s)*
Road traffic signs	For circulation areas	Any	1
* See Annex V to Regulation (EU) N° 305/2011			

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

5.1 Tasks for the ETA-holder

The cornerstones of the actions to be undertaken by the manufacturer of the product in the process of assessment and verification of constancy of performance are laid down in European Assessment Document 120001-01-0106, clause 3.2.

The manufacturer is allowed to use similar test or control methods, using different equipment and test samples under different conditions, as long as the manufacturer ensures constant product performances, but the frequency of control shall be respected.

5.2 Tasks of notified bodies

The cornerstones of the actions to be undertaken by the notified body in the procedure of assessment and verification of constancy of performance are laid down in European Assessment Document 120001-01-0106, clause 3.3.

6 Reference documents

See European Assessment Document 120001-01-0106, clause 4.

NOTE: The editions of reference documents given above are those which have been adopted by the UBAtc for its specific use when establishing this ETA. When new editions become available, these supersede the editions mentioned only when confirmed by the UBAtc.

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This European Technical Assessment has been issued by UBAtc asbl, in Sint-Stevens-Woluwe, on the basis of the technical work carried out by the Assessment Operator, COPRO.

On behalf of UBAtc asbl,

Peter Wouters, director

Benny De Blaere, director

On behalf of the Assessment Operator, COPRO, responsible for the technical content of the ETA,

Dirk Van Loo, director

The most recent version of this European Technical Assessment may be consulted on the UBAtc website (www.ubatc.be).

[3] see OJEU L 254, 8.10.1996, p. 52

[4] see OJEU L 178, 14.7.1999, p. 50