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**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™ High Intensity Prismatic Series 3930 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 plants:	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
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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 11/0426 and 11/0427 and 13/0304, all issued on 27 June 2013
This European Technical Assessment contains:	30 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 11/0426, ETA 11/0427 and ETA 13/0304. Compared with those documents, 3M Process Colour Series 4700 is no longer covered by this ETA and for ETA 11/0427 and 13/0304 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™ High Intensity Prismatic Reflective Sheeting Series 3930", 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™ High Intensity Prismatic Series 3930" and Combinations with Process Colour and Overlay Film

An overview of the complete set of components of "3M™ High Intensity Prismatic Series 3930", 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™ High Intensity Prismatic Reflective Sheeting Series 3930	White	3930	Thickness: 0,32 – 0,49 mm Rolls in various length and width
		Red	3932	
		Yellow	3931	
		Green	3937	
		Blue	3935	
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	
Process colour for digital printing	3M™ Piezo Inkjet Ink Series 8800 UV	Yellow		18 - 20 m²/l
		Red		
		Blue		
		Green		
		Brown		
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 Microprismatic 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*	*≥ 0.27*
Yellow *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 *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*
* 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	*≥ 0.27*
Yellow *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 *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*
* 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 10 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 High Intensity Prismatic Series 3930 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. The 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 on the enclosed instruction sheets using one or several illustrations.

In any case, national regulations and particularly concerning national traffic code shall be complied with.

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 High Intensity Series 3930” 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 High Intensity 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™ High Intensity Prismatic Series 3930”

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 High Intensity Prismatic Series 3930” 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 High Intensity Prismatic Series 3930” 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™ 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 High Intensity Prismatic Series 3930 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 can 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

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	No performance assessed
7	Daylight Chromaticity and Luminance Factor after natural weathering	3.x.7.1	Value (average of three samples)
8	Coefficient of Retro-reflection after natural weathering	3.x.7.2	Value (average of three samples)
9	Adhesion	3.x.8	No performance assessed

3.1 3M™ High Intensity Prismatic Series 3930

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 *Tolerance Sphere*	x y	*0.305* *0.315*	*0.335* *0.345*	*0.325* *0.355*	*0.295* *0.325*	*≥ 0.27*
Results White	*x* *y*	*0.314* *0.333*				*0.41*
Yellow *Tolerance Sphere*	*x* *y*	*0.494* *0.505*	*0.470* *0.480*	*0.513* *0.437*	*0.545* *0.454*	*≥ 0.16*
Results Yellow	*x* *y*	*0.508* *0.450*				*0.24*
Red *Tolerance Sphere*	*x* *y*	*0.735* *0.265*	*0.700* *0.250*	*0.610* *0.340*	*0.660* *0.340*	*≥ 0.03*
Results Red	*x* *y*	*0.665* *0.312*				*0.05*
Blue *Tolerance Sphere*	*x* *y*	*0.130* *0.090*	*0.160* *0.090*	*0.160* *0.140*	*0.130* *0.140*	*≥ 0.01*
Results Blue	*x* *y*	*0.147* *0.108*				*0.05*
Green *Tolerance Sphere*	*x* *y*	*0.110* *0.415*	*0.170* *0.415*	*0.170* *0.500*	*0.110* *0.500*	*≥ 0.03*
Results Green	*x* *y*	0.133 0.458				*0.08*

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 90° 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
12'	+5°	653	370	128	54	97
	+30°	464	233	96	31	65
	+40°	361	176	78	23	51
20'	+5°	546	332	111	53	84
	+30°	259	121	48	20	38
	+40°	193	95	41	12.4	27
2°	+5°	6.7	4.3	1.7	0.8	1.3
	+30°	3.6	3.1	0.9	0.4	0.7
	+40°	4.6	3.2	1.1	0.4	0.7

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 90° according to the manufacturer's specification.

Rotational symmetry	
#	Ratio
White	
Average of three Samples	1 : 1,46
Yellow	
Average of three Samples	1 : 1,35
Red	
Average of three Samples	1 : 1,62
Blue	
Average of three Samples	1 : 1,56
Green	
Average of three Samples	1 : 1,34

3.1.5 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	

3.1.6 Temperature resistance

No performance assessed.

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 Tolerance Sphere	***x*** ***y***	**0.355** **0.355**	**0.305** **0.305**	**0.285** **0.325**	**0.335** **0.375**	***≥ 0.27***
White Results	x y	0.312 0.332				*0.44*
Yellow Tolerance Sphere	***x*** ***y***	**0.545** **0.454**	**0.487** **0.423**	**0.427** **0.483**	**0.465** **0.534**	***≥ 0.16***
Yellow Results	x y	0.501 0.455				*0.29*
Red Tolerance Sphere	***x*** ***y***	**0.735** **0.265**	**0.674** **0.236**	**0.569** **0.341**	**0.655** **0.345**	***≥ 0.03***
Red Results	x y	0.614 0.312				*0.04*
Blue Tolerance Sphere	***x*** ***y***	**0.078** **0.171**	**0.150** **0.220**	**0.210** **0.160**	**0.137** **0.038**	***≥ 0.01***
Blue Results	x y	0.155 0.121				*0.05*
Green Tolerance Sphere		**0.007** **0.703**	**0.248** **0.409**	**0.177** **0.362**	**0.026** **0.399**	***≥ 0.03***
Green Results	x y	0.147 0.431				*0.07*

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 β1= 5° and 30°. The rotation angle ε has been set to 90° 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°
White	416	225
Yellow	277	158
Red	73	38
Blue	42	17,8
Green	63	26

3.1.8 Adhesion

No performance assessed

3.2 3M™ High Intensity Prismatic Series 3930 + 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 *Tolerance Sphere*	*x* *y*	*0.494* *0.505*	*0.470* *0.480*	*0.513* *0.437*	*0.545* *0.454*	*≥ 0.16*
Results Yellow	*x* *y*	*0.529* *0.464*				*0.27*
Red *Tolerance Sphere*	*x* *y*	*0.735* *0.265*	*0.700* *0.250*	*0.610* *0.340*	*0.660* *0.340*	*≥ 0.03*
Results Red	*x* *y*	*0.661* *0.314*				*0.04*
Blue *Tolerance Sphere*	*x* *y*	*0.130* *0.090*	*0.160* *0.090*	*0.160* *0.140*	*0.130* *0.140*	*≥ 0.01*
Results Blue	*x* *y*	*0.150* *0.110*				*0.04*
Green *Tolerance Sphere*	*x* *y*	*0.110* *0.415*	*0.170* *0.415*	*0.170* *0.500*	*0.110* *0.500*	*≥ 0.03*
Results Green	*x* *y*	0.140 0.429				*0.07*
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*
Results Brown	*x* *y*	*0.478* *0.396*				*0.04*

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 90° 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
12'	+5°	342	108	34	80	30
	+30°	223	169	18.9	46	18.5
	+40°	171	51	14.6	34	13.4
20'	+5°	306	90	35	75	27
	+30°	118	34	12	29	9.5
	+40°	93	28	7.9	19	7.3
2°	+5°	3.6	1.4	0.5	1.2	0.5
	+30°	3.2	1.2	0.4	1.0	0.4
	+40°	3.2	1.1	0.4	0.8	0.4

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 90° according to the manufacturer's specification.

Rotational symmetry	
#	Ratio
Yellow	
Average of three Samples	1 : 1,34
Red	
Average of three Samples	1 : 1,45
Blue	
Average of three Samples	1 : 1,39
Green	
Average of three Samples	1 : 1,48
Brown	
Average of three Samples	1 : 1,47

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

No performance assessed.

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 1	2	3	4	Luminance Factor ß
Yellow Tolerance Sphere	***x*** ***y***	**0.545** **0.454**	**0.487** **0.423**	**0.427** **0.483**	**0.465** **0.534**	***≥ 0.16***
Yellow Results	x y	0.520 0.462				*0.31*
Red Tolerance Sphere	***x*** ***y***	**0.735** **0.265**	**0.674** **0.236**	**0.569** **0.341**	**0.655** **0.345**	***≥ 0.03***
Red Results	x y	0.605 0.312				*0.04*
Blue Tolerance Sphere	***x*** ***y***	**0.078** **0.171**	**0.150** **0.220**	**0.210** **0.160**	**0.137** **0.038**	***≥ 0.01***
Blue Results	x y	0.155 0.122				*0.05*
Green Tolerance Sphere		**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				*0.08*
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***
Brown Results	x y	0.472 0.397				*0.05*

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 β1= 5° and 30°. The rotation angle ε has been set to 90° 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°
Yellow	265	143
Red	84	47
Blue	43	20
Green	73	35
Brown	31	15,2

3.2.8 Adhesion

No performance assessed.

3.3 3M™ High Intensity Prismatic Series 3930 printed with 3M™ Process Colour 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 *Tolerance Sphere*	*x* *y*	*0.494* *0.505*	*0.470* *0.480*	*0.513* *0.437*	*0.545* *0.454*	*≥ 0.16*
Results Yellow	*x* *y*	*0.514* *0.454*				*0.23*
Red *Tolerance Sphere*	*x* *y*	*0.735* *0.265*	*0.700* *0.250*	*0.610* *0.340*	*0.660* *0.340*	*≥ 0.03*
Results Red	*x* *y*	*0.634* *0.323*				*0.05*
Blue *Tolerance Sphere*	*x* *y*	*0.130* *0.090*	*0.160* *0.090*	*0.160* *0.140*	*0.130* *0.140*	*≥ 0.01*
Results Blue	*x* *y*	*0.141* *0.121*				*0.04*
Green *Tolerance Sphere*	*x* *y*	*0.110* *0.415*	*0.170* *0.415*	*0.170* *0.500*	*0.110* *0.500*	*≥ 0.03*
Results Green	*x* *y*	0.152 0.426				*0.09*

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 90° 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
12'	**+5°**	338	119	40	128
	+30°	222	80	21	74
	+40°	173	60	16	57
20'	**+5°**	284	98	37	117
	+30°	110	39	12.8	42
	+40°	91	33	8.5	31
2°	**+5°**	3.6	1.6	0.8	1.5
	+30°	2.6	1.2	0.7	1.2
	+40°	2.5	1.2	0.6	1.2

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 90° according to the manufacturer's specification.

Rotational symmetry	
#	Ratio
Yellow	
Average of three Samples	1 : 1,30
Red	
Average of three Samples	1 : 1,34
Blue	
Average of three Samples	1 : 1,19
Green	
Average of three Samples	1 : 1,22

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

No performance assessed.

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 Tolerance Sphere	***x*** ***y***	**0.545** **0.454**	**0.487** **0.423**	**0.427** **0.483**	**0.465** **0.534**	***≥ 0.24***
Yellow Results	x y	0.484 0.455				*0.29*
Red Tolerance Sphere	***x*** ***y***	**0.735** **0.265**	**0.674** **0.236**	**0.569** **0.341**	**0.655** **0.345**	***≥ 0.03***
Red Results	x y	0.608 0.314				*0.05*
Blue Tolerance Sphere	***x*** ***y***	**0.078** **0.171**	**0.150** **0.220**	**0.210** **0.160**	**0.137** **0.038**	***≥ 0.01***
Blue Results	x y	0.159 0.151				*0.06*
Green Tolerance Sphere		**0.007** **0.703**	**0.248** **0.409**	**0.177** **0.362**	**0.026** **0.399**	***≥ 0.03***
Green Results	x y	0.147 0.428				*0.07*

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 $\beta 1$= 5° and 30°. The rotation angle ε has been set to 90° 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°
Yellow	285	173
Red	73,5	22,6
Blue	32	19
Green	80	46

3.3.8 Adhesion

No performance assessed

3.4 3M™ High Intensity Prismatic Series 3930 + 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 *Tolerance Sphere*	x y	*0.305* *0.315*	*0.335* *0.345*	*0.325* *0.355*	*0.295* *0.325*	*≥ 0.27*
Results White	x y	*0.313* *0.333*				*0.41*
Yellow *Tolerance Sphere*	x y	*0.494* *0.505*	*0.470* *0.480*	*0.513* *0.437*	*0.545* *0.454*	*≥ 0.16*
Results Yellow	x y	*0.473* *0.481*				*0.28*
Red *Tolerance Sphere*	x y	*0.735* *0.265*	*0.700* *0.250*	*0.610* *0.340*	*0.660* *0.340*	*≥ 0.03*
Results Red	x y	*0.637* *0.330*				*0.06*
Blue *Tolerance Sphere*	x y	*0.130* *0.090*	*0.160* *0.090*	*0.160* *0.140*	*0.130* *0.140*	*≥ 0.01*
Results Blue	x y	*0.143* *0.126*				*0.04*
Green *Tolerance Sphere*	x y	*0.110* *0.415*	*0.170* *0.415*	*0.170* *0.500*	*0.110* *0.500*	*≥ 0.03*
Results Green	x y	0.162 0.453				*0.06*
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*
Results Brown	x y	*0.517* *0.401*				*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 90° 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
12'	+5°	603	265	85	56	74	67
	+30°	348	137	39	23	32	31
	+40°	230	97	25	14.4	19.9	18.4
20'	+5°	522	255	77	43	60	58
	+30°	196	107	31	20	28	23
	+40°	125	69	17.6	10.4	14.8	12.9
2°	+5°	5.4	5.4	2.0	0.9	1.3	1.6
	+30°	3.6	4	1.5	0.5	0.8	1.1
	+40°	5.1	4.2	1.5	0.4	0.7	1.0

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 90° according to the manufacturer's specification.

Rotational symmetry	
#	Ratio
White	
Average of three Samples	1 : 1.51
Yellow	
Average of three Samples	1 : 1,17
Red	
Average of three Samples	1 : 1,15
Blue	
Average of three Samples	1 : 1,08
Green	
Average of three Samples	1 : 1,05
Brown	
Average of three Samples	1 : 1,12

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 1	2	3	4	Luminance Factor ß
White Tolerance Sphere	**x** **y**	**0.355** **0.355**	**0.305** **0.305**	**0.285** **0.325**	**0.335** **0.375**	***≥ 0.27***
White Results	x y	0.313 0.333				*0.43*
Yellow Tolerance Sphere	***x*** ***y***	**0.545** **0.454**	**0.487** **0.423**	**0.427** **0.483**	**0.465** **0.534**	***≥ 0.16***
Yellow Results	x y	0.466 0.475				*0.29*
Red Tolerance Sphere	***x*** ***y***	**0.735** **0.265**	**0.674** **0.236**	**0.569** **0.341**	**0.655** **0.345**	***≥ 0.03***
Red Results	x y	0.595 0.329				*0.07*
Blue Tolerance Sphere	***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 0.141				*0.05*
Green Tolerance Sphere		**0.007** **0.703**	**0.248** **0.409**	**0.177** **0.362**	**0.026** **0.399**	***≥ 0.03***
Green Results	x y	0.179 0.430				*0.07*
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***
Brown Results	x y	0.478 0.393				*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 β1= 5° and 30°. The rotation angle ε has been set to 90° 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°
White	522	196
Yellow	255	107
Red	77	31
Blue	43	20
Green	60	28
Brown	58	23

3.4.8 Adhesion

No performance assessed

3.5 3M™ High Intensity Prismatic Series 3930 + 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 *Tolerance Sphere*	x y	*0.305* *0.315*	*0.335* *0.345*	*0.325* *0.355*	*0.295* *0.325*	*≥ 0.27*
Results White	*x* *y*	*0.314* *0.334*				*0.38*
Yellow *Tolerance Sphere*	*x* *y*	*0.494* *0.505*	*0.470* *0.480*	*0.513* *0.437*	*0.545* *0.454*	*≥ 0.16*
Results Yellow	*x* *y*	*0.477* *0.476*				*0.27*
Red *Tolerance Sphere*	*x* *y*	*0.735* *0.265*	*0.700* *0.250*	*0.610* *0.340*	*0.660* *0.340*	*≥ 0.03*
Results Red	*x* *y*	*0.639* *0.331*				*0.06*
Blue *Tolerance Sphere*	*x* *y*	*0.130* *0.090*	*0.160* *0.090*	*0.160* *0.140*	*0.130* *0.140*	*≥ 0.01*
Results Blue	*x* *y*	*0.141* *0.123*				*0.04*
Green *Tolerance Sphere*	*x* *y*	*0.110* *0.415*	*0.170* *0.415*	*0.170* *0.500*	*0.110* *0.500*	*≥ 0.03*
Results Green	*x* *y*	0.162 0.456				*0.06*
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*
Results Brown	*x* *y*	*0.520* *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 90° 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	Brown
12'	+5°	813	292	87	56	70	72
	+30°	357	156	40	23	29	32
	+40°	215	102	24	14.4	18.1	19
20'	+5°	607	282	78	43	59	62
	+30°	252	125	31	20	25	25
	+40°	130	72	17.3	10.4	13.6	13.5
2°	+5°	9.8	5.9	2.1	0.9	1.4	1.6
	+30°	3.7	4.7	1.6	0.5	0.8	1.1
	+40°	2.7	4.6	1.6	0.4	0.7	1.0

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 90° according to the manufacturer's specification.

Rotational symmetry	
#	Ratio
White	
Average of three Samples	1 : 1,29
Yellow	
Average of three Samples	1 : 1,18
Red	
Average of three Samples	1 : 1,20
Blue	
Average of three Samples	1 : 1,10
Green	
Average of three Samples	1 : 1,09
Brown	
Average of three Samples	1 : 1,13

3.5.5 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	

3.5.6 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 1	2	3	4	Luminance Factor ß
White Tolerance Sphere	**x** **y**	**0.355** **0.355**	**0.305** **0.305**	**0.285** **0.325**	**0.335** **0.375**	***≥ 0.27***
White Results	x y	0.313 0.331				*0.40*
Yellow Tolerance Sphere	***x*** ***y***	**0.545** **0.454**	**0.487** **0.423**	**0.427** **0.483**	**0.465** **0.534**	***≥ 0.16***
Yellow Results	x y	0.481 0.475				*0.28*
Red Tolerance Sphere	***x*** ***y***	**0.735** **0.265**	**0.674** **0.236**	**0.569** **0.341**	**0.655** **0.345**	***≥ 0.03***
Red Results	x y	0.629 0.331				*0.06*
Blue Tolerance Sphere	***x*** ***y***	**0.078** **0.171**	**0.150** **0.220**	**0.210** **0.160**	**0.137** **0.038**	***≥ 0.01***
Blue Results	x y	0.143 0.131				*0.04*
Green Tolerance Sphere		**0.007** **0.703**	**0.248** **0.409**	**0.177** **0.362**	**0.026** **0.399**	***≥ 0.03***
Green Results	x y	0.159 0.444				*0.07*
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***
Brown Results	x y	0.513 0.390				*0.04*

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 β1= 5° and 30°. The rotation angle ε has been set to 90° 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°
White	648	293
Yellow	251	107
Red	61	47
Blue	53	18.3
Green	73	33
Brown	51	22

3.5.8 Adhesion

No performance assessed

3.6 3M™ High Intensity Prismatic Series 3930 + 3M™ Premium Protective Overlay Film 1160

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 *Tolerance Sphere*	x y	*0.305* *0.315*	*0.335* *0.345*	*0.325* *0.355*	*0.295* *0.325*	*≥ 0.27*
Results White	x y	*0.314* *0.334*				*0.414*
Yellow *Tolerance Sphere*	x y	*0.494* *0.505*	*0.470* *0.480*	*0.513* *0.437*	*0.545* *0.454*	*≥ 0.16*
Results Yellow	x y	*0.501* *0.466*				*0.27*
Red *Tolerance Sphere*	x y	*0.735* *0.265*	*0.700* *0.250*	*0.610* *0.340*	*0.660* *0.340*	*≥ 0.03*
Results Red	x y	*0.660* *0.310*				*0.04*
Blue *Tolerance Sphere*	x y	*0.130* *0.090*	*0.160* *0.090*	*0.160* *0.140*	*0.130* *0.140*	*≥ 0.01*
Results Blue	x y	*0.152* *0.110*				*0.04*
Green *Tolerance Sphere*	x y	*0.110* *0.415*	*0.170* *0.415*	*0.170* *0.500*	*0.110* *0.500*	*≥ 0.03*
Results Green	x y	0.139 0.427				*0.07*

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 90° 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
12'	+5°	560	482	124	54	102
	+30°	360	309	83	27	56
	+40°	279	262	65	22	47
20'	+5°	592	486	120	55	103
	+30°	183	127	33	15.5	25
	+40°	138	130	34	10.7	21
2°	+5°	8.0	8.0	2.3	1.1	2.1
	+30°	5.1	4.5	1.2	0.5	1.0
	+40°	5.0	4.5	1.4	0.5	0.8

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 90° according to the manufacturer's specification.

Rotational symmetry	
#	Ratio
White	
Average of three Samples	1 : 1,33
Yellow	
Average of three Samples	1 : 1,29
Red	
Average of three Samples	1 : 1,37
Blue	
Average of three Samples	1 : 1,22
Green	
Average of three Samples	1 : 1,26

3.6.5 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	

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 1	2	3	4	Luminance Factor ß
White Tolerance Sphere	**x** **y**	**0.355** **0.355**	**0.305** **0.305**	**0.285** **0.325**	**0.335** **0.375**	***≥ 0.27***
White Results	x y	0.313 0.332				*0.42*
Yellow Tolerance Sphere	***x*** ***y***	**0.545** **0.454**	**0.487** **0.423**	**0.427** **0.483**	**0.465** **0.534**	***≥ 0.16***
Yellow Results	x y	0.501 0.465				*0.27*
Red Tolerance Sphere	***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 0.308				*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***
Blue Results	x y	0.151 0.114				*0.04*
Green Tolerance Sphere		**0.007** **0.703**	**0.248** **0.409**	**0.177** **0.362**	**0.026** **0.399**	***≥ 0.03***
Green Results	x y	0.139 0.431				*0.07*

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 β1= 5° and 30°. The rotation angle ε has been set to 90° 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°
White	691	252
Yellow	554	201
Red	111	46
Blue	59	19.5
Green	113	36

3.6.8 Adhesion

No performance assessed

3.7 3M™ High Intensity Prismatic Series 3930 + 3M™ Electrocut Film Series 1170 + 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	
Yellow *Tolerance Sphere*	*x* *y*	*0.494* *0.505*	*0.470* *0.480*	*0.513* *0.437*	*0.545* *0.454*	*≥ 0.16*
Results Yellow	*x* *y*	*0.529* *0.463*				*0.29*
Red *Tolerance Sphere*	*x* *y*	*0.735* *0.265*	*0.700* *0.250*	*0.610* *0.340*	*0.660* *0.340*	*≥ 0.03*
Results Red	*x* *y*	*0.657* *0.311*				*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*
Results Blue	*x* *y*	*0.150* *0.114*				*0.04*
Green *Tolerance Sphere*	*x* *y*	*0.110* *0.415*	*0.170* *0.415*	*0.170* *0.500*	*0.110* *0.500*	*≥ 0.03*
Results Green	*x* *y*	0.142 0.432				*0.07*
Orange *Tolerance Sphere*	*x* *y*	0.631 0.369	0.560 0.360	0.506 0.404	0.570 0.429	*≥ 0.14*
Results Orange	*x* *y*	*0.575* *0.390*				*0.179*

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 90° 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	Orange
12'	+5°	679	185	83	150	331
	+30°	321	85	33	62	152
	+40°	192	49	20	39	92
20'	+5°	477	132	52	104	237
	+30°	217	52	26	47	97
	+40°	116	28	13.1	24	53
2°	+5°	8.0	2.3	0.9	2.0	4.0
	+30°	3.4	0.9	0.3	0.8	1.6
	+40°	2.6	0.8	0.2	0.6	1.3

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 90° according to the manufacturer's specification.

Rotational symmetry	
#	Ratio
Yellow	
Average of three Samples	1 : 1,42
Red	
Average of three Samples	1 : 1,47
Blue	
Average of three Samples	1 : 1,17
Green	
Average of three Samples	1 : 1,21
Orange	
Average of three Samples	1 : 1,39

3.7.5 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	
Orange	

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	
Yellow Tolerance Sphere	***x*** ***y***	**0.545** **0.454**	**0.487** **0.423**	**0.427** **0.483**	**0.465** **0.534**	***≥ 0.16***
Yellow Results	x y	0.525 0.463				*0.30*
Red Tolerance Sphere	***x*** ***y***	**0.735** **0.265**	**0.674** **0.236**	**0.569** **0.341**	**0.655** **0.345**	***≥ 0.03***
Red Results	x y	0.638 0.309				*0.3*
Blue Tolerance Sphere	***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 0.117				*0.05*
Green Tolerance Sphere		**0.007** **0.703**	**0.248** **0.409**	**0.177** **0.362**	**0.026** **0.399**	***≥ 0.03***
Green Results	x y	0.145 0.435				*0.08*
Orange Tolerance Sphere	***x*** ***y***	**0.631** **0.369**	**0.560** **0.360**	**0.506** **0.404**	**0.570** **0.429**	***≥ 0.14***
Orange Results	x y	0.556 0.378				*0.17*

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 β1= 5° and 30°. The rotation angle ε has been set to 90° 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°
Yellow	531	207
Red	124	46
Blue	70	21
Green	112	33
Orange	247	90

3.7.8 Adhesion

No performance assessed

3.8 3M™ High Intensity Prismatic Series 3930 + 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 Tolerance Sphere	*x* *y*	*0.313* *0.682*	*0.313* *0.453*	*0.248* *0.409*	*0.127* *0.557*	*0.01-0.07*
Results Dark Green 3930 + 1176	*x* *y*	*0.193* *0.516*				*0.04*
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*
Results Dark Green 3930 + 1176 + 1150	*x* *y*	*0.181* *0.540*				*0.03*
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*
Results Dark Green 3930 + 1176 + 1160	*x* *y*	*0.190* *0.515*				*0.04*
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*
Results Dark Green 3930 + 1176 + 1180	*x* *y*	*0.187* *0.531*				*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 90° 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 3930 + 1176	Dark Green 3930 + 1176 + 1150	Dark Green 3930 + 1176 + 1160	Dark Green 3930 + 1176 + 1180
12'	+5°	66	48	77	80
	+30°	26	18.8	30	32
	+40°	15.4	11.0	17.6	18.9
20'	+5°	48	41	54	59
	+30°	22	16.7	25	26
	+40°	10.0	8.1	11.5	12
2°	+5°	0.7	0.6	0.7	0.8
	+30°	0.3	0.4	0.3	0.3
	+40°	0.2	0.3	0.2	0.2

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 90° according to the manufacturer's specification.

Rotational symmetry	
#	Ratio
Dark Green - 3930 + 1176	
Average of three Samples	1 : 1,2
Dark Green - 3930 + 1176 + 1150	
Average of three Samples	1 : 1,1
Dark Green - 3930 + 1176 + 1160	
Average of three Samples	1 : 1,2
Dark Green - 3930 + 1176 + 1180	
Average of three Samples	1 : 1,3

3.8.5 Impact resistance

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

Sample	Test result
3930 + 1176	No apparent cracking or delamination observed
3930 + 1176 + 1150	
3930 + 1176 + 1160	
3930 + 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 Tolerance Sphere	***x*** ***y***	***0.313*** ***0.682***	***0.313*** ***0.453***	***0.248*** ***0.409***	***0.127*** ***0.557***	***0.01-0.07***
Results Dark Green 3930 + 1176	***x*** ***y***	***0.189*** ***0.512***				***0.04***
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***
Results Dark Green 3930 + 1176 + 1150	***x*** ***y***	***0.185*** ***0.518***				***0.03***
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***
Results Dark Green 3930 + 1176 + 1160	***x*** ***y***	***0.194*** ***0.489***				***0.04***
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***
Results Dark Green 3930 + 1176 + 1180	***x*** ***y***	***0.186*** ***0.518***				***0.03***

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 β1= 5° and 30°. The rotation angle ε has been set to 90° according to the manufacturer's specification.

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

Dark Green	Geometry of Measurements	
	α = 0,33° / β1 = 5°	α = 0,33° / β1 = 30°
3930 + 1176	51,4	21,6
3930 + 1176 + 1150	41,8	18,5
3930 + 1176 + 1160	59,6	24,9
3930 + 1176 + 1180	59,2	25,4

3.8.8 Adhesion

No performance assessed

3.9 3M™ High Intensity Prismatic Series 3930 + 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 *Tolerance Sphere*	*x* *y*	*0.494* *0.505*	*0.470* *0.480*	*0.513* *0.437*	*0.545* *0.454*	*≥ 0.24*
Results Yellow	*x* *y*	*0.487* *0.471*				*0.27*
Red *Tolerance Sphere*	*x* *y*	*0.735* *0.265*	*0.700* *0.250*	*0.610* *0.340*	*0.660* *0.340*	*≥ 0.03*
Results Red	*x* *y*	*0.636* *0.330*				*0.07*
Blue *Tolerance Sphere*	*x* *y*	*0.130* *0.090*	*0.160* *0.090*	*0.160* *0.140*	*0.130* *0.140*	*≥ 0.01*
Results Blue	*x* *y*	*0.144* *0.122*				*0.04*
Green *Tolerance Sphere*	*x* *y*	*0.110* *0.415*	*0.170* *0.415*	*0.170* *0.500*	*0.110* *0.500*	*≥ 0.03*
Results Green	*x* *y*	0.156 0.458				*0.06*
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*
Results Brown	*x* *y*	*0.524* *0.334*				*0.04*

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 90° 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
12'	**+5°**	221	93	48	67	43
	+30°	124	53	25	34	23
	+40°	88	36	19	24	14.5
20'	**+5°**	201	85	44	61	39
	+30°	78	33	15.8	25	14.6
	+40°	53	23	10.4	15.2	9.2
2°	**+5°**	4.1	2.0	0.9	1.4	1.1
	+30°	2.6	1.4	0.5	0.9	0.7
	+40°	2.7	1.5	0.5	0.9	0.7

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 90° according to the manufacturer's specification.

Rotational symmetry	
#	Ratio
Yellow	
Average of three Samples	1 : 1,16
Red	
Average of three Samples	1 : 1,15
Blue	
Average of three Samples	1 : 1,19
Green	
Average of three Samples	1 : 1,13
Brown	
Average of three Samples	1 : 1,21

3.9.5 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	

3.9.6 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 Tolerance Sphere	***x*** ***y***	**0.545** **0.454**	**0.487** **0.423**	**0.427** **0.483**	**0.465** **0.534**	***≥ 0.16***
Yellow Results	x y	0.478 0.477				*0.29*
Red Tolerance Sphere	***x*** ***y***	**0.735** **0.265**	**0.674** **0.236**	**0.569** **0.341**	**0.655** **0.345**	***≥ 0.03***
Red Results	x y	0.626 0.331				*0.06*
Blue Tolerance Sphere	***x*** ***y***	**0.078** **0.171**	**0.150** **0.220**	**0.210** **0.160**	**0.137** **0.038**	***≥ 0.01***
Blue Results	x y	0.143 0.130				*0.04*
Green Tolerance Sphere		**0.007** **0.703**	**0.248** **0.409**	**0.177** **0.362**	**0.026** **0.399**	***≥ 0.03***
Green Results	x y	0.159 0.447				*0.017*
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***
Brown Results	x y	0.517 0.395				*0.05*

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 90° 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°
Yellow	206	104
Red	89	47
Blue	40	14
Green	63	30
Brown	44	23

3.9.8 Adhesion

No performance assessed

3.10 3M™ High Intensity Prismatic Series 3930 + 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	
White *Tolerance Sphere*	x y	*0.305* *0.315*	*0.335* *0.345*	*0.325* *0.355*	*0.295* *0.325*	*≥ 0.27*
Results White	*x* *y*	*0.312* *0.332*				*0.42*
Yellow *Tolerance Sphere*	*x* *y*	*0.494* *0.505*	*0.470* *0.480*	*0.513* *0.437*	*0.545* *0.454*	*≥ 0.16*
Results Yellow	*x* *y*	*0.510* *0.462*				*0.27*
Red *Tolerance Sphere*	*x* *y*	*0.735* *0.265*	*0.700* *0.250*	*0.610* *0.340*	*0.660* *0.340*	*≥ 0.03*
Results Red	*x* *y*	*0.648* *0.316*				*0.05*
Blue *Tolerance Sphere*	*x* *y*	*0.130* *0.090*	*0.160* *0.090*	*0.160* *0.140*	*0.130* *0.140*	*≥ 0.01*
Results Blue	*x* *y*	*0.150* *0.112*				*0.04*

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 90° 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
12'	**+5°**	451	406	109	45
	+30°	315	287	82	23
	+40°	271	245	68	19,4
20'	**+5°**	491	455	114	59
	+30°	129	107	31	14,4
	+40°	136	111	34	9,0
2°	**+5°**	10,2	9,4	2,6	1,2
	+30°	4,9	4,8	1,3	0,3
	+40°	4,3	4,1	1,5	0,2

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 90° according to the manufacturer's specification.

Rotational symmetry	
#	Ratio
White	
Average of three Samples	1 : 1,24
Yellow	
Average of three Samples	1 : 1,34
Red	
Average of three Samples	1 : 1,41
Blue	
Average of three Samples	1 : 1,48

3.10.5 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	

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	
White Tolerance Sphere	**x** **y**	**0.355** **0.355**	**0.305** **0.305**	**0.285** **0.325**	**0.335** **0.375**	***≥ 0.27***
White Results	x y	0.313 0.331				*0.40*
Yellow Tolerance Sphere	***x*** ***y***	**0.545** **0.454**	**0.487** **0.423**	**0.427** **0.483**	**0.465** **0.534**	***≥ 0.16***
Yellow Results	x y	0.513 0.458				*0.26*
Red Tolerance Sphere	***x*** ***y***	**0.735** **0.265**	**0.674** **0.236**	**0.569** **0.341**	**0.655** **0.345**	***≥ 0.03***
Red Results	x y	0.639 0.314				*0.05*
Blue Tolerance Sphere	***x*** ***y***	**0.078** **0.171**	**0.150** **0.220**	**0.210** **0.160**	**0.137** **0.038**	***≥ 0.01***
Blue Results	x y	0.153 0.118				*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 α = 0.33° and β1= 5° and 30°. The rotation angle ε has been set to 90° 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°
White	648	293
Yellow	540	219
Red	124	53
Blue	55	24

3.10.8 Adhesion

No performance assessed

3.11 3M™ High Intensity Prismatic Series 3930 + 3M™ Electrocut Film Series 1170 + 3M™ Dew Resistant Overlay Film 1180

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	
Yellow *Tolerance Sphere*	*x* *y*	*0.494* *0.505*	*0.470* *0.480*	*0.513* *0.437*	*0.545* *0.454*	*≥ 0.16*
Results Yellow	*x* *y*	*0.530* *0.462*				*0.29*
Red *Tolerance Sphere*	*x* *y*	*0.735* *0.265*	*0.700* *0.250*	*0.610* *0.340*	*0.660* *0.340*	*≥ 0.03*
Results Red	*x* *y*	*0.647* *0.311*				*0.04*
Blue *Tolerance Sphere*	*x* *y*	*0.130* *0.090*	*0.160* *0.090*	*0.160* *0.140*	*0.130* *0.140*	*≥ 0.01*
Results Blue	*x* *y*	*0.152* *0.117*				*0.05*
Green *Tolerance Sphere*	*x* *y*	*0.110* *0.415*	*0.170* *0.415*	*0.170* *0.500*	*0.110* *0.500*	*≥ 0.03*
Results Green	*x* *y*	0.137 0.435				*0.08*
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*
Results Brown	*x* *y*	*0.476* *0.398*				*0.05*

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 90° 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
12'	+5°	419	114	52	78	45
	+30°	250	83	23	47	26
	+40°	200	65	18.6	38	19
20'	+5°	550	136	62	97	60
	+30°	135	36	16.7	25	14.4
	+40°	101	33	9.4	17.2	9.8
2°	+5°	8.8	2.7	1.0	1.8	1.2
	+30°	4.4	1.1	0.2	0.7	0.3
	+40°	4.6	1.3	0.3	0.6	0.3

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 90° according to the manufacturer's specification.

Rotational symmetry	
#	Ratio
Yellow	
Average of three Samples	1 : 1,65
Red	
Average of three Samples	1 : 1,66
Blue	
Average of three Samples	1 : 1,59
Green	
Average of three Samples	1 : 1,23
Brown	
Average of three Samples	1 : 2,14

3.11.5 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	

3.11.6 Temperature resistance

No performance assessed.

3.11.7 Visibility after weathering

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

3.11.7.1 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 Tolerance Sphere	***x*** ***y***	**0.545** **0.454**	**0.487** **0.423**	**0.427** **0.483**	**0.465** **0.534**	***≥ 0.16***
Yellow Results	x y	0.527 0.458				*0.28*
Red Tolerance Sphere	***x*** ***y***	**0.735** **0.265**	**0.674** **0.236**	**0.569** **0.341**	**0.655** **0.345**	***≥ 0.03***
Red Results	x y	0.620 0.306				*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***
Blue Results	x y	0.153 0.121				*0.05*
Green Tolerance Sphere		**0.007** **0.703**	**0.248** **0.409**	**0.177** **0.362**	**0.026** **0.399**	***≥ 0.03***
Green Results	x y	0.147 0.429				*0.08*
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***
Brown Results	x y	0.468 0.397				*0.05*

3.11.7.2 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 90° 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°
Yellow	504	226
Red	140	53
Blue	58	27
Green	113	54
Brown	57	20

3.11.8 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 EAD 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 EAD 120001-01-0106, clause 3.3.

6 Reference documents

See EAD 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.

UBAtc asbl is a non-profit organization according to Belgian law. It is a Technical Assessment Body notified by the Belgian notifying authority, the Federal Public Services Economy, SMEs, Self-Employed and Energy, on 17 July 2013 in the framework of Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC and is member of the European Organisation for Technical Assessment, EOTA (www.eota.eu).

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