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Trade name of the construction product:

Product family to which the construction product belongs:

Manufacturer:

Manufacturing plants:

Website:

This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of:

This version replaces

This European Technical Assessment contains:

1. 3M™ High Intensity Prismatic Digital Sheeting 3930DS + 3M™ Piezo Inkjet Ink + 3M™ Protective Overlay Film 1170
2. 3M™ High Intensity Prismatic Digital Sheeting 3930DS + 3M™ Piezo Inkjet Ink + 3M™ Protective Overlay Film 1170 + 3M™ Premium Protective Overlay Film 1160

Micro-prismatic retro-reflective sheeting for traffic signs

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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 305/2011¹ 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 1062/2013² of 30 October 2013 on the format of the European Technical Assessment for construction products
 - European Assessment Document (EAD) : 120001-01-0106
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- 14 This European Technical Assessment was first issued by UBAtc on: 2017-07-26. Compared with the 1st version, this ETA comprises an additional production facility and the combination with an additional anti-graffiti layer (referred as product n° 2 on the front page). Clause 3.2 has been added.

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 in a micro-prismatic 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 "3M High Intensity Prismatic Digital Sheeting 3930DS + 3M™ Piezo Inkjet Ink + 3M™ Protective Overlay Film 1170, with or without 3MPremium Protective Overlay Film 1160".

1.2 Components of "3M™ High Intensity Prismatic Digital Sheeting 3930DS + 3M™ Piezo Inkjet Ink + 3M™ Protective Overlay Film 1170, with or without 3M™ Premium Protective Overlay Film 1160"

The complete set of Micro-prismatic retro-reflective sheeting is given 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 |
|---|--|---|--|
| Micro-prismatic retro-reflective sheeting | 3M™ High Intensity Prismatic Digital Sheeting 3930DS | White 3930DS | Nominal Thickness: 0.3 mm Rolls in various length and widths |
| Process Colour for digital printing | 3M™ Piezo Inkjet Ink Series 8800UV or 8900 UV* | Yellow Red Blue Green Orange Brown Grey Dark Green | 18-20 mg/l |
| 3M™ Protective Overlay Film | | Clear 1170 | Combined Nominal Thickness: 0,45 mm |
| 3M™ Premium Protective Overlay Film | | Clear 1160 | Combined Nominal Thickness: 0,60 mm |

* 3M Piezo Ink Jet Ink Series 8800 UV or 8900 UV are variations of the same basic ink formulations. The difference between Series 8800 and 8900 are the dispersant and stabilizer packages to make the ink suitable for the different printer models and printheads. The curable components are identical. 3M markets both ink series as equal alternatives with the same performances.

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

| Colours | | Chromaticity Coordinates | | | | Luminance Factor β |
|------------------------------------|---|--------------------------|-------|-------|-------|--------------------------|
| | | 1 | 2 | 3 | 4 | |
| White Tolerance Sphere* | x | 0.305 | 0.335 | 0.325 | 0.295 | ≥ 0.40 |
| | y | 0.315 | 0.345 | 0.355 | 0.325 | |
| Yellow Tolerance Sphere* | x | 0.494 | 0.470 | 0.513 | 0.545 | ≥ 0.24 |
| | y | 0.505 | 0.480 | 0.437 | 0.454 | |
| Red Tolerance Sphere* | x | 0.735 | 0.700 | 0.610 | 0.660 | ≥ 0.03 |
| | y | 0.265 | 0.250 | 0.340 | 0.340 | |
| Red on Yellow Tolerance Sphere* | x | 0.735 | 0.700 | 0.610 | 0.660 | ≥ 0.03 |
| | y | 0.265 | 0.250 | 0.340 | 0.340 | |
| Blue Tolerance Sphere* | x | 0.130 | 0.160 | 0.160 | 0.130 | ≥ 0.01 |
| | y | 0.090 | 0.090 | 0.140 | 0.140 | |
| Green Tolerance Sphere* | x | 0.110 | 0.170 | 0.170 | 0.110 | ≥ 0.03 |
| | y | 0.415 | 0.415 | 0.500 | 0.500 | |
| Orange Tolerance Sphere* | x | 0.631 | 0.560 | 0.506 | 0.570 | ≥ 0.14 |
| | y | 0.369 | 0.360 | 0.404 | 0.429 | |
| Brown Tolerance Sphere* | x | 0.455 | 0.523 | 0.479 | 0.558 | 0.03-0.09 |
| | y | 0.397 | 0.429 | 0.373 | 0.394 | |
| Grey Tolerance Sphere* | x | 0.305 | 0.335 | 0.325 | 0.295 | 0.11-0.18 |
| | y | 0.315 | 0.345 | 0.355 | 0.325 | |
| Dark Green Tolerance Sphere* | x | 0.313 | 0.313 | 0.248 | 0.127 | 0.01-0.07 |
| | y | 0.682 | 0.453 | 0.409 | 0.557 | |

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

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

| Colours | | Chromaticity Coordinates | | | | Luminance Factor β |
|------------------------------------|---|--------------------------|-------|-------|-------|--------------------------|
| | | 1 | 2 | 3 | 4 | |
| White Tolerance Sphere* | x | 0.355 | 0.305 | 0.285 | 0.335 | ≥ 0.40 |
| | y | 0.355 | 0.305 | 0.325 | 0.375 | |
| Yellow Tolerance Sphere* | x | 0.545 | 0.487 | 0.427 | 0.465 | ≥ 0.24 |
| | y | 0.454 | 0.423 | 0.483 | 0.534 | |
| Red Tolerance Sphere* | x | 0.735 | 0.674 | 0.569 | 0.655 | ≥ 0.03 |
| | y | 0.265 | 0.236 | 0.341 | 0.345 | |
| Red on Yellow Tolerance Sphere* | x | 0.735 | 0.700 | 0.610 | 0.660 | ≥ 0.03 |
| | y | 0.265 | 0.250 | 0.340 | 0.340 | |
| Blue Tolerance Sphere* | x | 0.078 | 0.150 | 0.210 | 0.137 | ≥ 0.01 |
| | y | 0.171 | 0.220 | 0.160 | 0.038 | |
| Green Tolerance Sphere* | x | 0.007 | 0.248 | 0.177 | 0.026 | ≥ 0.03 |
| | y | 0.703 | 0.409 | 0.362 | 0.399 | |
| Orange Tolerance Sphere* | x | 0.631 | 0.560 | 0.506 | 0.570 | ≥ 0.14 |
| | y | 0.369 | 0.360 | 0.404 | 0.429 | |
| Brown Tolerance Sphere* | x | 0.455 | 0.523 | 0.479 | 0.558 | 0.03-0.09 |
| | y | 0.397 | 0.429 | 0.373 | 0.394 | |
| Grey Tolerance Sphere* | x | 0.350 | 0.300 | 0.285 | 0.335 | 0.11-0.18 |
| | y | 0.360 | 0.310 | 0.325 | 0.375 | |
| Dark Green Tolerance Sphere* | x | 0.313 | 0.313 | 0.248 | 0.127 | 0.01-0.07 |
| | y | 0.682 | 0.453 | 0.409 | 0.557 | |

* 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 Digital Sheeting 3930DS + 3M™ Piezo Inkjet Ink + 3M™ Protective Overlay Film 1170 + 3M™ Premium Protective Overlay Film 1160”, 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 can 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 1.1 of this ETA may be used for the systems “3M High Intensity Prismatic Digital Sheeting 3930DS + 3M™ Piezo Inkjet Ink + 3M™ Protective Overlay Film 1170 + 3M™ Premium Protective Overlay Film 1160”.

2.2.2.2 Design

Users are urged to carefully evaluate all substrates for adhesion and sign durability. “3M™ High Intensity Prismatic Digital Sheeting 3930DS” is designed primarily for application to flat substrates.

2.2.2.3 Application

“3M™ High Intensity Prismatic Digital Sheeting 3930DS”

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/TSS, shall be carried out in compliance with national regulations, if any.

“3M™ High Intensity Prismatic Digital Sheeting 3930DS” 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 Digital Sheeting 3930DS” 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™ Piezo Inkjet Ink Series 8800 UV or 8900 UV

3M Piezo Ink Jet Ink Series 8800 UV or 8900 UV are designed as part of the 3M MCS™ (Matched Component System) for application using the Durst Rho 161TS / 162TS / 163 and EFI H1625RS Printer onto 3M High Intensity Prismatic Digital Sheeting 3930DS 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 3M Protective Overlay Film 1170 as an overlamine.

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 or 8900UV.

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

3M™ Protective Overlay Film 1170

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.

3M Protective Overlay Film 1170 shall always be applied, following below instructions:

To avoid a silvering artefact (trapped air between ink layer and overlamine), 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™ Premium Protective Overlay Film 1160

Premium 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.

The application of Premium Protective Overlay Film is typically done on the finished signface (for digitally printed signs after the application of Protective Overlay Film 1170).

Alternatively, for digitally printed signs, the 1170 and 1160 Protective Overlay Film may be purchased prelaminated as combination and applied in a single lamination step by the user. The Combination of Protective Overlay Films shall always be applied, following above instructions for the 1170 Film.

2.3 Recommendations

2.3.1 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 |
| 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 accelerated artificial weathering | 3.x.7.1 | Value |
| 8 | Coefficient of Retro-reflection after accelerated artificial weathering | 3.x.7.2 | Value (average of three samples) |
| 9 | Visibility after natural weathering | 3.x.8 | No performance assessed |
| 10 | Adhesion | 3.x.9 | No performance assessed |

3.1 3M™ High Intensity Prismatic Digital Sheeting 3930DS + 3M™ Piezo Inkjet Ink + 3M™ Protective Overlay Film 1170

3.1.2 Night-time colour

No performance assessed.

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 and have been specified in Annex 1, clause 1.1, of this ETA.

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 | Orange | Brown | Grey | Dark Green |
| 12° | +5° | 953 | 285 | 99 | 80 | 61 | 228 | 79 | 427 | 56 |
| | +30° | 423 | 142 | 50 | 36 | 28 | 112 | 39 | 210 | 26 |
| | +40° | 290 | 94 | 32 | 25 | 19 | 73 | 26 | 146 | 17 |
| 20° | +5° | 621 | 245 | 85 | 63 | 51 | 193 | 67 | 306 | 47 |
| | +30° | 279 | 110 | 36 | 30 | 24 | 85 | 29 | 141 | 21 |
| | +40° | 152 | 64 | 21 | 16 | 13 | 49 | 17 | 84 | 11 |
| 2° | +5° | 11 | 8 | 2,7 | 0,8 | 1,4 | 5,4 | 2,2 | 5,4 | 1,6 |
| | +30° | 4,4 | 6,1 | 2,1 | 0,6 | 1,0 | 4 | 1,7 | 2,8 | 1,2 |
| | +40° | 3,4 | 5,7 | 2,0 | 0,5 | 0,9 | 3,8 | 1,6 | 2,5 | 1,0 |

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.

| White Rotational symmetry | |
|------------------------------|----------|
| # | Ratio |
| Sample 1 | 1 : 1,31 |
| Sample 2 | 1 : 1,27 |
| Sample 3 | 1 : 1,30 |

| Yellow Rotational symmetry | |
|-------------------------------|----------|
| # | Ratio |
| Sample 1 | 1 : 1,05 |
| Sample 2 | 1 : 1,06 |
| Sample 3 | 1 : 1,32 |

| Red Rotational symmetry | |
|----------------------------|----------|
| # | Ratio |
| Sample 1 | 1 : 1,07 |
| Sample 2 | 1 : 1,08 |
| Sample 3 | 1 : 1,09 |

| Blue Rotational symmetry | |
|-----------------------------|----------|
| # | Ratio |
| Sample 1 | 1 : 1,07 |
| Sample 2 | 1 : 1,15 |
| Sample 3 | 1 : 1,08 |

| Green Rotational symmetry | |
|------------------------------|----------|
| # | Ratio |
| Sample 1 | 1 : 1,04 |
| Sample 2 | 1 : 1,07 |
| Sample 3 | 1 : 1,05 |

| Orange Rotational symmetry | |
|-------------------------------|----------|
| # | Ratio |
| Sample 1 | 1 : 1,04 |
| Sample 2 | 1 : 1,06 |
| Sample 3 | 1 : 1,09 |

| Brown Rotational symmetry | |
|------------------------------|----------|
| # | Ratio |
| Sample 1 | 1 : 1,06 |
| Sample 2 | 1 : 1,07 |
| Sample 3 | 1 : 1,05 |

| Grey Rotational symmetry | |
|-----------------------------|----------|
| # | Ratio |
| Sample 1 | 1 : 1,17 |
| Sample 2 | 1 : 1,26 |
| Sample 3 | 1 : 1,30 |

| Dark Green Rotational symmetry | |
|-----------------------------------|----------|
| # | Ratio |
| Sample 1 | 1 : 1,02 |
| Sample 2 | 1 : 1,05 |
| Sample 3 | 1 : 1,08 |

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 | |
| Orange | |
| Brown | |
| Grey | |
| Dark Green | |

3.1.6 Temperature resistance

No performance assessed

3.1.7 Visibility after weathering

The 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. The size of the specimens is (5,5 x 10) cm.

3.1.7.1 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 test, have been specified in Annex 1, clause 1.2 of this ETA.

3.1.7.2 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 $\alpha = 0.33^\circ$ and $\beta_1 = 5^\circ$ 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 | |
|------------|---|--|
| | $\alpha = 0,33^\circ / \beta_1 = 5^\circ$ | $\alpha = 0,33^\circ / \beta_1 = 30^\circ$ |
| White | 594 | 242 |
| Yellow | 275 | 118 |
| Red | 91 | 36 |
| Blue | 71 | 32 |
| Green | 59 | 26 |
| Orange | 219 | 94 |
| Brown | 77 | 31 |
| Grey | 337 | 149 |
| Dark Green | 59 | 25 |

3.1.8 Visibility after natural weathering

No performance assessed

3.1.9 Adhesion

No performance assessed

3.2 3M™ High Intensity Prismatic Digital Sheeting 3930DS + 3M™ Piezo Inkjet Ink + 3M™ Protective Overlay Film 1170 + 3M™ Premium Protective Overlay Film 1160

3.2.2 Night-time colour

No performance assessed.

3.2.1 Daylight Chromaticity and Luminance Factor

The characteristics of initial daylight chromaticity and luminance factor have been determined according to EAD 120001-01-0106, clause 2.2.1 and have been specified in Annex 2, clause 2.1, of this ETA.

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 ($\beta_2 = 0$) | White | Yellow | Red | Blue | Green | Orange | Brown | Grey | Dark Green |
| 12° | +5° | 637 | 227 | 78 | 55 | 54 | 180 | 67 | 282 | 44 |
| | +30° | 430 | 119 | 43 | 27 | 26 | 98 | 36 | 173 | 21 |
| | +40° | 352 | 83 | 29 | 19 | 17 | 69 | 24 | 135 | 14 |
| 20° | +5° | 671 | 231 | 80 | 56 | 54 | 185 | 68 | 316 | 44 |
| | +30° | 199 | 84 | 29 | 21 | 21 | 69 | 25 | 98 | 17 |
| | +40° | 172 | 53 | 19 | 12 | 12 | 44 | 15 | 73 | 9.4 |
| 2° | +5° | 10.1 | 8.2 | 3.1 | 1.3 | 1.8 | 5.8 | 2.6 | 5.9 | 2.0 |
| | +30° | 5.6 | 5.8 | 2.4 | 0.8 | 1.3 | 4.2 | 1.9 | 3.4 | 1.4 |
| | +40° | 5.6 | 5.5 | 2.3 | 0.8 | 1.2 | 4.0 | 1.7 | 3.4 | 1.2 |

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.

| White Rotational symmetry | |
|------------------------------|----------|
| # | Ratio |
| Sample 1 | 1 : 1,52 |
| Sample 2 | 1: 1,56 |
| Sample 3 | 1: 1,27 |

| Yellow Rotational symmetry | |
|-------------------------------|----------|
| # | Ratio |
| Sample 1 | 1 : 1,13 |
| Sample 2 | 1: 1,06 |
| Sample 3 | 1: 1,20 |

| Red Rotational symmetry | |
|----------------------------|----------|
| # | Ratio |
| Sample 1 | 1 : 1,13 |
| Sample 2 | 1: 1,06 |
| Sample 3 | 1: 1,20 |

| Blue Rotational symmetry | |
|-----------------------------|----------|
| # | Ratio |
| Sample 1 | 1 : 1,15 |
| Sample 2 | 1: 1,12 |
| Sample 3 | 1: 1,16 |

| Green Rotational symmetry | |
|------------------------------|----------|
| # | Ratio |
| Sample 1 | 1 : 1,09 |
| Sample 2 | 1: 1,06 |
| Sample 3 | 1: 1,10 |

| Orange Rotational symmetry | |
|-------------------------------|----------|
| # | Ratio |
| Sample 1 | 1 : 1,11 |
| Sample 2 | 1: 1,08 |
| Sample 3 | 1: 1,16 |

| Brown Rotational symmetry | |
|------------------------------|----------|
| # | Ratio |
| Sample 1 | 1 : 1,11 |
| Sample 2 | 1: 1,06 |
| Sample 3 | 1: 1,13 |

| Grey Rotational symmetry | |
|-----------------------------|----------|
| # | Ratio |
| Sample 1 | 1 : 1,21 |
| Sample 2 | 1: 1,27 |
| Sample 3 | 1: 1,09 |

| Dark Green Rotational symmetry | |
|-----------------------------------|----------|
| # | Ratio |
| Sample 1 | 1 : 1,07 |
| Sample 2 | 1: 1,05 |
| Sample 3 | 1: 1,28 |

3.2.5 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 | |
| Orange | |
| Brown | |
| Grey | |
| Dark Green | |

3.2.6 Temperature resistance

No performance assessed

3.2.7 Visibility after weathering

The 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. The size of the specimens is (5,5 x 10) cm.

3.2.7.1 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 test, have been specified in Annex 2, clause 2.2 of this ETA.

3.2.7.2 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 $\alpha = 0.33^\circ$ and $\beta_1 = 5^\circ$ 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 | |
|------------|---|--|
| | $\alpha = 0,33^\circ / \beta_1 = 5^\circ$ | $\alpha = 0,33^\circ / \beta_1 = 30^\circ$ |
| White | 633 | 180 |
| Yellow | 237 | 86 |
| Red | 80 | 29 |
| Blue | 61 | 23 |
| Green | 66 | 24 |
| Orange | 194 | 71 |
| Brown | 78 | 28 |
| Grey | 328 | 96 |
| Dark Green | 57 | 21 |

3.2.8 Visibility after natural weathering

No performance assessed

3.2.9 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 1996/06/24³, as amended by Commission Decision 1999/453/EC of 1999/06/18⁴, 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 clause 3.2 of the European Assessment Document 120001-01-0106.

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 clause 3.3 of the European Assessment Document 120001-01-0106.

6 Reference documents

See clause 4 of the European Assessment Document 120001-01-0106.

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,

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



Peter Wouters,
director



Benny De Blaere,
director



Dirk Van Loo,
CEO COPRO

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

³ see OJEU L 254, 8.10.1996, p. 52

⁴ see OJEU L 178, 14.7.1999, p. 50

Annex 1: 3M™ High Intensity Prismatic Digital Sheeting 3930DS + 3M™ Piezo Inkjet Ink + 3M™ Protective Overlay Film 1170

Daylight Chromaticity and Luminance Factor, initial and after accelerated artificial weathering

1.1 Daylight Chromaticity and Luminance Factor, initial

| Colours | | Chromaticity Coordinates | | | | Luminance Factor β |
|--|---|--------------------------|-------|-------|-------|--------------------------|
| | | 1 | 2 | 3 | 4 | |
| White <i>Tolerance Sphere</i> | x | 0.305 | 0.335 | 0.325 | 0.295 | ≥ 0.40 |
| | y | 0.315 | 0.345 | 0.355 | 0.325 | |
| White Sample 1 | x | 0.315 | | | | 0.44 |
| | y | 0.332 | | | | |
| White Sample 2 | x | 0.316 | | | | 0.43 |
| | y | 0.333 | | | | |
| White Sample 3 | x | 0.315 | | | | 0.44 |
| | y | 0.333 | | | | |
| Yellow <i>Tolerance Sphere</i> | x | 0.494 | 0.470 | 0.513 | 0.545 | ≥ 0.24 |
| | y | 0.505 | 0.480 | 0.437 | 0.454 | |
| Yellow Sample 1 | x | 0.481 | | | | 0.28 |
| | y | 0.474 | | | | |
| Yellow Sample 2 | x | 0.476 | | | | 0.28 |
| | y | 0.474 | | | | |
| Yellow Sample 3 | x | 0.481 | | | | 0.27 |
| | y | 0.486 | | | | |
| Red <i>Tolerance Sphere</i> | x | 0.735 | 0.700 | 0.610 | 0.660 | ≥ 0.03 |
| | y | 0.265 | 0.250 | 0.340 | 0.340 | |
| Red Sample 1 | x | 0.630 | | | | 0.07 |
| | y | 0.331 | | | | |
| Red Sample 2 | x | 0.625 | | | | 0.07 |
| | y | 0.332 | | | | |
| Red Sample 3 | x | 0.637 | | | | 0.07 |
| | y | 0.331 | | | | |
| Blue <i>Tolerance Sphere</i> | x | 0.130 | 0.160 | 0.160 | 0.130 | ≥ 0.01 |
| | y | 0.090 | 0.090 | 0.140 | 0.140 | |
| Blue Sample 1 | x | 0.141 | | | | 0.04 |
| | y | 0.130 | | | | |
| Blue Sample 2 | x | 0.146 | | | | 0.06 |
| | y | 0.139 | | | | |
| Blue Sample 3 | x | 0.141 | | | | 0.05 |
| | y | 0.129 | | | | |
| Green <i>Tolerance Sphere</i> | x | 0.110 | 0.170 | 0.170 | 0.110 | ≥ 0.03 |
| | y | 0.415 | 0.415 | 0.500 | 0.500 | |
| Green Sample 1 | x | 0.169 | | | | 0.06 |
| | y | 0.438 | | | | |
| Green Sample 2 | x | 0.166 | | | | 0.05 |
| | y | 0.476 | | | | |
| Green Sample 3 | x | 0.160 | | | | 0.06 |
| | y | 0.448 | | | | |
| Orange <i>Tolerance Sphere</i> | x | 0.631 | 0.560 | 0.506 | 0.570 | ≥ 0.14 |
| | y | 0.369 | 0.360 | 0.404 | 0.429 | |
| Orange Sample 1 | x | 0.546 | | | | 0.16 |
| | y | 0.404 | | | | |
| Orange Sample 2 | x | 0.544 | | | | 0.15 |
| | y | 0.407 | | | | |
| Orange Sample 3 | x | 0.527 | | | | 0.16 |
| | y | 0.397 | | | | |

| Colours | Chromaticity Coordinates | | | | Luminance Factor B | |
|--|--------------------------|-------|-------|-------|--------------------|-----------|
| | 1 | 2 | 3 | 4 | | |
| Brown Tolerance Sphere | x | 0.455 | 0.523 | 0.479 | 0.558 | 0.03-0.09 |
| | y | 0.397 | 0.429 | 0.373 | 0.394 | |
| Brown Sample 1 | x | 0.524 | | | 0.05 | |
| | y | 0.402 | | | | |
| Brown Sample 2 | x | 0.515 | | | 0,05 | |
| | y | 0.396 | | | | |
| Brown Sample 3 | x | 0,523 | | | 0,04 | |
| | y | 0.394 | | | | |
| Grey Tolerance Sphere | x | 0.305 | 0.335 | 0.325 | 0.295 | 0.11-0.18 |
| | y | 0.315 | 0.345 | 0.355 | 0.325 | |
| Grey Sample 1 | x | 0.321 | | | 0.16 | |
| | y | 0.336 | | | | |
| Grey Sample 2 | x | 0.321 | | | 0.15 | |
| | y | 0.336 | | | | |
| Grey Sample 3 | x | 0.323 | | | 0.14 | |
| | y | 0.338 | | | | |
| Dark Green Tolerance Sphere | x | 0.313 | 0.313 | 0.248 | 0.127 | 0.01-0.07 |
| | y | 0.682 | 0.453 | 0.409 | 0.557 | |
| Dark Green Sample 1 | x | 0.233 | | | 0.06 | |
| | y | 0.501 | | | | |
| Dark Green Sample 2 | x | 0.212 | | | 0.06 | |
| | y | 0.561 | | | | |
| Dark Green Sample 3 | x | 0.250 | | | 0.05 | |
| | y | 0.535 | | | | |

1.2 Daylight Chromaticity and Luminance Factor, after accelerated artificial weathering

| Colours | Chromaticity Coordinates | | | | | Luminance Factor β |
|--------------------------------|--------------------------|-------|-------|-------|-------|--------------------------|
| | 1 | 2 | 3 | 4 | | |
| White Tolerance Sphere | x | 0.355 | 0.305 | 0.285 | 0.335 | ≥ 0.40 |
| | y | 0.355 | 0.305 | 0.325 | 0.375 | |
| White Sample 1 | x | 0.316 | | | | 0.45 |
| | y | 0.333 | | | | |
| White Sample 2 | x | 0.317 | | | | 0.45 |
| | y | 0.335 | | | | |
| White Sample 3 | x | 0.316 | | | | 0.45 |
| | y | 0.333 | | | | |
| Yellow Tolerance Sphere | x | 0.545 | 0.487 | 0.427 | 0.465 | ≥ 0.24 |
| | y | 0.454 | 0.423 | 0.483 | 0.534 | |
| Yellow Sample 1 | x | 0.476 | | | | 0.29 |
| | y | 0.474 | | | | |
| Yellow Sample 2 | x | 0.467 | | | | 0.28 |
| | y | 0.474 | | | | |
| Yellow Sample 3 | x | 0.474 | | | | 0.28 |
| | y | 0.479 | | | | |
| Red Tolerance Sphere | x | 0.735 | 0.674 | 0.569 | 0.655 | ≥ 0.03 |
| | y | 0.265 | 0.236 | 0.341 | 0.345 | |
| Red Sample 1 | x | 0.615 | | | | 0.07 |
| | y | 0.332 | | | | |
| Red Sample 2 | x | 0.601 | | | | 0.07 |
| | y | 0.333 | | | | |
| Red Sample 3 | x | 0.619 | | | | 0.06 |
| | y | 0.334 | | | | |
| Blue Tolerance Sphere | x | 0.078 | 0.150 | 0.210 | 0.137 | ≥ 0.01 |
| | y | 0.171 | 0.220 | 0.160 | 0.038 | |
| Blue Sample 1 | x | 0.145 | | | | 0.04 |
| | y | 0.152 | | | | |
| Blue Sample 2 | x | 0.149 | | | | 0.06 |
| | y | 0.151 | | | | |
| Blue Sample 3 | x | 0.142 | | | | 0.05 |
| | y | 0.137 | | | | |
| Green Tolerance Sphere | | 0.007 | 0.248 | 0.177 | 0.026 | ≥ 0.03 |
| | | 0.703 | 0.409 | 0.362 | 0.399 | |
| Green Sample 1 | x | 0.174 | | | | 0.06 |
| | y | 0.423 | | | | |
| Green Sample 2 | x | 0.174 | | | | 0.06 |
| | y | 0.459 | | | | |
| Green Sample 3 | x | 0.170 | | | | 0.07 |
| | y | 0.438 | | | | |
| Orange Tolerance Sphere | x | 0.631 | 0.560 | 0.506 | 0.570 | ≥ 0.14 |
| | y | 0.369 | 0.360 | 0.404 | 0.429 | |
| Orange Sample 1 | x | 0.535 | | | | 0.16 |
| | y | 0.406 | | | | |
| Orange Sample 2 | x | 0.529 | | | | 0.16 |
| | y | 0.411 | | | | |
| Orange Sample 3 | x | 0.525 | | | | 0.16 |
| | y | 0.403 | | | | |
| Brown Tolerance Sphere | x | 0.455 | 0.523 | 0.479 | 0.558 | 0.03-0.09 |
| | y | 0.397 | 0.429 | 0.373 | 0.394 | |
| Brown Sample 1 | x | 0.509 | | | | 0.06 |
| | y | 0.400 | | | | |
| Brown Sample 2 | x | 0.494 | | | | 0.06 |
| | y | 0.395 | | | | |
| Brown Sample 3 | x | 0.506 | | | | 0.05 |
| | y | 0.397 | | | | |
| Grey Tolerance Sphere | x | 0.350 | 0.300 | 0.285 | 0.335 | 0.11-0.18 |
| | y | 0.360 | 0.310 | 0.325 | 0.375 | |
| Grey Sample 1 | x | 0.321 | | | | 0.18 |
| | y | 0.337 | | | | |
| Grey Sample 2 | x | 0.321 | | | | 0.16 |
| | y | 0.337 | | | | |
| Grey Sample 3 | x | 0.323 | | | | 0.15 |
| | y | 0.338 | | | | |

| Colours | Chromaticity Coordinates | | | | Luminance Factor β | |
|------------------------------------|--------------------------|--------------|--------------|--------------|--------------------------|------------------|
| | | 1 | 2 | 3 | | 4 |
| <i>Dark Green Tolerance Sphere</i> | <i>x</i> | <i>0.313</i> | <i>0.313</i> | <i>0.248</i> | <i>0.127</i> | <i>0.01-0.07</i> |
| | <i>y</i> | <i>0.682</i> | <i>0.453</i> | <i>0.409</i> | <i>0.557</i> | |
| Dark Green Sample 1 | x | 0.243 | | | 0.06 | |
| | y | 0.484 | | | | |
| Dark Green Sample 2 | x | 0.215 | | | 0.06 | |
| | y | 0.544 | | | | |
| Dark Green Sample 3 | x | 0.250 | | | 0.06 | |
| | y | 0.527 | | | | |

Annex 2: 3M™ High Intensity Prismatic Digital Sheeting 3930DS + 3M™ Piezo Inkjet Ink + 3M™ Protective Overlay Film 1170 + 3M™ Premium Protective Overlay Film 1160

Daylight Chromaticity and Luminance Factor, initial and after accelerated artificial weathering

2.1 Daylight Chromaticity and Luminance Factor, initial

| Colours | | Chromaticity Coordinates | | | | Luminance Factor β |
|--|---|--------------------------|-------|-------|-------|--------------------------|
| | | 1 | 2 | 3 | 4 | |
| White <i>Tolerance Sphere</i> | x | 0.305 | 0.335 | 0.325 | 0.295 | ≥ 0.40 |
| | y | 0.315 | 0.345 | 0.355 | 0.325 | |
| White Sample 1 | x | 0.314 | | | | 0.47 |
| | y | 0.331 | | | | |
| White Sample 2 | x | 0.313 | | | | 0.46 |
| | y | 0.329 | | | | |
| White Sample 3 | x | 0.314 | | | | 0.46 |
| | y | 0.331 | | | | |
| Yellow <i>Tolerance Sphere</i> | x | 0.494 | 0.470 | 0.513 | 0.545 | ≥ 0.24 |
| | y | 0.505 | 0.480 | 0.437 | 0.454 | |
| Yellow Sample 1 | x | 0.481 | | | | 0.29 |
| | y | 0.472 | | | | |
| Yellow Sample 2 | x | 0.481 | | | | 0.27 |
| | y | 0.470 | | | | |
| Yellow Sample 3 | x | 0.484 | | | | 0.28 |
| | y | 0.472 | | | | |
| Red <i>Tolerance Sphere</i> | x | 0.735 | 0.700 | 0.610 | 0.660 | ≥ 0.03 |
| | y | 0.265 | 0.250 | 0.340 | 0.340 | |
| Red Sample 1 | x | 0.623 | | | | 0.08 |
| | y | 0.332 | | | | |
| Red Sample 2 | x | 0.633 | | | | 0.06 |
| | y | 0.325 | | | | |
| Red Sample 3 | x | 0.633 | | | | 0.07 |
| | y | 0.328 | | | | |
| Blue <i>Tolerance Sphere</i> | x | 0.130 | 0.160 | 0.160 | 0.130 | ≥ 0.01 |
| | y | 0.090 | 0.090 | 0.140 | 0.140 | |
| Blue Sample 1 | x | 0.145 | | | | 0.04 |
| | y | 0.131 | | | | |
| Blue Sample 2 | x | 0.145 | | | | 0.06 |
| | y | 0.133 | | | | |
| Blue Sample 3 | x | 0.142 | | | | 0.05 |
| | y | 0.130 | | | | |
| Green <i>Tolerance Sphere</i> | x | 0.110 | 0.170 | 0.170 | 0.110 | ≥ 0.03 |
| | y | 0.415 | 0.415 | 0.500 | 0.500 | |
| Green Sample 1 | x | 0.167 | | | | 0.06 |
| | y | 0.450 | | | | |
| Green Sample 2 | x | 0.167 | | | | 0.07 |
| | y | 0.436 | | | | |
| Green Sample 3 | x | 0.158 | | | | 0.06 |
| | y | 0.444 | | | | |
| Orange <i>Tolerance Sphere</i> | x | 0.631 | 0.560 | 0.506 | 0.570 | ≥ 0.14 |
| | y | 0.369 | 0.360 | 0.404 | 0.429 | |
| Orange Sample 1 | x | 0.545 | | | | 0.17 |
| | y | 0.404 | | | | |
| Orange Sample 2 | x | 0.553 | | | | 0.15 |
| | y | 0.402 | | | | |
| Orange Sample 3 | x | 0.544 | | | | 0.16 |
| | y | 0.394 | | | | |

| Colours | Chromaticity Coordinates | | | | Luminance Factor B | |
|--|--------------------------|-------|-------|-------|--------------------|-----------|
| | 1 | 2 | 3 | 4 | | |
| Brown Tolerance Sphere | x | 0.455 | 0.523 | 0.479 | 0.558 | 0.03-0.09 |
| | y | 0.397 | 0.429 | 0.373 | 0.394 | |
| Brown Sample 1 | x | 0.517 | | | 0.06 | |
| | y | 0.401 | | | | |
| Brown Sample 2 | x | 0.499 | | | 0.06 | |
| | y | 0.390 | | | | |
| Brown Sample 3 | x | 0.525 | | | 0.04 | |
| | y | 0.386 | | | | |
| Grey Tolerance Sphere | x | 0.305 | 0.335 | 0.325 | 0.295 | 0.11-0.18 |
| | y | 0.315 | 0.345 | 0.355 | 0.325 | |
| Grey Sample 1 | x | 0.320 | | | 0.17 | |
| | y | 0.335 | | | | |
| Grey Sample 2 | x | 0.320 | | | 0.16 | |
| | y | 0.335 | | | | |
| Grey Sample 3 | x | 0.321 | | | 0.14 | |
| | y | 0.336 | | | | |
| Dark Green Tolerance Sphere | x | 0.313 | 0.313 | 0.248 | 0.127 | 0.01-0.07 |
| | y | 0.682 | 0.453 | 0.409 | 0.557 | |
| Dark Green Sample 1 | x | 0.231 | | | 0.06 | |
| | y | 0.492 | | | | |
| Dark Green Sample 2 | x | 0.228 | | | 0.07 | |
| | y | 0.562 | | | | |
| Dark Green Sample 3 | x | 0.250 | | | 0.06 | |
| | y | 0.524 | | | | |

2.2 Daylight Chromaticity and Luminance Factor, after accelerated artificial weathering

| Colours | Chromaticity Coordinates | | | | | Luminance Factor β |
|--------------------------------|--------------------------|-------|-------|-------|-------|--------------------------|
| | 1 | 2 | 3 | 4 | | |
| White Tolerance Sphere | x | 0.355 | 0.305 | 0.285 | 0.335 | ≥ 0.40 |
| | y | 0.355 | 0.305 | 0.325 | 0.375 | |
| White Sample 1 | x | 0.314 | | | | 0.46 |
| | y | 0.330 | | | | |
| White Sample 2 | x | 0.315 | | | | 0.47 |
| | y | 0.332 | | | | |
| White Sample 3 | x | 0.315 | | | | 0.46 |
| | y | 0.331 | | | | |
| Yellow Tolerance Sphere | x | 0.545 | 0.487 | 0.427 | 0.465 | ≥ 0.24 |
| | y | 0.454 | 0.423 | 0.483 | 0.534 | |
| Yellow Sample 1 | x | 0.476 | | | | 0.30 |
| | y | 0.475 | | | | |
| Yellow Sample 2 | x | 0.475 | | | | 0.28 |
| | y | 0.472 | | | | |
| Yellow Sample 3 | x | 0.476 | | | | 0.29 |
| | y | 0.474 | | | | |
| Red Tolerance Sphere | x | 0.735 | 0.674 | 0.569 | 0.655 | ≥ 0.03 |
| | y | 0.265 | 0.236 | 0.341 | 0.345 | |
| Red Sample 1 | x | 0.612 | | | | 0.08 |
| | y | 0.335 | | | | |
| Red Sample 2 | x | 0.618 | | | | 0.06 |
| | y | 0.330 | | | | |
| Red Sample 3 | x | 0.616 | | | | 0.07 |
| | y | 0.330 | | | | |
| Blue Tolerance Sphere | x | 0.078 | 0.150 | 0.210 | 0.137 | ≥ 0.01 |
| | y | 0.171 | 0.220 | 0.160 | 0.038 | |
| Blue Sample 1 | x | 0.145 | | | | 0.04 |
| | y | 0.154 | | | | |
| Blue Sample 2 | x | 0.148 | | | | 0.05 |
| | y | 0.149 | | | | |
| Blue Sample 3 | x | 0.146 | | | | 0.06 |
| | y | 0.153 | | | | |
| Green Tolerance Sphere | | 0.007 | 0.248 | 0.177 | 0.026 | ≥ 0.03 |
| | | 0.703 | 0.409 | 0.362 | 0.399 | |
| Green Sample 1 | x | 0.177 | | | | 0.07 |
| | y | 0.456 | | | | |
| Green Sample 2 | x | 0.180 | | | | 0.08 |
| | y | 0.440 | | | | |
| Green Sample 3 | x | 0.171 | | | | 0.06 |
| | y | 0.443 | | | | |
| Orange Tolerance Sphere | x | 0.631 | 0.560 | 0.506 | 0.570 | ≥ 0.14 |
| | y | 0.369 | 0.360 | 0.404 | 0.429 | |
| Orange Sample 1 | x | 0.534 | | | | 0.17 |
| | y | 0.407 | | | | |
| Orange Sample 2 | x | 0.542 | | | | 0.15 |
| | y | 0.405 | | | | |
| Orange Sample 3 | x | 0.532 | | | | 0.17 |
| | y | 0.397 | | | | |
| Brown Tolerance Sphere | x | 0.455 | 0.523 | 0.479 | 0.558 | 0.03-0.09 |
| | y | 0.397 | 0.429 | 0.373 | 0.394 | |
| Brown Sample 1 | x | 0.516 | | | | 0.07 |
| | y | 0.403 | | | | |
| Brown Sample 2 | x | 0.488 | | | | 0.07 |
| | y | 0.392 | | | | |
| Brown Sample 3 | x | 0.517 | | | | 0.05 |
| | y | 0.387 | | | | |
| Grey Tolerance Sphere | x | 0.350 | 0.300 | 0.285 | 0.335 | 0.11-0.18 |
| | y | 0.360 | 0.310 | 0.325 | 0.375 | |
| Grey Sample 1 | x | 0.319 | | | | 0.18 |
| | y | 0.335 | | | | |
| Grey Sample 2 | x | 0.320 | | | | 0.16 |
| | y | 0.335 | | | | |
| Grey Sample 3 | x | 0.321 | | | | 0.14 |
| | y | 0.336 | | | | |

| Colours | Chromaticity Coordinates | | | | Luminance Factor β | |
|------------------------------------|--------------------------|--------------|--------------|--------------|--------------------------|------------------|
| | | 1 | 2 | 3 | | 4 |
| <i>Dark Green Tolerance Sphere</i> | <i>x</i> | <i>0.313</i> | <i>0.313</i> | <i>0.248</i> | <i>0.127</i> | <i>0.01-0.07</i> |
| | <i>y</i> | <i>0.682</i> | <i>0.453</i> | <i>0.409</i> | <i>0.557</i> | |
| Dark Green Sample 1 | x | 0.243 | | | 0.07 | |
| | y | 0.486 | | | | |
| Dark Green Sample 2 | x | 0.236 | | | 0.07 | |
| | y | 0.557 | | | | |
| Dark Green Sample 3 | x | 0.261 | | | 0.06 | |
| | y | 0.514 | | | | |