Product Description

3M™ Diamond Grade™ Flexible Work Zone Sheeting Series 3910 (“Sheeting”) is a wide angle prismatic lens reflective sheeting intended for reflectorizing reboundable traffic control devices such as polyethylene drums, posts, and tubes. The Sheeting is precoated with a pressure sensitive adhesive conforming to ASTM D 4956 Class 1 adhesive requirements. 3M™ Diamond Grade™ Flexible Work Zone Sheeting 3911 fluorescent yellow and 3M™ Diamond Grade™ Flexible Work Zone Sheeting 3914 fluorescent orange are visible-activated fluorescent reflective sheetings as defined in ASTM E991.

For details of the features and benefits of Series 3910 Sheeting, please refer to www.3M.com/roadsafety.

The Sheeting is available in the following colors:

Table A. Product Codes by Colors

Color	Product Code
White	3910
Fluorescent Yellow	3911
Fluorescent Orange	3914

Specifications

Daytime Color (x, y, Y)

The chromaticity coordinates and luminance factors of the Sheeting conform to the requirements shown in Table B.

Table B. CIE Chromaticity Coordinate Limits[1] for New Sheeting

Color	1		2		3		4		Limit Y%
	x	y	x	y	x	y	x	y	Min.
White	0.303	0.300	0.368	0.366	0.340	0.393	0.274	0.329	40
Yellow	0.479	0.479	0.446	0.483	0.512	0.421	0.557	0.442	45
Orange	0.583	0.583	0.535	0.400	0.595	0.351	0.645	0.355	25

Color Test - Ordinary Color

Conformance to standard chromaticity (x, y) and luminance factor (Y%) requirements shall be determined by instrumental methods in accordance with ASTM E 1164 on Sheeting applied to smooth aluminum test panels cut from Alloy 6061-T6 or 5052-H38. The values shall be determined on a HunterLab ColorFlex 45/0 spectrophotometer. Calculations shall be performed using CIE Illuminant D65 and the 2° standard observer.[2]

Color Test - Fluorescent Color

Conformance to standard chromaticity (x, y) and luminance factor (Y%) requirements shall be determined by instrumental methods in accordance with ASTM E 991 on Sheeting applied to smooth aluminum test panels cut from Alloy 6061-T6 or 5052-H38. The values shall be determined on a HunterLab ColorFlex 45/0 spectrophotometer. Calculations shall be performed using CIE Illuminant D65 and the 2° standard observer.[2]

1. The four pairs of chromaticity coordinates define the acceptable color limits when under CIE D65 illumination, in terms of the CIE 1931 Standard Colorimetric System.
2. The instrumentally determined color values of retroreflective sheeting can vary significantly depending on the make and model of colorimetric spectrophotometer as well as the color and retroreflective optics of the sheeting (David M. Burns and Timothy J. Donahue, Measurement Issues in the Color Specification of Fluorescent Retroreflective Materials for High Visibility Traffic Signing and Personal Safety Applications, Proceedings of SPIE: Fourth Oxford Conference on Spectroscopy, 4826, pp. 39-49, 2003). For the purposes of this document, the HunterLab ColorFlex 45/0 spectrophotometer shall be the reference instrument.

Coefficient of Retroreflection

Table C. Minimum Coefficient of Retroreflection, R_A, Values for Series 3910 Sheeting, (cd/lux/m^2)

Color	Observation Angle[a]	Entrance Angle[b]		
		-4°	30°	45°
White	0.1	1000	600	180
	0.2	550	300	130
	0.5	200	100	50
	1.0	15	10	7.5
Fluorescent Yellow	0.1	450	180	150
	0.2	300	120	100
	0.5	135	51	40
	1.0	15	10	7.5
Fluorescent Orange	0.1	375	200	50
	0.2	200	120	40
	0.5	80	50	20
	1.0	10	7.5	5

Test for Coefficient of Retroreflection

Conformance to coefficient of retroreflection requirements are to be determined instrumentally, in accordance with ASTM E-810 “Test Method for Coefficient of Retroreflection Sheeting.”

Physical Properties

Interlocking Diamond Seal Pattern

Diamond Grade™ sheeting is differentiated from other prismatic or encapsulated lens sheeting by the distinctive seal pattern in the Sheeting. Under normal light, this seal pattern will appear lighter in color than the reflective portion, as illustrated in Figure 1.

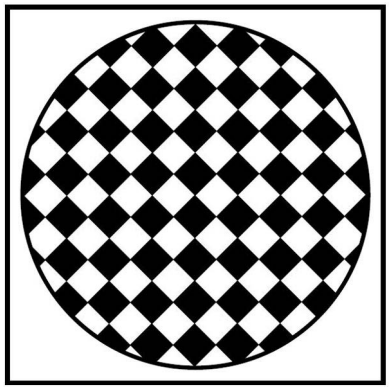

Figure 1. An enlarged illustration of the Interlocking diamond seal pattern enlarged.

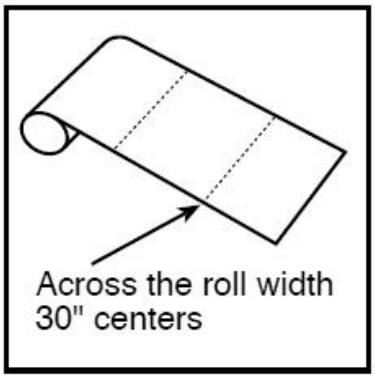

Figure 2. Tooling Lines

Tooling Lines

The manufacturing processes for prismatic sheeting results in tooling lines. In 3M™ Diamond Grade™ sheeting these lines are slightly thicker than the seal pattern legs and occur across the web, as shown in Figure 2. Tooling lines are more pronounced under shop light but cannot be seen on the road either under daylight or under typical night time use conditions.

Recommended Substrates & Application Procedures

The Sheeting is designed for application to clean polyethylene-based work zone devices such as drums, tubes, and posts. Polyethylene substrates must be properly flame-treated or corona-treated before Sheeting application (see 3M Information Folder 3.3). 3M does NOT recommend applying the Sheeting to plasticized polyvinyl chloride devices.

Application and substrate temperatures should exceed 60°F (15°C), and the Sheeting must be applied with firm pressure using a plastic squeegee or rubber roller.

NOTE

Take care to avoid misaligning the Sheeting during application. The Sheeting will flex minimally and unusual stretching may cause minor wrinkles. These wrinkles do not affect product performance. Sheeting should be overlapped at splices by ½ in. to 1 in (1.2 cm to 2.5 cm).

Process Colors

The Sheeting may be screen processed before or after mounting on a substrate using 3M™ Process Colors Series 990. 3M™ Process Colors Series 990 process colors must be clear coated with 3M™ Transparent Screen Printing Overprint Clear Ink 4430R after the ink has been allowed to air dry for three hours. Unprocessed Sheeting and Sheeting processed only with opaque black do not need to be clear coated. For screen processing, use a P. E. 157 screen mesh and a fill pass. See 3M Information Folder 1.8 for details.

Shelf Life, Storage, and Shipping

Shelf Life

The shelf life is never more than two years from the data of manufacture on the original box.

Storage

- 65°F to 75°F (18°C to 24°C)
- Relative humidity of 30% to 50%
- Store horizontally in the original container or suspended on rods or pipes through their cores

Shipping

Devices such as drums should be stored and shipping in vertical stacks to avoid scuffing.

Maintenance

Sheeting that requires cleaning should be flushed with water, then washed with a detergent solution and soft bristle brush or sponge. Avoid pressure that may damage the materials. Flush the Sheeting with water following washing. Do NOT use solvents to clean Sheeting. See 3M Information Folder 1.10 for further details.

Durability

The Sheeting's durability depends upon many factors including, but not limited to: substrate selection and preparation, compliance with recommended application procedures, geographic area, exposure conditions, and maintenance. The user is responsible for determining if the Sheeting is suitable for the intended use when applied to a chosen substrate or device. Application to improperly prepared, excessively rough or non-weather resistant surfaces, and exposure to severe or unusual conditions can reduce Sheeting durability.

The purchaser should select a suitable test for determining the durability of the Sheeting when applied to a chosen device or substrate. For reboundable substrates, the test should incorporate the plastic manufacturer's procedure for testing the impact resistance of the reboundable plastic traffic control device.

3M Related Literature

In addition to other 3M bulletins specified in this document, the following bulletins provide details users may need to successfully apply a graphic.

- 3M Information Folder 1.7 Sign Base Surface Preparation
- 3M Information Folder 1.8 Process Color Instructions
- 3M Information Folder 1.10 Cutting, Premasking, and Prespacing
- 3M Information Folder 3.3 Application Procedures for Applying 3M Reflective Sheeting to Rebounable Traffic Control Devices

Health and Safety

Tools and Equipment Usage

When using any equipment, always follow the manufacturer's instructions for safe operation.

Chemicals

When handling any chemical products, read the manufacturers' container labels and the safety data sheets (SDS) for important health, safety, and environmental information.

Follow this link to obtain SDS sheets for 3M products.

Follow this link to obtain information about substances of very high concern (SVHC) for EU products.

Warranty Information

Technical Information

Technical information, guidance, and other statements provided by 3M are based upon records, tests, or experience that 3M believes to be reliable, but the accuracy, completeness, and representative nature of such information is not guaranteed. Such information is intended for people with knowledge and technical skills sufficient to assess and apply their own informed judgment to the information. No license to any intellectual property rights is granted or implied with respect to this technical information.

Product Selection and Use

Many factors beyond 3M's control and uniquely within user's knowledge and control can affect the use and performance of a 3M product in a particular application. Customer is solely responsible for evaluating the product and determining whether it is appropriate and suitable for customer's application, including conducting a workplace hazard assessment, reviewing all applicable regulations and standards, and reviewing the product label and use instructions. Failure to properly evaluate, select, and use a 3M product in accordance with instructions or to meet all applicable safety regulations may result in injury, sickness, death, and/or harm to property.

Warranty, Limited Remedy, and Disclaimer

Unless a different warranty is specifically stated on the applicable 3M product packaging or product literature (in which case such warranty governs), 3M warrants that each 3M product meets the applicable 3M product specification at the time 3M ships the product. 3M MAKES NO OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTY OR CONDITION OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR ARISING OUT OF A COURSE OF DEALING, CUSTOM, OR USAGE OF TRADE. If a 3M product does not conform to this warranty, the sole and exclusive remedy is, at 3M's option, replacement of the 3M product or refund of the purchase price.

Additional Warranty

3M makes the Additional Warranty (as defined in this section) regarding traffic control and guidance devices made with the Sheeting for use in the United States and Canada ("Device"). Any Additional Warranty is contingent on all components involved in that Additional Warranty being stored, applied, installed, and used only as 3M recommends in its Product Bulletins and Other Product Information.

3M warrants that Sheeting sold by 3M to be used as components in Devices will remain effective for its intended use for three (3) years, measured from the date of initial installation ("Installation Date"), subject to the following provisions:

Warranty Policy for Series 3910 applied to Polyethylene Traffic Control Devices

The 3M Warranty policy for Sheeting applied to polyethylene Devices is effective only following 3M OEM Certification. For 3M Certification, contact 3M Technical Service at 1-800-327-3431 extension 4.

Sheeting that has been properly applied to a polyethylene device by a 3M Certified Manufacturer/OEM, according to the instructions detailed in 3M Information Folder 3.3, may be eligible for a 3M Warranty claim if:

- The device has been officially rejected by the DOT for Sheeting performance, or
- The Sheeting demonstrates adhesion loss that compromises the retro-reflective performance of the Device.

Contact a 3M sales representative to initiate a warranty claim. If the Sheeting is verified defective by 3M Technical Service then a buyer's exclusive remedy, and 3M's sole obligation, is that 3M will credit Sheeting, device, transportation, and labor costs for the replacement of the polyethylene Device for up to three (3) years, prorated according to the schedule set forth in Table D.

Table D. Cost Prorating Schedule

Time Period	Rate
0 to 12 months	100%
13 to 24 months	66%
25 to 36 months	33%
36+ months	0%

Control charting data, as outlined under quality control in 3M Information Folder 3.3, is required for 3M Warranty consideration.

Terms and Conditions

- Sheeting must be processed and applied to a vertically-mounted (±10°) 3M recommended substrate as described in this product bulletin and in accordance with all 3M application, fabrication, and cleaning procedures provided in 3M's product bulletins, information folders, and applicable technical memos (which will be furnished to the manufacturer upon request).
- Any third-party imaging or altering of the Sheeting not endorsed by 3M will void the 3M Warranty.
- A Sheeting's failure to meet the 3M Warranty must be solely the result of design or manufacturing defects in the Sheeting and not of (a) outside causes including improper storage, fabrication, handling, maintenance, or installation; (b) use of process colors, thinners, coatings, or other chemicals not recommended by 3M; (c) use of application procedures or equipment not recommended by 3M; (d) failure of Device; (e) exposure to chemicals or solvents not recommended by 3M; (f) abrasion and other physical damage; (g) snow or any other burial of the marking; (h) collisions, vandalism, or malicious mischief; or (i) an act of God.
- Sheeting buckling, wrinkling, and bubbling are not covered by the 3M Warranty.
- Sheeting loss on a Device that has been caught under a vehicle and dragged on the pavement is not covered by the 3M Warranty.
- Sheeting loss on a Device that has been repaired by a non-3M Certified manufacturer/OEM is not covered by the 3M Warranty.
- Sheeting loss on a Device that has been refurbished is not covered by the 3M Warranty.
- Sheeting loss on a Device that is cracked or split is not covered by the 3M Warranty (Sheeting is not expected to hold the device together).
- 3M reserves the right to determine the method of replacement. Replacement sheeting will carry the unexpired warranty of the Sheeting it replaces.
- Claims made under the 3M Warranty will be honored only if 3M is presented with a traceable record of the Sheeting's Installation Date; 3M is notified of a potential failure within thirty days of discovery; reasonable information requested by 3M is provided,;3M is permitted to verify the cause of the failure; and defective Devices are made available for pick up by 3M.

Limitation of Liability

Except for the limited remedy stated above, and except to the extent prohibited by law, 3M will not be liable for any loss or damage arising from or related to the 3M product, whether direct, indirect, special, incidental, or consequential (including, but not limited to, lost profits or business opportunity), regardless of the legal or equitable theory asserted, including, but not limited to, warranty, contract, negligence, or strict liability.

Commercial Branding and Transportation
3M Center, Building 223-3N-30
St. Paul, MN 55144

1-800-328-3908
3M.com/roadsafety