3M™ Advanced Flexible Engineer Grade Reflective Sheeting Series 7300

Product Bulletin 7300
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Description

3M™ Advanced Flexible Engineer Grade Reflective Sheeting Series 7300 (the "Sheeting") is a non-metallized (corrosion resistant), non-conductive, microprismatic reflective sheeting. The Sheeting meets the performance requirements of ASTM D4956 for Type I sheeting. It is designed to have high scratch resistance and is flexible and durable.

The adhesive on the Sheeting is designed for application to a variety of signing and temporary traffic control devices, including plywood, metal, and both flat and curved reboundable plastic substrates. The Sheeting utilizes a microseal technology to provide an exceptionally uniform appearance. The incorporated microseal technology also makes the Sheeting plotter- and die-cuttable, and eliminates the need for edge sealing.

The Sheeting features microprismatic optics that return light to drivers under a diverse set of nighttime viewing geometries drivers encounter. When applied to properly prepared substrates, the Sheeting provides long-term reflectivity and durability.

The white Sheeting is designed for use in the production of retroreflective commercial signs, regulated and non-regulated traffic control signs exposed vertically in service, and pressure sensitive stickers.

The Sheeting is available in the colors and for the applications shown in Table A.

Table A. Product Codes and Application Compatibilities by Color

Color	Product Code	Temporary and Traffic Control Devices and Signs	Regulated and Non-Regulated Traffic Control Signs and Stickers
White	7310	✓	✓
Yellow	7311	✓	
Orange	7314	✓	
White/Orange 4" Stripe Barricade L/R	7334L/7334R	✓	
White/Orange 6" Stripe Barricade L/R	7336L/7336R	✓	

Specifications

Coefficient of Retroreflection and Chromaticity

The Sheeting's minimum performance coefficient of retroreflection (R_A) values are shown in Table B.

Table B. Minimum Coefficient of Retroreflection, R_A, cd/fc/ft^2 (cd/lx/m^2) per ASTM D4956 for Type I Signing

Observation Angle[a]	Entrance Angle[b]	White	Yellow	Orange
0.2°	**-4°**	70	40	25
0.2°	**30°**	30	22	7
0.5°	**-4°**	30	25	13
0.5°	**30°**	15	13	4

a. Observation Angle - The angle between the illumination axis and the observation axis.

b. Entrance Angle - The angle from the illumination axis to the retroreflector axis. The retroreflector axis is an axis perpendicular to the retroreflective surface.

The color specification limits and daytime luminance factor (Y%) data for the Sheeting are shown in Table C.

Table C. Color Specification Limits (Daytime)

Color	1		2		3		4		Daytime Luminance Factor (Y%)	
	X	Y	X	Y	X	Y	X	Y	Min.	Max.
White	.303	.300	.368	.366	.340	.393	.274	.329	27	-
Yellow	.498	.412	.557	.442	.479	.520	.438	.472	15	45
Orange	.558	.352	.636	.364	.570	.429	.506	.404	14	30

Substrates

The most reliable and durable traffic devices and signs are made from properly prepared substrates. See 3M Information Folder 1.7 for surface preparation recommendations.

Regulated and Non-Regulated Signs (White Sheeting Only)

Properly prepared aluminum sheets and extrusions are the most reliable and durable substrates for traffic sign usage. Carefully evaluate all other substrates for adhesion and sign durability. Other substrates suitable for secure and durable applications of Sheeting have the following characteristics:

- Clean
- Smooth
- Flat
- Rigid
- Dimensionally stable
- Weather resistant
- Non-porous
- High surface energy (pass water break test)

Temporary Traffic Control Devices and Signs

See 3M Information Folder 1.7 for surface preparation recommendations. Low surface energy substrates may require additional preparation steps, such as flame treatment, mechanical abrasion, or the use of adhesion promoters prior to Sheeting application.

Sheeting failures caused by substrate failures or improper surface preparations are not the responsibility of 3M. The user is responsible for determining whether Sheeting is suitable for a particular purpose and application, and for determining if a substrate is appropriate for a specific purpose. Carefully evaluate all substrates for adhesion and device durability prior to application.

Application

Pressure Sensitive Adhesive

The Sheeting utilizes a pressure sensitive adhesive designed to retain adhesion over a wide temperature range, and for application to a broad range of surfaces. Although not optimal, these surfaces may even include moderately rough or porous wood, plastic, and a variety of metal surfaces.

For optimal adhesion, apply the Sheeting at room temperature (65°F [18°C]) or higher using any of the methods described below. If the Sheeting temperature is lower than 65°F (18°C), acclimatize it at a temperature of 65°F (18°C) or greater for at least 24 hours before application.

Application Equipment

- Interstate Squeeze Roll Applicator 48 Inch (see 3M Information Folder 1.4)
- Hand Squeeze Roll Applicator (HSRA) (see 3M Information Folder 1.6)

NOTE

When using an HSRA with an air cylinder kit, apply the minimum tension needed to properly position the Sheeting on the substrate. 3M recommends a nip roller pressure of 80 psi when using a 48 in. laminator.

Hand Application

3M recommends using hand application for copy only. See 3M Information Folder 1.5 for detailed hand application instructions. Hand applications may result in visual irregularities that may not be visually acceptable to some users. Such irregularities are more noticeable on darker colors. A roll laminator must be used to obtain a close-up uniform appearance.

All direct applied copy and border MUST be cut at all panel seams and squeegeed at all joints. Use a felt-edged squeegee to help prevent damage to the sheeting surface.

Other Application Methods

Customized application equipment exists for a wide range of flat and curved substrate surfaces. Users have found the Sheeting to be compatible with a variety of customized application equipment. Contact a 3M representative for more information.

Splices

The Sheeting may be either butt spliced or overlap spliced when more than one piece of Sheeting is used on a single piece of substrate.

Regulated and Non-Regulated Sign Installation (White Sheeting Only)

Nylon washers are required when twist style fasteners are used to mount the sign.

Imaging

Digitally imaged and screen printed areas of white Sheeting processed according to 3M's instructions shall provide coefficients of retroreflection of not less than 70% of the values of the corresponding ASTM D4956 Type I sheeting colors and conform to all other performance requirements of ASTM D4956 for Type I sheeting. Most consistent results are achieved when using 3M approved combinations of products (Table E and Table F).

Use of the Sheeting is not restricted to the inks and printers listed below. The Sheeting may perform adequately with select latex, solvent, and UV ink jet inks and printers. Contact a 3M representative for more information on ink and print system compatibilities.

Screen Printing

Screen print Sheeting using 3M's approved combinations of products. (See Table D.) Consult 3M Information Folder 1.8 for details on screen printing procedures.

It is the user's responsibility to determine the suitability and durability of any other process colors. 3M assumes no responsibility for the premature failure of sign face legends processed with non-recommended process colors.

Table D. 3M Approved Combinations of Products

Component Type	Product(s)
Process Color	Series 880N, Series 880I, or Series 990
Slipsheet	3M slipsheeting materials as defined in 3M Information Folder 1.11
Prespacing Tape	SCPS-2
Premasking Tape	SCPM-3
Transfer Tape	TPM-5

Digital Processing

Table E. 3M Approved Product Combinations and Color Availability for Permanent Traffic Control Signs and Stickers.

Printer[a]	Traffic Colors	Ink	Overlay Film (REQUIRED)
Durst Rho 161TS **Durst Rho 162TS**	Red, blue, green, brown, yellow, and black	3M™ Piezo Inkjet Series 8800UV Ink	3M™ ElectroCut™ Film Series 1170; 3M™ Premium Protective Overlay Film Series 1160i.2
Durst Rho 163TS		3M™ Piezo Inkjet Series 8900UV Ink	
EFI H1625-RS		3M™ Piezo Inkjet Series 8900UV Ink	
Canon Colorado M-Traffic		Canon UVgel 540-R	
HP 360/365	Red, green, brown, and black	HP Series 831/871 Inkjet inks	
HP 700/730	Red, blue, green, and black	HP Series 832 inkjet inks	
HP 800/830	Red, blue, green, and black	HP Series 873 inkjet inks	

a. Must be printed according to 3M's requirements including printer settings and profiles.

Table F. 3M Approved Product Combinations and Color Availability for Temporary Traffic Control Signs

Printer[a]	Traffic Colors	Ink	Overlay Film (Optional)
Durst Rho 161TS **Durst Rho 162TS**	Black	3M™ Piezo Inkjet Series 8800UV Ink	3M™ ElectroCut™ Film Series 1170; 3M™ Premium Protective Overlay Film Series 1160i.2
Durst Rho 163TS		3M™ Piezo Inkjet Series 8800UV Ink	
EFI H1625-RS		3M™ Piezo Inkjet Series 8800UV Ink	
Canon Colorado M-Traffic		Canon UVgel 540-R	
HP 360/365		HP Series 831/871 Inkjet inks	
HP 700/730		HP Series 832 inkjet inks	
HP 800/830		HP Series 873 inkjet inks	

a. Must be printed according to 3M's requirements including printer settings and profiles.

Cutting Methods

The Sheeting may be cut into letters and shapes for direct applied copy. The Sheeting does not require edge sealing.

Plotter Cutting

The plotter cutting procedure used for the Sheeting is similar to that used for typical beaded engineer grade sheeting. Start with the cutter settings typically used for beaded engineer grade sheeting and adjust as necessary. Slight adjustments in down force and knife depth may be required.

Premasking/Prespacing Markings

Use one of the following premasking or prespacing tapes:

- 3M™ Prespacing Tape SCPM-2 (paper tape)
- 3M™ Application Tape SCPM-3 (paper tape)
- 3M™ Clear Transfer Tape TPM5 (transparent tape)

Other Cutting Methods

Users are encouraged to evaluate cutting procedures for their own equipment and shop conditions. Sheeting may be hand cut, die cut, plotter cut, or guillotined multiple sheets at a time. The Sheeting may be cut into any desired shape, including cone sleeves. Cut edges of the Sheeting do not require sealing. Details regarding cutting methods can be found in 3M Information Folder 1.10.

Fabrication Lines

The Sheeting manufacturing process results in repeating fabrication lines in the product, as illustrated in Figure 1. The lines repeat at the same interval throughout the roll. Fabrication lines may be noticeable in some situations but should not impact sign functionality on the road, either in daylight or at night, under typical use conditions.

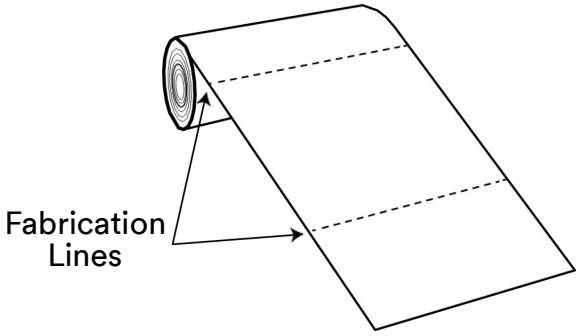


Figure 1. Fabrication Lines

Cleaning

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

Shelf Life, Storage, and Shipping

Shelf Life

Use the Sheeting within two years of the date of manufacture

Storage Conditions

- Cool, dry area, preferably 65°F to 75°F (18°C to 24°C)
- Relative humidity of 30% to 50%
- Full rolls should be stored horizontally in their shipping container.
- Partially used rolls can be stored in their shipping containers, or suspended horizontally from rods or pipes through their cores.
- Unprocessed sheets should be stored flat.
- Apply the Sheeting within two years of date of manufacture.

Packaging

See 3M Information Folder 1.11 for instructions on packing for storage and shipment.

Special Instructions for Regulated and Non-Regulated Signs (White Sheeting Only)

- Store finished signs and applied blanks on edge.
- Protect processed sign faceswith 3M slipsheeting materials. Place the glossy side of the slipsheet against the sign face.
- Place the glossy side of a slipsheet against each face of double faced signs.
- Store unmounted sign faces flat and interleaved with 3M slipsheeting materials, glossy side against the sign face.
- Avoid banding, crating, or stacking signs.
- Package for shipment in accordance with commercially accepted standards to prevent movement and chafing. Store sign packages indoors on edges.
- Panels and finished signs must remain dry during shipment and storage. If packaged signs become wet, unpack immediately and allow signs to dry.
- Refer to 3M Information Folder 1.11 for instructions on packing for storage and shipment.

Durability

The durability of a Sheeting application depends on substrate selection and preparation, compliance with recommended application procedures, geographic area, exposure conditions, and maintenance practices.

Refer to 3M Information Folder 1.7. 3M strongly recommends conducting periodic sign inspections and regular sign replacements in order to help sign owners establish their own effective service life exceptions, beyond the warranty period..

The durability statements contained herein do NOT constitute warranties of quality, life, or characteristics.

Durability Considerations for Work Zone Construction Signs

Work zone construction signs are exposed to severe or unusual conditions and are considered to be nonstationary objects which could result in reduced durability compared to permanent sign applications.

3M recommends performing appropriate tests to determine if the Sheeting meets performance requirements when applied to reboundable plastic substrates. Such tests should incorporate the plastic manufacturer's recommendations for subjecting reboundable plastic traffic control devices to impacts.

Exposure Considerations

Exposure to severe or unusual conditions can shorten the Sheeting’s lifetime. Signs in mountainous areas that are covered by snow for prolonged periods may also have reduced durability. Atmospheric conditions in certain geographic areas may have a negative effect on durability.

Custom Process Colors Considerations

Custom colors may have reduced durability compared to regulated traffic colors.

3M Related Literature

Always confirm you have the most current version of the applicable product bulletin, information folder, or other product information from 3M's website at www.mmm.com/roadsafety.

- 3M Information Folder 1.4 Instructions for Operation of the Interstate Squeeze Roll Applicator
- 3M Information Folder 1.5 Hand Application Instructions for Reflective Sheeting and Scotchcal™ Film with PSA
- 3M Information Folder 1.6 Hand Squeeze Roll Applicators
- 3M Information Folder 1.7 Substrates and Preparations for Retroreflective Sign Sheeting Applications
- 3M Information Folder 1.8 3M™ Process Colors Series 880I, 880N, and 990 Instructions for Use
- 3M Information Folder 1.10 Cutting, Premasking and Prespacing of 3M™ Reflective Sheetings
- 3M Information Folder 1.11 3M™ Reflective Sheeting Sign Maintenance Management
- 3M Information Folder 1.19 Digital Imaging with Durst 163TS Printers on 3M™ Reflective Sheeting
- 3M Information Folder 1.20 Digital Imaging with EFI H1625 RS Printer on 3M™ Reflective Sheeting
- 3M Information Folder 3.3 Reflective Sheeting Guidelines for Application to Reboundable Traffic Control Devices
- 3M Product Bulletin 880 3M™ Process Color Series 880I and 3M™ Process Color Series 880N
- 3M Product Bulletin 990 3M™ Process Color Series 990
- 3M Product Bulletin 1160i.2 3M™ Premium Protective Overlay Film 1160i.2
- 3M Product Bulletin 1170 3M™ ElectroCut™ Film Series 1170
- 3M Product Bulletin 1170C 3M™ ElectroCut™ Film 1170C Clear
- 3M Product Bulletin 8900UV 3M™ Piezo Inkjet Series 8900UV Ink
- 3M™ MCS™ Warranty and 3M™ MCS™ Warranty for Traffic Matrices
- 3M Sign Warranty Bulletin

ASTM Test Methods are available from ASTM International, West Conshohocken, PA.

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.

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