



# Advanced Engineer Grade Prismatic Sheeting

## Series 7930 with Pressure Sensitive Adhesive

Product Bulletin 7930 – International Market Test

September 2014

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### Description

3M™ Advanced Engineer Grade Prismatic Sheeting Series 7930 meets ASTM D4956 Type I and is a non-metalized microprismatic reflective sheeting designed for production of reflective commercial signs and non-critical traffic control signs that are exposed vertically in service, as well as pressure sensitive stickers. Unique micro-sealing technology gives Series 7930 a more uniform visual appearance compared to other prismatic products and a whiter base color compared to beaded sheeting. Series 7930 can be readily identified by the integral product number watermark. When applied to properly prepared sign substrates, Series 7930 sheeting provides long-term reflectivity and durability.

Series 7930 sheeting is available in the following colors.

Color	Product Code
White	7930
Yellow	7931
Red	7932
Orange	7934
Blue	7935
Green	7937
Brown	7939

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### Sign Fabrication Methods

#### Application

Series 7930 sheeting incorporates a pressure sensitive adhesive and should be applied to the sign substrate at room temperature 65°F (18°C) or higher by any of the methods below. If the sheeting temperature is less than 65°F (18°C), allow it to condition to 65°F – 75°F (18°C – 24°C) for at least 24 hours.

Mechanical squeeze roll applicator – Reference Information Folder 1.4.

Hand squeeze roll applicator — Reference Information Folder 1.6.

Hand application is recommended for copy only. See Information Folder 1.5. Hand applications may result in visual irregularities that may be aesthetically objectionable to some customers. Such irregularities are more noticeable on darker colors. To obtain a close-up uniform appearance, a roll laminator must be used.

All direct applied copy and border MUST be cut at all panel seams and squeegeed at the joint.

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**Sign Fabrication  
Methods  
(continued)**

**Splices**

Series 7930 sheeting should be butt spliced when more than one piece of sheeting is used on one piece of substrate. The sheeting pieces should not touch each other at the splice. This is to prevent buckling as the sheeting expands in extreme temperature/humidity exposure.

**Double Faced Signs**

The sheeting on the bottom side of a double faced sign can be damaged if rolled through a squeeze roll applicator with an unprotected steel bottom roller. The use of a semi-soft flat sheet between the steel roller and the applied sign face will provide protection from damage. A material such as a rubber mat, tag board or cardboard is recommended.

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**Substrates**

For traffic sign use, substrates found to be most reliable and durable are properly prepared aluminum sheets and extruded aluminum street name blades. It is up to the the individual customer to determine if a substrate is appropriate for its specific purpose. Users are urged to carefully evaluate all other substrates for adhesion and sign durability. Other substrates that may be satisfactory for proper application of sheeting will have the following characteristics:

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

Refer to Information Folder 1.7 for surface preparation recommendations. Substrates with low surface energy may require additional preparation such as flame treatment, mechanical abrasion or use of adhesion promoters prior to sheeting application.

Series 7930 is designed primarily for applications to flat substrates but also may be suitable for simple curves, such as a pipe. Any use that requires a radius of curvature of less than five inches should also be supported by rivets or bolts. Plastic substrates are not recommended where cold shock performance is required. **Sign failures caused by the substrate or improper surface preparation are not the responsibility of 3M. User is responsible for determining whether the 3M product is fit for a particular purpose and suitable for user's application.**

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**Imaging**

**Screen Processing**

Series 7930 may be screen processed into traffic signs before or after mounting on a sign substrate, using 3M™ Process Colors Series 880N or Series 880I. Series 880N and Series 880I process colors can be screened at 60–100°F (16–38°C) at relative humidity of 20–50%. A PE 157 screen mesh with a fill pass is recommended. Refer to Information Folder 1.8 for details. Clear coating is not required or recommended. Use of other process colors series is not recommended. **Care should be taken to avoid flexing Series 7930 sheeting before and especially after screening to eliminate the possibility of cracking from improper handling techniques.**

For screen printed areas on white sheeting when processed according to 3M recommendations, the coefficients of retroreflection should not be less than 70% of the value for the corresponding color in Table A. The color chromaticity and luminance shall conform to Table B.

**Digital Printing**

Series 7930 may be appropriate for UV ink jet and latex printing. Due to high variations in the available UV ink jet and latex printing systems and inks, individual equipment and applications should be evaluated by the customer for suitability and for identifying optimal settings.

Series 7930 is not recommended for thermal transfer printing.

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**Cutting and Matching** Series 7930 may be cut into letters and shapes for direct applied copy. Sealing cut edges of Series 7930 sheeting is not required.

**Plotter Cutting**

Users are encouraged to evaluate cutting procedures for their own equipment and shop conditions, using typical commercial vinyl settings. A slight increase in down force and knife depth may be needed.

**Premasking/Prespacing**

1. Premasked Markings: Use Application Tape SCPM-3.
2. Prespaced Markings: Use Prespacing Tape SCPS-2 or Application Tape SCPM-3.

**Other Cutting Methods**

Series 7930 may be hand cut or die cut one sheet at a time, and band sawed or guillotined in stacks. Cutting equipment such as guillotines and metal shears, which have pressure plates on the sheeting when cutting, may damage the optics. Padding the pressure plate and easing it down onto the sheets being cut will significantly reduce damage. Maximum stack height for cutting Series 7930 sheeting is 50 sheets. Details on cutting can be found in Information Folder 1.10.

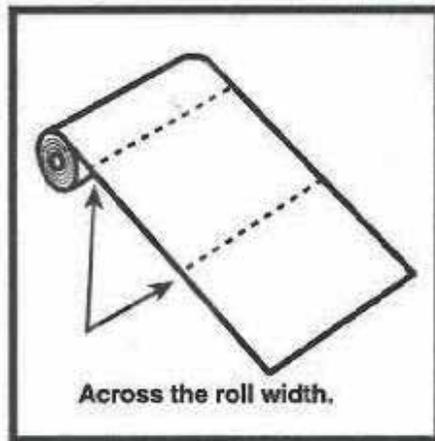
**Background matching**

When used as background, sheeting should be oriented identically across all panels or pieces of the sign for uniform appearance of sign background.

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**Fabrication Lines**

The manufacture of prismatic sheeting results in lines being present in the product. Series 7930 fabrication lines may be noticeable in shop light but are not observable on the road either in daylight or at night under typical use conditions (Figure 1).



**Figure 1 - Fabrication Lines**

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**Cleaning**

Signs that require cleaning should be flushed with water, then washed with a detergent solution and soft bristle brush or sponge. Avoid pressure that may damage the sign face. Flush with water following washing. Do not use solvents to clean signs. See 3M Information Folder 1.10.

<b>Storage and Packaging</b>	<p>Series 7930 should be stored in a cool, dry area, preferably at 65–75°F (18–24°C) and 30–50% relative humidity and should be applied within one year of purchase. Rolls should be stored horizontally in the shipping carton. Partially used rolls should be returned to the shipping carton or suspended horizontally from a rod or pipe through the core. Unprocessed sheets should be stored flat. Finished signs and applied blanks should be stored on edge. Screen processed signs must be protected with SCW 568 slipsheet paper. Place the glossy side of the slipsheet against the sign face. Double faced signs must have the glossy side of the slipsheet against each face of the sign.</p> <p>Unmounted screened faces must be stored flat and interleaved with SCW 568 slipsheet, glossy side against the sign face.</p> <p>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.</p> <p>Panels or finished signs must remain dry during shipment and storage. If packaged signs become wet, unpack immediately and allow signs to dry. Refer to Information Folder 1.11 for instructions on packing for storage and shipment.</p>
<b>Installation</b>	<p>Nylon washers are required when twist style fasteners are used to mount the sign.</p>
<b>Health and Safety Information</b>	<p>Read all health hazard, precautionary and first aid statements found in the Material Safety Data Sheet, and/or product label of chemicals prior to handling or use.</p>
<b>General Performance Considerations</b>	<p>Minimum coefficient of retroreflection, chromaticity limits, and daytime luminance factor (Y%) for the engineer grade prismatic sheeting Series 7930 are given in Table A and Table B, respectively.</p> <p><b>Durability Considerations</b></p> <p>The durability of Series 7930 and finished signs using 3M’s matched component materials (Table C) will depend upon substrate selection and preparation, compliance with recommended application procedures, geographic area, exposure conditions, and maintenance. Advanced engineer grade prismatic sheeting can be expected to provide satisfactory performance for five to seven years when processed with 3M matched component inks and films, depending upon climatic conditions of the installation.</p> <p>Maximum durability of Series 7930 can be expected in applications subject to vertical exposure on stationary objects when processed and applied to properly prepared aluminum according to 3M recommendations. Periodic sign inspection and regular sign replacement are strongly recommended in order for sign owners to establish their own effective service life expectation beyond any durability warranty, if provided.</p> <p><b>Substrate Considerations</b></p> <p>The user must determine the suitability of any nonmetallic sign backing for its intended use. Substrate manufacturer recommendations for preparation should be followed as well as guidance provided in Information Folder 1.7. Applications to unprimed, excessively rough or non-weather resistant surfaces can shorten the performance of such applications. <b>Sign failures caused by the substrate or improper surface preparation are not the responsibility of 3M.</b></p> <p><b>Exposure Considerations</b></p> <p>Exposure to severe or unusual conditions can shorten the performance of such applications. Signs in mountainous areas that are covered by snow for prolonged periods may also have reduced durability. Atmospheric conditions in certain geographic areas may result in reduced durability.</p> <p><b>Custom Process Colors Considerations</b></p> <p>Custom colors, certain lighter colors, heavily toned color or blends containing yellow or gold may have reduced durability. Digitally printing signs may have reduced durability and may fail to meet the color and brightness requirements of the regulated traffic sign markets.</p> <p>Minimum coefficient of retroreflection, chromaticity limits, and daytime luminance factor (Y%) for Series 7930 are given in Table A and Table B, respectively.</p>

**General Performance Considerations (continued)**

**Table A – Minimum Coefficient of Retroreflection**

Candelas/Foot Candle/Square Foot Candelas/Lux/Square Meter

Obs. <sup>1</sup> Angle	Ent Angle <sup>2</sup>	White	Yellow	Red	Orange	Green	Blue	Brown
0.2	-4	70	50	14.0	25	9.0	4.0	1.0
0.2	+30	30	22	6.0	7.0	3.5	1.7	0.3
0.5	-4	30	25	7.5	13	4.5	2.0	0.3
0.5	+30	15	13	3.0	4.0	2.2	0.8	0.2

Reflectivity conforms to ASTM D 4956-13.

<sup>1</sup>Observation Angle – The angle between the illumination axis and the observation axis.

<sup>2</sup>Entrance Angle – The angle from the illumination axis to the retroreflector axis. The retroreflector axis is an axis perpendicular to the retroreflective surface.

**Table B – CIE Chromaticity Coordinate Limits**

Color	x		y		x		y		Reflectance Limit (Y)	
	x	y	x	y	x	y	x	y	Min	Max
White	.303	.300	.368	.366	.340	.393	.274	.329	27.0	
Yellow	.498	.412	.557	.442	.479	.520	.438	.472	15.0	45.0
Red	.648	.351	.735	.265	.629	.281	.565	.346	2.5	15.0
Orange	.558	.352	.636	.364	.570	.429	.506	.404	10.0	30.0
Blue	.140	.035	.244	.210	.190	.255	.065	.216	1.0	10.0
Green	.026	.399	.166	.364	.286	.446	.207	.771	3.0	12.0
Brown	.430	.340	.610	.390	.550	.450	.430	.390	1.0	9.0

**Table C – Matched Component Materials**

Matched Components	
Process Color	Series 880N or Series 880I
Slipsheet	SCW 568
Prespacing Tape	SCPS-2
Premasking Tape	SCPM-3
Transfer Tape	TPM-5

**Additional General Performance Considerations - Orange**

**Advanced Engineer Grade Prismatic Sheeting Orange 7934 can be expected to provide satisfactory performance for up to three years when processed with 3M matched component inks and films, depending upon climatic conditions of the installation.** The user must determine the suitability of any sign substrate for its intended use. Applications to unprimed, excessively rough or non-weather-resistant surfaces, or exposure to severe or unusual conditions can shorten the durability of such applications.

**3M Warranty and Limited Remedy**

3M warrants that 3M™ Advanced Engineer Grade Prismatic Sheeting Series 7930 (the Product) sold by 3M to be used for traffic control signs and delineators is free of defects in material and workmanship. Additionally, 3M warrants that for a period subject to the terms of sale, but not to exceed 7 years (not to exceed 3 years for 7934 Orange) from date of application, a sign produced with the Product will remain functional for its intended purpose, subject to the following provisions: Sheeting Series 7930 must be processed and applied to a vertical ( $\pm 10^\circ$ ) surface in accordance with all 3M application and fabrication procedures provided in 3M’s product and information folders and technical memos (which will be furnished to the agency upon request), including the exclusive use of 3M matched component systems, process colors, overlay films, and recommended application equipment. If any Sign made with the Product is proven not to have met the Additional Warranty, then a buyer’s exclusive remedy, and 3M’s sole obligation, at 3M’s option, will be replacement of the Product.

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**3M Warranty and Limited Remedy (continued)**

**Conditions:** Such failure must be solely the result of design or manufacturing defects in the Product and not of outside causes such as: improper fabrication, handling, maintenance or installation; use of any material or product (such as process colors, thinners, coatings, solvents, or overlay films and sheetings) not made by 3M or not included in Table C; use of application equipment not recommended by 3M; failure of sign substrate; exposure to chemicals, abrasion and other mechanical damage from fasteners used to mount the sign; sign burial; collisions, vandalism or malicious mischief.

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 this warranty will be honored only if the signs have been dated at the time of sheeting application, which constitutes the start of the warranty period. Claims made under this warranty will be honored only if 3M is notified of a failure within a reasonable time, reasonable information requested by 3M is provided, and 3M is permitted to verify the cause of the failure.

**Limitation of Liability and Remedies**

3M WILL NOT UNDER ANY CIRCUMSTANCES BE LIABLE TO A BUYER FOR DIRECT (other than the applicable Limited Remedy stated above), SPECIAL, INCIDENTAL, INDIRECT OR CONSEQUENTIAL DAMAGES (INCLUDING, WITHOUT LIMITATION, LOSS OF PROFITS) IN ANY WAY RELATED TO A PRODUCT OR THIS PRODUCT BULLETIN, REGARDLESS OF THE LEGAL OR EQUITABLE THEORY ON WHICH SUCH DAMAGES ARE SOUGHT.

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**Literature Reference**

Product Bulletin 880I	3M™ Process Color Series 880I
Product Bulletin 880N	3M™ Process Color Series 880N
Information Folder 1.4	Instructions for Squeeze Roll Applicator
Information Folder 1.5	Hand Application Instructions
Information Folder 1.6	Instructions for Hand Squeeze Roll Applicator
Information Folder 1.7	Sign Base Surface Preparation
Information Folder 1.8	Process Color Instructions
Information Folder 1.10	Cutting, Matching, Premasking, and Prespacing Instructions
Information Folder 1.11	Sign Maintenance Management

**FOR INFORMATION OR ASSISTANCE**

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