

Transportation Safety Division

3M™ High Intensity Prismatic Reflective Sheeting Series 3930 with Pressure Sensitive Adhesive

Product Bulletin Series 3930

1 Description

3M™ High Intensity Prismatic Reflective Sheeting Series 3930 is a non-metalized micro-prismatic lens reflective sheeting designed for the production of durable traffic control signs, work zone devices and delineators, that are exposed vertically in service. Series 3930 comprises solventless adhesive¹, coated without the use of organic solvents.

Applied to properly prepared sign substrates, Series 3930 provides long-term reflectivity and durability.

Sheeting	Color
3930	White
3931	Yellow
3932	Red
3934	Orange
3935	Blue
3937	Green



3M™ High Intensity Prismatic Reflective Sheeting Series 3930 is approved for the manufacturing of signfaces for traffic signs with a European Technical Assessment (ETA). All provisions concerning the attestation of conformity and the performances described in the ETA 18/0290 were applied and the product fulfills all the prescribed requirements (see the Declaration of Performance at the end of this document for more details).

¹ Due to the use of ancillary organic materials in the manufacturing of the adhesive, traces of organic solvent can be found in the product

2 Photometric Properties

The initial minimum coefficient of retroreflection of High Intensity Prismatic, when measured according to CIE 54.2 using CIE standard illuminant A, conforms to Table 4 of EN 12899-1:2007 for Class RA 2 materials.

Geometry of measurements		Color					
α	β_1 ($\beta_2=0$)	White	Yellow	Red	Green	Blue	Orange
0,2°	+5°	250	170	45	45	20	100
	+30°	150	100	25	25	11	60
	+40°	110	70	15	12	8	29
0,33°	+5°	180	120	25	21	14	65
	+30°	100	70	14	12	8	40
	+40°	95	60	13	11	7	20
2°	+5°	5	3	1	0,5	0,2	1,5
	+30°	2,5	1,5	0,4	0,3	-	1
	+40°	1,5	1,0	0,3	0,2	-	-
“-“ indicates "Value greater than zero but not significant or applicable"							

Table A: Minimum Coefficient of Retroreflection [$cd / (lx * m^2)$] for Class RA2

The above angular definitions apply for the CIE Goniometer system (co-planar geometry). The sheeting shall be mounted in 90° orientation on the goniometer (as shown below).

The initial chromaticity coordinates and luminance factors conform to Class CR2 of EN 12899-1:2007 for Class RA 2 materials (except orange) and ETA 18/0290 (Table B).

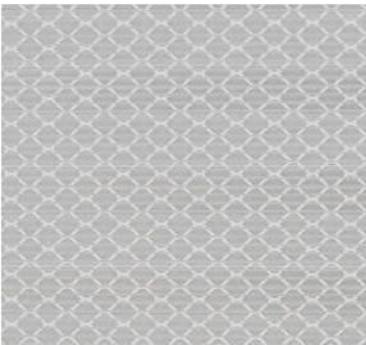
Color	1		2		3		4		Luminance factor
	x	y	x	y	X	y	x	y	
White	0,305	0,315	0,335	0,345	0,325	0,355	0,295	0,325	$\geq 0,27$
Yellow	0,494	0,505	0,470	0,480	0,513	0,437	0,545	0,454	$\geq 0,16$
Red	0,735	0,265	0,700	0,250	0,610	0,340	0,660	0,340	$\geq 0,03$
Blue	0,130	0,090	0,160	0,090	0,160	0,140	0,130	0,140	$\geq 0,01$
Green	0,110	0,415	0,170	0,415	0,170	0,500	0,110	0,500	$\geq 0,03$
Orange	0,631	0,369	0,560	0,360	0,506	0,404	0,570	0,429	$\geq 0,14$

Table B: Chromaticity and luminance factors

3 Printed Colors

For printed color areas on white sheeting, when processed according to 3M™ recommendations, the coefficients of retroreflection shall not be less than 70% of the value for the corresponding color in table A. The chromaticity coordinates and luminance factors shall conform to table B. This complies with requirements in EN 12899-1.

4 Surface Pattern



The High Intensity Prismatic sheeting is differentiated from other prismatic or encapsulated lens sheeting by the distinctive surface pattern, permanently integrated in the sheeting.

Figure 1 – Sheeting is positioned at 90° orientation

5 Orientation

High Intensity Prismatic is designed to be an effective wide angle reflective sheeting regardless of its orientation on the substrate or ultimate orientation after installation. However, because the efficiency of light return from cube corner reflectors is not equal at all rotation angles, the sheeting should be positioned in 0° or 90° application orientation on the completed sign when wide entrance angle performance is important for a given sign type or situation.

6 Application

High Intensity Prismatic sheeting should be conditioned prior to application to provide a minimum sheeting temperature of 18°C throughout the roll or sheeting stack. The sheeting should be applied with mechanical squeeze roll applicators to properly prepared substrates. If the application is done by hand, use firm pressure with a rubber roller or equivalent to obtain maximum initial adhesion. Use multiple, heavy overlapping strokes. Re-roll all edges. For further information refer to Information Folder IF 1.4, 1.5 and 1.6.

7 Splices

High Intensity Prismatic 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. A splice gap of up to 1,5 mm is acceptable. This is to prevent buckling as the sheeting expands in extreme temperature and humidity exposure.

8 Substrates

For traffic sign use, product application is limited to properly prepared aluminum (see Information Folder 1.7). The substrate should be conditioned prior to application to provide a minimum surface temperature of 15°C.

Extrusions are to be wrapped and flat panel signs are to be carefully trimmed, so that sheeting from adjacent panels do not touch on assembled signs. Users are urged to carefully evaluate all other substrates for adhesion and sign durability. High Intensity Prismatic sheeting is designed primarily for applications to flat substrates. Rivets or bolts should also support any use that requires a radius of curvature of less than 130 mm.

Sign failures caused by the substrate or improper surface preparation are not the responsibility of 3M.

9 Compatible Products

Screenprint Applications

- 3M™ Process Color Series 880I
- 3M™ Process Color Series 880N

Digital Printing Applications

- 3M™ Piezo Inkjet Ink Series 8800UV

(for Durst Rho 161TS and 162TS printer)

- 3M™ Protective Overlay Film 1170

Copy Part Applications

- 3M™ Scotchcal™ ElectroCut Film 100-12

(other colors of Scotchcal™ Opaque Graphic Film Series 100 are compatible, regional warranties apply)

- 3M™ ElectroCut Film Series 1170
- 3M™ TFEC 260 D

All Applications

- Selected 3M application tapes

Important: Screen-printed sign faces must be sufficiently ventilated during the filling of the drying rack or immediately run through a conveyor. If the print is not ventilated properly, the solvents may damage the top film of the sheeting. Refer to Product Bulletin 880 and Information Folder 1.8 for more details. Care should be taken to avoid flexing Series 3930 sheeting before and especially after screening. Convert from series 880I to series 880N when ink triggered cracking first appears in your shop.

10 Health and Safety Information

Read all health hazard, precautionary and first aid statements found in the Material Safety Data Sheets and/or product label of chemicals prior to handling or use.

11 General Performance Considerations

The performance and durability of 3M™ High Intensity Prismatic Reflective Sheeting Series 3930 will depend upon a number of factors including (but not limited to):

- Selection, preparation and temperature of the substrate
- Application procedures
- Geographic area
- Exposure and atmospheric conditions (e.g. snow, frost)
- Correct combination of sheeting, ink and overlay film
- Ink formulation
- Ink drying/curing methods
- Cleaning and maintenance methods

11.1 Warranty

3M™ High Intensity Prismatic Reflective Sheeting Series 3930 sold by 3M to be used for permanent traffic control signs and devices in Europe is warranted for a period up to 10 years* from date of application (concrete definition of the period is subject to the terms of sale) to be free of defects in material and workmanship, subject to the following provisions:

If Sheeting Series 3930 is 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, 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.

*(3 years for 3934 Orange)

11.2 Important Notice to Purchaser

All statements, technical information and recommendations herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed. Before using, user shall determine the suitability of the product for its intended use, and user assumes all risk and liability whatsoever in connection therewith. All questions of warranty and liability relating to this product are governed by the terms of the sale subject where applicable to the prevailing law.

No statement or recommendation not contained herein shall have any force or effect unless in an agreement signed by authorized personnel of seller and manufacturer.

11.3 Disclaimer

THE 3M WARRANTY IS MADE IN LIEU OF ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OR CONDITION OF MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE, OR ANY IMPLIED WARRANTY ARISING OUT OF A COURSE OF DEALING OR OF PERFORMANCE, CUSTOM OR USAGE OF TRADE.

11.4 Limitation of Liability

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

11.5 Other Product Information

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

11.6 Literature References

Instructions for Squeeze Roll Applicator	IF 1.4
Hand Application Instructions	IF 1.5
Instructions for Hand Squeeze Roll Applicator	IF 1.6
Sign Base Materials	IF 1.7
Instructions for using 3M Process Colors	IF 1.8
Cutting, Matching, Premasking and Prespacing Instructions	IF 1.10
Storage and Packaging	IF 1.11
3M Process Color Series 880I	PB 880I
3M Process Color Series 880N	PB 880N
3M Piezo Inkjet Ink Series 8800UV	PB 8800UV

For Further Assistance

For help on specific questions relating to 3M™ reflective products, please contact your local 3M Application Engineer or contact:

