



Scotchlite™

# High Intensity Grade Reflective Sheeting

Series 3870 With Pressure Sensitive Adhesive

Product Bulletin 3870

November 1999

Replaces PB 3800 dated February 1996

## Health and Safety Information

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.

3M™ Scotchlite™ High Intensity Grade Reflective Sheeting Series 3870 is also described in the Scotchlite high intensity grade reflective sheeting product bulletin. These products conform to the following specification:

U.S. Department of Transportation, Federal Highway Administration, STANDARD SPECIFICATIONS FOR CONSTRUCTION OF ROADS AND BRIDGES ON FEDERAL HIGHWAY PROJECTS, 1985 FP-92, Type IIIA, Section 718.01.

## Description

Series 3870 is primarily intended for reflectorizing traffic control signs, and delineators which are exposed vertically in service. Applied to properly prepared sign backings, High Intensity Grade sheeting provides long term reflectivity and durability.

Series 3870 sheeting is available in the following colors.

**Table 1 - Color and Product Code**

| <u>Color</u> | <u>Product Code</u> |
|--------------|---------------------|
| White        | 3870                |
| Yellow       | 3871                |
| Red          | 3872                |
| Blue         | 3875                |
| Green        | 3877                |
| Brown        | 3879                |

Sheeting colors conform to Federal Specifications FP-92 Sec. 718.01 (c) and ATM D4956 (replaces L-S-300C).

## Application

Series 3870 sheeting with pressure sensitive adhesive is recommended for application by one of the following methods:

1. Mechanical Squeeze Roll Applicator with approved heater. See Information Folder 1.4.
2. Hand Squeeze Roll Applicator. See Information Folder 1.6.
3. Hand Application. See Information Folder 1.5. Table II lists recommended application procedures. They vary with liner color and substrate.

Screen Processed signs must be protected with SCW 568 slipsheet paper. Place the glossy side of the slipsheeting against the sign face and pad the face with closed cell packaging foam. Double faced signs must have the glossy side of the slipsheet against each face of the sign.

Unmounted screened faces must be stored flat and interleaved with SCW 568 slipsheet, glossy side against the sign face. Packages of finished sign faces must include sufficient nylon washers for mounting.

**Table II**  
**Scotchlite™ Reflective Sheeting High Intensity**  
**Grade**

**Application and Screening Guide**

Process all sheetings according to their liner color and procedure below:

| High Intensity Grade Sheeting Color/Code          | Recommended Application Temperature |                  |  | Screen Processing Color Series |                                |
|---|-------------------------------------|------------------|--|--------------------------------|--------------------------------|
|   | Application Equipment               | Aluminum and FRP | HDOP Plywood   | Before Application             | After Application              |
| Pressure Sensitive<br>White 3870<br>Yellow 3871   | SRA                                 | RT               | 110°F CR/ "on"<br><br>RT nominal 18" and narrower width* | 880 Rapid Dry                  | 880 Rapid Dry                  |
| Red 3872<br>Blue 3875<br>Green 3877<br>Brown 3879 | SRA or HSRA                         | RT               | 120°F CR/ "on"   | Not Applicable<br><br>(Cutout  | Not Applicable<br><br>Letters) |

FRP - Fiber Reinforced Plastic

HDOP - High Density Overlay Plywood

SRA - Squeeze Roll Applicator

110° - 120°F - Use Temperature Indicator RAA 28.

RT - Room Temperature Application. If substrate is 65°F or above, apply without heater. If lower than 65°F, apply with heater aimed at substrate and adjust speed to obtain minimum of 65°F.

CR - Cal-Rod Type heater on squeeze roll applicator.

**Notice:** Post screening of 880 Rapid Dry colors is limited to Pressure Sensitive Materials applied as described above or post screen cracking will result.

**Process Colors**

3M™ Scotchlite™ High Intensity Grade Reflective Sheeting Series 3870 may be screen processed before mounting on a sign substrate using 3M™ Scotchlite™ Process Color Series 880.

Series 3870 sheeting may be screen processed after mounting on a substrate using Scotchlite process color series 880 as indicated in Table II. See Product Bulletin 880 for available Process Colors, Thinners and Clears. For screen processing of traffic signs, screen using PE 157 screen mesh using a fill pass. See Information Folder 1.8 for details.

**General Performance Considerations**

The performance and durability of Scotchlite reflective sheeting will depend upon a number of factors including (but not limited to) substrate selection and preparation, compliance with recommended application procedures, sign placement, geographic area, exposure conditions, atmospheric conditions (e.g. fog, snow, rain), surface deposits (e.g. dirt, dew, frost), maintenance and age.

Maximum durability of Series 3870 sheeting can be expected in applications subject to vertical exposure on stationary objects when processed and applied according to 3M recommendations to properly prepared aluminum according to Information Folder 1.7 on Sign Base Surface Preparation.

The user must determine the suitability of any nonmetallic sign backing 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.

Signs in mountainous areas that are covered by snow for prolonged periods may also have reduced durability.

Scotchlite process colors, when used according to 3M recommendations, are generally expected to provide performance comparable to colored reflective sheeting, except for certain lighter colors, such as yellow, gold, or heavily toned colors or blends containing yellow or gold, whose durability depend on how much of each color is used. Dilution of color and atmospheric conditions in certain geographical areas may result in reduced durability. 3M™ Scotchcal™ Film 3650-12 Black, Scotchcal™ Film 7720-12, 3M™ Controltac™ Film 180-12 Black, and 3M™ Scotchlite™ ElectroCut™ Film Series 1170 can be expected to perform satisfactorily for the life of the sign when direct applied to Series 3870 sheeting, except where shortened performance is stated in the literature.

**Warranty**

*This warranty is in effect on Scotchlite™ High Intensity Grade Reflective Sheeting Series 2870/3870/9800/3860 when requested in a specification, bid or purchase document.*

Minnesota Mining and Manufacturing Company (3M) warrants that Scotchlite™ High Intensity Grade Reflective Sheeting to be sold by 3M to be used as components for traffic control and guidance signs in the United States and Canada will remain effective for its intended use and meet the stated minimum values for coefficient of retroreflection for ten years, subject to the following provisions:

**Minimum Coefficient of Retroreflection  
Candelas per Foot Candle per Square Foot  
Candelas per Lux per Square Meter  
(.2° observation and -4° entrance angle)**

| <b>Sheeting Color</b> | <b>Min. Coeff of Retro. (Seven Years)</b> | <b>Min. Coeff. of Retro. (Ten Years)</b> |
|-----------------------|---|--|
| White                 | 212                                       | 200                                      |
| Yellow                | 144                                       | 136                                      |
| Green                 | 38  | 36                                       |
| Red                   | 38  | 36                                       |
| Blue                  | 17  | 16                                       |
| Brown                 | 10  | 9  |

\*All measurements shall be made after sign cleaning according to 3M recommendations and in accordance with ASTM E 810 "Standard Test Method for Coefficient of Retroreflection of Retroreflective Sheeting." For screenprinted transparent colored areas on white sheeting, the coefficients of retroreflection shall not be less than 70% of the values for the corresponding color in the above table.

If a Scotchlite high intensity grade sign surface is processed and applied to sign blank materials in accordance with all 3M application and fabrication procedures provided in 3M's product bulletins, 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, clear coatings, electronic cuttable films, protective overlay films, and recommended application equipment; and If the sign deteriorates due to natural causes to the extent that: 1) the sign is ineffective for its intended purpose when viewed from a moving vehicle under normal day and night driving conditions by drivers with normal vision, or 2) the coefficient of retroreflection is less than the minimum herein specified, 3M's sole responsibility and purchaser's and user's exclusive remedy shall be: If the failure occurs within the first 7 years from the date of fabrication, 3M will, at its expense, restore the sign surface to its original effectiveness.

If the failure occurs from the 8th through the 10th year from the date of fabrication, 3M will furnish the necessary amount of high intensity grade sheeting to restore the sign surface to its original effectiveness.

**Conditions**

Such failure must be solely the result of design or manufacturing defects in the Scotchlite high intensity grade reflective sheeting and not of outside causes such as: improper fabrication, handling, maintenance or installation; use of process colors, thinners, coatings, or overlay films and sheetings not made by 3M; 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; snow 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**

3M's liability under this warranty is limited to replacement as stated herein, and 3M assumes no liability for any incidental or consequential damages, such as lost profits, business or revenues in any way related to the product regardless of the legal theory on which the claim is based. THIS WARRANTY IS MADE IN LIEU OF ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY, OF FITNESS FOR A PURPOSE, AND ANY IMPLIED WARRANTY ARISING OUT OF A COURSE OF DEALING OR OF PERFORMANCE, CUSTOM OR USAGE OF TRADE.

## Literature Reference

- PB 880 Series 880 Colors and Clears
- IF 1.1 Instructions for Heat Lamp Vacuum Applicators
- IF 1.2 Application Instructions for Heat Lamp Vacuum Applicators
- IF 1.3 Instructions for Squeeze Roll Applicator
- IF 1.4 Application Instructions for Squeeze Roll Application
- IF 1.5 Hand Application Instructions
- IF 1.6 Instructions for Hand Squeeze Roll Application
- IF 1.7 Sign Base Materials
- IF 1.8 Color Application Instructions
- IF 1.9 Application of 9800 Series System 5
- IF 1.10 Cutting and Matching Instructions Premasking and Prespacing
- IF 1.11 Storage, Maintenance & Removal Instructions

## Additional References

- Standard Specification for ASTM D 4956 Retroreflective Sheeting for Traffic Control Type III
- Federal Specification, FP 92, 1992 Section 718.01 Retroreflective Sheeting FP-92 (FHWA)
- Color Measurement ASTM E 1347 and ASTM E 1349
- Gloss Measurement ASTM D 523
- Retroreflection Measurement ASTM E 810
- Impact Resistance ASTM D 2794

## FOR INFORMATION OR ASSISTANCE

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 *40% Pre-consumer waste paper  
10% Post-consumer waste paper*

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