

# Technical Data Sheet

## 3M™ Scotchlite™ Reflective Material Pressure Sensitive Adhesive (PSA) Films

### Description

3M™ Scotchlite™ Reflective Material – Pressure Sensitive Adhesive (PSA) Films are composed of wide angle, exposed retroreflective lenses bonded to an adhesive. When properly used, Scotchlite reflective material – PSA films help enhance the visibility of the wearer in nighttime or low-light conditions when illuminated by a light source, such as headlights, by returning the light back toward the original source reaching the automobile driver's eye. Marking films are PSA films with an additional fabric scrim for use on helmets and rigid surfaces. ANSI/ISEA 107-2004 and NFPA certified products are available.

3M™ Scotchlite™ Reflective Material			
Product Number	Fabric Scrim	Adhesive	Application
8830 Silver Marking Film	94% polyester / 6% nylon tricot knit	Acrylic	Fire apparel such as helmets and rubber boots; general occupational helmets
8850 Silver Pressure Sensitive Adhesive Film	None	Rubber	Flexible, conformable surfaces such as non-vinyl rainwear and rubber boots
8886 Fluorescent red-orange Marking Film	94% polyester / 6% nylon tricot knit	Acrylic	Fire apparel such as helmets and rubber boots; general occupational helmets
8887 Fluorescent lime-yellow Marking Film	94% polyester / 6% nylon tricot knit	Acrylic	Fire apparel such as helmets and rubber boots; general occupational helmets

### Retroreflective Performance

The coefficient of retroreflection ( $R_A$ , in cd/lux/m<sup>2</sup>) of 3M™ Scotchlite™ Reflective Material is measured by methods based on either of the following retroreflective intensity testing procedures:

ASTM E809-02 and E810-03 ( $R_A$ )

CIE 54.2:2001 ( $R'$ )

Reflected color of Scotchlite reflective material – PSA films is white.

Retroreflective performance data was generated by 3M and is based on testing new product. The  $R_A$  values listed in the following tables were measured at +5.0° entrance and 0.2° observation angles.

It is important to note that use, wear, and environmental conditions will affect performance. Please contact your 3M representative for proposed product specifications.

3M™ Scotchlite™ Reflective Material			
Product Number	Daytime Color	Initial Average $R_A$ <sup>1</sup>	Minimum $R_A$ <sup>2</sup>
8830 Silver Marking Film	Silver	500	330
8850 Silver PSA Film	Silver	500	330
8886 Fluorescent red-orange Marking Film	Fluorescent red-orange	175	NA
8887 Fluorescent lime-yellow Marking Film	Fluorescent lime-yellow	175	NA

<sup>1</sup>Measured by 3M on new product at +5.0° entrance and 0.2° observation angles

<sup>2</sup>ANSI/ISEA 107-2004 minimum coefficient of retroreflection for Level 2 retroreflective material

## Product Certification

### ANSI/ISEA 107-2004

3M™ Scotchlite™ Reflective Material – 8830 Silver Marking Film and 3M™ Scotchlite™ Reflective Material – 8850 Silver Pressure Sensitive Adhesive Film are certified to the ANSI/ISEA 107-2004 American National Standard for High-Visibility Safety Apparel and Headwear for Level 2 retroreflective performance.

### NFPA

The following 3M™ Scotchlite™ Reflective Material – Pressure Sensitive Adhesive Films meet the helmet requirements, as listed below, for: NFPA 1971 Standard on Protective Clothing and Equipment for Structural Fire Fighting and Proximity Fire Fighting, 2007 edition; NFPA 1977 Standard on Protective Clothing and Equipment for Wildland Fire Fighting, 2005 Edition; and NFPA 1951 Standard on Protective Ensembles for Technical Rescue Incidents, 2007 Edition. See the Physical Performance section for specific test methods.

3M™ Scotchlite™ Reflective Material				
Product	Retroreflectivity (NFPA 1971)	Wet Reflectivity (NFPA 1971)	Fluorescence (ASTM E-1164)	Convective Heat 10 min @ 140 °C (285 °F)
8830 Silver Marking Film	X	X		X
8886 Fluorescent red-orange Marking Film	X	X		X
8887 Fluorescent lime-yellow Marking Film	X	X	X	X

**Note:** Scotchlite reflective material – 8850 silver pressure sensitive adhesive film is designed for compliance with applicable ANSI/ISEA 107-2004 requirements rather than being certified to NFPA standards.

## Physical Performance

Scotchlite reflective material – PSA films will meet or exceed the following specifications as noted. All  $R_A$  values are at +5.0° entrance angle and 0.2° observation angle. (See product certificates on website for testing laboratory and test date.)

3M™ Scotchlite™ Reflective Material		
Physical Performance	Test Method	Approved Products
Retroreflectivity: (Initial)	ANSI/ISEA 107-2004 Level 2 (Table 5)	8830 Silver Marking Film 8850 Silver Pressure Sensitive Adhesive Film
	ASTM E 809 (NFPA 1971, NFPA 1977)	8830 Silver Marking Film 8886 Fluorescent red-orange Marking Film 8887 Fluorescent lime-yellow Marking Film
Abrasion: $R_A \geq 100$	EN 530 Method 2, 5000 cycles	8830 Silver Marking Film 8850 Silver Pressure Sensitive Adhesive Film
Flexing: $R_A \geq 100$	ISO 7854 Method A, 7500 cycles	8830 Silver Marking Film 8850 Silver Pressure Sensitive Adhesive Film
Cold Fold: $R_A \geq 100$	ISO 4675, -20 °C (-4 °F)	8830 Silver Marking Film 8850 Silver Pressure Sensitive Adhesive Film
Temperature Cycle: $R_A \geq 100$	12 hours @ 50 °C (122 °F); 20 hours @ -30 °C (-22 °F)	8830 Silver Marking Film 8850 Silver Pressure Sensitive Adhesive Film
Wet Reflectivity: $R_A \geq 100$	ANSI/ISEA 107-2004, Appendix A	8830 Silver Marking Film 8850 Silver Pressure Sensitive Adhesive Film
	NFPA 1971, 2007 (EN 471, Annex D)	8830 Silver Marking Film 8886 Fluorescent red-orange Marking Film 8887 Fluorescent lime-yellow Marking Film
Convective Heat: $R_A \geq 100$	10 minutes @ 140 °C (285 °F)	8830 Silver Marking Film 8886 Fluorescent red-orange Marking Film 8887 Fluorescent lime-yellow Marking Film



## Performance

While use of 3M™ Scotchlite™ Reflective Material enhances visibility, no reflective material can guarantee absolute visibility, particularly in adverse weather conditions. Performance will vary depending upon actual use, exposure conditions and maintenance. Customers should be aware that 3M presents a Scotchlite reflective material product portfolio that offers a range of product attributes, and users should test reflective material to satisfy conformance to their own requirements.

## Application Instructions

Whenever two or more pieces of 3M™ Scotchlite™ Reflective Material – Pressure Sensitive Adhesive Films are used together on a single surface or as a set, they should be matched to ensure uniform daytime color and nighttime retroreflectivity. All high visibility safety apparel items should be constructed in accordance with the appropriate standard(s).

1. 3M™ Scotchlite™ Reflective Material – 8830 Silver Marking Film, 3M™ Scotchlite™ Reflective Material – 8886 Fluorescent red-orange Marking Film, and 3M™ Scotchlite™ Reflective Material – 8887 Fluorescent lime-yellow Marking Film have a brown release liner on the PSA surface. 3M™ Scotchlite™ Reflective Material – 8850 Silver PSA Film has clear release liner on the PSA surface. Remove the liner prior to application to clean, dry, smooth surfaces.
2. Position the film and press firmly into place across the entire surface.
3. Allow 72 hours for adhesion to reach its maximum strength.
4. Scotchlite reflective material – 8850 silver PSA film has a white paper liner on the reflective surface. Remove this liner after application.

**Cutting** – Die-cutting is recommended, although it can also be hand-cut or guillotined.

**Screen Printing** – Images may be printed on the surface of Scotchlite reflective material – PSA films. All inks should be continuously tested to ensure acceptable adhesion in the event of changes occurring in the manufacturing process or composition of the ink. Prior to printing, wiping the surface with a soft cloth lightly dampened with isopropyl alcohol may help ink adhesion. Printed areas will not be retroreflective.

### Handling Precautions

1. Scotchlite reflective material – 8830 silver marking film and Scotchlite reflective material – 8850 silver pressure sensitive adhesive film contain an aluminum layer as part of their construction. Blemishing of this aluminum layer can occur if the paper carrier is removed and the front surface of the product has direct contact from hands during application and is then exposed to hot and humid conditions, greater than 26.7 °C (80 °F) and greater than 70% relative humidity, for a period of weeks. These blemishes do not affect performance of the product. Please refer to 3M Technical Bulletin “Care Guidelines to Reduce Staining on 3M™ Scotchlite™ Reflective Material”.
2. Scotchlite reflective material – 8850 silver pressure sensitive adhesive film may not be compatible with some polyvinyl chloride (PVC, vinyl) films, especially those containing phosphate plasticizers. It is possible that some plasticizers might be able to migrate into the reflective material, making the reflective surface soft and sticky. 3M recommends that substrates always be tested prior to production to ensure that it meet specific needs. For alternate products and additional information, please refer to 3M Technical Bulletin “Plasticizer Migration in 3M™ Scotchlite™ Reflective Material – 8710 Silver Transfer Film and Related Products”.

## Care and Maintenance Instructions

**Important:** Test each application according to appropriate care instructions required for the finished product. Actual life of Scotchlite reflective material depends on cleaning methods and wear conditions. Use of pressure sensitive adhesives is not recommended for permanent clothing applications that require wash durability.

### Care Recommendation

Damp wipe only, using warm water and mild detergent. Rinse thoroughly, dry with a soft cloth or allow to air dry.

## Product Availability

3M™ Scotchlite™ Reflective Material – Pressure Sensitive Adhesive Films are available in rolls with the following standard width and length:

3M™ Scotchlite™ Reflective Material – PSA Films		
Width	Width Tolerance	Standard Roll Length
< 150 mm (< 6 in.)	Standard $\pm 1$ mm ( $\pm 0.04$ in.) Special $\pm 0.5$ mm ( $\pm 0.02$ in.)	100 m (109 yd)
150 mm $\leq w < 900$ mm (6 in. $\leq w < 36$ in.)	+ 0 mm to + 4 mm (+ 0.0 in. to + 0.16 in.)	100 m (w > 300 mm = 50 yd) 109 yd (w > 12 in. = 54.7 yd)
900 mm $\leq w \leq 1220$ mm (36 in. $\leq w \leq 48$ in.)	+ 3 mm to + 7 mm (+ 0.12 in. to + 0.28 in.)	50 m (54.7 yd)

## Order and Product Information

To order 3M™ Scotchlite™ Reflective Material Products contact 3M Visibility and Insulation Solutions Customer Service at 800-328-7098.

## Storage and Shelf Life

Store in a cool, dry area and use within one year after date of receipt. Store rolls in original shipping cartons. Return partially used rolls to the carton or suspend horizontally through the core. Cut pieces should be stored flat.

## Important Notice to User

**LIMITED WARRANTY:** In the event any 3M™ Scotchlite™ Reflective Material is found to be defective in material, workmanship, or not in conformation with any express warranty, 3M's only obligation and your exclusive remedy shall be to replace or refund the purchase price, at 3M's option, of such product upon timely notification thereof and substantiation that the product has been stored, maintained and used in accordance with 3M's written instructions.

**EXCLUSIONS TO WARRANTY: THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ANY IMPLIED WARRANTY OR CONDITION OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OTHER WARRANTY OR CONDITION OF QUALITY, EXCEPT OF TITLE AND AGAINST PATENT INFRINGEMENT.**

**LIMITATION OF LIABILITY:** Except as provided above, 3M shall not be liable in contract or tort for any loss or damage, whether direct, indirect, incidental, special or consequential, (including, without limitation, lost profits, goodwill and business opportunity) arising out of the sale, use or misuse of the product, or the user's inability to use the product. **THE REMEDIES SET FORTH HEREIN ARE EXCLUSIVE.**

Because of the unlimited variety of potential applications for these products, BEFORE production use, the user (which may be a product designer, product specifier, converter or end product manufacturer or others) must determine that the Products are suitable for the intended use and are compatible with other component materials. User is solely responsible for determining the proper amount and placement of Products. While reflective products enhance visibility, no reflective product can ensure visibility or safety under all possible conditions.

3M may change the product, specifications and availability of the product as improvements are made; therefore, user should contact 3M for latest information before specifying the product.



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