

Technical Data Sheet

3M™ Scotchlite™ Reflective Material High Gloss Products

Description

3M™ Scotchlite™ Reflective Material – High Gloss Products are designed for use on safety garments and when properly used, help enhance the visibility of the wearer in nighttime or low-light conditions when illuminated by headlights. Scotchlite reflective material – high gloss products consist of highly retroreflective microprisms formed on flexible, glossy and UV-stabilized polymeric film. A flexible vinyl film sealed on the backside of the 3M™ Scotchlite™ Reflective Material – High Gloss Trim, Chevron and Panel encapsulates the microprisms and protects the reflective product from dirt and moisture penetration. Fluorescent red-orange and fluorescent lime-yellow high gloss colors enhance conspicuity under daytime conditions, particularly at dawn or dusk or on cloudy days.

3M™ Scotchlite™ Reflective Material							
Product Number	Unsealed Film	Sealed Edges	Trim: Sealing Pattern	Channels For Sewing	Recommended For Occupational Use	Sparkling Feature Visible Day and Night	Polyester Liner
High Gloss Trims							
Series 6100 High Gloss Trim		x	x	x	x		
Series 6100R ¹ High Gloss Trim		x	x	x	x		
Series 6300 High Gloss Smooth Trim		x					
Series 7100 ² High Gloss Trim		x	x	x	x		
High Gloss Films							
Series 6200 High Gloss Film	x						x
Series 6200R ¹ High Gloss Film	x						x
Series 6500 High Gloss Sparkle Film	x					x	x
High Gloss Panel and Chevron							
Series 6600 High Gloss Panel		x		x	x		
Series 6600R ² High Gloss Chevron		x		x	x		

¹3M™ Scotchlite™ Reflective Material – Series 6100R High Gloss Trim and 3M™ Scotchlite™ Reflective Material – Series 6200R High Gloss Film incorporate a coating to help resist dye migration for applications requiring this protection.

²3M™ Scotchlite™ Reflective Material – Series 7100 High Gloss Trim and 3M™ Scotchlite™ Reflective Material – Series 6600R High Gloss Chevron incorporate a dye resistant coating along with premium seal strength for durable applications that require superior water holdout.

Retroreflective Performance

The coefficient of retroreflection (R_A , in $\text{cd}/\text{lux}/\text{m}^2$) is measured by methods traceable to either of the following retroreflective intensity testing procedures:

ASTM E809-08 and E810-03 (R_A)

CIE 54.2:2001 (R')

The R_A values were measured at 5.0° entrance and 0.2° observation angles. All average R_A values were measured using unsealed film.

The R_A values are averages of readings taken from rotation angles that are 90 degrees apart unless stated differently. The 0° rotation angle is to be taken as the down web direction of 3M supplied rolls. These data were generated by 3M and are based on testing new product. Use, wear, laundering, and environmental conditions will affect performance. Please contact your 3M Representative for product specifications.

3M™ Scotchlite™ Reflective Material				
Product Number	Daytime Color	Reflected Color	Average R_A	Minimum R_A ³
High Gloss Trims				
6160R 6360 7160	White	White	700	330
7180	Gray	White	700	330
6187R 6387 7187	Fluorescent lime-yellow	Yellow	700	330
6196R 6396 7196	Fluorescent red-orange	Orange	450	250
6185 6385	Blue	Blue	75	NA
High Gloss Films				
6260	White	White	700	330
6260R	White	White	700	330
6560	White	White	200	NA
6287	Fluorescent lime-yellow	Yellow	700	330
6287R	Fluorescent lime-yellow	Yellow	700	330
6587	Fluorescent lime-yellow	Yellow	200	NA
6296	Fluorescent red-orange	Orange	450	250
6296R	Fluorescent red-orange	Orange	450	250
6285	Blue	Blue	75	NA
6585	Blue	Blue	40	NA
High Gloss Panel and Chevron				
6660 6660R	White	White	700	330
6687 6687R	Fluorescent lime-yellow	Yellow	700	330
6696R	Fluorescent red-orange	Orange	450	250

³ANSI/ISEA 107 minimum coefficient of retroreflection for Level 2 or Level 1 retroreflective material.

NA Not applicable (ANSI/ISEA 107 does not apply to these products)

ANSI/ISEA 107 Certified Products

Many 3M™ Scotchlite™ Reflective Material – High Gloss Products are certified to meet ANSI/ISEA 107 and CSA Z9 Level 2 retroreflective performance. Fluorescent red-orange high gloss products are certified to meet ANSI/ISEA 107 Level 1 retroreflective performance.

The following products have certificates available for the current editions of the ANSI/ISEA 107 American National Standard for High-Visibility Safety Apparel and Headwear and CSA Z96 Canadian Standard for High Visibility Safety Apparel.

3M™ Scotchlite™ Reflective Material – High Gloss Products			
Product Number	Retroreflective Level	Combined-Performance Retroreflective	Washing Cycles
6160R Trim	2		75
6260 Film	2		
6260R Film	2		
6360 Smooth Trim	2		10
6660 Panel	2		75
6660R Chevron	2		75
7160 Trim	2		75
7180 Trim	2		75
6187R Trim	2	X	75
6196R Trim	1		75
6287 Film	2		
6296 Film	1		
6287R Film	2		
6296R Film	1		
6387 Smooth Trim	2	X	10
6396 Smooth Trim	1		10
6687 Panel	2	X	75
6687R Chevron	2	X	75
6696R Chevron	1		75
7187 Trim	2	X	75
7196 Trim	1		75

Please contact your 3M Representative or visit our website at Scotchlite.com. For information on certification to the CSA Z96 standard, please visit the 3M Canada website at 3M.com/ca/besaferbeseen.

Scotchlite reflective material – high gloss products are not certified for marine safety applications requiring IMO type approval. 3M™ Scotchlite™ Reflective Materials – SOLAS Grade Products have this type of certificate.

Physical Performance

3M™ Scotchlite™ Reflective Material – High Gloss Products will meet or exceed the following specifications as noted. All R_A values are at 0° orientation, 5° entrance angle and 0.2° observation angle, unless stated differently (see product certificates on our website for third party testing laboratory and test date).

3M™ Scotchlite™ Reflective Material		
Physical Performance	Approved Products	Test Method
Retroreflectivity: (Initial)	Products listed in the ANSI/ISEA 107 Certified Products Section	ANSI/ISEA 107 and CAN/CSA Z96 Level 2 (Table 4)
Abrasion: $R_A \geq 100$	Products listed in the ANSI/ISEA 107 Certified Products Section	EN 530 Method 2, 5000 cycles
Flexing: $R_A \geq 100$	Products listed in the ANSI/ISEA 107 Certified Products Section	ISO 7854 Method A, 7500 cycles
Cold Fold: $R_A \geq 100$	Products listed in the ANSI/ISEA 107 Certified Products Section	ISO 4675, -20 °C (-4 °F)
Cold Fold: (Initial)	All high gloss products	ISO 4675, -15 °C (+5 °F) Will not crack when flexed over a 3 mm mandrel
Temperature Cycle: $R_A \geq 100$	Products listed in the ANSI/ISEA 107 Certified Products Section	12 hours @ 50 °C (122 °F) 20 hours @ -30 °C (-22 °F)
Heat Resistance: $R_A \geq 75\%$ of initial R_A (@ 0° orientation, -4° entrance angle, 0.2° observation angle)	3M™ Scotchlite™ Reflective Material – Series 6500 High Gloss Sparkle Film	When exposed to 82 °C (180 °F) for 30 minutes
Wash: $R_A \geq 100$	Products listed in the ANSI/ISEA 107 Certified Products Section	ISO 6330 Method 2A, 10 cycles @ 60 °C (140 °F) or 75 cycles @ 60 °C (140 °F)
Wash: $R_A \geq 80\%$ of initial R_A (@ 0° orientation, -4° entrance angle, 0.2° observation angle)	Scotchlite reflective material – series 6500 high gloss sparkle film	ISO 6330 Method 2A, 15 cycles @ 40 °C (104 °F) and tumble dry @ 38 °C (100 °F)
Wet Reflectivity: $R_A \geq 100$	Products listed in the ANSI/ISEA 107 Certified Products Section	ANSI/ISEA 107 Appendix A

Solvent Resistance: During 3M laboratory testing, Scotchlite reflective material high gloss products did not dissolve or pucker when wiped several times with a soft cloth containing mineral spirits, kerosene, unleaded gasoline, methanol or VM&P Naphtha.

UV Stability: 3M™ Scotchlite™ Reflective Material – Series 6100R High Gloss Trim, Series 6200R High Gloss Film, Series 6600R High Gloss Chevron and Series 7100 High Gloss Trim have superior color and brightness retention after UV exposure compared to other high gloss products. However, fluorescent colors may show fading in extreme UV light exposures.

Color Specifications

The initial color for 3M™ Scotchlite™ Reflective Material – High Gloss Film (when measured with white backing), Trim, Chevron and Panel, as measured in accordance with ASTM E1164-09a (45/0 or 0/45 geometry, illuminant D65, 2° standard observer) are within the color boxes defined below:

White ⁴	Y(%) ~ 46	x	0.303	0.368	0.340	0.274
		y	0.287	0.353	0.380	0.316
Fluorescent lime-yellow	Y(%) ≥ 70.0	x	0.387	0.356	0.398	0.460
		y	0.610	0.494	0.452	0.540
Fluorescent red-orange ⁵	Y(%) ≥ 40.0	x	0.610	0.535	0.570	0.655
		y	0.390	0.375	0.340	0.344
Blue ⁴	Y(%) ~ 4	x	0.144	0.244	0.190	0.066
		y	0.030	0.202	0.247	0.208

⁴Typical values only, not to be used for specification purposes. Data generated by 3M laboratory testing.

⁵Excluding 3M™ Scotchlite™ Reflective Material – 6296 Fluorescent red-orange High Gloss Film, 3M™ Scotchlite™ Reflective Material – 6296R Fluorescent red-orange High Gloss Film and 3M™ Scotchlite™ Reflective Material – 6396 Fluorescent red-orange Smooth Trim.

Performance

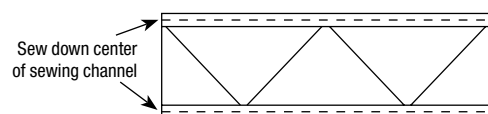
While use of 3M™ Scotchlite™ Reflective Material enhances visibility, no reflective material can guarantee absolute visibility, particularly in adverse weather conditions or unusually harsh wear conditions. Performance will vary depending upon actual use, exposure conditions, and proper cleaning/maintenance. The Scotchlite reflective material product portfolio offers a range of product attributes, and users should test the reflective material on their finished garments to satisfy conformance to their own requirements.

3M recommends that all customers, in accordance with good manufacturing practices, establish an ongoing quality system. Customers should implement continuous testing throughout their production and on their finished garments that reflects their garment needs.

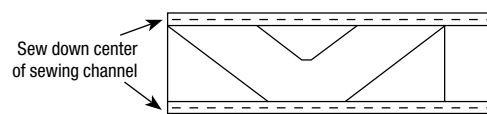
Application Instructions

Whenever two or more pieces of Scotchlite reflective material are used together on a single surface or as a set, they should be matched to ensure uniform color and reflectivity. All safety garments should be constructed in accordance with ANSI/ISEA 107 or other prevailing standard.

Sewing to Fabrics: Sew in place with no more than 8 stitches per inch (2.54 cm), and not less than 1/8" (3 mm) from the edge of the material. Thread recommendation: 100% polyester. To reduce sticking, apply a non-stick material (e.g., silicone or nylon) to the bottom of the presser foot. Sewing channels along the edge are provided on 3M™ Scotchlite™ Reflective Material – Series 6100 High Gloss Trim, Series 6100R High Gloss Trim, Series 6600 High Gloss Panel, Series 6600R High Gloss Chevron and Series 7100 High Gloss Trim to protect against water penetration. Sew down the center of the 1/4" wide sewing channels.



3M™ Scotchlite™ Reflective Material – Series 6100 and Series 6100R High Gloss Trim



3M™ Scotchlite™ Reflective Material – Series 7100 High Gloss Trim

Welding to Fabrics: 3M™ Scotchlite™ Reflective Material High Gloss Products are composed primarily of vinyl materials and will weld suitably to most PVC films with any of the following methods: radio frequency (RF), high frequency (HF), dielectric or ultrasonic. Adhesion to specific films will vary with the lubricants, pigments, plasticizers and fillers used to make the PVC film. It is important to test weld strength with each new lot and new vendor.

RF Sealing: Radio Frequency is a widely used method of sealing vinyl films. It has the advantage of handling patches and trims using a step-and-repeat process. For more information, please refer to our 3M™ Scotchlite™ Reflective Material High Gloss Film Application Guide for Welding.

Screen Printing: Below are inks that can be used for printing on the surface of 3M™ Scotchlite™ Reflective Material – High Gloss Products. 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 alcohol may help prevent ink adhesion failure. 3M™ Scotchlite™ Reflective Material – Series 6100R High Gloss Trim, Series 6200R High Gloss Film, Series 6600R High Gloss Chevron and Series 7100 High Gloss Trim do not require this alcohol cleaning step.

Ink	Ink Type	Manufacturer
VF Series Flat Vinyl Screen Ink ⁶	Opaque	Nazdar 800-767-9942 • Fax: 913-422-2296 International: 913-422-1888
PP Series Plastic Plus Gloss Vinyl Screen Ink ⁷	Opaque	Nazdar 800-767-9942 • Fax: 913-422-2296 International: 913-422-1888
3M™ Scotchlite™ Transparent Screen Printing Ink Series 2900 ⁸	Transparent	3M Commercial Graphics Division 800-374-6772 • Fax: 651-736-4233 International: 651-737-3136

⁶Nazdar VF Series ink is not recommended for Scotchlite reflective material – series 6100R high gloss trim, Scotchlite reflective material – series 6200R high gloss film or Scotchlite reflective material – series 7100 high gloss trim.

⁷Up to 10% by weight Nazdar NB80 Adhesion Promoter can be added to improve adhesion and/or blocking resistance. Be sure to read and follow manufacturer's handling recommendations for NB80.

NOTE: Scotchlite reflective material high gloss film is shipped with a polyester liner on top of the vinyl film for easy handling. This polyester liner can be removed either before or after the sealing process and should be removed before sewing or screen printing. The film does not require a sealing film to be retroreflective. However, we do recommend the application of a sealing film to keep out dirt and water that can result in decreased reflectivity.

NOTE: Dyes may migrate when placed in direct contact with vinyl and some fabrics. Prior to application, Scotchlite reflective material – high gloss products must be kept separate and should be tested for dye migration. Scotchlite reflective material – series 6100R high gloss trim, series 6200R high gloss film, series 6600R high gloss chevron and series 7100 high gloss trim have a special coating to help resist dye migration.

Care and Maintenance Instructions

Important: Test each application according to appropriate care instructions required for the finished product. Actual life of Scotchlite reflective material high gloss products depends on cleaning methods and wear conditions. Care label recommendations:

- Wash:**  Machine wash, 60 °C (140 °F)
- Bleach:**  Do not bleach
- Dry:**  Tumble dry medium, 50 °C (122 °F)
- Iron:**  Do not iron
- Dry-clean:**  Do not dry-clean

Product Availability

3M™ Scotchlite™ Reflective Material – High Gloss Film, Trim, Chevron and Panel are available in rolls and sheets in the following standard width and lengths:

3M™ Scotchlite™ Reflective Material				
Product Number	Roll Width Unless Noted	Width Tolerance	Splices Allowed	Standard Roll Length
High Gloss Trims				
Series 6100 High Gloss Trim	1", 1 3/8", 1 1/2", 2" (25.4 mm, 34.9 mm, 38.1 mm, 50.8 mm)	+/- 1/32" (+/- 0.8 mm)	2 per roll	100 m
Series 6100R High Gloss Trim	1", 1 3/8", 1 1/2", 2" (25.4 mm, 34.9 mm, 38.1 mm, 50.8 mm)	+/- 1/32" (+/- 0.8 mm)	2 per roll	100 m
Series 6300 High Gloss Smooth Trim	1/2", 3/4", 1", 1 3/8", 1 1/2", 2" and 4" (12.7 mm, 19.05 mm, 25.4 mm, 34.9 mm, 38.1 mm, 50.8 mm and 101.6 mm)	+/- 1/32" (+/- 0.8 mm)	2 per roll	100 m
Series 7100 High Gloss Trim	2" (50.8 mm)	+/- 1/32" (+/- 0.8 mm)	2 per roll	100 m
High Gloss Films				
Series 6200 High Gloss Film	18.0" (457.2 mm)	+ 6.3 mm - 0 mm	2 per roll	100 m
Series 6200R High Gloss Film	18.0" (457.2 mm)	+ 6.3 mm - 0 mm	2 per roll	100 m
Series 6500 High Gloss Sparkle Film	17.0" (431.8 mm)	+ 6.3 mm - 0 mm	2 per roll	100 m
	Sheets 17.75" x 18.55"	+/- 0.5"	None	NA
High Gloss Panel and Chevron				
Series 6600 High Gloss Panel	4" x 17.75"	+/- 1/32" (+/- 0.8 mm)	None	NA
Series 6600R High Gloss Chevron	1.5" x 18" 2" x 18"	+/- 1/32" (+/- 0.8 mm)	None	NA

Order and Product Information

To order 3M™ Scotchlite™ Reflective Material Products contact 3M Protective Apparel and Footwear Market Center Customer Service at 800-328-7098 (in Canada, 800-364-3577).

Storage and Shelf Life

In order to preserve performance, store in a cool, dry area and use within two years 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

WARRANTY, LIMITED REMEDY AND DISCLAIMER: 3M warrants that 3M™ Scotchlite™ Reflective Material that is stored, maintained and used in accordance with 3M's written instructions will meet the applicable 3M product specifications. 3M MAKES NO 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 OR CONDITION ARISING OUT OF A COURSE OF DEALING, CUSTOM OR USAGE OF TRADE. If any Scotchlite reflective material does not conform to this warranty, then the sole and exclusive remedy is, at 3M's option, replacement of the 3M product or refund of the purchase price.

LIMITATION OF LIABILITY: Except where prohibited by law, 3M will not be liable for any loss or damage arising from the 3M product, whether direct, indirect, special, incidental or consequential, regardless of the legal theory asserted, including warranty, contract or strict liability.

PRODUCT USE: Because of the variety of factors that can affect the use and performance of Scotchlite reflective material, user is solely responsible for evaluating the product and determining whether it is fit for a particular purpose and suitable for user's method of application. User is solely responsible for determining the proper amount and placement of the product. While reflective products enhance visibility, no reflective product can ensure visibility or safety under all possible conditions. 3M may change the product, specification and availability of the product as improvements are made; therefore, user should contact 3M for latest information before specifying the product.



**Occupational Health and
Environmental Safety Division
3M Protective Apparel and
Footwear Market Center**

3M Center, Building 0235-02-F-06
St. Paul, MN 55144-1000
800-328-7098
Scotchlite.com

3M Canada

P.O. Box 5757
London, Ontario N6A 4T1
800-267-4414 Technical Service
800-364-3577 3M HELPS

3M and Scotchlite are trademarks of
3M, used under license in Canada.
Please recycle. Printed in U.S.A.
© 3M 2011. All rights reserved.
75-0500-7790-2