

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 are conspicuous 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		

[1]3M™ 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.

[2]3M™ 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 cd/lux/m^2) is measured by methods traceable to either of the following retroreflective intensity testing procedures:

ASTM E809-02 and E810-03 (R_A)

CIE 54.2:2001 (R')

The R_A values were measured at the listed specific entrance and 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 downweb direction of 3M supplied rolls. This data was generated by 3M and is based on testing new product. Use, wear, laundering, and environmental conditions will affect performance. Please contact your 3M representative for proposed product specifications.

3M™ Scotchlite™ Reflective Material					
Product Number	**Daytime Color**	**Reflected Color**	**Entrance/ Observation Angles**	**Average R_A**	**Minimum R_A[3]**
High Gloss Trims					
6160R 6360 7160	White	White	5.0°/0.2° 5.0°/0.33°	700 500	330 250
6187R 6387 7187	Fluorescent lime-yellow	Yellow	5.0°/0.2° 5.0°/0.33°	700 500	330 250
6196R 6396	Fluorescent red-orange	Orange	5.0°/0.2° 5.0°/0.33°	450 370	330 250
6185 6385	Blue	Blue	5.0°/0.2°	75	NA
High Gloss Films					
6260	White	White	5.0°/0.2°	700	330
6260R	White	White	5.0°/0.2°	700	330
6560	White	White	5.0°/0.2°	200	NA
6287	Fluorescent lime-yellow	Yellow	5.0°/0.2°	700	330
6287R	Fluorescent lime-yellow	Yellow	5.0°/0.2°	700	330
6587	Fluorescent lime-yellow	Yellow	5.0°/0.2°	200	NA
6296	Fluorescent red-orange	Orange	5.0°/0.2°	500	330
6296R	Fluorescent red-orange	Orange	5.0°/0.2°	500	330
6285	Blue	Blue	5.0°/0.2°	75	NA
6585	Blue	Blue	5.0°/0.2°	40	NA
High Gloss Panel and Chevron					
6660 6660R	White	White	5.0°/0.2°	700	330
6687 6687R	Fluorescent lime-yellow	Yellow	5.0°/0.2°	700	330
6696R	Fluorescent red-orange	Orange	5.0°/0.2°	450	330

[3]ANSI/ISEA 107-2004 minimum coefficient of retroreflection for Level 2 retroreflective material.

NA Not applicable (ANSI/ISEA 107-2004 does not apply to these products)

ANSI/ISEA 107-2004 Certified Products

Many 3M™ Scotchlite™ Reflective Material – High Gloss Products are certified to meet ANSI/ISEA 107-2004 and CSA Z96-02 Level 2 retroreflective performance.

The following products have certificates available for the ANSI/ISEA 107-2004 American National Standard for High-Visibility Safety Apparel and Headwear and CSA Z96-02 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		75
6260R Film	2		75
6360 Smooth Trim	2		10
6660 Panel	2		75
6660R Chevron	2		75
7160 Trim	2		75
6196R Trim	2	x	75
6296 Film	2		75
6396 Smooth Trim	2	x	10
6696R Chevron	2	x	75
6187R Trim	2	x	75
6287 Film	2		75
6287R Film	2		75
6387 Smooth Trim	2	x	10
6687 Panel	2	x	75
6687R Chevron	2	x	75
7187 Trim	2	x	75

Please contact your 3M representative or visit our website at 3M.com/Scotchlite. For information on certification to the CSA Z96-02 standard, please visit the 3M Canada website at 3M.com/ca/besaferbeseen.

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 107-2004 Certified Products Section	ANSI/ISEA 107-2004 and CAN/CSA Z96-02 Level 2 (Table 5)
Abrasion: $R_A \geq 100$	Products listed in the ANSI/ISEA 107-2004 Certified Products Section	EN 530 Method 2, 5000 cycles
Flexing: $R_A \geq 100$	Products listed in the ANSI/ISEA 107-2004 Certified Products Section	ISO 7854 Method A, 7500 cycles
Cold Fold: $R_A \geq 100$	Products listed in the ANSI/ISEA 107-2004 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 107-2004 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 107-2004 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 107-2004 Certified Products Section	ANSI/ISEA 107-2004 Annex 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 E1164-02 (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

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

[5]Excluding 3M™ Scotchlite™ Reflective Material – 6296 Fluorescent red-orange High Gloss Film and 3M™ Scotchlite™ Reflective Material – 6296R Fluorescent red-orange High Gloss Film.

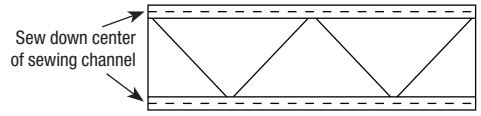
Performance

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. Users should test reflective material to satisfy conformance to their own requirements.

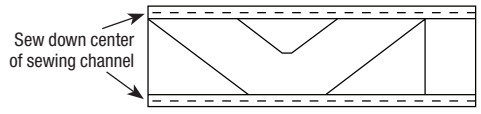
Application Instructions

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 107-2004.

Sewing to Fabrics: Sew in place with no more than 8 stitches per inch (2.54 cm), and not less than ⅛" (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 ¼" 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 ink adhesion. The 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 1-800-767-9942 • Fax: 1-913-422-2296 International: 1-913-422-1888
3M™ Scotchlite™ Transparent Screen Printing Ink Series 2900	Transparent	3M Commercial Graphics Division 1-800-374-6772 • Fax: 1-651-736-4233 International: 1-651-737-3136

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

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. However, 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 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 ⅜", 1 ½", 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 ⅜", 1 ½", 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	½", ¾", 1", 1 ⅜", 1 ½", 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) Sheets 17.75" x 18.55"	+ 6.3 mm - 0 mm +/- 0.5"	2 per roll None	100 m 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 Visibility and Insulation Solutions Customer Service at 1-800-328-7098 (in Canada, 1-800-364-3577).

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 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.

3M

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