Technical Data Sheet

3M™ Scotchlite™ Reflective Material

Transfer Films

Description

3M™ Scotchlite™ Reflective Material – Transfer Films are designed for use on safety garments and in athletic and casual wear. When properly used, Scotchlite reflective material – transfer 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 and reaching the automobile driver's eye. Scotchlite reflective material – transfer films are composed of wide angle, exposed retroreflective lenses bonded to a heat activated adhesive. Most products contain a plastic liner to protect the adhesive side that must be removed before lamination and a paper liner to protect the retroreflective side during handling. Scotchlite reflective material – transfer films are available in home wash and industrial wash constructions. 3M™ Scotchlite™ Reflective Material – 8705 Silver Transfer Film Trim is printed with 3M trademarks on the surface for easy product identification.

3M™ Scotchlite™ Reflective Material				
Product Number	**Adhesive (Heat Activated)**	**Home Wash[1]**	**Industrial Wash[1]**	**Recommended for Occupational Apparel[2]**
5510 Segmented Home Wash Trim	Polyester	X		X
5530 Segmented Industrial Wash Trim	Polyester	X	X	X
8705 Silver Transfer Film Trim	Polyurethane	X		X
8710 Silver Transfer Film	Polyurethane	X		X
8711 Silver Graphic-Ready Transfer Film	Polyurethane	X		X
8725 Silver Transfer Film and 8725LL Linerless Silver Transfer Film*	Polyester	X		X
8726 Silver Transfer Film and 8726LL Linerless Silver Transfer Film*	Polyester	X		X
8730 Silver Transfer Film	Vinyl	X		X
8765 White Transfer Film	Polyurethane	X		
8786 Fluorescent red-orange Transfer Film	Polyester	X		X
8787 Fluorescent lime-yellow Transfer Film	Polyester	X		X
9720 Silver Industrial Wash Transfer Film	Polyester	X	X	X

[1]See Care and Maintenance Instructions section for Home Wash and Industrial Wash conditions
[2]Certified to an occupational or industrial clothing standard such as ANSI/ISEA 107-2004 American National Standard for High Visibility Safety Apparel and Headwear; or NFPA 1971 Standard for Protective Clothing and Equipment for Structural Fire Fighting and Proximity Fire Fighting, 2007 Edition, or CAN/CSA Z96.2 High Visibility Safety Apparel. Customers should contact 3M Technical Service regarding certifications to specific standards.
*"LL" denotes that transfer film is sold without a liner on the reflective or adhesive surfaces

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Retroreflective Performance

The coefficient of retroreflection (R_A, in cd/lux/m²) 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 3M™ Scotchlite™ Reflective Material – Transfer 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, laundering, and environmental conditions will affect performance. Please contact your 3M representative for proposed product specifications.

Product Certification

ANSI/ISEA 107-2004 and CAN/CSA Z96-02

The following Scotchlite reflective material – transfer films have certificates available for the ANSI/ISEA 107-2004 American National Standard for High-Visibility Safety Apparel and Headwear for Level 2 retroreflective performance and meet the requirements for CAN/CSA Z96-02 High Visibility Safety Apparel. Scotchlite reflective material that is certified to ANSI/ISEA 107-2004 will also meet the requirements for retroreflective material in ANSI/ISEA 207-2006 American National Standard for High-Visibility Public Safety Vests.

3M™ Scotchlite™ Reflective Material					
Product Number	**Daytime Color**	**Initial Average R_A[3]**	**Minimum R_A[4]**	**Washing Cycles[5]**	**Dry Cleaning Cycles[6]**
5510 Segmented Home Wash Trim	Silver	> 330	330	75	30
5530 Segmented Industrial Wash Trim	Silver	> 330	330	100	50
8705 Silver Transfer Film Trim	Silver	500	330	15	0
8710 Silver Transfer Film	Silver	500	330	25	25
8711 Silver Graphic-Ready Transfer Film	Silver	500	330	25	25
8725 Silver Transfer Film and 8725LL Linerless Silver Transfer Film	Silver	500	330	50	30
8726 Silver Transfer Film and 8726LL Linerless Silver Transfer Film	Silver	450	330	50	30
8730 Silver Transfer Film	Silver	500	330	25	25
9720 Silver Industrial Wash Transfer Film	Silver	500	330	50	50

[3]Measured by 3M on new product at +5.0° entrance and 0.2° observation angles
[4]ANSI/ISEA 107-2004 minimum coefficient of retroreflection for Level 2 retroreflective material
[5]ISO 6330 Method 2A at 60 °C (140 °F) and $R_A \geq 100$ cd/lux/m² (home wash)
[6]ISO 3175 Method 9.1 and $R_A \geq 100$ cd/lux/m²

Not Certified for Occupational Use in the U.S.

The following 3M™ Scotchlite™ Reflective Material products are not certified to a specific standard for occupational work wear in the United States. The products may be regulated or conform to standards in other parts of the world. The products offer other features such as fluorescence and printing. Test methods listed in the US standards are used to evaluate the performance of these products. Please consult the website of the country of interest through 3M.com for more information on regional standards or contact Technical Service for additional assistance with product selection.

3M™ Scotchlite™ Reflective Material		
Product Number	**Daytime Color**	**Initial Average R_A[3]**
8765 White Transfer Film	White	90
8786 Fluorescent red-orange Transfer Film	Fluorescent red-orange	175
8787 Fluorescent lime-yellow Transfer Film	Fluorescent lime-yellow	175

[3]Measured by 3M on new product at +5.0° entrance and 0.2° observation angles

Other Standards

Scotchlite reflective material products are used globally. Please visit our website at 3M.com for more information on certification to other high visibility standards such as EN 471, and AS/NZS 1906.

Physical Performance

3M™ Scotchlite™ Reflective Material – Transfer Films that are certified to ANSI/ISEA 107-2004 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**
Retroreflectivity: (Initial)	ANSI/ISEA 107-2004 Level 2 (Table 5)
Abrasion: $R_A \geq 100$	EN 530 Method 2, 5000 cycles
Flexing: $R_A \geq 100$	ISO 7854 Method A, 7500 cycles
Cold Fold: $R_A \geq 100$	ISO 4675, -20 °C (-4 °F)
Temperature Cycle: $R_A \geq 100$	12 hours @ 50 °C (122 °F); 20 hours @ -30 °C (-22 °F)
Wash: $R_A \geq 100$	ISO 6330 Method 2A, @ 60 °C (140 °F) number of cycles listed
Dry Clean: $R_A \geq 100$	ISO 3175 Method 9.1, number of cycles listed
Wet Reflectivity: $R_A \geq 100$	ANSI/ISEA 107-2004, Appendix A

Performance

While use of 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 – Transfer 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 garments should be constructed in accordance with the appropriate standard(s).

Cutting – Die-cutting is recommended, although it can also be hand-cut or guillotined. For Scotchlite reflective material – transfer films with a white paper liner, the protective white paper liner should not be used as the carrier when applying (laminating) plotter cut and weeded images; the exposed liner may adhere to certain fabrics at recommended lamination temperatures.

Heat Lamination

1. Work on a flat surface where uniform heat and pressure can be applied. Avoid applying film over seams and stitches.
2. Remove adhesive side liner (if the product has one), exposing dry adhesive. Do not remove reflective side liner. See Table below to determine which liner is adhesive side liner. Note: 3M™ Scotchlite™ Reflective Material – 8705 Silver Transfer Film Trim product has a clear, plastic liner on the adhesive side.
3. Place Scotchlite reflective material – transfer film on fabric (substrate) adhesive side down and apply heat and pressure as described in the table below. Place a non-stick slip sheet between the platen and laminating surface to prevent any excess adhesive transfer contamination.
4. Allow application to cool to room temperature before removing the paper liner. Place application on a flat surface and remove the paper liner by lifting one corner and pulling (about 45° angle) in a continuous, smooth manner.

Additional Precautions for Heat Lamination

1. Do not exceed lamination temperatures listed below because the paper liner may become difficult to remove. If high temperatures are required for bond durability, follow lamination steps 1-3 using recommended temperature, remove paper liner, and then laminate again at the higher temperature (using a non-stick slip sheet to protect reflective surface).
2. The lamination temperature, time, and pressure listed below should be used as a guide. Each substrate and reflective film combination should be tested to determine the best set of conditions that will meet customer requirements.
3. Other lamination methods, such as roll to roll, heat fusing, and HF welding can also be used. The proper temperature, time, and pressure conditions must be tested for each fabric to assure adequate adhesion and physical performance.
4. Many fabrics can be used as lamination substrates; however, nylons and fabrics treated with a durable water repellent (DWR) finish are difficult to adhere to and are not recommended. For specific application assistance, contact 3M Technical Service.
5. Do not use 3M™ Scotchlite™ Reflective Material – 8705 Silver Transfer Film Trim on 100% cotton. 3M™ Scotchlite™ Reflective Material – 8710 Silver Transfer Film performs best when laminated to polyester and polyester blend fabrics.

3M™ Scotchlite™ Reflective Material					
Product Number	**Adhesive Side Liner**	**Reflective Side Liner**	**Temperature**	**Dwell Time (seconds)**	**Line Pressure**
5510	None	Blue polyethylene	175-190 °C (350-375 °F)	10-20	Firm (30-40 psi)
5530	None	Green polyethylene	175-190 °C (350-375 °F)	10-20	Firm (30-40 psi)
8705	Clear polyethylene	Paper	165-190 °C (325-375 °F)	10-20	Firm (30-40 psi)
8710	Rose polyethylene	Paper	165-190 °C (325-375 °F)	10-20	Firm (30-40 psi)
8711	Paper	None	165-190 °C (325-375 °F)	10-20	Firm (30-40 psi)
8725	None	Paper	165-177 °C (325-350 °F)	10-20	Firm (30-40 psi)
8725LL	None	None	165-177 °C (325-350 °F)	10-20	Firm (30-40 psi)
8726	None	Paper	165-177 °C (325-350 °F)	10-20	Firm (30-40 psi)
8726LL	None	None	165-177 °C (325-350 °F)	10-20	Firm (30-40 psi)
8730	Blue polyethylene	Paper	135-165 °C (275-325 °F)	10-20	Firm (30-40 psi)
8765	Rose polyethylene	Paper	165-190 °C (325-375 °F)	10-20	Firm (30-40 psi)
8786	None	Paper	165-177 °C (325-350 °F)	10-20	Firm (30-40 psi)
8787	None	Paper	165-177 °C (325-350 °F)	10-20	Firm (30-40 psi)
9720	None	None	165-177 °C (325-350 °F)	10-20	Firm (30-40 psi)

Printing

1. Screen Printing – Images may be printed on the surface of 3M™ Scotchlite™ Reflective Material – Transfer Films. All inks should be continuously tested to ensure acceptable adhesion due to changes in the processes or composition of the ink. Before printing, wiping the surface with a soft cloth lightly dampened with isopropyl alcohol may help ink adhesion. Printed areas will not be retroreflective.

2. Sublimation Printing – 3M™ Scotchlite™ Reflective Material – 8765 White Transfer Film offers good ink adhesion and durability for sublimated colors and images. For further information, contact 3M Visibility and Insulation Solutions Technical Service.

Handling Precautions

1. Scotchlite reflective material – transfer films 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 – transfer films 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. We recommend that substrates always be tested prior to production to ensure that they meet your 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”.

3. Fabrics finished with dyes containing sulfur compounds should not be used with 3M™ Scotchlite™ Reflective Material – 9720 Silver Industrial Wash Transfer Film and 3M™ Scotchlite™ Reflective Material – 5530 Segmented Industrial Wash Trim . Exposure to sulfur compounds in dyes or in the environment will darken the retroreflective material and may affect retroreflectivity.

Care and Maintenance Instructions

Important: Test each application according to appropriate care instructions required for the finished product. Actual life of 3M™ Scotchlite™ Reflective Material depends on cleaning methods and wear conditions.

Home Wash Guidelines

Home laundering means using a top or front loading consumer type home washing machine with a consumer detergent at moderate water temperatures (up to 60° C, 140°F). Garment finishing such as tumble drying at high temperatures can limit garment life and should be considered as part of the cleaning process.

3M™ Scotchlite™ Reflective Material – Transfer Films may be home washed. Dry-cleaning may also be used. If bleach is needed, only non-chlorine bleach should be used. Exception: 3M™ Scotchlite™ Reflective Material – 8705 Silver Transfer Film Trim should not be dry-cleaned and non-chlorine bleach should not be used. Garment care label guidelines need to consider the garment fabric as well as the recommendations for garment components such as retroreflective trim.

Care label recommendations for Scotchlite reflective material – transfer films are:

Dry-clean, normal cycle

Non-chlorine bleach when needed

3M™ Scotchlite™ Reflective Material			
Product	**Maximum Wash Temp**	**Dry**	**Iron**
8705 Silver Transfer Film Trim	 Machine wash warm, 40 °C (105 °F)  Do not bleach  Do not dry-clean	 Tumble dry low	 Cool iron, 110 °C (230 °F)
8710 Silver Transfer Film 8711 Silver Graphic-Ready Transfer Film 8730 Silver Transfer Film 8765 White Transfer Film 8786 Fluorescent red-orange Transfer Film 8787 Fluorescent lime-yellow Transfer Film	 Machine wash warm, 40 °C (105 °F)	 Tumble dry low	 Cool iron, 110 °C (230 °F)
5510 Segmented Home Wash Trim 5530 Segmented Industrial Wash Trim 8725 Silver Transfer Film 8725LL Linerless Silver Transfer Film 8726 Silver Transfer Film 8726LL Linerless Silver Transfer Film 9720 Silver Industrial Wash Transfer Film	 Machine wash hot, 60 °C (140 °F)	 Tumble dry low	 Cool iron, 110 °C (230 °F)

Industrial Wash Guidelines

Industrial laundering means regularly washing large amounts of clothing in a relatively short amount of time, with large machines (> 25 kg loads), aggressive detergent chemistry (pH 10.5 – 12), and high wash temperatures (up to 85 °C, 185 °F). Garment finishing (tumble dry or tunnel finish) can limit garment life and should be considered as part of the cleaning process. Using harsher cleaning conditions than those recommended may significantly reduce product performance. The following 3M™ Scotchlite™ Reflective Material – Transfer Films are suitable for applications that will be exposed to industrial laundering:

5530 Segmented Industrial Wash Trim

9720 Silver Industrial Wash

Industrial wash guidelines for Scotchlite reflective material – transfer films are:

3M™ Scotchlite™ Reflective Material	
Washing	
Special instructions:	Stain treatment wash processing may reduce life of Scotchlite reflective material – transfer films.
Wash chemistry:	Lower pH (nearer to neutral) and lower active alkalinity will increase the lifetime performance of the retroreflective material. Actual lifetime will be dependent upon the detergent system and dosage level. **Do not** use solvenated surfactants. **Do not** use chlorine or perborate bleach. Low to medium alkaline, high surfactant detergents are preferred.
Maximum wash temperature:	75 °C (165 °F)
Break/suds cycles:	Less than 20 minutes total.
Drying	
Tunnel dry:	Maximum inlet temperature of 160 °C (320 °F) Drying time not to exceed 7 minutes. Fabric temperature not to exceed 135 °C (275 °F)
Tumble dry:	Maximum exhaust temperature 90 °C (195 °F)
Pressing	Do not exceed 150 °C (300 °F)

Product Availability

Scotchlite reflective material – transfer films are available in rolls with the following standard width and lengths:

3M™ Scotchlite™ Reflective Material				
Product Number	**Roll Width**	**Width Tolerance**	**Standard Roll Length**	**Additional Information**
5510 Segmented Home Wash Trim	50.8 mm (2 in.)	± 0.5 mm (± 0.02 in.)	100 m (109 yd) 200 m (218 yd)	
5530 Segmented Industrial Wash Trim	50.8 mm (2 in.)	± 0.5 mm (± 0.02 in.)	100 m (109 yd) 200 m (218 yd)	
8705 Silver Transfer Film Trim	50.8 mm (2 in.)	± 0.5 mm (± 0.02 in.)	200 m (218 yd)	Minimum order quantity 1 pallet (276 rolls)
All others	< 150 mm (< 6 in.)	Standard ± 1 mm (± 0.04 in.) Special ± 0.5 mm (± 0.02 in.)	100 m (109 yd) 200 m (218 yd)	
	150 mm ≤ w < 900 mm (6 in. ≤ w < 36 in.)	0 mm to + 4 mm (0 in. to 0.16 in.)	50 m (55 yd) 100 m (109 yd)	
	≥ 900 mm (≥ 36 in.)	+ 3 mm to + 7 mm (+ 0.12 in. to + 0.28 in.)	50 m (55 yd) 100 m (109 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.

3M

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