

Technical Data Sheet August 2015

3M™ Scotchlite™ Reflective Material 5540 Segmented Industrial Wash Flame Resistant Trim

Description

3M™ Scotchlite™ Reflective Material – 5540 Segmented Industrial Wash Flame Resistant Trim is designed for use on safety garments requiring flame resistance as defined by NFPA 2112 or NFPA 1977 for example. When properly used, Scotchlite reflective material – 5540 segmented industrial wash flame resistant trim helps to enhance the conspicuity of the wearer in nighttime or low-light conditions when illuminated by a light source such as vehicle headlights or search lights, by returning the light back toward the original source and reaching the driver’s eyes. Scotchlite reflective material – 5540 segmented industrial wash flame resistant trim is composed of wide angle, exposed retroreflective lenses bonded to a heat-activated adhesive. The trim is 50 mm wide and comprised of reflective patterned segments on a blue plastic liner.

Retroreflective Performance

The coefficient of retroreflection (R_A , in cd/lux/m²) is measured by methods traceable to either of the following retroreflective intensity testing procedures:

ASTM E809-08(2013) and E810-03(2013) (R_A)

CIE 54.2:2001 (R')

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 and CAN/CSA Z96

Scotchlite reflective material – 5540 segmented industrial wash flame resistant trim is certified to the current edition of ANSI/ISEA 107 American National Standard for High-Visibility Safety Apparel and Headwear for Level 2 retroreflective performance and to the current edition of CAN/CSA Z96 High Visibility Safety Apparel.

| 3M™ Scotchlite™ Reflective Material | | | | | |
|---|---------------|-----------------|-------------------------|-----------------|--------------------------|
| Product Number | Daytime Color | Reflected Color | Initial Average R_A^1 | Minimum R_A^2 | Wash Cycles ³ |
| 5540 Segmented Industrial Wash Flame Resistant Trim | Silver | White | >330 | 330 | 100 |

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

²ANSI/ISEA 107 minimum coefficient of retroreflection for Level 2 retroreflective material at +5° entrance angle and 0.2° observation angle

³ISO 6330, Method 2A at 60°C (140°F) and $R_A \geq 100$ cd/lux/m²

Scotchlite reflective material – 5540 segmented industrial wash flame resistant trim is not certified for marine safety applications requiring IMO type approval. 3M™ Scotchlite™ Reflective Material – SOLAS Grade Products have this type of certificate.



NFPA and CAN/CGSB

3M™ Scotchlite™ Reflective Material – 5540 Segmented Industrial Wash Flame Resistant Trim is certified to the following NFPA and CGSB standards. See the Physical Performance section for specific test methods used to evaluate heat and flame resistance. These standards include:

NFPA 1951-2013 Standard on Protective Ensembles for Technical Rescue Incidents;

NFPA 1971-2013 Standard on Protective Clothing and Equipment for Structural Fire Fighting and Proximity Fire Fighting;

NFPA 1977-2011 Standard on Protective Clothing and Equipment for Wildland Fire Fighting;

NFPA 2112-2012 Standard on Flame-Resistant Garments for Protection of Industrial Personnel Against Flash Fire;

CAN/CGSB 155.22-97 Fireline Workwear for Forest Firefighters;

CAN/CGSB 155.20-2000 Workwear for Protection Against Hydrocarbon Flash Fire.

| 3M™ Scotchlite™ Reflective Material | | |
|---|---------------------------|---------------------------|
| Product | NFPA 1971 Minimum R_A^1 | Fluorescent per NFPA 1971 |
| 5540 Segmented Industrial Wash Flame Resistant Trim | 100 | No |

¹Measured by 3M on new product at a 5° entrance angle and 0.2° observation angle

Performance

While use of 3M™ Scotchlite™ Reflective Material enhances wearer conspicuity, 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. Users should test reflective material to satisfy conformance to their own requirements.

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

Please visit our website, 3M.com/Scotchlite, for new or updated technical literature, or contact your local 3M Personal Safety Division Technical Service/ Application Development Representative.

Physical Performance

Scotchlite reflective material - 5540 segmented industrial wash flame resistant trim will meet or exceed the following physical performance as noted. All R_A values, except initial, are at +5° entrance angle and 0.2° observation angle.

See product certificate on 3M.com/Scotchlite for testing laboratory and test date.

| 3M™ Scotchlite™ Reflective Material | |
|--|---|
| Physical Performance Category | Performance (Test Method) |
| Retroreflectivity: Initial | ASTM DE809/E810 ANSI/ISEA 107-2010 Level 2 (Table 4) |
| 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, 100 cycles @ 60 °C (140 °F) |
| Wet Reflectivity: $R_A \geq 100$ | ANSI/ISEA 107-2010, Appendix A; NFPA 1971, Section 8.45.4.3 |
| Flame Resistance: After flame ≤ 2 seconds, char length ≤ 4 inches | ASTM D6413 |
| Heat Resistance: Cannot melt, drip, separate or ignite after 5 minutes @ 260 °C (500 °F) | ISO 17493 |
| Convective Heat: $R_A \geq 100$ after 10 minutes @ 140 °C (285 °F) | Per NFPA 1971, Section 8.1.5 |
| Arc Thermal Performance Value | ASTM F1959, ATPV ≥ 5 cal/cm ² |

Application Instructions

Whenever two or more pieces of 3M™ 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 the appropriate standard(s).

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

Heat Lamination:

1. Work on a flat surface where uniform heat and pressure can be applied. Avoid applying film over seams and stitches.
2. Place trim on fabric substrate with the adhesive side down and apply heat and pressure as described in the table below.

- The lamination temperature, time and pressure listed below should be used as a guide. Each substrate should be tested to determine the best set of conditions that will meet customer requirements.
- 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 ensure adequate adhesion and physical performance.
- Caution is required when applying other materials to the reflective surface of 3M™ Scotchlite™ Reflective Material, as it can be difficult to obtain good adhesion. If you are laminating a 3M™ Scotchlite™ Reflective Material – Transfer Film to the surface of Scotchlite reflective material, then testing is recommended to ensure the adhesion meets the customer’s specifications. It is also recommended that continuous testing should be done to ensure acceptable adhesion is maintained throughout the manufacturing process. If acceptable adhesion cannot be achieved, then contact your local Technical Service/ Application Development Engineer for assistance.



Wash: Machine wash hot, 60 °C (140 °F)



Bleach: Non-chlorine bleach when needed



Dry: Tumble dry low.



Iron: Use 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.

Industrial wash guidelines for 3M™ Scotchlite™ Reflective Material – 5540 Segmented Industrial Wash Flame Resistant Trim:

| 3M™ Scotchlite™ Reflective Material | | | |
|---|----------------------------|------------|---------------------|
| Product | Temperature | Dwell Time | Line Pressure |
| 5540 Segmented Industrial Wash Flame Resistant Trim | 175-190 °C (350-375 °F) | 20 seconds | Firm (30-40 psi) |

Handling Precautions

Fabrics finished with dyes containing sulfur compounds should not be used with Scotchlite reflective material - 5540 segmented industrial wash flame resistant 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.

Care label recommendations for 3M™ Scotchlite™ Reflective Material – 5540 Segmented Industrial Wash Flame Resistant Trim are:

| 3M™ Scotchlite™ Reflective Material | |
|-------------------------------------|---|
| Washing | |
| Special Instructions | Stain treatment wash processing may reduce the lifetime performance of retroreflective material |
| Wash chemistry | Lower pH (nearer to neutral) and lower active alkalinity will increase the lifetime performance of the retroreflective material. Actual lifetime will depend 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 of 90 °C (195 °F) |
| Pressing | Do not exceed 150 °C (300 °F) |

Product Availability

3M™ Scotchlite™ Reflective Material – 5540 Segmented Industrial Wash Flame Resistant Trim is available in rolls with the following standard width and roll length:

| 3M™ Scotchlite™ Reflective Material | | |
|-------------------------------------|------------------------|----------------------|
| Roll Width | Width Tolerance | Standard Roll Length |
| 50.8 mm (2.0") | +/- 0.5 mm (+/- 0.02") | 200 m (218 yd) |

Order and Product Information

To order 3M™ Scotchlite™ Reflective Material Products, contact 3M Personal Safety Apparel Customer Service at 800-328-7098.

Storage and Shelf Life

In order to preserve performance, 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

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.

3M™ Scotchlite™ Reflective Material – Series 5500 Comfort Trim is converted by Safe Reflections, Inc.



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