

# 3M™ Scotchlite™ Reflective Material – Product Bulletin

## 5410 Diamond Mesh Trim

### 1. Product Description

3M™ Scotchlite™ Reflective Material – 5410 Diamond Mesh Trim is intended for application on high-visibility warning clothing such as occupational work wear, as well as consumer garments, to enhance the visibility of the wearer during darkness and low light conditions. The product will appear brilliant white when illuminated by vehicle headlights, even when the wearer is situated at the side of the road.

When converting or storing the reflective material, certain circumstances (see chapter 6.2) may change the uniform appearance of the reflective material; the reflective properties – and hence the defined functionality – will not be affected by this.



### 2. Product Features

#### 2.1 Product Design

3M™ Scotchlite™ Reflective Material – 5410 Diamond Mesh Trim is a transfer film composed of high-performance glass lenses bonded with a durable polymer layer to a heat activated polyester adhesive.

3M™ Scotchlite™ Reflective Material – 5410 Diamond Mesh Trim is manufactured as a 50.8mm (± 0.5mm) wide trim. The trim is comprised of a retroreflective diamond mesh pattern on a plastic liner, designed to easy heat-lamination to suitable fabric substrates.

#### 2.2 High Performance according to ISO 20471

3M™ Scotchlite™ Reflective Material – 5410 Diamond Mesh Trim:

- Exceeds the highest brightness requirements for retroreflective material.
- Is non-orientation sensitive.
- Offers 60°C domestic wash durability per ISO 20471, 75 cycles per ISO 6330 6N.
- Offers good dry cleaning durability per ISO 20471, 30 cycles per ISO 3175-2, 8.1.
- Offers good fabric compatibility and drape

#### 2.3 Special Feature

To ensure consistency of performance, 3M™ Scotchlite™ Reflective Materials are manufactured within an ISO 9001 controlled manufacturing environment.

### 3. General Safety Information

**Read Scotchlite™ Reflective Material – 5410 Diamond Mesh Trim Product Bulletin carefully. The wearer is ultimately responsible for his/her own safety.**

- Verify the suitability of 3M™ Scotchlite™ Reflective Material – 5410 Diamond Mesh Trim for the intended use of the PPE (EC Directive 89/656/EEC Art. 4 and Art. 5; EC Communication 89/C328/EEC Annex §7).
- No reflective material can guarantee absolute visibility.
- Various factors (e.g. environmental) can influence visibility. **For further details, see chapter 9 – “Specific Safety Information”.**
- Field test the finished garment to verify suitability for intended use and for the selection of appropriate care conditions.

## 4. Product Application

Retroreflective materials are important in applications where being visible can reduce the risk of an accident. Examples of environments where high-visibility garments should be worn include applications of vehicular hazard such as motorways, rural and urban roads, railway environments, airports and docks.

3M™ Scotchlite™ Reflective Material – 5410 Diamond Mesh Trim is recommended for garments not suffering from harsh wear impact and being subjected to domestic wash care procedures.

### Occupational Application

Clothing for road works, track maintenance, sanitation, transportation, postal service, armed forces and police.

### Non-Occupational Application

Clothing for pedestrians, joggers, cyclists and children.

## 5. Product Converting

### 5.1 Cutting

3M™ Scotchlite™ Reflective Material – 5410 Diamond Mesh Trim can be hand-cut, die-cut or guillotined. Plotter cutting is not recommended.

**Note:** Use very sharp cutting knives only and cut from the reflective side.

### 5.2 Lamination onto substrate

3M™ Scotchlite™ Reflective Material – 5410 Diamond Mesh Trim can be applied in the form of trims directly to many different types of substrate.

3M™ Scotchlite™ Reflective Material – 5410 Diamond Mesh Trim can be laminated using the process conditions recommended below. Convertors are advised to determine which configuration best suits their lamination process.

Work with lamination equipment, which provides uniform heat and pressure.

The following recommendations are guidelines for heat press lamination. Other lamination methods (roll-to-roll, heat fusing, etc.) might also be used. Proper lamination parameters must be determined for each substrate to ensure adequate adhesion.

Substrate	Time (sec)	Temperature (°C)	Pressure (kg/cm <sup>2</sup> )
Knitted Polyester	15	175	1.5
Polyester/Cotton	15	175	1.5
2-ply or 3-ply Polyester, Coated	15	165	1.5

- Preheat the press.
- Material must be applied with the plastic liner.
- Place the transfer film with the adhesive side facing the substrate. Apply heat and pressure as described. It is not recommended to apply film over seams and stitches.
- A press-cloth or a siliconised slip-sheet for delicate or coated substrates may be used to cover the transfer film and substrate during lamination.
- Allow the application to cool to room temperature before removing the plastic liner. Place application on a flat surface and remove the plastic liner by lifting one corner and pulling gently at about 45° in a continuous, smooth manner.

### Note:

- In general 3M™ Scotchlite™ Reflective Material – 5410 Diamond Mesh Trim is not recommended for application on polyamide fabrics. The adhesion on polyamides such as nylon is often not satisfactory.
- Lamination on coated substrates might require reduced lamination temperature and time to prevent surface damage. Appropriate lamination parameters have to be determined accordingly. Air blisters have to be avoided.
- Substrate finishes such as silicone, parafin, fluorocarbon resin or flame retardant coating might strongly influence the level of adhesion to the substrate. To ensure adequate adhesion to substrate, it is strongly
- recommended to test the application in the intended care procedure for the finished product.

Prior to production, it is essential to test the actual 3M™ Scotchlite™ Reflective Material 5410 Diamond Mesh Trim on the actual substrate being used.

- Whenever two or more pieces of reflective transfer film are used together on a single surface or as a set, they should be matched to ensure uniform day time colour appearance.
- Production-dependent colour deviations of new retroreflective material do not affect the suitability of 3M™ Scotchlite™ Reflective Material for uses according to the performance requirements laid down in ISO 20471 for retroreflective material.

### 5.3 Lamination on Continuous Heat Fusing Machines

For more information refer to 3M Technical Information, “3M™ Scotchlite™ Reflective Material – 8725 / 8725LL Silver Transfer Film Conveyor Fusing Press Guideline”.

## 6. Handling and Storage

### 6.1 Product Storage

Store in a cool, dry area and use within 1 year of receipt.

Rolls should be stored in their original cartons, whilst partially used rolls should be returned to their carton or suspended horizontally from the core via a rod or pipe.

Cut sheets should be stored flat.

### 6.2 Handling and Storage Precautions

Aggressive chemicals, e.g. sulphur – or chlorine – containing compounds, perspiration, strong acids or alkalis may affect the aesthetic appearance of Scotchlite™ Silver Reflective Material. When exposed to excessive heat and more than 70% relative humidity conditions, these products have the potential to become stained. These stains do not affect the retroreflective performance of the material and do not indicate that the input product was defective.

Care must be taken by the user when handling Scotchlite™ Silver Reflective Material in hot and humid environments. During application, storage and shipping, ambient conditions should be kept. Measures like cooling, dehumidifying the manufacturing area and specific handling precautions should be taken. Appropriate specific storekeeping is essential. In conditions of excessive heat and humidity, it is recommended to leave the paper liner on the applied transfer film as long as possible.

Knowing the individual situation, the user may contact 3M for further advice if needed.

## 7. Product Cleaning

Reflective fabrics and films naturally age. Ageing depends upon material type, conditions of use, environment and maintenance procedures.

The retroreflective performance of all reflective materials is affected by soiling. Any kind of dirt, liquid chemicals, grease and alike will reduce brightness in the area of contamination.



### 7.1 Caution

Washing/cleaning conditions harsher than those recommended below could diminish the brilliance of the fabric and shorten the product’s lifetime significantly.

Therefore, the instructions must be strictly followed.

- No presoaking.
- No application of high alkaline products (e.g. heavy duty products or stain removal products).
- No application of solvenated detergents or microemulsions.
- No additional bleaches.

Before use, the suitability of the intended care process for 3M™ Scotchlite™ Reflective Material – 5410 Diamond Mesh Trim must be determined. Test duration should mirror the anticipated maximum number of care cycles in use.



### 7.2 Homewash

#### 7.2.1 Washing Conditions

A colored clothing wash program without pre-wash should be used.

#### Recommendation:

Wash temperature range:	30°C to 60°C
Max. wash time at highest wash temperature:	12 minutes
Max. program time:	50 – 90 minutes

Wash temperatures higher than 60°C and industrial laundering processes are not recommended.

The use of bleach or detergents containing organic solvent will result in a reduction in retroreflective performance.

Use of temperatures lower than 40°C will increase the lifetime of the reflective fabric. Actual lifetime will be dependent upon the detergent system and its dosage level.



#### 7.2.2 Do not use additional bleach.

- No chlorine bleach.
- No bleaches on oxygen basis (e.g. sodium perborate bleaches).

Do not pre-soak laundry even in a low concentration of bleach.



### 7.2.3 Drying conditions

#### Tumble Dryer

Tumble drying should be performed in a commercially available household dryer using the medium dry setting.

Do **not** overdry.

**Air Drying:** Line drying is recommended where possible



### 7.3 Dry Cleaning Conditions

Cleaning process should be based on a pre- and main-bath only. For P it is recommended to only use **pure** perchloroethylene. Adjust load and solvent level to give a moderate mechanical action.

Max. solvent temperature:	30°C
Recommended drying temperature:	48°C
Max. inlet temperature:	80°C
Max. exhaust temperature:	60°C
Max. drying time:	15 minutes
Max. program time:	60 minutes

If stain removing substances (e.g. surfactant-based cleaning booster) need to be used, their compatibility with the reflective material should be determined prior to the application.

**Note:** High numbers of dry cleaning cycles may stiffen the product and thus lead to increased abrasion.



### 7.4 Ironing Conditions

- Use medium setting, use press cloth.
- Do **not** apply steam.

## 8. Product Maintenance

### 8.1 Maintenance Misuse

3M™ Scotchlite™ Reflective Material – 5410 Diamond Mesh Trim is an optical system. Coating of the product with material of high refractive index, such as oil, will greatly diminish the reflective performance.

- No harsh mechanical treatment, e.g. abrasion with wire brushes or sand paper.
- No uniform coating or spraying of oils, protective waxes, inks or paint.
- No application of products such as leather spray or shoe shine.

### 8.2 Inspection

High-visibility warning clothing should be maintained in good condition and inspected regularly for signs of damage or deterioration.

Where frequent care cycles are performed, inspection should be pursued after every cleaning cycle. Records of test results should be kept for reference.

Replacement of the reflective material must be considered, if the retroreflective performance is below  $R' = 100 \text{ cd/lx/m}^2$  (refer to ISO 20471).

**For specific guidance contact your 3M representative.**

### 8.3 Product Disposal

Product can be discarded attached to the garment. The product can be incinerated in a commercial or industrial facility or disposed in a sanitary landfill. Before recycling, the compatibility shall be determined with the intended recycling process.

## 9. Specific Safety Information

### Visibility Limits see chapter 3

#### “General Safety Information”

Recognition of the wearer can also be significantly reduced, if the reflective material is covered, e.g. by simultaneously wearing other personal protective equipment or by obstacles in the working zone.

**In such instances the wearer should be aware of these limitations.**

The brightness of 3M™ Scotchlite™ Reflective Material – 5410 Diamond Mesh Trim can also be diminished in extreme weather conditions.

- Test results show, that 3M™ Scotchlite™ Reflective Material – 5410 Diamond Mesh Trim exceeds the retroreflective performance requirements in rainfall conditions as defined in ISO 20471. Initial brightness levels return as the material dries.
- Fog, mist, smoke and dust can scatter the light from headlights, the wearer must be aware that detection distance will be severely reduced.
- Visual noise (contrast variations in the visual field) decreases the contrast of the reflective material with the background and affects the visibility in low-light conditions.

**Important Notice to Purchaser / Converter / Wearer:**

All statements, technical information and recommendations herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed. We shall not be liable and no warranty shall apply for products not applied according to our published information folder. Before using / converting, the user / converter must determine the suitability of the product for its intended use / converting, and the user / converter assumes all risk and liability whatsoever in connection therewith. All questions of warranty and liability relating to this product are governed by the terms of the sale subject where applicable to the prevailing law. No statement or recommendation not contained herein shall have any force or effect unless in an agreement signed by officers of us.



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