



**Scotchlite™**  
Reflective Material

# 3M™ Scotchlite™ Reflective Material – Product Bulletin

## 9687 Yellow-Silver-Yellow Flame Resistant Fabric

### 1. Product Description

3M™ Scotchlite™ Reflective Material – 9687 Yellow-Silver-Yellow Flame Resistant Fabric is intended to enhance the visibility of the wearer, when applied to firefighting apparel and flame resistant occupational work wear. It is most appropriate where enhanced visibility of the wearer during daytime, and in lowlight nighttime conditions, in combination with heat resistance and wear durability, is required.

The product will appear brilliant white, when illuminated by vehicle headlights, by returning the light back toward the original source and reaching the automobile driver's eye.

### 2. Product Features

#### 2.1 Product Design

3M™ Scotchlite™ Reflective Material – 9687 Yellow - Silver-Yellow Flame Resistant Fabric is composed of wide angle, exposed retroreflective lenses bonded to a aramid backing fabric.

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

#### 2.2 High Performance according to ISO 20471 (High visibility warning clothing)

3M™ Scotchlite™ Reflective Material – 9687 Yellow-Silver-Yellow Flame Resistant Fabric:

- Exceeds the highest brightness requirements for a separate performance retroreflective material according to ISO 20471.
- Is non-orientation sensitive.
- Offers 60 °C domestic wash durability per ISO 20471, 50 cycles per ISO 6330 6N/F depending on substrate.

- Offers good dry-cleaning durability, per ISO 20471, 30 cycles per ISO 3175-2, 8.1. depending on substrate
- Meets the requirements for fluorescent yellow background material when new (clause 5.1), after Xenon (clause 5.2) and after being subjected to convective heat test at 180°C for 5 minutes for the fluorescent lime-yellow parts.
- Meets the requirements for fluorescent yellow background material (clause 5.1) after being subjected to 50 cycles washing at 60°C per ISO 20471.
- Meets the requirements for fluorescent yellow background material (clause 5.1) after being subjected to 30 cycles dry-cleaning per ISO 20471.

#### 2.3 High Performance according to EN 469 (Protective clothing for firefighters)

3M™ Scotchlite™ Reflective Material – 9687 Yellow-Silver-Yellow Flame Resistant Fabric:

- Meets the performance requirements regarding brightness according to EN 469, 6.2.6
- Exceeds the minimum retroreflective performance requirements of ISO 20471 after exposure to heat resistance according to EN 469, 6.2.6.
- Meets the performance requirements for heat resistance according to EN 469, 6.2.1.6, depending on substrate.
- Meets the performance requirements for heat resistance exposure at 260 °C for 5 minutes, depending on substrate.
- Meets the requirements for flame spread according to EN 469, 6.2.1.1, depending on the substrate.

## 2.4 Performance according to ISO 15384

3M™ Scotchlite™ Reflective Material – 9687 Yellow-Silver-Yellow Flame Resistant Fabric:

- Meets the performance requirements regarding brightness according to DIN EN ISO 15384, 9.2.
- Exceeds the minimum retroreflective performance requirements of ISO 20471 after exposure to heat resistance according to DIN EN ISO 15384, 6.3.2.
- Meets the performance requirements for heat resistance exposure at 260 °C according to DIN EN ISO 15384, 6.3.
- Meets the requirements for flame spread according to DIN EN ISO 15384, 6.1.2.

## 2.5 Other Flame Resistance Standards

3M™ Scotchlite™ Reflective Material – 9687 Yellow-Silver-Yellow Flame Resistant Fabric:

- Meets the performance requirements for flame spread according to ISO 11611, 6.7, even after wash treatments as described under 2.2.
- Meets the performance requirements for flame spread according to ISO 11612, 6.3.2 (A1), even after wash treatments as described under 2.2.
- Meets requirement for limited flame spread index 3 according to ISO 14116, even after wash treatments as described under 2.2.

## 3. General Safety Information

**Read the 3M™ Scotchlite™ Reflective Material – 9687 Yellow-Silver-Yellow Flame Resistant Fabric Product Bulletin carefully. The wearer is ultimately responsible for their own safety.**

- Verify the suitability of 3M™ Scotchlite™ Reflective Material – 9687 Yellow-Silver-Yellow Flame Resistant Fabric 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 enhanced visibility can reduce the risk of an accident.

Examples are

- Garments according to EN 469 (protective clothing for firefighters) and DIN EN ISO 15384 (protective clothing for wildland firefighter garments).
- Reflective design elements.

The final garment design is depending on the specific applications and needs to be assessed by the end-user.

## 5. Product Converting

When converting/storing the reflective material, certain circumstances (see e.g. 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.

### 5.1 Cutting

3M™ Scotchlite™ Reflective Material – 9687 Yellow-Silver-Yellow Flame Resistant Fabric can be hand cut, die-cut or guillotined.

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

### 5.2 Sewing

3M™ Scotchlite™ Reflective Material – 9687 Yellow-Silver-Yellow Flame Resistant Fabric can be applied directly to a fabric.

The reflective fabric should be sewn with a coated brand circular top needle, using a suitable thread. To minimize edge fraying, sew in place using a lockstitch of 3 mm stitch length, placed at least 2 mm from the edge of the reflective fabric.

Prior to production, it is essential to test the actual 3M™ Scotchlite™ Reflective Material – 9687 Yellow-Silver-Yellow Flame Resistant Fabric on the actual substrate being used.

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

## 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 shipping carton or suspended horizontally from the core via a rod or pipe.

## 6.2 Handling and Storage Precautions

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als, e.g. Sulphur or chlorine containing compounds, perspiration, strong acids or bases may affect the aesthetic appearance of 3M™ Scotchlite™ Reflective Material.

Care must be taken by the user when handling 3M™ Scotchlite™ Reflective Material in hot and humid environments.

Measures like cooling, dehumidifying the manufacturing area and specific handling precautions should be taken. Appropriate specific storekeeping is essential.

Blemishing of this aluminum layer can occur if the front surface of the product has direct contact from hands during application or handling and is then exposed to hot and humid conditions, greater than 26 °C and greater than 70 % relative humidity, for a period of weeks.

These stains do not affect the retroreflective performance of the material and do not indicate that the input product was defective.

**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 surfactants/detergents.
- No chlorine bleaches.
- Do not overdry.

**Before use, the suitability of the intended care process for 3M™ Scotchlite™ Reflective Material – 9687 Yellow-Silver-Yellow Flame Resistant Fabric 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.

Parameter	Recommendation
Wash temperature range	30 °C to 60 °C
Max. wash time at highest wash temperature	12 minutes
Max. program time	60 minutes

**Detergent:** Brand powdered household detergents should be used. Recommended are detergents for delicate or colored laundry. Refer to the detergent manufacturer's recommendations for dosage in areas of high water hardness and for various degrees of garment soiling.

**Wash temperatures higher than 60 °C 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 60 °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.

- Do not pre-soak laundry even in a low concentration of any 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. Damp dry only.

#### Air Drying

Line drying is recommended where possible.

## 7.3 Ironing Conditions

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

## **8. Product Maintenance**

### **8.1 Maintenance Misuse**

3M™ Scotchlite™ Reflective Material – 9687 Yellow-Silver-Yellow Flame Resistant Fabric is an optical system. Coating of the product with material of a high refractive index, such as oil, will greatly diminish reflective performance.

- No harsh mechanical treatment, e.g. abrasion with wire brushes or sandpaper.
- No uniform coating or spraying of oils, protective waxes, inks or paint.
- No application of products such as leather sprays or shoeshine.

### **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  $R' = 100 \text{ cd} / (\text{lx} \cdot \text{m}^2)$  (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”

Various environmental factors, like line of sight, rain, fog, smoke, dust and visual noise can influence visibility.

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 – 9687 Yellow-Silver-Yellow Flame Resistant Fabric can also be diminished in extreme weather conditions.

- Test results show that 3M™ Scotchlite™ Reflective Material – 9687 Yellow-Silver-Yellow Flame

Resistant Fabric exceeds the retroreflective performance requirements in rainfall conditions as defined in ISO 20471 or ISO 17353. 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 distances 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.

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