3M™ Scotchlite™ Reflective Material – Product Bulletin

8735 Flame Resistant Transfer Film

1. Product Description

3M™ Scotchlite™ Reflective Material – 8735 Flame Resistant Transfer Film is intended to enhance the visibility of the wearer during darkness and in low-light conditions. It can be applied to flame resistant occupational work wear, where enhanced visibility of the wearer, in combination with heat and flame resistance is required.

The reflective material will appear brilliant white when illuminated by vehicle headlights, even when the wearer is situated at the side of the road.

2. Product Features

2.1 Product Design
3M™ Scotchlite™ Reflective Material – 8735 Flame Resistant Transfer Film is composed of wide angle, exposed retroreflective glass lenses bonded to a heat-activated adhesive. The product comes without any liner on the reflective surface and can be laminated directly on to compatible substrates.

2.2 High Performance according to ISO 20471 (High visibility warning clothing)
3M™ Scotchlite™ Reflective Material – 8735 Flame Resistant Transfer Film:

- Exceeds the highest brightness requirements for a separate performance retroreflective material.
- Is non-orientation sensitive.
- Offers industrial laundering durability per ISO 20471, Annex B. 15 cycles per ISO15797-8 depending on substrate
- Offers 60°C domestic wash durability per ISO 20471, 50 cycles per ISO 6330 6N. depending on substrate.
- Offers good fabric compatibility.

2.3 High Performance according to EN 469 (Protective clothing for firefighters)
3M™ Scotchlite™ Reflective Material – 8735 Flame Resistant Transfer Film:

- Meets the performance requirements regarding brightness according to EN 469 Annex B, B.3.
- Exceeds the minimum retroreflective performance requirements of ISO 20471 after exposure to heat resistance according to EN 469 Annex B, B3.1.
- Meets the performance requirements for heat resistance according to EN 469 Annex B, B.3.1, depending on the substrate.
- Offers excellent resistance to heat with high retroreflective performance retention after exposure to 260°C for 5 minutes, depending on the substrate.
- Meets requirement for flame spread according to EN 469 Annex B, B3.2, depending on the substrate.
- Meets requirement for limited flame spread index 3 according to ISO 14116, even after 50 wash cycles per ISO 6330 method 6N depending on the substrate.

2.4 Performance according to ISO 11612
3M™ Scotchlite™ Reflective Material – 8735 Flame Resistant Transfer Film:

- Meets the performance requirements for flame spread according to ISO 11612, 6.3.2 (A1).
- Meets the performance requirements for molten metal splash code letter D3 and code E2, both dependant on the substrate.

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

3. General Safety Information

Read 3M™ Scotchlite™ Reflective Material – 8735 Flame Resistant Transfer Film Product Bulletin carefully. The wearer is ultimately responsible for his/her own safety.

- While the 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.
- Verify the suitability of 3M™ Scotchlite™ Reflective Material – 8735 Flame Resistant Transfer Film for the intended use of the PPE (EC Directive 89/656/EEC Art. 4

and Art. 5; EC Communication 89/C328/EEC Annex §7).
- Field test the finished garment to verify suitability for the intended use and for the selection of appropriate care conditions. Various factors (e.g. environmental) can influence visibility. For further details, see section 9 – "Specific Safety Information".

4. Product Application

3M™ Scotchlite™ Reflective Material – 8735 Flame Resistant Transfer Film is recommended for garments not suffering from harsh wear impact and being subjected to domestic or industrial wash care procedures. 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 daytime colour and nighttime retroreflectivity. Production dependant colour variations 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. All high visibility safety garments should be constructed in accordance with the appropriate standard(s).

5. Product Converting

5.1 Cutting

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

5.2 Lamination onto substrate

In general 3M™ Scotchlite™ Reflective Material – 8735 Flame Resistant Transfer Film is not recommended for polyamide fabrics. The adhesion on polyamides such as nylon is often not satisfying.

We recommend that substrates are always tested prior to production to ensure that they meet your specific needs. It is essential to test the actual 3M™ Scotchlite™ Reflective Material – 8735 Flame Resistant Transfer Film on the actual substrate being used prior to production.

5.3 Lamination Process

- Work on a flat surface where uniform heat and pressure can be applied. Avoid applying film over seams and stitches.
- Place the transfer film on the fabric substrate with the adhesive side down and apply heat and pressure as described in the table below. Use a non-stick slip sheet between the platen and laminating surface to prevent transfer contamination with any excess adhesive.
- The lamination temperature, time and pressure listed below should be used as a guide. Each substrate and reflective film combination should be tested prior to production to determine the best set of conditions that will meet customer requirements.
- Other lamination methods, such as roll to roll, heat fusing, and high frequency (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.
- Substrate finishes such as silicone, paraffin, fluorocarbon resin or flame retardant coating might strongly influence the level of adhesion to the substrate.

Substrate	Temperature	Dwell Time	Line Pressure
8735 Flame Resistant Transfer Film	175-190 °C (350-375 °F)	20 seconds	kg/cm² 1.5

6. Handling and Storage

6.1 Product Storage

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

Store rolls in their original shipping cartons. Return partially used rolls to the carton or suspend horizontally through the core. Cut pieces should be stored flat.

6.2 Handling and Storage Precautions

- Aggressive chemicals e.g. sulphur- or chlorine-containing compounds, perspiration, strong acids or bases may affect the aesthetic appearance of 3M™ Scotchlite™ Silver Reflective Materials. 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 using 3M™ Scotchlite™ Silver Reflective Materials 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 storekeeping is essential.
- Knowing the individual situation, the user may contact 3M for further advice if needed.

7. Product Cleaning and Maintenance

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 similar substances 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 micro-emulsions.
- No additional bleaches.
- Do not overdry.

Before use, the suitability of the intended care process for 3M™ Scotchlite™ Reflective Material – 8735 Flame Resistant Transfer Film must be determined. Test duration should mirror the anticipated maximum number of care cycles in use.

7.2 Industrial Wash

7.2.1 Washing Conditions

Scotchlite 8735 can be used in commercially available industrial wash equipment The best results so far have been achieved with a front-loading, open pocket washer extractor.

- Brightly coloured clothing should be washed separately from normal coloured work wear.
- The wash process in such a single front-loading wash extractor should be based on a pre- and main-wash followed by a third bath, or a cool down and three rinse cycles with interspin. Extended rinsing is recommended to completely remove all detergent residues.
- Load factor should not exceed 70%, with the liquor ratio for washing in the range of 1:4 to 1:5 and for rinsing in the range of 1:6 to 1:8.

Use of a lower pH and active alkalinity will increase the lifetime of the reflective fabric. Actual lifetime will be dependent upon the wash equipment, the detergent system and its dosage level.

For different wash equipment types an equivalent wash process needs to be developed by the user to achieve maximum number of wash cycles. Number of wash cycles may differ from number certified in ISO 15797 wash process in each individual wash process.

Wash temperature should not exceed 75°C.

Total time of the pre- and main-wash bath should **not** exceed 20 minutes.

Detergent: Low- to- medium alkaline, high-surfactant detergents are preferred.

- The detergent should not contain free sodium or potassium hydroxide.

Controlled detergent dosage should give actual wash lye concentration not exceeding those detailed below.

Parameter	Recommended	Maximum
pH- value	10.0 to 10.5	≤ 11.0
Active Alkalinity Na_2O sodium oxide	≤ 600 mg/l	≤ 900 mg/l

Sour: The wash load should be effectively soured achieving a pH-value of 5.5 - 6.5 in the final rinse.

(Alkalinity titration against phenolphthalein endpoint, without $BaCl_2$ addition).

Detergent systems with a high alkaline strength, containing organic solvents or free sodium / potassium hydroxide should **not** be used.

Detergent systems and sour should not contain any oxidising chemicals, (e.g. chlorine bleach).

Use of a lower pH and active alkalinity will increase the lifetime of the reflective fabric. Actual lifetime will be dependent upon the detergent system and its dosage level.

7.2.2 No chlorine bleach

- Do not store a wash batch even in a low concentration of bleach.

7.2.3 Drying conditions

Tumble Dry

- Load ratio: 1:25.
- Inlet temperature should not exceed 135°C.
- **The drying process must be controlled to ensure that the exhaust temperature does not exceed 90°C.**
- The drying process should be continued until the load is damp dry.

Tunnel finish

For 3M™ Scotchlite™ Reflective Material – 8940 Silver Industrial Wash Flame Resistant Fabric sewn to aramid blend fabrics with an area weight of 220-240 g/m².

- Inlet temperature should not exceed 160°C.

- The drying time should not exceed 5 minutes.
- Spray steam pressure should not exceed 4 bar.
- The distance between the garments during the finishing process should be in a range of 70-100 mm.
- Do not overdry. Reflective fabric temperature should not exceed 135°C at any time during drying.

7.3 Homewash

7.3.1 Washing Conditions
A coloured clothing wash programme 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:	60 minutes

Detergent: Branded powdered household detergents should be used. Recommended are detergents for delicate or coloured 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 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 material. Actual lifetime will be dependent upon the detergent system and its dosage level.

7.3.2 Do not use additional bleach.
- No chlorine bleach.
- Do not pre-soak laundry even in a low concentration of bleach.

7.3.3 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

7.4 Dry Cleaning Conditions
- Dry Cleaning is not recommended.

7.5 Ironing Conditions
- Use low setting. Use press cloth.
- Do **not** apply steam.

8. Specific Safety Information

8.1 Maintenance Misuse
- 3M™ Scotchlite™ Reflective Material – 8735 Flame Resistant Transfer Film is an optical system. Coating of the product with material of high refractive index, such as oil, will greatly diminish 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 sprays 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 carried out after every cleaning cycle. Records of test results should be kept for reference.

8.3 Product Disposal
Product can be recycled 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 – 8735 Flame Resistant Transfer Film can also be diminished in extreme weather conditions. Test results show, that 3M™ Scotchlite™ Reflective Material – 8735 Flame Resistant Transfer Film 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 so the wearer must be aware that the 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.

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