

3M™ Scotchlite™ Reflective Material – Product Bulletin

9720 Silver Industrial Wash Transfer Film

1. Product Description

3M™ Scotchlite™ Reflective Material – 9720 Silver Industrial Wash Transfer Film is intended for the application on high-visibility warning clothing such as occupational workwear, 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/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.

2. Product Features

2.1 Product Design

- 3M™ Scotchlite™ Reflective Material – 9720 Silver Industrial Wash Transfer Film consists of exposed high performance glass lenses bonded to a special polymer layer, which is coated with a heat activated adhesive.
- 3M™ Scotchlite™ Reflective Material – 9720 Silver Industrial Wash Transfer Film comes without any liner and can directly be laminated to compatible substrates made of polyester or polyester/cotton blends.

2.2 High Performance according to ISO 20471

3M™ Scotchlite™ Reflective Material – 9720 Silver Industrial Wash Transfer Film:

- Exceeds the highest brightness requirements for retroreflective material.
- Is non-orientation sensitive.
- Offers industrial laundering durability per ISO 20471, Annex B. 25 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 dry cleaning durability, per ISO 20471. 50 cycles per ISO 3175-2, 8.1. depending on substrate
- Offers good drape and fabric compatibility.

2.3 Special Feature

3M™ Scotchlite™ Reflective Material – 9720 Silver Industrial Wash Transfer Film has been specially designed to withstand repeated industrial launderings per care instruction and will exceed minimum retroreflective performance requirements of ISO 20471 even after extended number of laundering cycles according to the recommended laundering procedure, given in the care guideline.

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 – 9720 Silver Industrial Wash Transfer Film Product Bulletin carefully. The wearer is ultimately responsible for his/her own safety.

- Verify the suitability of 3M™ Scotchlite™ Reflective Material – 9720 Silver Industrial Wash 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).
- 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. Example of environments where high-visibility garments should be worn includes applications of vehicular hazard such as motorways, rural and urban roads, railway environments, airports and docks.

4.1 Occupational Application

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

5. Product Converting

5.1 Cutting

3M™ Scotchlite™ Reflective Material – 9720 Silver Industrial Wash Transfer Film can be handcut, die-cut or guillotined. Use very sharp cutting knives only and cut from the reflective side.

Note:

Cutting of 3M™ Scotchlite™ Reflective Material – 9720 Silver Industrial Wash Transfer Film may cause handling difficulties, particularly if the cut design is complex.

For the purpose of plotter-cut or kiss-cut complex cut designs, application tape should be used on the reflective side prior to cutting. In this case, cut with the adhesive side up. Weed strip the cut material before placing it on the substrate with the adhesive side facing the substrate.

Please also refer to the 3M™ Scotchlite™ Reflective Material – Glass Bead Products Plotter Cutting Guideline.

5.2 Lamination onto substrate

3M™ Scotchlite™ Reflective Material – 9720 Silver Industrial Wash Transfer Film can be applied in form of trims, emblems and logos directly to many different types of substrates.

3M™ Scotchlite™ Reflective Material – 9720 Silver Industrial Wash Transfer Film can be laminated using the process conditions recommended below. Converters are advised to determine which configuration best suits their lamination process.

5.3 Lamination Process – Heat Press

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, HF welding, etc.) may also be used. Proper lamination parameters

must be determined for each substrate to assure adequate adhesion.

Substrate	Time (sec)	Temperature (°C)	Pressure (kg/cm ²)
Knitted Polyester	15	185	2
Polyester/Cotton	15	185	2
2-ply or 3-ply Polyester, Coated	15	185	2

- Preheat the press.
- 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 may be used to cover the transfer film and substrate during lamination, preventing the transfer of residues from the heat press to the surface of the reflective film.

5.4 Lamination Process – Heat Fusing

Work with lamination equipment which provides uniform heat and pressure.

The following recommendations are guidelines for conveyor belt heat fusing lamination. The actual belt speed shall mirror the time given in the table below and depends on the machine type used. Proper lamination parameters must be determined for each substrate to assure adequate adhesion.

Substrate	Time (sec)	Temperature (°C)	Pressure (kg/cm ²)
Knitted Polyester	13 – 15	175 – 185	1.5
Polyester/Cotton	15	175 – 185	1.5
2-ply or 3-ply Polyester, Coated	13	175 – 185	1.5

- Parameters for other specific machines or substrates, please contact your 3M representative.
- For future references carefully record all application parameters for each substrate and application.
- Following these parameters is essential to avoid variations in quality due to changes of machine set-up.

Note:

- In general 3M™ Scotchlite™ Reflective Material – 9720 Silver Industrial Wash Transfer Film is not recommended for polyamide fabrics. The adhesion on polyamides such as Nylon is often not satisfying.
- Lamination onto polyurethane/polyvinylchloride coated substrates or other fabrics with a heat sensitive surface is not recommended. High lamination temperatures can damage the substrate and lower temperatures than recommended might result in unsatisfactory adhesion of the transfer film.

- Substrate finishes such as silicone, paraffin, 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 – 9720 Silver Industrial Wash Transfer Film 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 assure uniform day time colour appearance.
- Production dependent colour 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.

5.5 Silk Screen Printing

3M™ Scotchlite™ Reflective Material – 9720 Silver Industrial Wash Transfer Film should be silk screen printed after the application to avoid residues from the ink affecting the adhesive performance of the transfer film.

3M™ Scotchlite™ Reflective Material – 9720 Silver Industrial Wash Transfer Film can be printed using either silk screen or rotary printing methods.

Due to the product construction, durable prints on glass bead products are difficult to obtain.

Choice of ink will depend upon usage condition and care procedure. User should make test applications and select the appropriate care instruction for the finished product to ensure adequate adhesion of the ink. It is recommended to test the ink adhesion on the actual batch of 3M™ Scotchlite™ Reflective Material – 9720 Silver Industrial Wash Transfer Film being used before production.

When illuminated by e.g. vehicle headlights, opaque silk screen printing inks will appear black and greatly diminishes the brightness in the printed areas, transparent inks will reduce brightness when viewed as retroreflected light at low light conditions.

Note:

It is the responsibility of the converter to ensure the compatibility of ink with the reflective material and the suitability of the printing process.

For more information please refer to 3M Technical Information “Printing Guidelines for Glass Bead Products”.

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.

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 bases may affect the aesthetic appearance of 3M™ 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 3M™ 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.

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.
- No additional bleaches.
- Before the use of micro-emulsions tests are needed to determine the feasibility of the particular detergent.
- Do not overdry.

Before use, the suitability of the intended care process for 3M™ Scotchlite™ Reflective Material – 9720 Silver Industrial Wash Fabric 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 9720 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.

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 hydroxide or potassium hydroxide.
- Controlled detergent dosage should give actual wash lye concentration not exceeding those detailed below.

Parameter	Recommended	Maximum
pH- value	10.5 to 11.0	≤ 11.6
Active Alkalinity Na ₂ O sodium oxide	≤ 650 mg/l	≤ 1000 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 BaCl₂ 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.

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

7.2.2 No chlorine bleach

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

7.2.3 Drying conditions

Tumble Dry

- Load ratio: 1:25.
- 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. Maximum drying time should not exceed 20 minutes.

Tunnel finish

- For 3M™ Scotchlite™ Reflective Material – 9720 Silver Industrial Wash Transfer Film laminated to polyester/cotton fabrics with an area weight of 230-270 g/m².
- Inlet temperature should not exceed 160°C.
- The drying time should not exceed 7 minutes.
- Spray steam pressure should not exceed 4 bar.

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



7.3.1 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

Detergent: Brand 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 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.



7.3.2 Do not use additional bleach.

- No chlorine bleach.
- Do not presoak laundry even in a low concentration of any 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 Ironing Conditions

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

8. Product Maintenance

8.1 Maintenance Misuse

3M™ Scotchlite™ Reflective Material – 9720 Silver Industrial Wash Transfer Film 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 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 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”

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 – 9720 Silver Industrial Wash Transfer Film can also be diminished in extreme weather conditions.

- Test results show, that 3M™ Scotchlite™ Reflective Material – 9720 Silver Industrial Wash 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. 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.

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.



3M Deutschland GmbH
Carl-Schurz-Str. 1
41453 Neuss

Phone 1-800-328-3908
Fax 1-800-328-3909
E-Mail areaofexpertise@mmm.com
Web mmm.com/areaofexpertise

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