

3M™ Scotchlite™ Reflective Material – Product Bulletin

C790 Carbon Black Stretch Transfer Film

1. Product Description

3M™ Scotchlite™ Reflective Material – C790 Carbon Black Stretch Transfer Film is designed for use on athletic and casual wear. C790 Carbon Black Stretch Transfer Film is composed of wide angle, exposed retroreflective lenses.

2. Product Features

The coefficient of retroreflection (RA, in cd/lux/m²) of 3M™ Scotchlite™ Reflective Material is measured by methods based on either of the following retroreflective intensity testing procedures:

- ASTM E809-02 and E810-03 (RA)
- CIE 54.2:2001 (R')

2.1 Product Design

3M™ Scotchlite™ Reflective Material – C790 Carbon Black Stretch Transfer Film contains a stretchy polyurethane adhesive. This reflective transfer film has a black daytime appearance while is highly reflective at nighttime. Due to its high reflectivity and high angularity, the daytime appearance of the black color may change based on your viewing angle. The product is designed for low temperature lamination over a wide variety of fabrics, including those requiring high stretch such as spandex.

2.2 Not Certified for Occupational Use

The 3M™ Scotchlite™ Reflective Material – C790 Carbon Black Stretch Transfer Film is designed for consumer use. It is not feasible for use on occupational clothing as the only reflective material. It can be used as an addition to Scotchlite reflective materials, which fulfill the regulation requirements for occupational clothing. If you require such Scotchlite reflective material designed for occupational use, please consult the 3M website at Scotchlite.com or contact 3M Technical Service for additional assistance with product selection.

2.3 Special Feature

3M™ Scotchlite™ Reflective Material – C790 Carbon Black Stretch Transfer Film:

- Offers enhanced resistance against abrasion and chemicals

- Is manufactured within an ISO 9001 controlled manufacturing environment to ensure consistency of performance.

3. General Safety Information

While use of 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. Customers should be aware that 3M presents a Scotchlite reflective material product portfolio that offers a range of product attributes, and users should test the reflective material on their finished garments to satisfy conformance to their own requirements. The following Scotchlite reflective material – C790 Carbon Black Stretch Transfer Film will have a minimum reflectivity R_A^4 greater than 100 after 50 wash cycles when washed per ISO 6330:2000 Textiles – Domestic washing and drying procedure for textile testing, Method 5A (40 °C) as noted.

4. Product Application

3M™ Scotchlite™ Reflective Material – C790 Carbon Black Stretch Transfer Film is a highly durable material **recommended** for garments subjected to **domestic wash care procedures**.

Non-Occupational Application

Clothing for pedestrians, joggers, cyclists and children.

Occupational Applications

Only as addition to already existing application, which fulfills the regulation requirements Example: Logos, lettering.

5. Product Converting

Whenever two or more pieces of Scotchlite reflective material are used together on a single surface or as a set, they should be matched to ensure uniform daytime color and nighttime retroreflectivity. All high visibility safety garments should be constructed in accordance with the appropriate standard(s).

5.1 Cutting

Die-cutting is recommended, although it can also be hand-cut or guillotined. For 3M™ Scotchlite™ Reflective Material – Transfer Films with a white paper liner, the protective white paper liner should not be used as the carrier when applying (laminating) plotter cut and weeded images; the exposed liner may adhere to certain fabrics at recommended lamination temperatures. For these applications 3M™ Scotchlite™ Reflective Material – 5807 Custom Cuttable Transfer Film is recommended.

5.2 Heat Lamination

- 1. Work on a flat surface where uniform heat and pressure can be applied. Avoid applying film over seams and stitches.
- 2. Remove transparent adhesive side liner exposing dry adhesive. Do not remove reflective side liner.
- 3. Place Scotchlite reflective material – transfer film on substrate with the adhesive side down and apply heat and pressure as described in the table below. Place a non-stick slip sheet between the platen and laminating surface to prevent any excess adhesive transfer contamination.
- 4. Allow application to cool to room temperature before removing the liner covering the reflective side (if the product has one). Place application on a flat surface and remove the paper liner by lifting one corner and pulling (about 45° angle) in a continuous, smooth manner. Some products may not have a reflective side liner; see the table for information.

Product Number	Temperature	Dwell Time (seconds)	Line Pressure
C790 Carbon Black Stretch Transfer Film	120-130 °C	20-25	2 bar

5.2.1 Additional Precautions for Heat Lamination

- 1. Do not exceed lamination temperatures listed above as the paper liner may become difficult to remove. If high temperatures are required for bond durability, follow lamination steps 1-3 using recommended temperature, remove paper liner, and then laminate again at the higher temperature (using a non-stick slip sheet to protect reflective surface).
- 2. The lamination temperature, time, and pressure listed above should be used as a guide. Each substrate and reflective film combination should be tested to determine the best set of conditions that will meet customer requirements.
- 3. Other lamination methods, such as roll to roll or heat fusing, can also be used unless noted.
 The proper temperature, time, and pressure conditions must be tested for each fabric to ensure adequate adhesion and physical performance.

- 4. 3M™ Scotchlite™ Reflective Material – C790 Carbon Black Stretch Transfer Film should not be used for HF welding.

Note:

- In general 3M™ Scotchlite™ Reflective Material – C790 Carbon Black Stretch Transfer Film is not recommended for polyamide fabrics. The adhesion on polyamides such as Nylon is often not satisfying.
- Lamination on coated substrates might require reduced lamination temperature and time to prevent surface damages. 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.
- 5. The reflective surface of Scotchlite reflective material can be difficult to adhere to and caution is required when applying other materials to it. If you are laminating a 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.

5.3 Printing

Screen Printing – Images may be printed on the surface of some Scotchlite reflective material. All inks should be continuously tested to ensure acceptable adhesion in the event of changes occurring in the manufacturing process or composition of the ink. Prior to printing, wiping the surface with a soft cloth lightly dampened with isopropyl alcohol may help ink adhesion. Printed areas will not be retroreflective. Please refer to 3M Technical Bulletin “Recommendations for Screen Printing Inks for 3M™ Scotchlite™ Reflective Material – Transfer Films, Pressure Sensitive Adhesive Films, Fabrics and Trims” for ink and application recommendations.

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™ 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™ 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 or microemulsions.
- No additional bleaches.

Before use, the suitability of the intended care process for 3M™ Scotchlite™ Reflective Material – C790 Carbon Black Stretch Transfer Film 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:	40 °C
Max. wash time at highest wash temperature:	12 minutes
Max. program time:	50 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.

Detergent used at wash temperatures higher than 40 °C should not contain oxidizing chemicals (e.g. sodium perborate bleach) or organic solvents.

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. Damp dry only.

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.



7.4 Ironing Conditions

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

8. Product Maintenance

8.1 Maintenance Misuse

3M™ Scotchlite™ Reflective Material – C790 Carbon Black Stretch Transfer Film is an optical system. Coating of the fabric 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 spray or shoe shine.

8.2 Inspection

Retroreflective materials should be maintained in good condition and inspected regularly for signs of damage or deterioration.

For specific guidance contact your 3M representative.

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 – C790 Carbon Black Stretch Transfer Film can also be diminished in extreme weather conditions.

- 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.



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