



Scotchlite™
Reflective Material

3M™ Scotchlite™ Reflective Material – Product Bulletin

C790 Carbon Black Stretch Transfer Film

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.

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

2.2 Not Certified for Occupational Use

The 3M™ Scotchlite™ Reflective Material – C790 Carbon Black Stretch Transfer Film is designed for consumer use.

If you require 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.

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 RA4 greater than 100 after 50 wash cycles when washed per ISO 6330:2020 Textiles – Domestic washing and drying procedure for textile testing, Method 4N (40°C) as noted.

- Field test the finished garment to verify suitability for intended use and for the selection of appropriate care conditions.

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.

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

3M™ Scotchlite™ Reflective Material – C790 Carbon Black Stretch Transfer Film can be hand cut, die-cut or guillotined (max. 5 cm stack height). Use very sharp cutting knives only and cut from the reflective side.

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 – Product Bulletin C790 Carbon Black Stretch Transfer Film Reflective Material – 5807 Custom Cuttable Transfer Film is recommended.

5.2 Lamination onto substrate

3M™ Scotchlite™ Reflective Material – C790 Carbon Black Stretch Transfer Film can be applied in form of trims, emblems and logos directly to many different types of substrates.

3M™ Scotchlite™ Reflective Material – C790 Carbon Black Stretch 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 on a flat surface where uniform heat and pressure can be applied.

The following recommendations are guidelines for heat press lamination. Other lamination methods (roll-to-roll, heat fusing, hot air etc.) may also be used.

3M™ Scotchlite™ Reflective Material – C790 Carbon Black Stretch Transfer Film should not be used for HF welding. Proper lamination parameters must be determined for each substrate to assure adequate adhesion.

| Product | Time (s) | Temperature (°C) | Pressure (bar) |
|------------------|----------|------------------|----------------|
| Scotchlite™ C790 | 20 - 25 | 150 - 160 | 2.0 - 2.8 |

- Remove transparent adhesive side liner exposing dry adhesive. Do not remove reflective side 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 siliconized 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.
- 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.

- For 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 – C790 Carbon Black Stretch 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 could significantly affect the level of adhesion to the substrate.
- 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.

Prior to production, it is essential to test the actual 3M™ Scotchlite™ Reflective Material – C790 Carbon Black Stretch 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 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 or ISO 17353 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.

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™ 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 solvated detergents
- No additional bleaches
- Do not overdry.

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.

| Parameter | 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 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 40 °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 presoak 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.

Exhaust temperature should not exceed 70°C.

Do **not** overdry. Damp dry only.

Air Drying

Line drying is recommended where possible.

7.3 Dry cleaning conditions or

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.

| Parameter | Recommendation |
|--------------------------|-----------------------|
| Max. solvent temperature | 30 °C |
| 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 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

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 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 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.

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