



Preclear Reflective License Plate Sheeting

For Use on Multi-Year License Plates

Series 4770

Product Bulletin 4770

May 2014

Replaces PB 4770 dated January 2013

Description

3M™ Preclear Reflective License Plate Sheeting Series 4770 is a durable, all-weather, retroreflective sheeting consisting of lens elements enclosed within a transparent resin. Series 4770 sheeting is designed for use in the fabrication of multi-year reflective license plates. Plates can be embossed and roll coated with either transparent or opaque roll coating inks to produce attractive license plates which function 24 hours a day to enhance nighttime safety and the legibility of the vehicle identification system. Series 4770 sheeting appears similar during the day and at night (when viewed by reflected light) and is highly reflective when viewed both head-on and at wide entrance angles.

The backside of the reflective sheeting is pre-coated with a pressure sensitive adhesive, protected by a removable liner, for application to license plate substrates.

Series 4770 sheeting is available with personalized graphic designs which offer a unique opportunity to promote a country, state or national attraction, event or image while continuing to provide the motorist with the safety aspects of fully reflective license plates. Additional stretch and registry control equipment is required to process graphic printed sheetings.

3M sheetings, processing materials and equipment provide flexibility in the design of a license plate system, specific to the desires and requirements of plate issue relative to color, reflectivity, durability, design and plate manufacture.

Performance Considerations

Series 4770 license plate sheetings are designed for multi-year applications. Experience indicates that finished plates, processed and applied as recommended, will perform without appreciable fading, cracking, blistering or peeling for a period up to five years.

A. Reflectivity

The minimum reflectivity values of 3M sheeting series 4770 sheeting are shown in Table A.

Table A

Minimum Coefficient of Retroreflection
Candlepower per foot candle per Square Foot
Candelas per lux per Square Meter
(0.2° Observation Angle¹)

Sheeting Color		Entrance Angles ²	
		-4°	40°
White	4770	50	16
Yellow	4771	25	10
Red	4772	9	3
Gold	4773	25	10
Orange	4774	25	10
Lt. Blue	4776	18	7
Lt. Green	4777	18	7
Lemon Yellow	4781	25	10
Pastel Colors			
Salmon	PC751	35	12
Silver Gray	PC752	35	12
Sand	PC753	35	12
Sunflower	PC754	35	12
Lime Yellow	PC755	35	12
Sea Green	PC756	35	12
Sky Blue	PC757	35	12
Straw	PC758	35	12
Chamois	PC759	35	12

¹Observation (Divergence) Angle — The angle between the illumination axis and the observation axis.

²Entrance (Incidence) Angle — The angle from the illumination axis to the retroreflector axis. The retroreflector axis is an axis perpendicular to the retroreflective surface.

All measurements shall be conducted in accordance with ASTM E-810, "Standard Test Method for Coefficient of Retroreflection of Retroreflective Sheeting."

Measurements on reflective sheeting with a preprinted graphic design shall be taken in an unprinted sheeting area.

The reflectivity of the flat area of the same test plate, totally wet by rain, will not be less than 90% of the values specified in Table A. Wet performance measurements shall be conducted in accordance with ASTM E-810. Contact your 3M Technical Representative for wet performance measurement test set-up.

To measure the reflectivity values of applied 3M sheeting, prepare test plates as follows:

- Test plates of the same size and format as the actual issue must be produced of the same materials, on the same equipment, and by the same general process of metal cleaning, laminating, embossing or debossing and roll coating as production plates.
- The plates must be designed to have a minimum of 36 square inches (230 sq. cm) of flat area, in one section of the plate to facilitate photometric testing.
- All test plates should be conditioned for 24 hours at 72°F ± 5°C (22°C ± 1°C) and 50 ± 5% R.H. prior to testing.
- Each plate must be thoroughly hand washed (see Cleaning) prior to testing.

B. Adhesive

Test plates as prepared above will resist peeling, scuffing and marring from recommended application surfaces, during normal use handling, and resist shocking off when jabbed with a spatula at -10°F (-23°C).

Prior to application, the protective paper liner can be removed from the adhesive by peeling without soaking in water or other solvents. The liner can be removed after accelerated storage for 4 hours at 150°F (65°C) under a weight of 2.5 pounds per square inch (0.18 kg/cm²).

Fabrication of Reflective License Plates

Note: For recommended manufacturing procedures used in the fabrication of license plates refer to Information Folder 9.8.

A. Substrates

The pre-coated adhesive will form a permanent bond to the surface of clean, chemically treated or conversion coated aluminum substrates normally used in the manufacture of license plates and as

recommended by 3M. Contact your 3M Technical Representative for specific substrate recommendations.

B. Application

3M sheeting is designed for application to clean flat coil or sheet stock by continuous squeeze roll application.

A minimum of 48 hours storage after application of sheeting is recommended before embossing or debossing. Laminated blanks must be stored on edge and used within one year after date of receipt of the 3M sheeting for best embossing results.

C. Embossing and Debossing

The reflective sheeting as applied to flat metal is sufficiently flexible to permit the embossing or debossing requirements of most conventional license plate designs.

3M sheeting may be embossed or debossed up to 2mm or 0.080 inches with standard embossing equipment and dies used for license plate production. Minimum embossing temperature is 70°F (21°C).

To enhance the printability and quality of the embossed or debossed license plates, they must be roll coated within 24 hours.

D. Color Processing

The legend is applied to embossed or debossed plates by roller coating with the following 3M recommended high quality transparent or opaque inks. **Note:** Care should be taken in choosing color combinations to ensure attractiveness and maximum legibility. This is especially true with graphic design sheetings. To assure suitable contrast for maximum legibility and safety, 3M recommends use of dark color roll coated characters on a white or yellow reflective sheeting background.

E. Oven Dried Inks:

3M™ Series 4800 Opaque

3M™ Series 4850 Opaque

3M™ Series 4900 Transparent

3M™ Series 4950 Transparent

Contact your 3M Technical Representative for assistance with oven drying conditions. Cool the license plates to room temperature before packaging.

F. Dry Roll Coat Foils

Note: For recommended dry roller coating practices, refer to Product Bulletin HSF100/200. Use series HSF100 or 200 dry roller coat foils.

Contact your 3M Technical Service Representative for additional information on dry roller coating foils.

Cleaning

For maximum service, do not use abrasive, or chemically concentrated harsh cleaners. Use the same care as is used in cleaning the paint surface on the vehicle. The license plate surface should be cleaned of normal use dirt accumulation by washing with a mild detergent and water using a soft bristle brush or cloth. Following cleaning, the plate should be thoroughly rinsed with water.

To remove tar, oil, or road film, cautious use of mild solvents such as mineral spirits, turpentine, or kerosene may be employed. Use of aromatic solvents and ketones or solvent mixtures containing them should be avoided.

Storage

Sheeting and roll coat inks must be stored in their original package in a cool, dry area and should be used within one year after date of receipt.

General Characteristics and Packaging

The reflective sheeting as supplied will be of good appearance, free from ragged edges and cracks, and packaged according to commercial standards. The sheeting must be spliced for continuous roll application. Additional sheeting is supplied to compensate for splices.

Specifications

The information contained herein on 3M reflective sheeting Series 4770 is considered to describe typical minimum requirements for an effective reflective license plate material. As such, the information may be incorporated into a product purchase specification to be used in conjunction with a specification for finished retroreflective license plates.

3M assumes no responsibility for any injury, loss or damage arising out of the use of a product that is not of our manufacture. Where reference is made in literature to a commercially available product, made by another manufacturer, it shall be the user's responsibility to ascertain the precautionary measures for its use outlined by the manufacturer.

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Health and Safety Information

Read all health hazard, precautionary, and first aid statements found in the Material Safety Data Sheet, and/or product label of chemicals prior to handling or use.

FOR INFORMATION OR ASSISTANCE

CALL:

1-877-777-3571

IN CANADA CALL:

1-800-265-1840

Internet:

www.3M.com/mvss



Traffic Safety and Security Division

3M Center, Building 225-04-N-14
P.O. Box 33225
St. Paul, MN 55144-1000
www.3M.com/mvss

3M Canada Company

P.O. Box 5757
London, Ontario N6A 4T1
1-800-3MHELPS

3M México, S.A. de C.V.

Av. Santa Fe No. 55
Col. Santa Fe, Del. Alvaro Obregón
México, D.F. 01210

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