



Scotchlite™

Plus Flexible Reflective Sheeting

Series 680

Product Bulletin 680P

January 1997

Replaces PB 680P dated January 1994

Health and Safety Information

Read all health hazard, precautionary, and first aid statements found in the Material Safety Data Sheet (MSDS), and/or product label of chemicals prior to handling or use. Also refer to MSDS for information about the volatile organic compound (VOC) content of chemical products. Consult local regulations and authorities for possible restrictions on product VOC content and/or VOC emissions.

Description

3M™ Scotchlite™ Plus Flexible Reflective Sheeting Series 680 is a highly flexible, durable, adhesive-coated sheeting designed for the production of multi-color emblems and markings. When properly processed markings are viewed at night, they have the same appearance as during the day. Scotchlite sheeting 680-85 Black appears white at night.

The sheetings' flexibility is suited for application over corrugated surfaces, surfaces with rivets, flat or curved surfaces and resists cracking in cold climates. Series 680 sheeting retains reflectivity when totally wet by rain or when viewed at wide entrance angles.

Series 680 Sheeting	
Adhesive	Positionable Pressure Activated
Adhesive Color	White
Minimum application temperature (sheeting and substrate)	50°F (10°C) Flat surface without rivets
	55°F (13°C) Flat surface with rivets
Maximum application temperature (sheeting and substrate)	100°F (38°C)

Series 680 sheeting is distinguished from other types of Scotchlite sheeting by white adhesive and liner printed as follows:

Scotchlite Plus series 680 with Controltac™ Adhesive.

Retroreflectance (Coefficient of retroreflection)

The sheetings in the next column have the following typical coefficient of retroreflection expressed as candelas/footcandle/square foot (candelas/lux/square meter) when measured in accordance with ASTM E 810. This value should not be used for specification or purchase description purposes. If such values are needed contact your 3M Representative.

Color	-4° Entrance Angle and 0.2° Observation Angle
680 -10 White	100
-14 Orange	25
-64 Gold	65
-71 Yellow	60
-72 Red	20
-75 Blue	10
-76 Light Blue	10
-77 Green	15
-81 Lemon Yellow	40
-82 Ruby Red	20
-85 Black (reflects white)	30

The observation angle is between the illumination axis and the observation axis. The entrance angle is the angle from the illumination axis to the retroreflector axis. The retroreflector axis is an axis perpendicular to the retroreflective surface.

To assure uniform day and night appearance, multiple pieces of sheeting used together as a set should be matched. See IF 4.6 for further information.

Fabrication

Letters and characters should be a minimum height of 3" with a minimum stroke width of 3/8".

Contact your 3M Representative for detailed processing or application procedures.

A. Cutting - Hand cut, band saw, guillotine, or die cut per Information Folder 4.6. Letters or designs over 3" high can be kiss cut.

B. Drying - Refer to bulletin on the specific ink used for drying information.

C. Premasking/Prespacing

1. Premasked Markings: Application Tape SCPM-3.
2. Prespaced Markings: Prespacing Tape SCPS-2 or Application Tape SCPM-3.
3. Premasked/Prespaced Markings: Application Tape SCPM-3 or Prespacing Tape SCPS-2.
4. "Kiss Cut" Premasked/Prespaced Markings: Prespacing Tape SCPS-2.
5. Marking with 9720 UV Overprint Clear:
Premasking - SCPM-44X
Prespacing - SCPS-53

D. Scoring - Series 680 sheeting has an easy release liner and generally does not require scoring. However, if scoring is required, use a mechanical scoring device such as one supplied by the Pierce Company, San Mateo, CA. Score sheeting after color processing. The sheeting should be scored parallel to the printing in the liner.

E. Clear Coating - For stated durability, scree printed inks shall be clear coated using 4430R Overprint Clear, which can be oven or air dried.

F. Edge Sealing - Emblems subjected to severe abrasion of high pressure spray washing and emblems applied to railroad stock and petro-chemical tankers shall also be sealed using Scotchlite™ Edge Sealer 4433.

Application

See Information Folders 4.1, 4.2, and 4.3 for surface preparation and application.

Application to Uncured Substrates:

Bubbling can occur on uncured paints and some plastic substrates. Two-part polyurethane paints and clear coats may stop curing when ambient temperatures are below 75°F even when the surface feels cured (dry). The following test should be conducted to see if the surface is cured:

Apply a 6" x 6" piece of sheeting to the area to be marked. Allow to set in temperatures above 75°F for 48 hours. If no bubbling occurs, mark the vehicle. If bubbling occurs, allow the paint on the vehicles to cure in warm temperatures (above 75°F) and repeat the test.

Cleaning

Hand wash with sponge, cloth, or soft brush using warm water and detergent. Rinse thoroughly.

To remove grease, oil, or tar, use cloth moistened with heptane, VM&P naphtha or mineral spirits. Then wash with detergent and water and rinse thoroughly.

Storage

Store in a cool, dry area and use within one year after date of receipt. Store rolls in original shipping carton or suspend horizontally from a rod or pipe through the core. Store sheets flat. (Information Folder 4.5) Store clear coated, pre-masked markings at a temperature below 85°F (29°C). If stored above this temperature, blocking of the premask to the sheeting could occur.

Shelf Life

Unprinted film may be stored by the fabricator for a period of up to one year and, after printing, markings may be stored for an additional period of up to one year. Sheeting and markings must be stored in a clean area, free from excessive moisture and direct sunlight, with ambient temperatures of 100°F (38°C) or less.

General Performance Considerations

Maximum durability of Series 680 sheetings will result from fabrication and application according to 3M recommendations and exposure of less than 10° from the vertical. Angular exposure greater than 10° from vertical may reduce durability. Horizontal exposure is not recommended.

Warranty

Minnesota Mining and Manufacturing Company (3M) warrants that Scotchlite™ Plus Flexible Reflective Sheeting Series 680 sold by 3M to be used for emblems and markings in the United States and Canada will remain effective for its intended use, subject to the following provision:

*Warranty Period-Years

<u>Sheeting Color</u>	Canada and U.S. Except Desert Southwest (AZ, NM, and desert areas of NV, CA, UT, and TX)		<u>Desert Southwest</u>	
	<u>Vertical ± 10°</u>	<u>10-45° From Vertical</u>	<u>Vertical ± 10°</u>	<u>10-45° From Vertical</u>
All except Black	7	5	5	0
Black	5	3	4	0
<u>Process Colors</u>				
3900 & 4400 with 4430R	7	5	5	0
9700 with 9720 UV	7	5	5	0
3900 & 4400 with 9720 UV	6	4	5	0
4400 4C with 4430R	5	3	4	0
9700 4C with 9720 UV	5	3	4	0

*Exposure at angles greater than 45° from vertical is not warranted.

If Scotchlite flexible reflective sheeting is processed and applied in accordance with all 3M application and fabrication procedures provided in 3M's product bulletins, information folders, technical memos (which will be furnished to the agency upon request), including the exclusive use of 3M matched component systems, process colors, clear coatings, protective overlay films, application tapes, and recommended application equipment; and

If the emblem or marking deteriorates due to natural causes; such as fading, cracking, peeling, lifting, or discoloration; 3M's sole responsibility and purchaser's and user's exclusive remedy shall be that 3M will provide replacement of the 3M materials per the following table:

<u>Total Warranty Period</u>	<u>Full Replacement</u>	<u>Pro-Rata Replacement Period</u>	<u>Monthly Reduction in Allowance</u>
7 yrs. (84 mos)	52 months	53rd - 84th mo.	1/32
5 yrs. (60 mos)	36 months	37th - 60th mo.	1/24
4 yrs. (48 mos)	30 months	31st - 48th mo.	1/18
3 yrs. (36 mos)	24 months	25th - 36th mo.	1/12
2 yrs. (24 mos)	18 months	19th - 24th mo.	1/6

In the event of a problem arising in fabrication, application, or performance of the graphics manufactured from Controltac *Plus* product Series 680, 3M will also reimburse a portion of the labor and other costs incurred in correcting the situation involved in the approved complaint. The amount of reimbursement will be determined by 3M on a case-by-case basis taking into account the expected amount of labor needed to make such repairs and other similar considerations. In the case of failure outside the initial full replacement period, the Adjustment Schedule above also will apply to reimbursement of the labor and other costs. This labor reimbursement provision applies to standard products only.

Conditions

Such failure must be solely the result of design or manufacturing defects in the Scotchlite Flexible Reflective Sheeting and not of outside causes such as: improper fabrication, handling, maintenance or installation; use of process colors, thinners, coatings, or overlay films and sheetings not made by 3M; use of application procedures not recommended by 3M; failure of substrate; exposure to chemicals, abrasion and other mechanical damage from fasteners used to mount the emblem or marking; collisions, vandalism or malicious mischief.

3M reserves the right to determine the method of replacement.

Replacement sheeting will carry the unexpired warranty of the sheeting it replaces.

Claims made under this warranty will be honored only if 3M is notified of a failure within a reasonable time, reasonable information requested by 3M is provided, and 3M is permitted to verify the cause of the failure.

Limitation of Liability

3M's liability under this warranty is limited to replacement as stated herein, and 3M assumes no liability for any incidental or consequential damages, such as lost profits, business or revenues in anyway related to the product regardless of the legal theory on which the claim is based. THIS WARRANTY IS MADE IN LIEU OF ALL OTHER WARRANTIES OF MERCHANTABILITY, OF FITNESS FOR A PARTICULAR PURPOSE, AND ANY IMPLIED WARRANTY ARISING OUT OF A COURSE OF DEALING OR OF PERFORMANCE, CUSTOM OR USAGE OF TRADE.

**FOR INFORMATION OR ASSISTANCE
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