Science.
Applied to Life.™

Traffic Safety and Security Division

3M™ ElectroCut™ Film Series 1170

Product Bulletin 1170
October 2016

Replaces PB 1170 dated July 2007

Description

3M™ ElectroCut™ Film Series 1170 is a durable, transparent, acrylic film coated with a transparent, pressure-sensitive adhesive that is protected by a removable liner, available in the colors in Table 1.

Table 1. Product Codes by Color

Color	Product Code
Clear	1170C
Yellow	1171
Red	1172
Orange	1174
Blue	1175
Worboy Green*	1176
Green	1177
Black (Opaque)	1178
Brown	1179

*Standard green color for U.K., Australia, and New Zealand

Series 1170 is intended for use on 3M Reflective Sheeting as part of 3M's system of matched components for signing. Series 1170 has a clear pressure-sensitive adhesive compatible with all the following 3M reflective sheetings used in permanent signing:

3M Advanced Engineer Grade Prismatic Series 7930
3M Engineer Grade Prismatic Series 3430
3M Engineer Grade Series 3290
3M High Intensity Prismatic Series 3930 and 3930TT
3M Diamond Grade™ Series 3990 and 3990TT
3M Diamond Grade™ DG^3 Series 4000 and 4000TT
3M Diamond Grade™ Translucent DG^3 Reflective Sheeting 4090T

Additionally, 3M™ ElectroCut Film 1170C Clear must be used with the following 3M reflective sheetings:
3M Diamond Grade DG^3 Prismatic Digital Sheeting 4090DS (White)
3M High Intensity Prismatic Digital Sheeting 3930DS (White)

Series 1170 is designed with a special film liner for kiss-cutting on electronic cutting machines. Rolls are available prepunched for sprocket fed cutters or unpunched for flatbed or friction fed cutters. The colored films in the Series 1170 are often used instead of silk screened inks to provide transparent colored background copy for retroreflective street name signs and other traffic control signs. Various film widths are available to fabricate single sign panels up to 48 inches wide. For single panel signs requiring more than a single piece of sheeting or for multipanel signs such as guide signs, be sure to follow 3M color matching procedures in Information Folder 1.10 to achieve satisfactory results. For best color uniformity on a colored multipanel sign, all panels must be made from the same lot of Series 1170.

Properties

Transparent clear, yellow, red, orange, blue, worboy green, green, black (opaque), and brown versions of the Series 1170 applied to compatible 3M retroreflective sheetings listed in the above section can be expected to provide performance comparable to the integrally colored version of the same reflective sheeting. The coefficient of retroreflection of a white sheeting overlaid with the Series 1170 depends primarily on the overlay film transparency and the coefficient of retroreflection of the white base sheeting. Series 1170 applied on the compatible microprismatic 3M retroreflective sheetings listed in the above section according to 3M recommendations will yield chromaticity values within the chromaticity limits given in ASTM D4956-16.

Table 1 gives the resultant minimum and maximum coefficient of retroreflection (R_A) values for each transparent Series 1170 film as a percentage of the R_A of the white reflective base sheeting on which it is applied.

Table 2. Coefficient of retroreflection* (R_A) after application of colored film Series 1170 versus the R_A of the white base sheeting (expressed as %)

Film	Minimum (% of base sheeting)	Maximum (% of base sheeting)
1171 (Yellow)	60	80
1172 (Red)	14	24
1174 (Orange)	30	--
1175 (Blue)	6.5	20
1176 (Worboy Green)	8	14
1177 (Green)	13	20
1179 (Brown)	5	--

*R_A measurements shall be made at 0.2°observation angle, -4° entrance angle, and 0° rotation, per ASTM E810.

Film Liner

Series 1170 films have a transparent film release liner designed to aid the cutting process and the removal of the film weed after cutting.

Storage

Store in a cool, dry area 65-75° F (18-24° C), 30-50% relative humidity, and use within one year from date of receipt.

Fabrication – Cutting and Application Procedures

Important Note: Read and follow the manufacturer's operating manual carefully for proper use of cutting equipment.

1. Adjust knife pressure to cut cleanly through the film and slightly score the liner. A 30° blade works best.
2. A clean cutting blade is required. To remove adhesive build-up use a soft cloth dampened with mineral spirits, isopropyl alcohol or 3M™ Citrus Base Cleaner.
3. Avoid excessive flexing when handling film as this may cause film to release from the liner.
4. After cutting is complete, lay sheets flat, face to face, back to back. Always store sheets in this manner until the sheeting has been weeded and transfer tape has been applied to sheeting.
5. Use a stripping tool designed for weeding films that has a blunt (not a sharp) edge.
6. After weeding is completed, also store sheets flat, face to face and back to back, until transfer tape is applied.
7. TPM-5 Clear Transfer Tape is recommended for best results. SCPM-3 Application Tape is also satisfactory for use on small signs. Other transfer tapes are not recommended.
8. Transfer tape can be applied either by hand using a plastic squeegee or through a hand squeeze roll applicator (HSRA). If applying the transfer tape by hand, care must be taken to always squeegee from the center to the outside in both directions. If applying the transfer tape through the HSRA the air pressure must be at 30 psi to avoid stretching the premask during application, and the “lead” edge must be cut square and fed into the nip very carefully to avoid wrinkles in the Series 1170.
9. Film Series 1170 may be applied to the sheeting either before or after the sheeting has been applied to the substrate. Use of an HSRA is recommended to ensure satisfactory results. Use the “split liner method” – start in the middle of the sheet and remove half the liner to ensure proper alignment.
10. After film Series 1170 and sheeting have been applied, remove the transfer tape by carefully removing the tape at as low an angle as possible.
11. IMPORTANT! When the transfer tape has been removed, reroll the sign through the laminator to ensure good adhesion.
12. Excess or overhanging film Series 1170 should be trimmed using a sharp utility knife held at a 30° angle with the substrate.

Health and Safety Information

Read all health hazard, precautionary, and first aid statements found in the Safety Data Sheets (SDS) and Article Information Sheets for important health, safety and environmental information. To obtain SDSs and Article Information Sheets for 3M products, go to 3M.com/SDS, or by mail, or in case of an emergency, call 1-800-364-3577.

Warranty

For detailed warranty information, please refer to the sheeting product bulletins and the 3M™ MCS™ Warranty for Traffic and MCS Warranty Bulletins.

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.

Important Notice
All statements, technical information and recommendations contained herein are based on tests we believe to be reliable at the time of this publication, but the accuracy or completeness thereof is not guaranteed, and the following is made in lieu of all warranties, or conditions express or implied. Seller's and manufacturer's only obligation shall be to replace such quantity of the product proved to be defective. Neither seller nor manufacturer shall be liable for any injury, loss or damage, direct, special or consequential, arising out of the use of or the inability to use the product. Before using, user shall determine the suitability of the product for his/her intended use, and user assumes all risk and liability whatsoever in connection therewith. Statements or recommendations not contained herein shall have no force or effect unless in an agreement signed by officers of seller and manufacturer.

Traffic Safety and Security Division
3M Center, Building 0225-04-N-14
St. Paul, MN 55144-1000 USA
Phone 1-800-553-1380
Web 3M.com/roadwaysafety

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

Please recycle. Printed in USA

Electronic Only

Cutting, Premasking and Prespacing of 3M™ Reflective Sheetings

Information Folder 1.10 **September 2010**

Replaces IF 1.10 dated July 2007

Follow the Instructions

3M recommends only the standard practice outlined in this information folder. Procedures and materials which do not literally conform to these instructions are excluded. See warranty information in sheeting product bulletins.

Cutting Sheets

Reflective sheetings can be cut using a variety of techniques. Single sheets can be hand cut, die cut or electronically cut. Volume cutting can be accomplished by methods such as band sawing, roll cutting or guillotine cutting.

All cutting tools must be kept sharp and clean to minimize the possibility of damage to sheeting or film or adhesive transfer.

In order to reduce the possibility of stress cracking, the inside corners of cut out letters and symbols should be rounded using the largest radius consistent with acceptable appearance, but in no case less than 1/8-inch.

A. Electronic Cutting

All 3M reflective sheeting for permanent signing is electronic cuttable. Cutting can be accomplished on a flat bed plotter or friction fed plotter. Please contact 3M Traffic Safety Systems Division technical service for recommendations.

B. Hand Cutting

Single sheets may be hand-cut using a scissors, razor blade, or other cutting tool. The cutting edges must be kept sharp.

When cutting with a razor blade or other tool, lay the sheeting or film, liner side down, on a flat surface and cut from the face side.

C. Band Sawing General

A band saw can be used for general cutting of large sheets or for precision cutting of specific shapes.

1. Blade Selection

A "skip tooth" blade with few teeth per inch is used for cutting sheeting. It should have sufficient set for good clearance to prevent the teeth from filling. Blade specifications for two blades which have been used successfully are given below:

	Milford "Profile" Blade No. S-3104	Do-All "Buttress" Blade
Width	3/16"	3/16"
Pitch	4	4
Set	.042"	—
Gauge	.025"	.025"

The blade must be sharp in order to maintain a good edge when cutting curves and angles. When it dulls, the blade will begin to tear the sheeting, and must be changed.

2. Saw Speed/Stack Height

Corrected saw speeds are necessary for proper cutting. Do not use heavy pressure to accelerate cutting speed as it will overheat the blade. Recommended speeds and the maximum number of sheets to be cut in one stack are listed on page 2.

D. Bandsawing Unprocessed Symbols and Legends

To cut symbols and legends from unprocessed sheeting, stack the material on a sheet of 1/4 inch plywood, and butt the sheetings tightly against guide boards set along the sides of the stack (Figure 1). When the stack is complete, cover with 1/8-inch wallboard upon which the pattern to be cut has been drawn or silk screened.

Drive nails through the stack and into the plywood to hold it in place, then remove the stack from the assembly fixture and saw as one piece. Note: If material is to be cut liner side up, layout must be drawn in reverse.

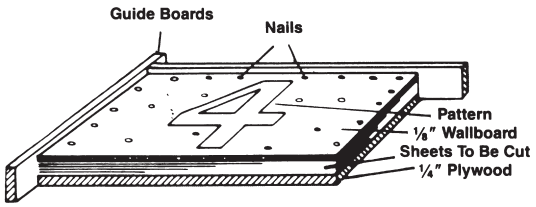

Figure 1

E. Bandsawing Printed Emblems and Copy

When printed markings or copy are to be sawed, make sure that each sheet in the stack is in register. This may be done by registering the sheets, during screen printing, against the guide boards when stacking the sheets for sawing (See Figure 1). For best results sheets should be squared at three points or more.

Another method to assure accurate stacking is to include register marks in the screen printing stencil so that the marks appear on each sheet (Figure 2). Screen the register marks on the plywood base, and drive a nail perpendicular from the bottom up through the plywood in the center of each register mark. Build the stack by pushing the nail through the center of each register mark on each sheet. When complete, the stack will be perfectly aligned and all sheets will be cut the same way.

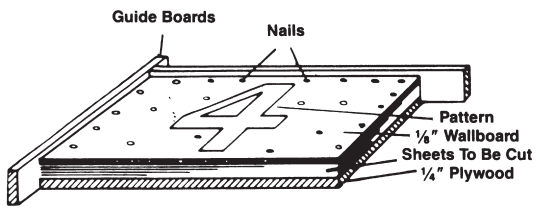

Figure 2

Not more than six sheets of 0.080 inch (2mm) or thicker aluminum may be cut in one stack; 10 sheets is the maximum stack height for aluminum which is less than 0.080: (2mm) thick.

F. Unmounted Bandsawing

Unmounted 3M reflective sheeting can be processed using a saw speed of 1000-1500 feet per minute and a maximum of 25 sheets.

G. Roll Cutting

Wide rolls can be cut to narrower widths using a roll cutting machine. The user must determine the accuracy and quality of cut for various sheetings.

H. Guillotine Cutter

Large volume cutting of straight edge sheets and markings can be easily and accurately accomplished using a guillotine-type cutter. The type and condition of the cutter and the technique employed will determine accuracy, tolerances, and quality of the cut. Evaluation of the process for the intended use is recommended prior to volume cutting.

The table under "Cutting Recommendations" gives maximum stack height for sheets 24 inches x 24 inches (61cm x 61cm) or larger. For smaller sheets reduce stack height accordingly.

Cardboard inserts can be used as counters in the larger stacks. If the bottom sheet(s) have a rough finish or small tabs after cutting, a piece of cardboard placed at the bottom of the stack will ensure a cleaner cut. Cardboard inserts are to be figured as a part of the total stack height.

To clean the blade of residual adhesive material, paper and film dust, wipe periodically with a cloth soaked in mineral spirits, then dry the blades thoroughly.* Sharp cutting blades are essential for good, clean cuts. If a blade is being used on an average of 8 hours per day, it should be resharpened every ten days.

*When using solvents for clean-up, it is essential that proper precautionary measures for handling such materials be observed.

Certain sheetings should be double cut as specified in the "Cutting Recommendations" table since the bevel edge of the blade tends to crack these materials. Therefore, when trimming, waste portion of any stack to be cut should rest against bevel edge of blade (Figure 3). If a stack is to be cut in half, allow sufficient area for additional trim cut of that edge which rests against bevel edge of blade.

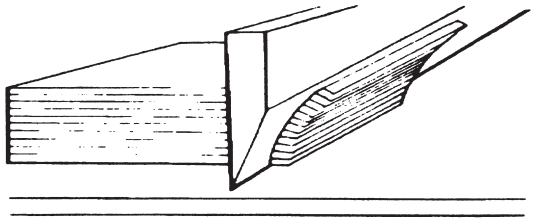

Figure 3

Some sheetings which have softer adhesives may tend to form tacky edges (adhesive ooze). To minimize ooze, the following procedures should be observed:

1. Ooze forms primarily on the flat side of the blade and not on the bevel side. Therefore, double cutting is not recommended.
2. Keep blade clean and sharp.
3. Cut in short stacks.
4. If adhesive ooze is encountered, it should be removed at the guillotine before the sheets are jobbed. Ooze can be removed easily by applying Scotch™ Masking Tape to the cut edge of the sheets. When the tape is removed, the adhesive ooze will adhere to the tape and be removed with the masking tape.
5. If adjustable, guillotine clamp bar pressure should be set at minimum.

I. Steel Rule Die Cutting

Large volume cutting can be effectively accomplished using the die cutting technique. Die cutting is usually done in a platen press so the work may be hand-fed. The material is fed into the press, using the same edges of the material, side guide and gripper edge that the printer uses for this register. With careful make-ready, the platen is raised until the entire die design is cutting cleanly. Single bevel and double bevel steel rule dies typically provide the best performance.

Radius corners are recommended on cut-out letters to avoid stress cracking. Minimum radius should be 1/8-inch on 3-inch letters. Care must be taken to insure prismatic sheeting is not damaged by the punching action of the die press.

Prespacing, Premasking and Transfer Tapes

Premasking and prespacing of sheeting simplifies the handling and application of markings and legends. 3M tapes fill these functions as follows:

Uses of Tapes

Application Aid

Application tapes when applied properly to mark sheeting, reduce stretching, wrinkling and air entrapment during hand application. The increased stiffness provided by the tape aids with the handling of marking (4 sq. ft. or larger), striping, intricate sign markings and for applications performed at high temperatures.

Imprinted Application Instructions

Application instructions and registry marks which aid in positioning and application can be imprinted on the surface of the tape.

Prespace Legends & Markings

Prespacing cut out letter legends eliminates the time-consuming layout of individual letters on the application surface.

Important: Color or clear processed sheeting must be dried thoroughly before application of tape. Follow drying procedure recommended for color and sheeting used.

Table 1

Tape	Recommended Use
SCPS-2 Prespacing Tape (White)	For prespacing legends which may or may not be premasked and for electronic cut letters and emblems.
SCPM-3 Application Tape (White)	Application Aid: Provides rigidity when liner is removed, reduces film stretching, wrinkling, and air entrapment during hand application, particularly helpful during hot weather or when applying large or intricately shaped emblems and letters.
TPM-5 Transfer Tape (Clear)	For premasking or applying prespaced legends wherever a clear transfer tape is desirable. Recommended for Series 1170 film.

Hand Application of Tapes

Sheets from which emblems are to be cut should be left unmasked 1/8-inch to 1/4-inch (3-6mm) along one of the edges that form the registry corner. This corner will normally be used for registry during cutting and its edge must be free of tape. The untaped edge will be removed in final die-cutting or trimming.

A. Strip application tape from roll and lay adhesive side up on table (Figure 5).

B. Drop material to be premasked into position face down on tape (Figure 6).

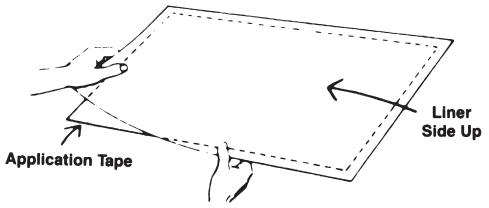

Figure 5

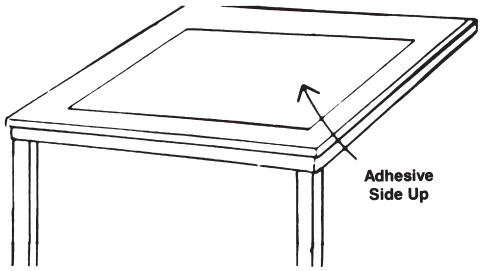

Figure 6

C. Squeegee to tape from center out (Figure 7).

D. Trim to size or cut to shape (Figure 8). Prespacing of letters smaller than 3/4-inch (1.9cm) on filigree and other intricate designs with narrow stroke widths must be on a test and approval basis.

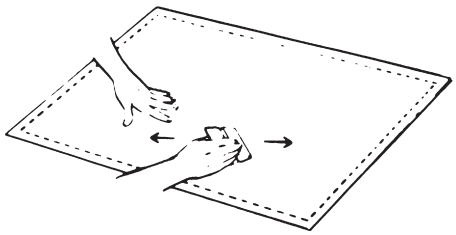

Figure 7

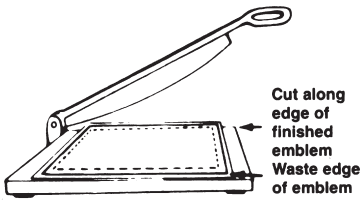

Figure 8

E. The 3M Hand Squeeze Roll Applicator may be used to apply premask, prespacing and transfer tapes. Reference IF 1.6.

F. Squeeze Roller Application
The Interstate Squeeze Roller Applicator may be used for premasking, prespacing and transfer tapes. Reference IF 1.4.

G. Storage
Store all tapes in a cool, dry area indoors and use tape within one year after date of purchase.

Store rolls of tape horizontally from the roll core. Do not expose tape to sunlight.

Taped sheeting should be applied within one year after assembly. Exposure to sunlight may cause the tape to permanently bond to the sheeting or film. Avoid stacking; if temporary stacking is necessary, follow stacking recommendations for sheeting or film being stacked.

H. Application of Premask or Prespaced Sheeting

The product combination of the taped sheeting may be applied by hand (IF 1.5), HSRA (IF 1.6) or powered squeeze roll (IF 1.4).

Important: To remove premask pull back on itself at 180º angle. After removal of the transfer tape, always resqueegee or reroll the sheeting.

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.

Literature Reference

IF 1.4 Instructions for the Interstate Squeeze Roll Applicator

IF 1.5 Hand Application Instructions for Reflective Sheeting and Scotchal™ Films with PSA

IF 1.6 Hand Squeeze Roll Applicators

FOR INFORMATION OR ASSISTANCE CALL:
1-800-553-1380

IN CANADA CALL:
1-800-265-1840

Internet:
www.3M.com/tss

Traffic Safety Systems Division
3M Center, Building 0235-03-A-09
St. Paul, MN 55144-1000
1-800-553-1380
www.3M.com/tss

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

Bolger 10090095
Electronic Only