

NEW

State of Maine**Master Agreement****Effective Date:** 10/01/18**Expiration Date:** 09/30/19**Master Agreement Description:** Reflective Adhesive Sheeting for Signs**Buyer Information**

William Allen

207-624-7871 ext. NULL WJE.Allen@maine.gov

Issuer Information

SHARON KRECHKIN

207-624-3038 ext. sharon.krechkin@maine.gov

Requestor Information

Sharon Krechkin

207-624-3038 ext. sharon.krechkin@maine.gov

Authorized Departments17A TRANSPORTATION
17D MOTOR TRANSPORT**Vendor Information****Vendor Line #: 1****Vendor ID**

VC1000000029

Vendor Name

3M CO

Alias/DBA**Vendor Address Information**

PO BOX 33225

ST PAUL, MN 55133-3225

US

Vendor Contact Information

DMV TSSD

877-777-3571 ext.

3Mtssdorders@mmm.com

Payment Discount Terms

Discount 1:	0.0000 %	30 Days
Discount 2:	%	0 Days
Discount 3:	%	0 Days
Discount 4:	%	0 Days

Commodity Information

Vendor Line #: 1

Vendor Name: 3M CO

Commodity Line #: 1

Commodity Code: 80149

Commodity Description: Reflective Adhesive Sheeting for Signs

Commodity Specifications:

Quantity 0.00000	UOM 	Unit Price \$0.00
Delivery Days 30	Free on Board	
Contract Amount \$0.00	Service Start Date	Service End Date
Catalog Name 3M Reflective Sheeting	Discount 0.0000 %	
	Discount Start Date 10/01/18	Discount End Date 09/30/19

MASTER AGREEMENT TERMS & CONDITIONS
MA 180907-027

COMMODITY ITEM: Reflective Adhesive Sheeting for Signs

CONTRACT PERIOD: Through September 30, 2019. The State of Maine with vendor approval can opt to issue up to one (1) one (1) year extensions.

VENDOR CONTACT PERSON: The contact person will help consumers place orders, inquire about orders that have not been delivered, all shipping issues, quality issues, and any issues pertaining to this Master Agreement. All orders not submitted through a DO will be sent through the contractor's contact person. The contact person will be: **Leslie A. O'Hara** Phone: **651-736-3528**
Email: laohara@mmm.com

EXTENSION OF CONTRACT: The Director of Procurement Services may, with the consent of the contractor extend the Contract period beyond the indicated expiration date.

CANCELLATION OF CONTRACT: The Division of Procurement Services reserves the right to cancel a contract with a thirty-day written notice OR cancel immediately if the contractor does not conform to terms and conditions and specifications of contract.

PRICES: Prices shown are to be net including transportation charges fully pre-paid by the contractor FOB destination. Prices are to remain firm for the duration of the contract.

QUANTITIES: It is understood and agreed that the contract will cover the **actual quantities** required by State Agency over the length of the contract.

ORDERING PROCEDURE: Delivery orders (DO) will be created in AdvantageME for all orders over \$5000.00. If a DO is used, the DO will be e-mailed to the email address set up in AdvantageME by the Vendor as a .pdf file. Orders less than \$5000.00 can be ordered using a P-Card.

INVOICES and PAYMENT: The Contractor shall submit an itemized bill to the Department for materials following delivery for approval and payment. Invoices shall minimally include the following:
Contractor name, address & Contract Number 18P 180907-027, Invoice Date & Number

DELIVERY: The Contractor will be responsible for the delivery of material in first class condition at the point of delivery, and in accordance with good commercial practice.

QUARTERLY REPORT: The Division of Procurement Services **requires a quarterly report of sales** be faxed to 207-287-6578 within 30 days of the end of each calendar quarter. It will be the responsibility of the vendor to produce a quarterly report. The report must include the dollar value of goods purchased, broken down by Department as well as the total dollar value of purchases made by all Departments.

PROCUREMENT CARD: State policy requires vendors to accept the State of Maine Procurement Card (P-Card) as a form of payment, with very rare exceptions. Your company will be required to accept these cards. The pricing offered to the State of Maine shall be the final cost to the State of Maine regardless of payment method. No surcharge or other compensation will be allowed. The State of Maine reserves the right to reject your bid if you are unwilling to accept this condition.

STATE OF MAINE

GENERAL TERMS AND CONDITIONS FOR GOODS AND/OR SERVICES UNDER BUYER PURCHASE ORDERS (BPOs) AND MASTER AGREEMENTS (MAs)

1. **DEFINITIONS:** The following definitions are applicable to these standard terms and conditions:
 - a. The term “Buyer” or “State” shall refer to the Government of the State of Maine or a person representing the Government of the State of Maine.
 - b. The term “Department” or “DAFS” shall refer to the State of Maine Department of Administrative and Financial Services.
 - c. The term “Bureau” or “BGS” shall refer to the State of Maine Bureau of General Services.
 - d. The term “Division” shall refer to the State of Maine Division of Purchases.
 - e. The term “Contractor”, “Vendor”, or “Provider” shall refer to the organization that is providing goods and/or services through the contract to which these standard terms and conditions have been attached and incorporated.
 - f. The term “Contract” or “Agreement” shall refer to the contract document to which these standard terms and conditions apply, taking the format of a Buyer Purchase Order (BPO) or Master Agreement (MA) or other contractual document that is mutually agreed upon between the State and the Contractor.

2. **WARRANTY:** The Contractor warrants the following:
 - a. That all goods and services to be supplied by it under this Contract are fit and sufficient for the purpose intended, and
 - b. That all goods and services covered by this Contract will conform to the specifications, drawing samples, symbols or other description specified by the Division, and
 - c. That such articles are merchantable, good quality, and free from defects whether patent or latent in material and workmanship, and
 - d. That all workmanship, materials, and articles to be provided are of the best grade and quality, and
 - e. That it has good and clear title to all articles to be supplied by it and the same are free and clear from all liens, encumbrances and security interest.

Neither the final certificate of payment nor any provision herein, nor partial nor entire use of the articles provided shall constitute an acceptance of work not done in accordance with this agreement or relieve the Contractor liability in respect of any warranties or responsibility for faulty material or workmanship. The Contractor shall remedy any defects in the work and pay any damage to other work resulting therefrom, which shall appear within one year from the date of final acceptance of the work provided hereunder. The Division of Purchases shall give written notice of observed defects with reasonable promptness.

3. **TAXES:** Contractor agrees that, unless otherwise indicated in the order, the prices herein do not include federal, state, or local sales or use tax from which an exemption is available for purposes of this order. Contractor agrees to accept and use tax exemption certificates when supplied by the Division as applicable. In case it shall ever be determined that any tax included in the prices herein was not required to be paid by Contractor, Contractor agrees to notify the Division and to make prompt application for the refund thereof, to take all proper steps to procure the same and when received to pay the same to the Division.

4. **PACKING AND SHIPMENT:** Deliveries shall be made as specified without charge for boxing, carting, or storage, unless otherwise specified. Articles shall be suitably packed to secure lowest

transportation cost and to conform to the requirements of common carriers and any applicable specifications. Order numbers and symbols must be plainly marked on all invoices, packages, bills of lading, and shipping orders. Bill of lading should accompany each invoice. Count or weight shall be final and conclusive on shipments not accompanied by packing lists.

5. DELIVERY: Delivery should be strictly in accordance with delivery schedule. If Contractor's deliveries fail to meet such schedule, the Division, without limiting its other remedies, may direct expedited routing and the difference between the expedited routing and the order routing costs shall be paid by the Contractor. Articles fabricated beyond the Division's releases are at Contractor's risk. Contractor shall not make material commitments or production arrangements in excess of the amount or in advance of the time necessary to meet delivery schedule, and, unless otherwise specified herein, no deliveries shall be made in advance of the Division's delivery schedule. Neither party shall be liable for excess costs of deliveries or defaults due to the causes beyond its control and without its fault or negligence, provided, however, that when the Contractor has reason to believe that the deliveries will not be made as scheduled, written notice setting forth the cause of the anticipated delay will be given immediately to the Division. If the Contractor's delay or default is caused by the delay or default of a subcontractor, such delay or default shall be excusable only if it arose out of causes beyond the control of both Contractor and subcontractor and without fault of negligence or either of them and the articles or services to be furnished were not obtainable from other sources in sufficient time to permit Contractor to meet the required delivery schedule.

6. FORCE MAJEURE: The State may, at its discretion, excuse the performance of an obligation by a party under this Agreement in the event that performance of that obligation by that party is prevented by an act of God, act of war, riot, fire, explosion, flood or other catastrophe, sabotage, severe shortage of fuel, power or raw materials, change in law, court order, national defense requirement, or strike or labor dispute, provided that any such event and the delay caused thereby is beyond the control of, and could not reasonably be avoided by, that party. The State may, at its discretion, extend the time period for performance of the obligation excused under this section by the period of the excused delay together with a reasonable period to reinstate compliance with the terms of this Agreement.

7. INSPECTION: All articles and work will be subject to final inspection and approval after delivery, notwithstanding prior payment, it being expressly agreed that payment will not constitute final acceptance. The Division of Purchases, at its option, may either reject any article or work not in conformity with the requirements and terms of this order, or re-work the same at Contractor's expense. The Division may reject the entire shipment where it consists of a quantity of similar articles and sample inspection discloses that ten (10%) percent of the articles inspected are defective, unless Contractor agrees to reimburse the Division for the cost of a complete inspection of the articles included in such shipment. Rejected material may be returned at Contractor's risk and expense at the full invoice price plus applicable incoming transportation charges, if any. No replacement of defective articles of work shall be made unless specified by the Division.

8. INVOICE: The original and duplicate invoices covering each and every shipment made against this order showing Contract number, Vendor number, and other essential particulars, must be forwarded promptly to the ordering agency concerned by the Vendor to whom the order is issued. Delays in receiving invoice and also errors and omissions on statements will be considered just cause for withholding settlement without losing discount privileges. All accounts are to be carried in the name of the agency or institution receiving the goods, and not in the name of the Division of Purchases.

9. ALTERATIONS: The Division reserves the right to increase or decrease all or any portion of the work and the articles required by the bidding documents or this agreements, or to eliminate all or any portion of such work or articles or to change delivery date hereon without invalidating this Agreement. All such alterations shall be in writing. If any such alterations are made, the contract amount or amounts shall be adjusted accordingly. In no event shall Contractor fail or refuse to continue the performance of the work in providing of articles under this Agreement because of the inability of the parties to agree on an adjustment or adjustments.

10. TERMINATION: The Division may terminate the whole or any part of this Agreement in any one of the following circumstances:

- a. The Contractor fails to make delivery of articles, or to perform services within the time or times specified herein, or
- b. If Contractor fails to deliver specified materials or services, or
- c. If Contractor fails to perform any of the provisions of this Agreement, or
- d. If Contractor so fails to make progress as to endanger the performance of this Agreement in accordance with its terms, or
- e. If Contractor is adjudged bankrupt, or if it makes a general assignment for the benefit of its creditors or if a receiver is appointed on account of its insolvency, or
- f. Whenever for any reason the State shall determine that such termination is in the best interest of the State to do so.

In the event that the Division terminates this Agreement in whole or in part, pursuant to this paragraph with the exception of 8(f), the Division may procure (articles and services similar to those so terminated) upon such terms and in such manner as the Division deems appropriate, and Contractor shall be liable to the Division for any excess cost of such similar articles or services.

11. NON-APPROPRIATION: Notwithstanding any other provision of this Agreement, if the State does not receive sufficient funds to fund this Agreement and other obligations of the State, if funds are de-appropriated, or if the State does not receive legal authority to expend funds from the Maine State Legislature or Maine courts, then the State is not obligated to make payment under this Agreement.

12. COMPLIANCE WITH APPLICABLE LAWS: Contractor agrees that, in the performance hereof, it will comply with applicable laws, including, but not limited to statutes, rules, regulations or orders of the United States Government or of any state or political subdivision(s) thereof, and the same shall be deemed incorporated herein by reference. Awarding agency requirements and regulations pertaining to copyrights and rights in data. Access by the grantee, the subgrantee, the Federal grantor agency, the Comptroller General of the United States, or any of their duly authorized representatives to any books, documents, papers and records of the Contractor which are directly pertinent to that specific contract for the purpose of making audit, examination, excerpts, and transcriptions. Retention of all required records for three years after grantees or subgrantees make final payments and all other pending matters are closed. Compliance with all applicable standards, orders, or requirements issued under section 306 of the Clean Air Act (42 U.S.C. 1857(h), section 508 of the Clean Water Act, (33 U.S.C. 1368), Executive Order 11738, and Environmental Protection Agency regulations (40 CFR part 15). (Contracts, subcontracts, and subgrants of amounts in excess of \$100,000). Mandatory standards and policies relating to energy efficiency which are

contained in the state energy conservation plan issued in compliance with Energy Policy and Conservation Act (Pub. L. 94-163, 89 Stat. 871).

13. INTERPRETATION: This Agreement shall be governed by the laws of the State of Maine as to interpretation and performance.

14. DISPUTES: The Division will decide any and all questions which may arise as to the quality and acceptability of articles provided and installation of such articles, and as to the manner of performance and rate of progress under this Contract. The Division will decide all questions, which may arise as to the interpretation of the terms of this Agreement and the fulfillment of this Agreement on the part of the Contractor.

15. ASSIGNMENT: None of the sums due or to become due nor any of the work to be performed under this order shall be assigned nor shall Contractor subcontract for completed or substantially completed articles called for by this order without the Division's prior written consent. No subcontract or transfer of agreement shall in any case release the Contractor of its obligations and liabilities under this Agreement.

16. STATE HELD HARMLESS: The Contractor agrees to indemnify, defend, and save harmless the State, its officers, agents, and employees from any and all claims and losses accruing or resulting to any and all contractors, subcontractors, material men, laborers and other persons, firm or corporation furnishing or supplying work, services, articles, or supplies in connection with the performance of this Agreement, and from any and all claims and losses accruing or resulting to any person, firm or corporation who may be injured or damaged by the Contractor in the performance of this Agreement.

17. SOLICITATION: The Contractor warrants that it has not employed or written any company or person, other than a bona fide employee working solely for the Contractor to solicit or secure this Agreement, and it has not paid, or agreed to pay any company, or person, other than a bona fide employee working solely for the Contractor any fee, commission, percentage, brokerage fee, gifts, or any other consideration, contingent upon, or resulting from the award for making this Agreement. For breach or violation of this warranty, the Division shall have the absolute right to annul this agreement or, in its discretion, to deduct from the Agreement price or consideration, or otherwise recover the full amount of such fee, commission, percentage, brokerage fee, gifts, or contingent fee.

18. WAIVER: The failure of the Division to insist, in any one or more instances, upon the performance of any of the terms, covenants, or conditions of this order or to exercise any right hereunder, shall not be construed as a waiver or relinquishment of the future performance of any such term, covenant, or condition or the future exercise of such right, but the obligation of Contractor with respect to such future performance shall continue in full force and effect.

19. MATERIAL SAFETY: All manufacturers, importers, suppliers, or distributors of hazardous chemicals doing business in this State must provide a copy of the current Material Safety Data Sheet (MSDS) for any hazardous chemical to their direct purchasers of that chemical.

20. COMPETITION: By accepting this Contract, Contractor agrees that no collusion or other restraint of free competitive bidding, either directly or indirectly, has occurred in connection with this award by the Division of Purchases.

21. INTEGRATION: All terms of this Contract are to be interpreted in such a way as to be consistent at all times with this Standard Terms and Conditions document, and this document shall take precedence over any other terms, conditions, or provisions incorporated into the Contract.

SUPPLIER PART NUMBER	ITEM DESCRIPTION	EXTENDED DESCRIPTION	UNIT OF MEASURE	LIST PRICE	DELIVERY DAYS
LDS-W346	Linear Delineation Strip, Diamond Grade, 34x6, White	34 Inch x 6 inch, 50 per Case	Case	\$487.88	30
LDS-FY346	Linear Delineation Strip, Diamond Grade, 34x6, Fl Yellow	34 Inch x 6 Inch, 50 per Case, Fluorescent Yellow	Case	\$596.28	30
LDS-W311.5	Linear Delineation Strip, Diamond Grade, 31x1.5, White	31 Inch x 1 1/2 Inch, 50 per Case	Case	\$445.25	30
LDS-FY311.5	Linear Delineation Strip, Diamond Grade, 31x1.5, Fl Yellow	31 Inch x 1 1/2 Inch, 50 per Case, Fluorescent Yellow	Case	\$445.25	30
LDS-W344	Linear Delineation Strip, Diamond Grade, 34x4, White	34 Inch x 4 inch, 50 per Case	Case	\$379.46	30
LDS-FY344	Linear Delineation Strip, Diamond Grade, 34x4, Fl Yellow	34 Inch x 4 Inch, 50 per Case, Fluorescent Yellow	Case	\$487.80	30
3200-38-W	Reflective Sheeting, Engineer Grade, 3200, 3/8, White	3/8 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesiv	RI	\$3.18	30
3200-34-W	Reflective Sheeting, Engineer Grade, 3200, 3/4, White	3/4 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesiv	RI	\$6.37	30
3200-1-W	Reflective Sheeting, Engineer Grade, 3200, 1, White	1 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesive	RI	\$8.50	30
3200-114-W	Reflective Sheeting, Engineer Grade, 3200, 1 1/4, White	1 1/4 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhes	RI	\$10.62	30
3200-2-W	Reflective Sheeting, Engineer Grade, 3200, 2, White	2 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesive	RI	\$17.00	30
3200-24-W	Reflective Sheeting, Engineer Grade, 3200, 24, White	24 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesive	RI	\$204.00	30
3200-30-W	Reflective Sheeting, Engineer Grade, 3200, 30, White	30 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesive	RI	\$255.00	30
3200-36-W	Reflective Sheeting, Engineer Grade, 3200, 36, White	36 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesive	RI	\$306.00	30
3200-48-W	Reflective Sheeting, Engineer Grade, 3200, 48, White	48 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesive	RI	\$357.00	30
3200-38-Y	Reflective Sheeting, Engineer Grade, 3200, 3/8, Yellow	3/8 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesiv	RI	\$3.18	30
3200-34-Y	Reflective Sheeting, Engineer Grade, 3200, 3/4, Yellow	3/4 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesiv	RI	\$6.37	30
3200-1-Y	Reflective Sheeting, Engineer Grade, 3200, 1, Yellow	1 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesive	RI	\$8.50	30
3200-114-Y	Reflective Sheeting, Engineer Grade, 3200, 1 1/4, Yellow	1 1/4 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhes	RI	\$10.62	30
3200-2-Y	Reflective Sheeting, Engineer Grade, 3200, 2, Yellow	2 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesive	RI	\$17.00	30
3200-24-Y	Reflective Sheeting, Engineer Grade, 3200, 24, Yellow	24 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesive	RI	\$204.00	30
3200-30-Y	Reflective Sheeting, Engineer Grade, 3200, 30, Yellow	30 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesive	RI	\$255.00	30
3200-36-Y	Reflective Sheeting, Engineer Grade, 3200, 36, Yellow	36 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesive	RI	\$306.00	30
3200-48-Y	Reflective Sheeting, Engineer Grade, 3200, 48, Yellow	48 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesive	RI	\$357.00	30
3200-38-R	Reflective Sheeting, Engineer Grade, 3200, 3/8, Red	3/8 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesiv	RI	\$3.18	30
3200-34-R	Reflective Sheeting, Engineer Grade, 3200, 3/4, Red	3/4 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesiv	RI	\$6.37	30
3200-1-R	Reflective Sheeting, Engineer Grade, 3200, 1, Red	1 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesive	RI	\$8.50	30
3200-114-R	Reflective Sheeting, Engineer Grade, 3200, 1 1/4, Red	1 1/4 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhes	RI	\$10.62	30
3200-2-R	Reflective Sheeting, Engineer Grade, 3200, 2, Red	2 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesive	RI	\$17.00	30
3200-24-R	Reflective Sheeting, Engineer Grade, 3200, 24, Red	24 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesive	RI	\$204.00	30
3200-30-R	Reflective Sheeting, Engineer Grade, 3200, 30, Red	30 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesive	RI	\$255.00	30
3200-36-R	Reflective Sheeting, Engineer Grade, 3200, 36, Red	36 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesive	RI	\$306.00	30
3200-48-R	Reflective Sheeting, Engineer Grade, 3200, 48, Red	48 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesive	RI	\$357.00	30
3200-38-B	Reflective Sheeting, Engineer Grade, 3200, 3/8, Blue	3/8 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesiv	RI	\$3.18	30
3200-34-B	Reflective Sheeting, Engineer Grade, 3200, 3/4, Blue	3/4 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesiv	RI	\$6.37	30
3200-1-B	Reflective Sheeting, Engineer Grade, 3200, 1, Blue	1 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesive	RI	\$8.50	30
3200-114-B	Reflective Sheeting, Engineer Grade, 3200, 1 1/4, Blue	1 1/4 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhes	RI	\$10.62	30
3200-2-B	Reflective Sheeting, Engineer Grade, 3200, 2, Blue	2 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesive	RI	\$17.00	30
3200-24-B	Reflective Sheeting, Engineer Grade, 3200, 24, Blue	24 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesive	RI	\$204.00	30
3200-30-B	Reflective Sheeting, Engineer Grade, 3200, 30, Blue	30 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesive	RI	\$255.00	30
3200-36-B	Reflective Sheeting, Engineer Grade, 3200, 36, Blue	36 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesive	RI	\$306.00	30
3200-48-B	Reflective Sheeting, Engineer Grade, 3200, 48, Blue	48 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesive	RI	\$357.00	30
3200-38-G	Reflective Sheeting, Engineer Grade, 3200, 3/8, Green	3/8 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesiv	RI	\$3.18	30
3200-34-G	Reflective Sheeting, Engineer Grade, 3200, 3/4, Green	3/4 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesiv	RI	\$6.37	30
3200-1-G	Reflective Sheeting, Engineer Grade, 3200, 1, Green	1 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesive	RI	\$8.50	30
3200-114-G	Reflective Sheeting, Engineer Grade, 3200, 1 1/4, Green	1 1/4 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhes	RI	\$10.62	30
3200-2-G	Reflective Sheeting, Engineer Grade, 3200, 2, Green	2 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesive	RI	\$17.00	30
3200-24-G	Reflective Sheeting, Engineer Grade, 3200, 24, Green	24 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesive	RI	\$204.00	30
3200-30-G	Reflective Sheeting, Engineer Grade, 3200, 30, Green	30 Inch, 50 Yard Rolls, ATSM Type 1, Pressure Sensitive Adhesive	RI	\$255.00	30

3930-1-G	Reflective Sheeting, Hi-Intensity Pris,3930, 1,Green	1 Inch, 50 Yard Rolls, ATSM Type IV, Pressure Sensitive Adhesive	RI	\$8.50	30
3930-114-G	Reflective Sheeting, Hi-Intensity Pris,3930, 1 1/4,Green	1 1/4 Inch, 50 Yard Rolls, ATSM Type IV, Pressure Sensitive Adhe	RI	\$10.62	30
3930-2-G	Reflective Sheeting, Hi-Intensity Pris,3930, 2,Green	2 Inch, 50 Yard Rolls, ATSM Type IV, Pressure Sensitive Adhesive	RI	\$17.00	30
3930-12.75-G	Reflective Sheeting, Hi-Intensity Pris,3930, 12 3/4,Green	12 3/4 Inch, 100 Yard Rolls, ATSM Type IV, Pressure Sensitive Ad	RI	\$216.75	30
3930-18-G	Reflective Sheeting, Hi-Intensity Pris,3930, 18,Green	18 Inch, 50 Yard Rolls, ATSM Type IV, Pressure Sensitive Adhesiv	RI	\$153.00	30
3930-24-G	Reflective Sheeting, Hi-Intensity Pris,3930, 24,Green	24 Inch, 50 Yard Rolls, ATSM Type IV, Pressure Sensitive Adhesiv	RI	\$204.00	30
3930-30-G	Reflective Sheeting, Hi-Intensity Pris,3930, 30,Green	30 Inch, 50 Yard Rolls, ATSM Type IV, Pressure Sensitive Adhesiv	RI	\$255.00	30
3930-36-G	Reflective Sheeting, Hi-Intensity Pris,3930, 36,Green	36 Inch, 550 Yard Rolls, ATSM Type IV, Pressure Sensitive Adhesi	RI	\$306.00	30
3930-48-G	Reflective Sheeting, Hi-Intensity Pris,3930, 48,Green	48 Inch, 50 Yard Rolls, ATSM Type IV, Pressure Sensitive Adhesiv	RI	\$357.00	30
3930-34-BR	Reflective Sheeting, Hi-Intensity Pris,3930, 3/4,Brown	3/4 Inch, 50 Yard Rolls, ATSM Type IV, Pressure Sensitive Adhesi	RI	\$6.37	30
3930-1-BR	Reflective Sheeting, Hi-Intensity Pris,3930, 1,Brown	1 Inch, 50 Yard Rolls, ATSM Type IV, Pressure Sensitive Adhesive	RI	\$8.50	30
3930-114-BR	Reflective Sheeting, Hi-Intensity Pris,3930, 1 1/4,Brown	1 1/4 Inch, 50 Yard Rolls, ATSM Type IV, Pressure Sensitive Adhe	RI	\$10.62	30
3930-2-BR	Reflective Sheeting, Hi-Intensity Pris,3930, 2,Brown	2 Inch, 50 Yard Rolls, ATSM Type IV, Pressure Sensitive Adhesive	RI	\$17.00	30
3930-12.75-BR	Reflective Sheeting, Hi-Intensity Pris,3930, 12 3/4,Brown	12 3/4 Inch, 100 Yard Rolls, ATSM Type IV, Pressure Sensitive Ad	RI	\$216.75	30
3930-18-BR	Reflective Sheeting, Hi-Intensity Pris,3930, 18,Brown	18 Inch, 50 Yard Rolls, ATSM Type IV, Pressure Sensitive Adhesiv	RI	\$153.00	30
3930-24-BR	Reflective Sheeting, Hi-Intensity Pris,3930, 24,Brown	24 Inch, 50 Yard Rolls, ATSM Type IV, Pressure Sensitive Adhesiv	RI	\$204.00	30
3930-30-BR	Reflective Sheeting, Hi-Intensity Pris,3930, 30,Brown	30 Inch, 50 Yard Rolls, ATSM Type IV, Pressure Sensitive Adhesiv	RI	\$255.00	30
3930-36-BR	Reflective Sheeting, Hi-Intensity Pris,3930, 36,Brown	36 Inch, 550 Yard Rolls, ATSM Type IV, Pressure Sensitive Adhesi	RI	\$306.00	30
3930-48-BR	Reflective Sheeting, Hi-Intensity Pris,3930, 48,Brown	48 Inch, 50 Yard Rolls, ATSM Type IV, Pressure Sensitive Adhesiv	RI	\$357.00	30
983-32ES-2	Tape, Diamond Grade Conspicuity Sheeting, Red/White, 2	2 inch, 50 Yard Roll	RI	\$61.50	30
983-32ES-3	Tape, Diamond Grade Conspicuity Sheeting, Red/White, 3	3 inch, 50 Yard Roll	RI	\$92.25	30
823i-10	Conspicuity Sheeting, Vehicle Safety, 823i, 48, White	48 Inch, 50 Yard Roll, Vehicle Safety Markings Series Conspicuity	RI	\$3,600.00	30
823i-11	Conspicuity Sheeting, Vehicle Safety, 823i, 48, Yellow	48 Inch, 50 Yard Roll, Vehicle Safety Markings Series Conspicuity	RI	\$3,600.00	30
823i-2	Conspicuity Sheeting, Vehicle Safety, 823i, 48, Red	48 Inch, 50 Yard Roll, Vehicle Safety Markings Series Conspicuity	RI	\$3,600.00	30
823i-15	Conspicuity Sheeting, Vehicle Safety, 823i, 48, Blue	48 Inch, 50 Yard Roll, Vehicle Safety Markings Series Conspicuity	RI	\$3,600.00	30
823i-83i	Conspicuity Sheeting, Vehicle Safety, 823i, 48, Fl Yel Green	48 Inch, 50 Yard Roll, Flourescent Yellow Green Vehicle Safety Ma	RI	\$3,600.00	30
823i-VWM	Conspicuity Sheeting, Vehicle Safety, 823i, 48, Red/White	48 Inch, 50 Yard Roll, Vehicle Safety Markings Series Conspicuity	RI	\$3,600.00	30
823i-CWM	Conspicuity Sheeting, Vehicle Safety, 823i, 48, Red/Wh Chev	48 Inch, 50 Yard Roll, Red/White Chevron Vehicle Safety Markings	RI	\$3,600.00	30
TPM-5-4	Tape-Transfer, Application, TPM-5 Clear, 4	4 Inch, 100 Yard Roll, Pre-Masking, Pre-Spacing	RI	\$25.00	30
TPM-5-6	Tape-Transfer, Application, TPM-5 Clear, 6	6 Inch, 100 Yard Roll, Pre-Masking, Pre-Spacing	RI	\$37.50	30
TPM-5-12	Tape-Transfer, Application, TPM-5 Clear, 12	12 Inch, 100 Yard Roll, Pre-Masking, Pre-Spacing	RI	\$75.00	30
TPM-5-24	Tape-Transfer, Application, TPM-5 Clear, 24	24 Inch, 100 Yard Roll, Pre-Masking, Pre-Spacing	RI	\$150.00	30
TPM-5-30	Tape-Transfer, Application, TPM-5 Clear, 30	30 Inch, 100 Yard Roll, Pre-Masking, Pre-Spacing	RI	\$187.50	30
TPM-5-36	Tape-Transfer, Application, TPM-5 Clear, 36	36 Inch, 100 Yard Roll, Pre-Masking, Pre-Spacing	RI	\$225.00	30
TPM-5-48	Tape-Transfer, Application, TPM-5 Clear, 48	48 Inch, 100 Yard Roll, Pre-Masking, Pre-Spacing	RI	\$300.00	30
SCPM-3-4	Tape-Premasking, SCPM-3 Clear, 4	4 Inch, 100 Yard Roll, Pre-Masking, Pre-Spacing	RI	\$20.00	30
SCPM-3-6	Tape-Premasking, SCPM-3 Clear, 6	6 Inch, 100 Yard Roll, Pre-Masking, Pre-Spacing	RI	\$30.00	30
SCPM-3-8	Tape-Premasking, SCPM-3 Clear, 8	8 Inch, 100 Yard Roll, Pre-Masking, Pre-Spacing	RI	\$40.00	30
SCPM-3-10	Tape-Premasking, SCPM-3 Clear, 10	10 Inch, 100 Yard Roll, Pre-Masking, Pre-Spacing	RI	\$50.00	30
SCPM-3-12	Tape-Premasking, SCPM-3 Clear, 12	12 Inch, 100 Yard Roll, Pre-Masking, Pre-Spacing	RI	\$60.00	30
SCPM-3-14	Tape-Premasking, SCPM-3 Clear, 14	14 Inch, 100 Yard Roll, Pre-Masking, Pre-Spacing	RI	\$80.00	30
SCPM-3-18	Tape-Premasking, SCPM-3 Clear, 18	18 Inch, 100 Yard Roll, Pre-Masking, Pre-Spacing	RI	\$90.00	30
SCPM-3-24	Tape-Premasking, SCPM-3 Clear, 24	24 Inch, 100 Yard Roll, Pre-Masking, Pre-Spacing	RI	\$120.00	30
SCPM-3-36	Tape-Premasking, SCPM-3 Clear, 36	36 Inch, 100 Yard Roll, Pre-Masking, Pre-Spacing	RI	\$180.00	30
SCPM-3-48	Tape-Premasking, SCPM-3 Clear, 48	48 Inch, 100 Yard Roll, Pre-Masking, Pre-Spacing	RI	\$240.00	30
7725-10-24	Scotchcal NonReflectiv ElectroCut Graphic Film,7725,24,White	24 Inch, 50 Yard Roll, Non-Punch	RI	\$144.00	30
7725-10-30	Scotchcal NonReflectiv ElectroCut Graphic Film,7725,30,White	30 Inch, 50 Yard Roll, Non-Punch	RI	\$180.00	30
7725-10-36	Scotchcal NonReflectiv ElectroCut Graphic Film,7725,36,White	36 Inch, 50 Yard Roll, Non-Punch	RI	\$216.00	30
7725-10-48	Scotchcal NonReflectiv ElectroCut Graphic Film,7725,48,White	48 Inch, 50 Yard Roll, Non-Punch	RI	\$288.00	30
7725-12-24	Scotchcal NonReflectiv ElectroCut Graphic Film,7725,24,Black	24 Inch, 50 Yard Roll, Non-Punch	RI	\$144.00	30

7725-12-30	Scotchcal NonReflectiv ElectroCut Graphic Film,7725,30,Blak	30 Inch, 50 Yard Roll, Non-Punch	RI	\$180.00	3
7725-12-36	Scotchcal NonReflectiv ElectroCut Graphic Film,7725,36,Black	36 Inch, 50 Yard Roll, Non-Punch	RI	\$216.00	30
7725-12-48	Scotchcal NonReflectiv ElectroCut Graphic Film,7725,48,Black	36 Inch, 50 Yard Roll, Non-Punch	RI	\$288.00	30
7725-47-24	Scotchcal NonReflectiv ElectroCut Graphic Film,7725,24,Blue	24 Inch, 50 Yard Roll, Non-Punch, Intense Blue	RI	\$144.00	30
7725-47-30	Scotchcal NonReflectiv ElectroCut Graphic Film,7725,30,Blue	30 Inch, 50 Yard Roll, Non-Punch, Intense Blue	RI	\$180.00	30
7725-47-36	Scotchcal NonReflectiv ElectroCut Graphic Film,7725,36,Blue	36 Inch, 50 Yard Roll, Non-Punch, Intense Blue	RI	\$216.00	30
7725-47-48	Scotchcal NonReflectiv ElectroCut Graphic Film,7725,48,Blue	48 Inch, 50 Yard Roll, Non-Punch, Intense Blue	RI	\$288.00	30
4090-34-W	Reflective Sheeting, Diamond Grade, 4090, 3/4,White	3/4 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$15.84	30
4090-1-W	Reflective Sheeting, Diamond Grade, 4090, 1,White	1 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$21.12	30
4090-2-W	Reflective Sheeting, Diamond Grade, 4090, 2,White	2 Inch, 50 Yard Roll, 4000 Series	RI	\$42.25	30
4090-3-W	Reflective Sheeting, Diamond Grade, 4090, 3,White	3 Inch, 50 Yard Roll,DG3 4000 Series	RI	\$63.37	30
4090-6-W	Reflective Sheeting, Diamond Grade, 4090, 6,White	6 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$126.75	30
4090-9-W	Reflective Sheeting, Diamond Grade, 4090, 9,White	9 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$190.12	30
4090-12-W	Reflective Sheeting, Diamond Grade, 4090, 12,White	12 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$253.50	30
4090-12.75-W	Reflective Sheeting, Diamond Grade, 4090, 12 3/4,White	12 3/4 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$269.34	30
4090-18-W	Reflective Sheeting, Diamond Grade, 4090, 18,White	18 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$380.25	30
4090-24-W	Reflective Sheeting, Diamond Grade, 4090, 24,White	24 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$507.00	30
4090-30-W	Reflective Sheeting, Diamond Grade, 4090, 30,White	30 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$633.75	30
4090-36-W	Reflective Sheeting, Diamond Grade, 4090, 36,White	36 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$760.50	30
4090-48-W	Reflective Sheeting, Diamond Grade, 4090, 48,White	48 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$1,014.00	30
4090-34-Y	Reflective Sheeting, Diamond Grade, 4090, 3/4,Yellow	3/4 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$15.84	30
4090-1-Y	Reflective Sheeting, Diamond Grade, 4090, 1,Yellow	1 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$21.12	30
4090-2-Y	Reflective Sheeting, Diamond Grade, 4090, 2,Yellow	2 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$42.25	30
4090-3-Y	Reflective Sheeting, Diamond Grade, 4090, 3,Yellow	3 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$63.37	30
4090-6-Y	Reflective Sheeting, Diamond Grade, 4090, 6,Yellow	6 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$126.75	30
4090-9-Y	Reflective Sheeting, Diamond Grade, 4090, 9,Yellow	9 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$190.12	30
4090-12-Y	Reflective Sheeting, Diamond Grade, 4090, 12,Yellow	12 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$253.50	30
4090-12.75-Y	Reflective Sheeting, Diamond Grade, 4090, 12 3/4,Yellow	12 3/4 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$269.34	30
4090-18-Y	Reflective Sheeting, Diamond Grade, 4090, 18,Yellow	18 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$380.25	30
4090-24-Y	Reflective Sheeting, Diamond Grade, 4090, 24,Yellow	24 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$507.00	30
4090-30-Y	Reflective Sheeting, Diamond Grade, 4090, 30,Yellow	30 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$633.75	30
4090-36-Y	Reflective Sheeting, Diamond Grade, 4090, 36,Yellow	36 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$760.50	30
4090-48-Y	Reflective Sheeting, Diamond Grade, 4090, 48,Yellow	48 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$1,014.00	30
4090-34-R	Reflective Sheeting, Diamond Grade, 4090, 3/4,Red	3/4 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$15.84	30
4090-1-R	Reflective Sheeting, Diamond Grade, 4090, 1,Red	1 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$21.12	30
4090-2-R	Reflective Sheeting, Diamond Grade, 4090, 2,Red	2 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$42.25	30
4090-3-R	Reflective Sheeting, Diamond Grade, 4090, 3,Red	3 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$63.37	30
4090-6-R	Reflective Sheeting, Diamond Grade, 4090, 6,Red	6 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$126.75	30
4090-9-R	Reflective Sheeting, Diamond Grade, 4090, 9,Red	9 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$190.12	30
4090-12-R	Reflective Sheeting, Diamond Grade, 4090, 12,Red	12 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$253.50	30
4090-12.75-R	Reflective Sheeting, Diamond Grade, 4090, 12 3/4,Red	12 3/4 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$269.34	30
4090-18-R	Reflective Sheeting, Diamond Grade, 4090, 18,Red	18 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$380.25	30
4090-24-R	Reflective Sheeting, Diamond Grade, 4090, 24,Red	24 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$507.00	30
4090-30-R	Reflective Sheeting, Diamond Grade, 4090, 30,Red	30 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$633.75	30
4090-36-R	Reflective Sheeting, Diamond Grade, 4090, 36,Red	36 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$760.50	30
4090-48-R	Reflective Sheeting, Diamond Grade, 4090, 48,Red	48 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$1,014.00	30
4090-34-B	Reflective Sheeting, Diamond Grade, 4090, 3/4,Blue	3/4 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$15.84	30
4090-1-B	Reflective Sheeting, Diamond Grade, 4090, 1,Blue	1 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$21.12	30
4090-2-B	Reflective Sheeting, Diamond Grade, 4090, 2,Blue	2 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$42.25	30
4090-3-B	Reflective Sheeting, Diamond Grade, 4090, 3,Blue	3 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$63.37	30

4090-6-B	Reflective Sheeting, Diamond Grade, 4090, 6,Blue	6 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$126.75	30
4090-9-B	Reflective Sheeting, Diamond Grade, 4090, 9,Blue	9 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$190.12	30
4090-12-B	Reflective Sheeting, Diamond Grade, 4090, 12,Blue	12 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$253.50	30
4090-12.75-B	Reflective Sheeting, Diamond Grade, 4090, 12 3/4,Blue	12 3/4 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$269.34	30
4090-18-B	Reflective Sheeting, Diamond Grade, 4090, 18,Blue	18 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$380.25	30
4090-24-B	Reflective Sheeting, Diamond Grade, 4090, 24,Blue	24 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$507.00	30
4090-30-B	Reflective Sheeting, Diamond Grade, 4090, 30,Blue	30 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$633.75	30
4090-36-B	Reflective Sheeting, Diamond Grade, 4090, 36,Blue	36 Inch, 50 Yard Roll, 4000 Series	RI	\$760.50	30
4090-48-B	Reflective Sheeting, Diamond Grade, 4090, 48,Blue	48 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$1,014.00	30
4090-34-G	Reflective Sheeting, Diamond Grade, 4090, 3/4,Green	3/4 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$15.84	30
4090-1-G	Reflective Sheeting, Diamond Grade, 4090, 1,Green	1 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$21.12	30
4090-2-G	Reflective Sheeting, Diamond Grade, 4090, 2,Green	2 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$42.25	30
4090-3-G	Reflective Sheeting, Diamond Grade, 4090, 3,Green	3 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$63.37	30
4090-6-G	Reflective Sheeting, Diamond Grade, 4090, 6,Green	6 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$126.75	30
4090-9-G	Reflective Sheeting, Diamond Grade, 4090, 9,Green	9 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$190.12	30
4090-12-G	Reflective Sheeting, Diamond Grade, 4090, 12,Green	12 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$253.50	30
4090-12.75-G	Reflective Sheeting, Diamond Grade, 4090, 12 3/4,Green	12 3/4 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$269.34	30
4090-18-G	Reflective Sheeting, Diamond Grade, 4090, 18,Green	18 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$380.25	30
4090-24-G	Reflective Sheeting, Diamond Grade, 4090, 24,Green	24 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$507.00	30
4090-30-G	Reflective Sheeting, Diamond Grade, 4090, 30,Green	30 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$633.75	30
4090-36-G	Reflective Sheeting, Diamond Grade, 4090, 36,Green	36 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$760.50	30
4090-48-G	Reflective Sheeting, Diamond Grade, 4090, 48,Green	48 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$1,014.00	30
4090-34-BR	Reflective Sheeting, Diamond Grade, 4090, 3/4,Brown	3/4 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$15.84	30
4090-1-BR	Reflective Sheeting, Diamond Grade, 4090, 1,Brown	1 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$21.12	30
4090-2-BR	Reflective Sheeting, Diamond Grade, 4090, 2,Brown	2 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$42.25	30
4090-3-BR	Reflective Sheeting, Diamond Grade, 4090, 3,Brown	3 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$63.37	30
4090-6-BR	Reflective Sheeting, Diamond Grade, 4090, 6,Brown	6 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$126.75	30
4090-9-BR	Reflective Sheeting, Diamond Grade, 4090, 9,Brown	9 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$190.12	30
4090-12-BR	Reflective Sheeting, Diamond Grade, 4090, 12,Brown	12 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$253.50	30
4090-12.75-BR	Reflective Sheeting, Diamond Grade, 4090, 12 3/4,Brown	12 3/4 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$269.34	30
4090-18-BR	Reflective Sheeting, Diamond Grade, 4090, 18,Brown	18 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$380.25	30
4090-24-BR	Reflective Sheeting, Diamond Grade, 4090, 24,Brown	24 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$507.00	30
4090-30-BR	Reflective Sheeting, Diamond Grade, 4090, 30,Brown	30 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$633.75	30
4090-36-BR	Reflective Sheeting, Diamond Grade, 4090, 36,Brown	36 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$760.50	30
4090-48-BR	Reflective Sheeting, Diamond Grade, 4090, 48,Brown	48 Inch, 50 Yard Roll, DG3 4000 Series	RI	\$1,014.00	30
4081-12.75	Reflective Sheeting, Diamond Grade, 4081, 12 3/4,Fl Yellow	12 3/4 Inch, Fluorescent Yellow, 50 Yard Roll, DG3 Series	RI	\$274.12	30
4081-18	Reflective Sheeting, Diamond Grade, 4081, 18,Fl Yellow	18 Inch, Fluorescent Yellow, 50 Yard Roll, DG3 Series	RI	\$387.00	30
4081-24	Reflective Sheeting, Diamond Grade, 4081, 24,Fl Yellow	24 Inch, Fluorescent Yellow, 50 Yard Roll, DG3 Series	RI	\$516.00	30
4081-30	Reflective Sheeting, Diamond Grade, 4081, 30,Fl Yellow	30 Inch, Fluorescent Yellow, 50 Yard Roll, DG3 Series	RI	\$645.00	30
4081-36	Reflective Sheeting, Diamond Grade, 4081, 36,Fl Yellow	36 Inch, Fluorescent Yellow, 50 Yard Roll, DG3 Series	RI	\$774.00	30
4081-48	Reflective Sheeting, Diamond Grade, 4081, 48,Fl Yellow	48 Inch, Fluorescent Yellow, 50 Yard Roll, DG3 Series	RI	\$1,032.00	30
4083-6	Reflective Sheeting, Diamond Grade, 4083, 6,Fl Yel Green	6 Inch, Fluorescent Yellow Green, 50 Yard Roll, DG3 Series	RI	\$129.00	30
4083-12	Reflective Sheeting, Diamond Grade, 4083, 12,Fl Yel Green	12 Inch, Fluorescent Yellow Green, 50 Yard Roll, DG3 Series	RI	\$258.00	30
4083-18	Reflective Sheeting, Diamond Grade, 4083, 18,Fl Yel Green	18 Inch, Fluorescent Yellow Green, 50 Yard Roll, DG3 Series	RI	\$387.00	30
4083-24	Reflective Sheeting, Diamond Grade, 4083, 24,Fl Yel Green	24 Inch, Fluorescent Yellow Green, 50 Yard Roll, DG3 Series	RI	\$516.00	30
4083-30	Reflective Sheeting, Diamond Grade, 4083, 30,Fl Yel Green	30 Inch, Fluorescent Yellow Green, 50 Yard Roll, DG3 Series	RI	\$645.00	30
4083-36	Reflective Sheeting, Diamond Grade, 4083, 36,Fl Yel Green	36 Inch, Fluorescent Yellow Green, 50 Yard Roll, DG3 Series	RI	\$774.00	30
4083-48	Reflective Sheeting, Diamond Grade, 4083, 48,Fl Yel Green	48 Inch, Fluorescent Yellow Green, 50 Yard Roll, DG3 Series	RI	\$1,032.00	30
4084-12	Reflective Sheeting, Diamond Grade, 4084, 12,Fl Orange	12 Inch, Fluorescent Orange, 50 Yard Roll, DG3 Series	RI	\$258.00	30
4084-18	Reflective Sheeting, Diamond Grade, 4084, 18,Fl Orange	18 Inch, Fluorescent Orange, 50 Yard Roll, DG3 Series	RI	\$387.00	30

4084-24	Reflective Sheeting, Diamond Grade, 4084, 24,Fl Orange	24 Inch, Flourescent Orange, 50 Yard Roll, DG3 Series	RI	\$516.00	30
4084-30	Reflective Sheeting, Diamond Grade, 4084, 30,Fl Orange	30 Inch, Flourescent Orange, 50 Yard Roll, DG3 Series	RI	\$645.00	30
4084-36	Reflective Sheeting, Diamond Grade, 4084, 36,Fl Orange	36 Inch, Flourescent Orange, 50 Yard Roll, DG3 Series	RI	\$774.00	30
4084-48	Reflective Sheeting, Diamond Grade, 4084, 48,Fl Orange	48 Inch, Flourescent Orange, 50 Yard Roll, DG3 Series	RI	\$1,032.00	30
4058-12.75	Reflective Sheeting, Diamond Grade,Type XI,4058,12 3/4 Purpl	12 3/4 Inch, 50 Yard Roll	RI	\$557.81	30
4058-48	Reflective Sheeting, Diamond Grade,Type XI,4058, 48 Purple	48 Inch, 50 Yard Roll	RI	\$2,100.00	30
1170-9-Y	Acrylic Electrocut Film, 1170, 9, Yellow	9 Inch, 50 Yard Roll	RI	\$73.12	30
1170-12-Y	Acrylic Electrocut Film, 1170, 12, Yellow	12 Inch, 50 Yard Roll	RI	\$97.50	30
1170-15-Y	Acrylic Electrocut Film, 1170, 15, Yellow	15 Inch, 50 Yard Roll	RI	\$121.87	30
1170-18-Y	Acrylic Electrocut Film, 1170, 18, Yellow	18 Inch, 50 Yard Roll	RI	\$146.25	30
1170-24-Y	Acrylic Electrocut Film, 1170, 24, Yellow	24 Inch, 50 Yard Roll	RI	\$195.00	30
1170-30-Y	Acrylic Electrocut Film, 1170, 30, Yellow	30 Inch, 50 Yard Roll	RI	\$243.75	30
1170-36-Y	Acrylic Electrocut Film, 1170, 36, Yellow	36 Inch, 50 Yard Roll	RI	\$292.50	30
1170-48-Y	Acrylic Electrocut Film, 1170, 48, Yellow	48 Inch, 50 Yard Roll	RI	\$390.00	30
1170-9-OR	Acrylic Electrocut Film, 1170, 9, Orange	9 Inch, 50 Yard Roll	RI	\$73.12	30
1170-12-OR	Acrylic Electrocut Film, 1170, 12, Orange	12 Inch, 50 Yard Roll	RI	\$97.50	30
1170-15-OR	Acrylic Electrocut Film, 1170, 15, Orange	15 Inch, 50 Yard Roll	RI	\$121.87	30
1170-18-OR	Acrylic Electrocut Film, 1170, 18, Orange	18 Inch, 50 Yard Roll	RI	\$146.25	30
1170-24-OR	Acrylic Electrocut Film, 1170, 24, Orange	24 Inch, 50 Yard Roll	RI	\$195.00	30
1170-30-OR	Acrylic Electrocut Film, 1170, 30, Orange	30 Inch, 50 Yard Roll	RI	\$243.75	30
1170-36-OR	Acrylic Electrocut Film, 1170, 36, Orange	36 Inch, 50 Yard Roll	RI	\$292.50	30
1170-48-OR	Acrylic Electrocut Film, 1170, 48, Orange	48 Inch, 50 Yard Roll	RI	\$390.00	30
1170-9-R	Acrylic Electrocut Film, 1170, 9, Red	9 Inch, 50 Yard Roll	RI	\$73.12	30
1170-12-R	Acrylic Electrocut Film, 1170, 12, Red	12 Inch, 50 Yard Roll	RI	\$97.50	30
1170-15-R	Acrylic Electrocut Film, 1170, 15, Red	15 Inch, 50 Yard Roll	RI	\$121.87	30
1170-18-R	Acrylic Electrocut Film, 1170, 18, Red	18 Inch, 50 Yard Roll	RI	\$146.25	30
1170-24-R	Acrylic Electrocut Film, 1170, 24, Red	24 Inch, 50 Yard Roll	RI	\$195.00	30
1170-30-R	Acrylic Electrocut Film, 1170, 30, Red	30 Inch, 50 Yard Roll	RI	\$243.75	30
1170-36-R	Acrylic Electrocut Film, 1170, 36, Red	36 Inch, 50 Yard Roll	RI	\$292.50	30
1170-48-R	Acrylic Electrocut Film, 1170, 48, Red	48 Inch, 50 Yard Roll	RI	\$390.00	30
1170-9-B	Acrylic Electrocut Film, 1170, 9, Blue	9 Inch, 50 Yard Roll	RI	\$73.12	30
1170-12-B	Acrylic Electrocut Film, 1170, 12, Blue	12 Inch, 50 Yard Roll	RI	\$97.50	30
1170-15-B	Acrylic Electrocut Film, 1170, 15, Blue	15 Inch, 50 Yard Roll	RI	\$121.87	30
1170-18-B	Acrylic Electrocut Film, 1170, 18, Blue	18 Inch, 50 Yard Roll	RI	\$146.25	30
1170-24-B	Acrylic Electrocut Film, 1170, 24, Blue	24 Inch, 50 Yard Roll	RI	\$195.00	30
1170-30-B	Acrylic Electrocut Film, 1170, 30, Blue	30 Inch, 50 Yard Roll	RI	\$243.75	30
1170-36-B	Acrylic Electrocut Film, 1170, 36, Blue	36 Inch, 50 Yard Roll	RI	\$292.50	30
1170-48-B	Acrylic Electrocut Film, 1170, 48, Blue	48 Inch, 50 Yard Roll	RI	\$390.00	30
1170-9-G	Acrylic Electrocut Film, 1170, 9, Green	9 Inch, 50 Yard Roll	RI	\$73.12	30
1170-12-G	Acrylic Electrocut Film, 1170, 12, Green	12 Inch, 50 Yard Roll	RI	\$97.50	30
1170-15-G	Acrylic Electrocut Film, 1170, 15, Green	15 Inch, 50 Yard Roll	RI	\$121.87	30
1170-18-G	Acrylic Electrocut Film, 1170, 18, Green	18 Inch, 50 Yard Roll	RI	\$146.25	30
1170-24-G	Acrylic Electrocut Film, 1170, 24, Green	24 Inch, 50 Yard Roll	RI	\$195.00	30
1170-30-G	Acrylic Electrocut Film, 1170, 30, Green	30 Inch, 50 Yard Roll	RI	\$243.75	30
1170-36-G	Acrylic Electrocut Film, 1170, 36, Green	36 Inch, 50 Yard Roll	RI	\$292.50	30
1170-48-G	Acrylic Electrocut Film, 1170, 48, Grren	48 Inch, 50 Yard Roll	RI	\$390.00	30
1170-9-BLK	Acrylic Electrocut Film, 1170, 9, Black	9 Inch, 50 Yard Roll	RI	\$73.12	30
1170-12-BLK	Acrylic Electrocut Film, 1170, 12, Black	12 Inch, 50 Yard Roll	RI	\$97.50	30
1170-15-BLK	Acrylic Electrocut Film, 1170, 15, Black	15 Inch, 50 Yard Roll	RI	\$121.87	30
1170-18-BLK	Acrylic Electrocut Film, 1170, 18, Black	18 Inch, 50 Yard Roll	RI	\$146.25	30

1170-24-BLK	Acrylic Electrocut Film, 1170, 24, Black	24 Inch, 50 Yard Roll	RI	\$195.00	30
1170-30-BLK	Acrylic Electrocut Film, 1170, 30, Black	30 Inch, 50 Yard Roll	RI	\$243.75	30
1170-36-BLK	Acrylic Electrocut Film, 1170, 36, Black	36 Inch, 50 Yard Roll	RI	\$292.50	30
1170-48-BLK	Acrylic Electrocut Film, 1170, 48, Black	48 Inch, 50 Yard Roll	RI	\$390.00	30
1170-9-BR	Acrylic Electrocut Film, 1170, 9, Brown	9 Inch, 50 Yard Roll	RI	\$73.12	30
1170-12-BR	Acrylic Electrocut Film, 1170, 12, Brown	12 Inch, 50 Yard Roll	RI	\$97.50	30
1170-15-BR	Acrylic Electrocut Film, 1170, 15, Brown	15 Inch, 50 Yard Roll	RI	\$121.87	30
1170-18-BR	Acrylic Electrocut Film, 1170, 18, Brown	18 Inch, 50 Yard Roll	RI	\$146.25	30
1170-24-BR	Acrylic Electrocut Film, 1170, 24, Brown	24 Inch, 50 Yard Roll	RI	\$195.00	30
1170-30-BR	Acrylic Electrocut Film, 1170, 30, Brown	30 Inch, 50 Yard Roll	RI	\$243.75	30
1170-36-BR	Acrylic Electrocut Film, 1170, 36, Brown	36 Inch, 50 Yard Roll	RI	\$292.50	30
1170-48-BR	Acrylic Electrocut Film, 1170, 48, Brown	48 Inch, 50 Yard Roll	RI	\$390.00	30
973-1-W	Conspicuity Sheeting, Flex Prismatic, 973, 1, White	1 Inch, 50 Yard Roll, Flexible Prismatic	RI	\$30.50	30
973-2-W	Conspicuity Sheeting, Flex Prismatic, 973, 2, White	2 Inch, 50 Yard Roll, Flexible Prismatic	RI	\$61.00	30
973-3-W	Conspicuity Sheeting, Flex Prismatic, 973, 3, White	3 Inch, 50 Yard Roll, Flexible Prismatic	RI	\$91.50	30
973-4-W	Conspicuity Sheeting, Flex Prismatic, 973, 4, White	4 Inch, 50 Yard Roll, Flexible Prismatic	RI	\$122.00	30
973-6-W	Conspicuity Sheeting, Flex Prismatic, 973, 6, White	6 Inch, 50 Yard Roll, Flexible Prismatic	RI	\$183.00	30
973-1-Y	Conspicuity Sheeting, Flex Prismatic, 973, 1, Yellow	1 Inch, 50 Yard Roll, Flexible Prismatic	RI	\$30.50	30
973-2-Y	Conspicuity Sheeting, Flex Prismatic, 973, 2, Yellow	2 Inch, 50 Yard Roll, Flexible Prismatic	RI	\$61.00	30
973-3-Y	Conspicuity Sheeting, Flex Prismatic, 973, 3, Yellow	3 Inch, 50 Yard Roll, Flexible Prismatic	RI	\$91.50	30
973-4-Y	Conspicuity Sheeting, Flex Prismatic, 973, 4, Yellow	4 Inch, 50 Yard Roll, Flexible Prismatic	RI	\$122.00	30
973-6-Y	Conspicuity Sheeting, Flex Prismatic, 973, 6, Yellow	6 Inch, 50 Yard Roll, Flexible Prismatic	RI	\$183.00	30
973-1-R	Conspicuity Sheeting, Flex Prismatic, 973, 1, Red	1 Inch, 50 Yard Roll, Flexible Prismatic	RI	\$30.50	30
973-2-R	Conspicuity Sheeting, Flex Prismatic, 973, 2, Red	2 Inch, 50 Yard Roll, Flexible Prismatic	RI	\$61.00	30
973-3-R	Conspicuity Sheeting, Flex Prismatic, 973, 3, Red	3 Inch, 50 Yard Roll, Flexible Prismatic	RI	\$91.50	30
973-4-R	Conspicuity Sheeting, Flex Prismatic, 973, 4, Red	4 Inch, 50 Yard Roll, Flexible Prismatic	RI	\$122.00	30
973-6-R	Conspicuity Sheeting, Flex Prismatic, 973, 6, Red	6 Inch, 50 Yard Roll, Flexible Prismatic	RI	\$183.00	30
973-1-OR	Conspicuity Sheeting, Flex Prismatic, 973, 1, Orange	1 Inch, 50 Yard Roll, Flexible Prismatic	RI	\$30.50	30
973-2-OR	Conspicuity Sheeting, Flex Prismatic, 973, 2, Orange	2 Inch, 50 Yard Roll, Flexible Prismatic	RI	\$61.00	30
973-3-OR	Conspicuity Sheeting, Flex Prismatic, 973, 3, Orange	3 Inch, 50 Yard Roll, Flexible Prismatic	RI	\$91.50	30
973-4-OR	Conspicuity Sheeting, Flex Prismatic, 973, 4, Orange	4 Inch, 50 Yard Roll, Flexible Prismatic	RI	\$122.00	30
973-6-OR	Conspicuity Sheeting, Flex Prismatic, 973, 6, Orange	6 Inch, 50 Yard Roll, Flexible Prismatic	RI	\$183.00	30
973-1-B	Conspicuity Sheeting, Flex Prismatic, 973, 1, Blue	1 Inch, 50 Yard Roll, Flexible Prismatic	RI	\$30.50	30
973-2-B	Conspicuity Sheeting, Flex Prismatic, 973, 2, Blue	2 Inch, 50 Yard Roll, Flexible Prismatic	RI	\$61.00	30
973-3-B	Conspicuity Sheeting, Flex Prismatic, 973, 3, Blue	3 Inch, 50 Yard Roll, Flexible Prismatic	RI	\$91.50	30
973-4-B	Conspicuity Sheeting, Flex Prismatic, 973, 4, Blue	4 Inch, 50 Yard Roll, Flexible Prismatic	RI	\$122.00	30
973-6-B	Conspicuity Sheeting, Flex Prismatic, 973, 6, Blue	6 Inch, 50 Yard Roll, Flexible Prismatic	RI	\$183.00	30
973-1-G	Conspicuity Sheeting, Flex Prismatic, 973, 1, Green	1 Inch, 50 Yard Roll, Flexible Prismatic	RI	\$30.50	30
973-2-G	Conspicuity Sheeting, Flex Prismatic, 973, 2, Green	2 Inch, 50 Yard Roll, Flexible Prismatic	RI	\$61.00	30
973-3-G	Conspicuity Sheeting, Flex Prismatic, 973, 3, Green	3 Inch, 50 Yard Roll, Flexible Prismatic	RI	\$91.50	30
973-4-G	Conspicuity Sheeting, Flex Prismatic, 973, 4, Green	4 Inch, 50 Yard Roll, Flexible Prismatic	RI	\$122.00	30
973-6-G	Conspicuity Sheeting, Flex Prismatic, 973, 6, Green	6 Inch, 50 Yard Roll, Flexible Prismatic	RI	\$183.00	30
1160-12	Transparent Prem Protect Overlay Film w/Premask,1160, 12	12 Inch, 50 Yard Roll, With Premask	RI	\$190.50	30
1160-18	Transparent Prem Protect Overlay Film w/Premask,1160, 18	18 Inch, 50 Yard Roll, With Premask	RI	\$285.75	30
1160-24	Transparent Prem Protect Overlay Film w/Premask,1160, 24	24 Inch, 50 Yard Roll, With Premask	RI	\$381.00	30
1160-30	Transparent Prem Protect Overlay Film w/Premask,1160, 30	30 Inch, 50 Yard Roll, With Premask	RI	\$476.25	30
1160-36	Transparent Prem Protect Overlay Film w/Premask,1160, 36	36 Inch, 50 Yard Roll, With Premask	RI	\$571.50	30
1160-42	Transparent Prem Protect Overlay Film w/Premask,1160, 42	42 Inch, 50 Yard Roll, With Premask	RI	\$666.75	30
1160-48	Transparent Prem Protect Overlay Film w/Premask,1160, 48	48 Inch, 50 Yard Roll, With Premask	RI	\$762.00	30
1160A-12	Transparent Prem Protect Overlay Film w/o Premask,1160A, 12	12 Inch, 50 Yard Roll, Without Premask	RI	\$187.50	30

1160A-18	Transparent Prem Protect Overlay Film w/o Premask,1160A, 18	18 Inch, 50 Yard Roll, Without Premask	RI	\$281.25	30
1160A-24	Transparent Prem Protect Overlay Film w/o Premask,1160A, 24	24 Inch, 50 Yard Roll, Without Premask	RI	\$375.00	30
1160A-30	Transparent Prem Protect Overlay Film w/o Premask,1160A, 30	30 Inch, 50 Yard Roll, Without Premask	RI	\$468.75	30
1160A-36	Transparent Prem Protect Overlay Film w/o Premask,1160A, 36	36 Inch, 50 Yard Roll, Without Premask	RI	\$562.50	30
1160A-42	Transparent Prem Protect Overlay Film w/o Premask,1160A, 42	42 Inch, 50 Yard Roll, Without Premask	RI	\$656.25	30
1160A-48	Transparent Prem Protect Overlay Film w/o Premask,1160A, 48	48 Inch, 50 Yard Roll, Without Premask	RI	\$750.00	30

Appendix E

**STATE OF MAINE
DEPARTMENT OF ADMINISTRATIVE AND FINANCIAL SERVICES
DIVISION OF PROCUREMENT SERVICES**

**MUNICIPALITY POLITICAL SUBDIVISION and SCHOOL DISTRICT PARTICIPATION
CERTIFICATION**

**RFQ # 17A 180820-052
Reflective Adhesive Sheeting for Signs**

The Division of Procurement Services is committed to providing purchasing opportunities for **municipalities, political subdivisions and school districts** in Maine by allowing them access, through our vendors, to our contract pricing. A bidder's willingness to extend contract pricing to these entities will be taken into consideration in making awards.

Will you accept orders from political subdivisions and school districts in Maine at the prices quoted?

Yes

Yes, with conditions as follows:

No

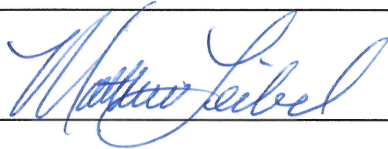
Name of Company:

3M Company

Address:

3M Center, Building 225-4N-14, Saint Paul, MN 55144

Signature:



Date:

8/30/18

Traffic Safety and Security Division

3M™ Vehicle Safety Markings Series 823i

Series 823i

Product Bulletin 823i
August 2016

Replaces PB 823i FYG and PB 823i dated January 2016

Description

3M™ Vehicle Safety Markings Series 823i is an impact resistant prismatic lens reflective sheeting pre-coated with pressure sensitive adhesive and currently meets or exceeds the reflectivity requirements of EN 12899-1:2007 for Class RA2. Series 823i is intended for use on clean, smooth, relatively non-porous, weather resistant surfaces when prepared as detailed in [3M Information Folder 4.9](#).

Features

- Impact resistant, metalized flexible retroreflective sheeting.
- Excellent angularity.
- Similar daytime and nighttime appearance.
- Suited for application over flat or simple curved surfaces.
- Up to 3 years durability.

Color and Dimension

Table 1. Product Codes by Color

Product Code	Color
823i-10	White
823i-11	Yellow
823i-12	Red
823i-15	Blue
823i-83i	Fluorescent Yellow-Green
823i VWM	Red/White Chevron
823i CWM	Red/White Chevron

Roll dimensions: 1220 mm x 45.7 m

Specifications

Coefficient of Retroreflection

The initial minimum coefficient of retroreflection, when measured according to CIE 54.2 using CIE standard illuminant A, conforms to Table 4 of EN 12899-1:2007 Class RA2 which is given below in Table 2.

Table 2. Minimum Coefficient of Retroreflection (cd/lx/m²)

Geometry of measurements		Color				
α	β_1	White	Yellow	Red	Blue	Fluorescent Yellow-Green
	($\beta_2=0$)					
0.2°	+5°	250	170	45	20	170
	+30°	150	100	25	11	100
	+40°	110	70	15	8	70
0.33°	+5°	180	120	25	14	120
	+30°	100	70	14	8	70
	+40°	95	60	13	7	60
2°	+5°	5	3	1	0.2	3
	+30°	2.5	1.5	0.4	--	1.5
	+40°	1.5	1.0	0.3	--	1.0

The above angular definitions apply for the CIE Goniometer system (co-planar geometry). The sheeting shall be mounted in 0° or 90° rotation on the goniometer (0° is the direction the roll is unwound).

Chromaticity Coordinates and Luminance Factor

The initial chromaticity and luminance factor conform to Class CR2 of EN 12899-1:2007 for Class RA2 materials as given in Table 3 below.

Table 3. Chromaticity and Luminance Factors

Color	Chromaticity Coordinates								Luminance Factor
	1		2		3		4		
	x	y	x	y	x	y	x	y	β
White	0.305	0.315	0.335	0.345	0.325	0.355	0.295	0.325	≥ 0.27
Yellow	0.494	0.505	0.470	0.480	0.513	0.437	0.545	0.454	≥ 0.16
Red	0.735	0.265	0.700	0.250	0.610	0.340	0.660	0.340	≥ 0.03
Blue	0.130	0.090	0.160	0.090	0.0160	0.140	0.130	0.140	≥ 0.01
Fluorescent Yellow-Green	0.387	0.610	0.356	0.494	0.398	0.452	0.460	0.540	≥ 0.40

Recommended Application and Use

Series 823i is intended for retroreflective vehicle markings. Typical applications include the manufacturing of safety markings according to DIN 30710.

Series 823i features 3M™ Comply™ with Controltac™ Liner which greatly improves ease of installation. For installation instructions please see 3M Information Folder 4.8.

Storage

- Cool, dry area out of direct sunlight.
- Temperature 65-75° F (18-24° C), humidity 30-50%.
- Store rolls horizontally, in carton or in original packaging.

Limitations

Series 823i is not intended for:

- Regulatory traffic signs.
- Graphics made for automotive Original Equipment Manufacturers (OEM); please contact 3M Automotive Division for alternatives.
- Flexible Prismatic Vehicle Markings Series 823i are not designed to perform on stainless steel substrates.

Compatible Products

For screen print applications, use [3M™ Process Color Series 990](#).

Health and Safety Information

Read all health hazard, precautionary, and first aid statements found in the Safety Data Sheet (SDS), Article Information Sheet and/or product label of chemicals prior to handling or use. Consult local regulations and authorities for possible restrictions. Visit us at www.3M.com/us and select SDS search to obtain current Safety Data Sheets.

Warranty

3M™ Vehicle Safety Markings Series 823i (“Product”) is warranted (“Basic Warranty”) to be free of defects in materials and manufacture at the time of shipment and to meet the specifications stated in this product bulletin. If the Product is proven not to have met the Basic Warranty on its shipment date, then a buyer’s exclusive remedy, and 3M’s sole obligation, at 3M’s option, will be refund or replacement of the Product.

Product will remain visible for a period of up to three years by resisting excessive fading, cracking, blistering or peeling in normal use.

Terms and Conditions

- Product must be processed and applied to a vertically-mounted ($\pm 20^\circ$) 3M™ recommended substrate as described in this product bulletin and in accordance with all 3M procedures provided in this product bulletin and 3M Information Folders (including but not limited to IF 4.8), and applicable technical memos (which will be furnished to the manufacturer upon request).
- Any third-party imaging or altering of the Product not endorsed by 3M™ will void the 3M Warranty.
- A Product’s failure to meet the 3M Warranty must be solely the result of design or manufacturing defects in the Product and not of (a) outside causes including improper storage, fabrication, handling, maintenance or installation; (b) use of process colors, thinners, coatings or other chemicals not recommended by 3M; (c) use of application procedures not recommended by 3M; (d) exposure to chemicals or solvents not recommended by 3M; (e) abrasion and other physical damage; (f) snow or any other burial of the marking; (g) collisions, vandalism or malicious mischief; (h) failure to cut markings around rivets, seams and body panels; (i) or an act of God.
- 3M reserves the right to determine the method of replacement. Replacement product will carry the unexpired warranty of the Product it replaces.
- Claims made under this warranty will be honored only if 3M is presented with a traceable record of the Product’s Installation Date. Claims made under this warranty will be honored only if 3M is notified of a potential failure within thirty days of discovery, reasonable information requested by 3M is provided, and 3M is permitted to verify the cause of the failure.

Exclusive Limited Remedy

If the Product is proven not to have met the 3M™ Warranty during the Warranty Period, then the purchaser’s and user’s exclusive remedy, and 3M’s sole obligation, at 3M’s option shall be that 3M will issue a refund or provide replacement of the Product.

Disclaimer

THE 3M WARRANTY IS MADE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OR CONDITION OF MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE, OR ANY IMPLIED WARRANTY ARISING OUT OF A COURSE OF DEALING OR OF PERFORMANCE, CUSTOM OR USAGE OF TRADE.

Limitation of Liability

Except for the limited remedy stated above, and except where prohibited by law, 3M will not be liable for any loss or damage arising from any 3M product, whether direct, indirect, special, incidental or consequential damages (including but not limited to lost profits, business or revenue in any way), regardless of the legal theory asserted including warranty, contract, negligence or strict liability.

Literature Reference

IF 4.8 3M Vehicle Safety Markings Series 823i

[IF 4.9](#) 3M Diamond Grade™ and Flexible Prismatic Conspicuity Markings
Application Instructions For Trucks, Trailers and Specialty Vehicles

For Information or Assistance

Call: 1-800-553-1380

In Canada Call:

1-800-265-1840

Internet:

<http://www.3m.com/roadwaysafety>

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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
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Phone 1-800-553-1380
Web 3M.com/roadwaysafety

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Diamond Grade™ Flexible Prismatic Markings

Series 973

Description

3M™ Diamond Grade™ Flexible Prismatic Markings Series 973 are designed to mark a wide variety of vehicles for which enhanced visibility is needed. This highly retroreflective marking consists of prismatic lenses that are formed in a transparent, synthetic resin, sealed and backed with an aggressive pressure sensitive adhesive and paper liner.

Series 973 markings have excellent angularity that allows them to be seen at angles up to and beyond 45° from perpendicular. This feature is important in cross traffic, turning maneuvers and when parked along roadways.

Markings are available in standard size rolls of 1 inch, 2 inch, 4 inch and 6 inch widths by 50 yards.

Properties

- Color: White 973-10
- Yellow 973-71
- Red 973-72
- Orange 973-74
- Blue 973-75
- Green 973-77

- Adhesive: Pressure Sensitive
- Minimum Application Temperature: 50°F (10°C) (sheeting and substrate)
- Maximum Application Temperature: 100°F (38°C) (sheeting and substrate)

Coefficient of Retroreflection

The minimum coefficient of retroreflection values of these sheetings when new are given in Table A in terms of candelas per lux per square meter. Measurements are made in accordance with ASTM E-810 “Standard Test Method for Coefficient of Retroreflective Sheeting” and represent an average of values at 0° and 90° orientations. Sheeting should be applied to aluminum panels and conditioned at room temperature for 24 hours prior to measurement.

Table A. Minimum Coefficient of Retroreflection (R_A) for New Markings (cd/lux/m²)

Observation Angle ¹	Entrance Angle ²	White	Yellow	Red	Orange	Blue	Green
0.2°	-4°	360	270	65	145	30	50
0.2°	30°	170	135	30	68	14	25
0.5°	-4°	150	110	27	60	13	21
0.5°	30°	72	54	13	28	6	10

¹Observation Angle – the angle formed by the light beam striking the reflective surface and the light beam returning to the observer.

²Entrance Angle – the angle formed by a light beam striking a surface at a point and a line perpendicular to the surface at the same point.

Entrance Angularity

Performance in Regard to Orientation

3M™ Diamond Grade™ Flexible Prismatic Markings are designed to be effective wide angle reflective markings regardless of the orientation on the substrate or vehicle. However, because the efficiency of light return from cube corner reflectors is not equal at all application angles, especially with increasing entrance angles, it is possible to get the widest entrance angle light return when the sheeting is oriented in a particular manner which takes advantage of increased performance at high entrance angles (>50°). When high entrance angle performance is a requirement for your markings you can obtain this performance easily by specifying the application angle of your markings so that the sheeting positioned at the 0° application angle (downweb direction perpendicular to the ground, ie, vertical). When the “primary groove line” (or, flat side of the diamond shape) is vertical, sheeting is said to be at a 0° application angle. When the “primary groove line” (or, flat side of the diamond shape) is horizontal, the sheeting is said to be at a 90° application angle. Unless the location and/or position of the marking requires extra wide entrance angularity performance, markings can be fabricated and installed using the application angle that most efficiently utilizes the reflective sheeting.

Typical Physical Properties

The following technical information should be considered typical only and should not be used for specification purposes. Any request for a custom specification can be submitted through your 3M sales representative. All test samples are conditioned for 24 hours at 73°F (23°C) and 50% relative humidity before testing.

Property	Series 973 Typical Value
Thickness (Caliper)	0.010 inch – 0.014 inch (.25 – .36mm)
Gloss ASTM D523 @ 85°	50 or greater
Dimensional Stability ASTM D4956	< 0.125 inch per side change on 9 x 9 inch panel in 24 hours
Flexibility – wrap around 0.125 inch mandrel @ 32°F (0°C)	No cracking
High Pressure Wash Test 45° angle, 1200 psi, 12 inch nozzle distance	Passes
Heat Resistance	Will retain at least 70% of original coefficient of retroreflection when applied to A1 panel and exposed to 170°F (77°C) for 24 hours in air circulating oven.
Chemical Resistance SAE J1967	Not affected by toluene, #2 diesel fuel, gasoline (leaded) kerosene, TSP detergent, xylene, dilute metal brighteners
Corrosion Resistance ASTM B-117 Salt Spray	No effect – 1000 hours
Impact Resistance Room Temperature 100 in-lbs., 5/8 inch tip	No damage outside impact area
Cold Temperature Impact 100 in-lbs. at 32°F (0°C)	No damage outside impact area
Adhesion (Instron 12 inch/min., 90° pull back)	≥ 4.0 lb./inch for degreased aluminum, Fruehauf painted panel, stainless steel and FRP

Application Procedure

These procedures should be followed to apply the markings to the cleaned surface within the proper application temperature range.

1. Apply markings no closer than 1/8 inch to door hinges, door hardware, ends and weld joints to avoid wrinkling or lifting. Markings must be cut 1/8 away from exterior posts and large bolts or rivets.
2. Peel the marking from the liner, position and align the marking on the car and tack down lightly to hold in position. Care should be taken not to stretch the marking.
3. Using a PA-1 applicator, press the marking to the surface using firm, vertical, overlapping strokes. Be sure **all** edges are adhered by resqueegeeing the edges.

Maintenance

Cleaning

Routine washing is recommended for maximum performance. The following cleaning methods are recommended:

- Wash with sponge, cloth or soft brush using water and detergent.
- Automatic vehicle wash or standard high-pressure hand spray:

Maximum pressure – 1200 PSI/80 bar.

Maximum water/wash solution temperature – 140°F/60°C.

Minimum of 12 inches/30cm distance between cleaning jets and markings.

Cleaning wand or jets are to be at **no greater** angle than 45 degrees from perpendicular to the marking's surface.

- When using metal brighteners, follow manufacturer's recommendations for dilution. Thoroughly rinse from marking after soaking vehicle.

Storage

- Cool, dry area out of direct sunlight.
- Temperature 65-75°F (18-24°C)
- Humidity 30-50%
- Store rolls horizontally, in carton or in original packaging.

Shelf Life

Apply 973 markings within one year of receipt of material.

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.

General Performance Considerations

Series 973 markings will provide maximum durability when:

- 3M recommended procedures are followed.
- Markings are applied to vertical surfaces.

Actual durability will be based on actual customer use conditions. Durability can be reduced if recommended techniques are not followed, including:

- Improper application or surface preparation.
- Failure to cut markings around rivets, seams and body panels.
- Improper use of high pressure cleaning.
- Spillage of chemicals or solvents.

Warranty

3M warrants that 3M™ Diamond Grade™ Flexible Prismatic Markings Series 973 sold by 3M to be used for markings in the United States and Canada will remain effective for the intended use for 5 years. Angular exposure between 10° and 45° from vertical decreases the warranty period by two years. Exposure at angles greater than 45° from vertical is not warranted. If the 3M reflective marking is applied in accordance with

all 3M application and fabrication procedures, including the exclusive use of 3M 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 exclusive remedy shall be that 3M will provide replacement of the 3M material per the following table:

Total Warranty Period	Full Replacement	Pro-Rata Replacement Period	Monthly Reduction in Allowance
5 yrs. (60 mos)	36 months	37th - 60th mo.	1/24
3 yrs. (36 mos)	24 months	25th - 36th mo.	1/12

Conditions

Such failures must be solely the result of design or manufacturing defects in the 3M reflective markings and not of outside causes such as: improper handling, maintenance or installation; 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 marking; collisions, vandalism or malicious mischief.

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

Replacement markings will carry the unexpired warranty of the markings they replace.

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 any way 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, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED 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

CALL:

1-800-553-1380

IN CANADA CALL:

1-800-265-1840

Internet:

www.3M.com/tss

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Traffic Safety and Security Division

3M™ Diamond Grade™ Conspicuity Markings

Series 983

Product Bulletin 983
April 2017

Replaces PB 983 dated June 2016

Description

3M™ Diamond Grade™ Conspicuity Markings Series 983 are highly retroreflective microprismatic markings designed to enhance the visibility of the sides and rear of vehicles. The reflective marking consists of prismatic lenses that are formed in a transparent, synthetic resin, sealed and backed with a pressure sensitive adhesive and clear polymeric liner. Diamond Grade Conspicuity Markings are highly durable providing up to ten years of field performance. 3M's Series 983 markings have excellent angularity which provides enhanced visibility for drivers.

For warranty and product information on specific applications such as trucks and trailers, rail cars, school buses or emergency vehicles, please see the specific product bulletins. This product bulletin applies to applications other than trucks and trailers, rail cars, school buses or emergency vehicles.

- Combined fluorescence and retroreflection provides 24-hour enhanced visibility and detection.
- Fluorescence enhances visibility for improved safety.

Easy to Apply

- Aggressive pressure sensitive adhesive
- Easy to remove liner
- Available in convenient rolls, packaged pieces, or kiss-cut pieces on a roll. Reference the 3M Traffic Safety and Security Division Pricing Catalog for the standard product offering.

Durable

- Pre-sealed edges
- Non-metallic construction

Table 1. Product Codes by Color

Product Code	Color
983-10	White
983-71	Yellow
983-72	Red
983-21	Fluorescent Yellow
983-23	Fluorescent Yellow-Green

Typical Physical Properties

Table 2 provides the typical physical properties of Series 983. The information in Table 2 should be considered typical only and should not be used for specification purposes.

Table 2. Typical Physical Properties

Property	Series 983 Typical Values
Thickness (Caliper)	0.014 inch - 0.018 inch
Whiteness Daytime Luminance Limit Y_T ASTM E1164	45 White 5 Red 27 Yellow 75 Fluorescent Yellow 90 Fluorescent Yellow-Green
Gloss ASTM D523 @ 85°	100
Shrinkage ASTM D4956	No substantial change
Flexibility - wrap around 0.125 inch mandrel @ 32° F (0° C)	No cracking
High pressure wash test 45° angle, 1200 psi, 8 inch away	Passes
Adhesion 90° Hanging Weight ASTM D4956	0.2 inch (4 mm)
Minimum Application Temp.	50° F (10° C)
Instron Peel Adhesion 12 inch/minute, 90° pullback	Degreased aluminum 5.3 lb/in (.95 kg/cm) Prepainted panel 3.0 lb/in (0.55 kg/cm) Stainless steel 6.0 lb/in (1.1 kg/cm) FRP 2.5 lb/in (0.52 kg/cm) Tedlar® 3.0 lb/in (0.54 kg/cm) Aluminum Rail 3.5 lb/in (0.56 kg/cm)
Chemical Resistance SAE J1967	Not affected by toluene, #2 diesel fuel, gasoline (leaded) kerosene, TSP detergent, xylene, dilute metal brighteners
Corrosion Resistance ASTM B-117 Salt Spray	No effect - 1000 Hours
Impact Resistance Room Temperature 100 in-lb, 5/8 inch tip	No damage outside impact
Cold Temperature 60 in-lb at -20° F	No damage outside impact

Coefficient of Retroreflection

The values in Table 3 are typical coefficients of retroreflection expressed in candelas per lux per square meter (cd/lux/m²). Conformance to coefficient of retroreflection requirements shall be determined by instrumental method in accordance with ASTM E810 “Test Method of Coefficient of Retroreflection of Retroreflective Sheeting”, and per ASTM E810 the values of 0° and 90° rotation are averaged to determine the R_A in Table 3.

Table 3. Typical Coefficient of Retroreflection (R_A) for New Sheeting (cd/lux/m²)

Observation Angle ¹	Entrance Angle ²	983 Typical White	983 Typical Red	983 Typical Yellow	983 Typical (Fl. Yellow)	983 Typical (Fl. Yellow-Green)
0.2 °	-4°	800	160	645	400	700
	30°	430	110	420	220	430
	45°	175	45	235	120	160
0.5 °	-4°	460	95	360	150	385
	30°	215	40	180	75	180
	45°	55	15	65	40	30

Typical Physical Characteristics

Table 4 provides the typical physical characteristics of Series 983. The information in Table 4 should be considered typical only and should not be used for specification purposes.

Table 4. Typical Physical Characteristics of Series 983

Property	Description
Adhesive color and type	Clear, pressure sensitive
Liner	Translucent polymeric
Application surfaces	Metal or painted metal flat without rivets
Heat resistance	Maintains 70% of original coefficient of retroreflection at ($\alpha=0.2$, $\beta=-4$) after 24 hr. exposure to 170° F (77° C) air
Recommended minimum application temperature (ambient and substrate)	50° F (10° C)
Performance range	-30° F to 200° F (-34° C to +94° C)

Photometrics

Fluorescence

Fluorescent materials absorb short wavelength, invisible, incident radiation (solar energy) and re-emit the radiation as longer wavelength, visible light. This re-emitted energy continues as long as incident radiation is present. These materials are especially effective during dawn, dusk, and overcast days. Fluorescence adds to daytime luminance (apparent brightness) of markings and enhances the visibility of rail cars and other vehicles.

¹ Observation Angle – The angle between the illumination axis and the observation axis.

² Entrance Angle – The angle from the illumination axis to the retroreflector axis. The retroreflector axis is an axis perpendicular to the retroreflective surface.

Color Test – Fluorescent Sheetings

Conformance to standard chromaticity (x, y) and luminance factor (Y) requirements shall be determined by instrumental method in accordance with ASTM E991 on sheeting applied to smooth aluminum test panels cut from Alloy 6061-T6 or 5052-H38. The values shall be determined on a HunterLab ColorFlex 45/0 spectrophotometer. Computations shall be done for CIE Illuminant D65 and the 2° standard observer.

Fluorescence Luminance Factor (Y_F) differentiates fluorescent markings from ordinary (nonfluorescent) markings. The additional daytime luminance provided by fluorescence is directly related to the increased conspicuity of fluorescent vehicle markings under varying conditions of daylight illumination encountered in outdoor safety marking applications. The fluorescence luminance factor, Y_F , provides a standardized measure of the marking's fluorescence.

The numerical value of Y_F under specified illumination and viewing conditions: 1) verifies the fluorescence of the marking (for nonfluorescent markings $Y_F=0$) and 2) quantifies the fluorescent efficiency of the marking. The magnitude of Y_F can be used to assess whether the fluorescence of the marking is sufficient to provide high daytime visibility performance under poor visibility conditions. Typical fluorescence luminance factor (Y_F) values of 983-21 fluorescent yellow and 983-23 fluorescent yellow-green are given in Table 5.

Table 5. Typical Luminance Factor Values for 3M™ Diamond Grade™ 983-21 Fluorescent Yellow and 983-23 Fluorescent Yellow-Green Conspicuity Markings³

Color	Total Luminance Factor (Y_T)	Luminance Factor (Y_F)	Luminance Factor (Y_R)
Fluorescent Yellow	75	55	20
Fluorescent Yellow-Green	90	55	35

Maintenance

Cleaning

Routine washing is recommended for maximum performance. The following cleaning methods are recommended.

- Wash with sponge, cloth or soft brush using water and detergent.
- Automatic truck/car wash or standard high-pressure hand spray:
 - Maximum pressure: 1200 PSI/80 bar.
 - Maximum water/wash solution temperature: 140° F/60° C.
 - Minimum of 12 inches/30 cm distance of cleaning jet(s) from markings.
 - Cleaning wand or jets to be at no greater angle than 45 degrees from perpendicular to the marking surface.
 - Use Spray Tip #1505 (15 degree spray angle, 05 capacity size).
- When using metal brighteners, follow manufacturer's recommendations for dilution. Thoroughly rinse from markings after soaking vehicle.

Storage

- Cool, dry area out of direct sunlight.
- Temperature 65-75° F (18-24° C), humidity 30-50%.
- Store rolls horizontally, in carton or in original packaging.

³ Total luminance is defined as the sum of fluorescent and reflected luminance ($Y_T=Y_F+Y_R$) and is determined in accordance with ASTM E2152 and ASTM E2153.

Shelf Life

- Apply Series 983 markings within one year of receipt of material.

General Performance Considerations

Series 983 will provide maximum durability when:

- All 3M™ recommended procedures are followed.
- Marking is applied to vertical surfaces (within $\pm 20^\circ$ from vertical).

Durability will depend on customer use. Failure to follow the 3M-required techniques may reduce durability. Below are some examples and conditions that may lead to reduced durability:

- Failure to cut markings around rivets, seams and body panels.
- Improper use of high pressure cleaning.
- Contact with non-recommended chemicals or solvents.
- Improper application or surface preparation.
- Horizontal exposure is not recommended.
- Open cells along the edge of the marking may collect dirt but will not reduce the performance of the marking.
- Damage due to external conditions may show loss of adhesion and reflectivity in the immediate area.

Health and Safety Information

Read all health hazard, precautionary, and first aid statements found in the Safety Data Sheet (SDS), Article Information Sheet and/or product label of chemicals prior to handling or use. Consult local regulations and authorities for possible restrictions. Visit us at www.3M.com/us and select SDS search to obtain current Safety Data Sheets.

Warranty

3M Basic Product Warranty, Exclusive Limited Remedy and Disclaimer

3M™ Diamond Grade™ Conspicuity Marking Series 983 (“Product”) is warranted (“Basic Warranty”) to be free of defects in materials and manufacture at the time of shipment and to meet the specifications stated in this product bulletin. If the Product is proven not to have met the Basic Warranty on its shipment date, then a buyer’s exclusive remedy, and 3M’s sole obligation, at 3M’s option, will be a refund or replacement of the Product.

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Additional Warranty

For additional warranty information on specific applications such as trucks and trailers, rail cars, school buses or emergency vehicles, please see the specific product bulletins for those applications.

Limitation of Liability

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Literature Reference

PB Series 983	Conspicuity Markings Series 983
PB Series 983	For Use on Emergency Vehicles
PB Series 983	For Use on Trucks and Trailers
PB Series 983 RR	For Use on Rail Cars
PB Series 983-21	For Use on School Buses
PB Series 983-71	For Use on School Buses
IF 4.9	Application Instructions for Diamond Grade Conspicuity Markings Series 983

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Premium Protective Overlay Film

Series 1160

Product Bulletin 1160

December 2013

Replaces PB 1160 November 2011

Description

3M™ Premium Protective Overlay Film Series 1160 is designed as a high performance protective transparent overlay for use on signs made from 3M Traffic Safety and Security Division sheetings, films, and images. Series 1160 has been specifically developed for use over signs made from 3M™ Diamond Grade™ and High Intensity Prismatic Sheeting, and 3M's system of matched components, and is recommended for use with these materials. Many types of defacement from vandalism can be cleaned from this film to substantially restore performance and appearance of the overlaid sign. Two configurations are available:

1160: with premask

1160A: without premask

Important: *A complete understanding of these instructions is recommended before sheeting application.*

Properties

A. Color and Transparency

Series 1160 is a clear, colorless film. Application of Series 1160 to a sign fabricated using 3M's matched component systems will preserve the initial and retained minimum retroreflectance specified for the sheeting used to fabricate the sign.

B. Film

Series 1160 is a high performance fluoropolymer film that provides a barrier and resists staining from common graffiti including paints, permanent marker ink, lipstick, eggs and stickers and allows for easier clean-up.

C. Adhesive and Liner

Series 1160 utilizes a clear, transparent, and pressure sensitive adhesive and has an easily removable white paper liner.

D. Premask

To aid film handling, Series 1160 is provided with a white paper premask which is easily peeled away from the film after application. After removing the premask, reroll the sign through the laminator to ensure good adhesion.

Application**A. Use Conditions Before Overlaying Film**

1. Air and substrate temperatures should be above 60°F (16°C).
2. Signs must be clean and screen printed inks completely dry.

B. Equipment

1. Mechanical squeeze roll applicator – See Information Folder 1.4.
2. Hand squeeze roll applicator – See Information Folder 1.6.
3. A laminating roll with a hardness of 35 durometer (Shore A) is recommended to minimize tenting of Series 1160 over direct apply copy or 3M™ ElectroCut™ Film Series 1170.

NOTE: Application of 1160A Film is best accomplished using a mechanical squeeze roll applicator. Use extra care when handling this film since it is not supported with a premask.

C. Premasked Film (1160)

1. Remove the premask AFTER film application to sign by lifting edge of premask with fingernail or knife and pulling premask back over itself at a vary sharp angle using a steady, even tension.

Note: Edge trim BEFORE removing premask.

WARNING: Do not allow premask to be exposed to moisture. Premask must be removed before storage or shipment.

D. Trimming

1. Use a sharp cutting blade to trim film along edges. It may be helpful to grasp the edge of the unsupported overhanging film to create tension on that portion of the film while trimming.
2. The overhanging portion of the film on the TOP EDGE of the sign may be folded over smoothly and adhered to the back edge of the sign to minimize any water or dirt intrusion along the top edge of the sign. The backside of the sign must be properly cleaned before film is applied.

E. Additional Processing

1. DO NOT apply any inks, films, or sheetings in the form of copy or images over 1160 film since this film is designed to repel adhesion of such markings.

F. Splices

1. Creating film splices to overlay a sign is not recommended.

Packaging and Storage

- A. Store film in a cool, dry area, preferably 65- 75°F and 30-50 percent relative humidity.
 - B. Faces and signs covered with overlay film do not require slipsheeting. Follow recommendations given in Information Folder 1.11 regarding proper storage, packaging, handling, shipping, and installation.
 - C. Use within one year from date of receipt.
-

Cleaning**A. Materials**

- 1. To remove normal dirt accumulation from signs, use a soft cloth and mild detergent and water solution followed by thorough water rinse.
 - 2. To remove other contaminations such as graffiti defacement, use commercially available cleaning systems recommended for this purpose. **Important: Before using any cleaning materials, read and carefully follow product label use and safety instructions. Test the cleaner on a small area of the sign to determine its suitability and to be sure it does not cause any unwanted results or damage to the performance of the sign.** Avoid the use of formulations containing strong polar solvents such as ketones (acetone, methyl ethyl ketone) or methylene chloride (dichloro methane) and other chlorinated solvents.

A cleaner such as 3M™ Citrus Cleaner can be effective for removal of common types of defacement such as from permanent marking pens, eggs, and stickers. A solvent such as isopropyl alcohol (IPA), or a 50/50 blend of IPA and xylene can be effective in removing paints and lacquers. Commercially available cleaners can also be highly effective. Although Series 1160 is resistant to strong solvents, prolonged exposure to solvents can result in permanent sign damage.
 - 3. A pressure sensitive tape such as SCPM-3 from 3M also may be effective in removing certain paints and stickers. Simply roll or squeegee the tape firmly over the defaced area and carefully lift away the tape with the defacement from the overlay. Small amounts of residual defacement may require cleaning solutions as stated above to remove small areas that the tape method did not remove adequately. The sign needs to be completely dry for this method to be effective.
 - 4. Always use soft cloths. Do NOT use abrasive brushes, scouring pads or implements to scrape defacement from sign as these will likely damage the sign permanently.
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3M Basic Product Warranty and Limited Remedy

3M™ Premium Protective Overlay Film Series 1160 (“Product”) is warranted to be free of defects in materials and manufacture at the time of shipment and to meet the specifications stated in this Product Bulletin. If the Product is proven not to have met the Basic Warranty on its shipment date, then a buyer’s exclusive remedy, and 3M’s sole obligation, at 3M’s option, will be refunded or replacement of the sheeting.

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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.
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General Surface Testing	3M™ Premium Protective Overlay Film Series 1160, when used according to the recommendation of 3M, can be expected to provide the same effective field performance as the sheeting on which it is applied. Series 1160 is designed to enable signs to be cleaned from many common types of defacement caused by vandalism. The film does not prevent defacement but allows the sign to be cleaned in many situations using recommended and conventional cleaners such that the performance and appearance of the original sign is substantially restored. This would include the occasional removal of such markings as common household spray paints, lipstick, permanent pen, eggs, and/or promotional stickers. Use of sharp implements, abrasive devices or certain types of strong and or corrosive chemicals to either deface the sign or used against recommendations to attempt to clean the sign could result in permanent damage to the overlay film and underlying sign which could severely reduce the performance expectation of the original sign. This overlay film is not intended to provide sign protection from impact, cutting, gouging, or pulling of the overlay film from the sign or from the use of strong chemicals that may damage the film and/or the underlying sign. Use of a flame or other high heat source and other such extreme abuse of overlaid signs would very likely severely reduce or destroy the sign's effectiveness permanently.
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Literature References	Information Folder 1.4 Instructions for Operation of Squeeze Roll Applicator Information Folder 1.5 Hand Applications Instructions Information Folder 1.6 Instructions for Hand Squeeze Roll Application Information Folder 1.11 Storage, Maintenance & Removal Instructions
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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™ DG³ Series 4000 and 4000TT
- 3M Diamond Grade™ Translucent DG³ Reflective Sheeting 4090T

Additionally, 3M™ ElectroCut Film 1170C Clear must be used with the following 3M reflective sheetings:
 3M Diamond Grade DG³ 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](#).

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Engineer Grade and Utility Grade Reflective Sheeting

Series 3200, 3260 and 5200
Meets ASTM Type I

Product Bulletin

September 2013

Replaces Information Folder 1.7 dated November 2005

Description

Engineer Grade Series 3200

3M™ Engineer Grade Reflective Sheeting Series 3200 meets ASTM D4956 Type I and is an enclosed lens, pressure sensitive adhesive-coated sheeting with an easy release liner, intended for production of non-critical traffic signs and pressure sensitive stickers.

Sheeting Colors:

Color	Product Code
-------	--------------

White	3290
-------	------

Yellow	3271
--------	------

Red	3272
-----	------

Blue	3275
------	------

Green	3277
-------	------

Brown	3279
-------	------

Adhesive: Pressure-sensitive

Adhesive Color: Clear

Application Temperature: 65°F (18°C) minimum (sheeting and substrate)

Engineer Grade Series 3260

3M™ Engineer Grade Reflective Sheeting Series 3260 is punched for use in sprocket fed electronic cutting machines. Series 3260 sheeting is available in the following colors:

Color	Product Code
-------	--------------

White	3260
-------	------

Yellow	3271
--------	------

Red	3272
-----	------

Blue	3275
------	------

Green	3277
-------	------

Series 3260 Roll Sizes

- 15 inch wide x 50 yard length (Useable sheeting width approximately 13-3/4")
- 30 inch wide x 50 yard length (Useable sheeting width approximately 28-3/4")

**Description
(continued)****Utility Grade Series 5200**

3M™ Utility Grade Reflective Sheeting Series 5200 meets ASTM D4956 Type I, Class 4 sheeting with enhanced cold weather application properties. It can be applied at temperatures down to -10°F (-23°C) on moderately rough or porous metals and plastic surfaces. These sheetings are not intended for use as large emblems or signs.

Series 5200 has a high tack pressure sensitive adhesive and is available in the following colors:

Color Product Code

White 5290

Yellow 5271

Series 5200 is designed for hand application. See Information Folder 1.5 for details.

Fabrication

For Series 3200 and Series 3260 sheeting temperature should be at least 65°F (18°C) or higher. If the sheeting temperature is less than 65°F (18°C), allow it to condition to 65°F – 75°F (18°C – 24°C) for at least 24 hours. For Series 5200 sheeting temperature should be at least 20°F (-7°C) or higher.

1. Series 3200 and Series 3260: Best application will be achieved by using a motorized or hand operated squeeze roll applicator.
2. Series 5200: Hand application. To obtain maximum initial adhesion use firm pressure with a two-inch (5 cm) rubber roller or plastic squeegee (PA1 or equivalent). Use multiple, heavy overlapping strokes. Resqueegee all edges. See Information Folder 1.5.

See Information Folder 1.7 for surface preparation and Information Folder 1.4, 1.5 and 1.6 for recommended application procedures.

A. Cutting:

The sheeting may be hand cut, band sawed, guillotined, cold or hot die cut, and electronically cut.

B. B. Screen Printing:

Use 3M™ Process Color 990.

See appropriate product bulletin for more information. Dry according to recommendations in product bulletin 990 and Information Folder 1.8.

C. Electronic Cutting Machines:

Users are encouraged to evaluate cutting procedures for their own equipment and shop conditions. However, these general recommendations should be followed to ensure easy handling. There should be enough down force on the knife blade to slightly score the liner. The knife blade should be sharp and clean. Letters and characters should be a minimum height of three inches with a minimum stroke width of three eighths (3/8) of an inch.

D. Premasking/Prespacing

1. Premasked Markings: Use Application Tape SCPM-3.
2. Prespacing Markings: Use Prespacing Tape SCPS-2 or Application Tape SCPM-3.

**Fabrication
(continued)**

Table A – Minimum Coefficient of Retroreflection
Candelas/Foot Candle/Square Foot
Candelas/Lux/Square Meter

Obs. ¹ Angle	Ent Angle ²	White	Yellow	Red	Green	Blue	Brown
0.2	-4	70	50	14.0	9.0	4.0	1.0
0.2	+30	30	22	6.0	3.5	1.7	0.3
0.5	-4	30	25	7.5	4.5	2.0	0.3
0.5	+30	15	13	3.0	2.2	0.8	0.2

Reflectivity conforms to ASTM D 4956.

¹Observation Angle – The angle between the illumination axis and the observation axis.

²Entrance Angle – The angle from the illumination axis to the retroreflector axis. The retroreflector axis is an axis perpendicular to the retroreflective surface.

Table B – CIE Chromaticity Coordinate Limits

Color	<u>x</u>	<u>y</u>	<u>x</u>	<u>y</u>	<u>x</u>	<u>y</u>	<u>x</u>	<u>y</u>	Reflectance Limit (Y)	
									Min	Max
White	.303	.300	.368	.366	.340	.393	.274	.329	27.0	
Yellow	.498	.412	.557	.442	.479	.520	.438	.472	15.0	45.0
Red	.648	.351	.735	.265	.629	.281	.565	.346	2.5	15.0
Blue	.140	.035	.244	.210	.190	.255	.065	.216	1.0	10.0
Green	.026	.399	.166	.364	.286	.446	.207	.771	3.0	12.0
Brown	.430	.340	.610	.390	.550	.450	.430	.390	1.0	9.0

Cleaning

Signs that require cleaning should be flushed with water, then washed with a detergent solution and soft bristle brush or sponge. Avoid pressure that may damage the sign face. Flush with water following washing. Do not use solvents to clean signs. See 3M Information Folder 1.10.

Storage and Shelf Life

Sheeting should be stored in a cool, dry area, preferably at 65-75°F (18-24°C) and 30-50% relative humidity and should be applied within one year of purchase. Rolls should be stored horizontally in the shipping carton. Partially used rolls should be returned to the shipping carton or suspended horizontally from a rod or pipe through the core. Unprocessed sheets should be stored flat. Refer to Information Folder 1.11 for more information. Unprinted sheeting may be stored by the fabricator for a period of up to one year and after printing, sign faces may be stored for an additional period of up to six months. Sheeting and sign faces must be stored in a clean area, free from excessive moisture and direct sunlight, with ambient temperatures of 85°F (29°C) or less.

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.

General Performance Considerations The performance and durability of 3M reflective sheeting will depend upon a number of factors including (but not limited to) substrate selection and preparation, compliance with recommended application procedures, sign placement, geographic area, exposure conditions, atmospheric conditions (e.g. fog, snow, rain), surface deposits (e.g. dirt, dew, frost), maintenance and age. Engineer grade reflective sheeting can be expected to provide satisfactory performance for five to seven years when processed with 3M matched component inks and films, depending upon climatic conditions of the installation.

Maximum durability of engineer grade reflective sheeting can be expected in applications subject to vertical exposure on stationary objects when processed and applied to properly prepared aluminum according to 3M recommendations provided in Information Folder 1.7 on Sign Base Preparation.

The user must determine the suitability of any nonmetallic sign backing for its intended use. Applications to unprimed, excessively rough or non-weather-resistant surfaces, or exposure to severe or unusual conditions can shorten the performance of such applications. Signs or stickers that are covered by snow or ice for prolonged periods, such as those in mountainous areas, may also have reduced durability.

Limitation of Liability 3M shall not be liable for any direct, indirect, special, incidental, or consequential losses or damage, including, but not limited to, lost profits, revenue, business opportunities, or goodwill, in any way related to the information contained in this document.

Literature References

Product Bulletin 990	3M™ Process Color Series 990
Information Folder 1.4	Instructions for Operation of the Interstate Squeeze Roll Applicator
Information Folder 1.5	3M™ Reflective Sheeting Hand Application Instructions
Information Folder 1.6	Hand Squeeze Roll Applicators
Information Folder 1.7	Sign Base Surface Preparation for 3M™ Reflective Sheeting Application
Information Folder 1.8	3M™ Series 700, 880, and 990 Process Color instructions for use on 3M™ Reflective Sheetings
Information Folder 1.10	Cutting, Matching, Premasking and Prespacing of 3M™ Reflective Sheetings and Films
Information Folder 1.11	Sign Maintenance Management, for 3M™ Reflective Sheeting

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**Internet:
www.3M.com/roadwaysafety**

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, 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.

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3M™ Engineer Grade Prismatic Reflective Sheeting

Series 3430 with Pressure Sensitive Adhesive

Product Bulletin

May 2016

Replaces PB 3430 dated August 2013

Health and Safety Information

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

Description

3M™ Engineer Grade Prismatic Reflective Sheeting Series 3430 is a non-metalized micro-prismatic lens reflective sheeting designed for the production of durable traffic control signs and devices, that are exposed vertically in service.

Series 3430 sheeting can easily be identified by the visible integral 'EGP' marking.

Applied to properly prepared sign substrates, Series 3430 provides long-term reflectivity and durability.

The initial photometric and colorimetric properties of Series 3430 are according to EN 12899-1:2007.

Sheeting	Color
3430	White
3431	Yellow
3432	Red
3435	Blue
3437	Green
3439	Brown

signfaces for traffic signs with a European Technical Approval (ETA).

All provisions concerning the attestation of conformity and the performances described in the ETA 10/0118 and 12/0550 were applied and the product fulfills all the prescribed requirements (see the Declaration of Performance at the end of this document for more details).

Properties

The initial minimum coefficient of retroreflection of Engineer Grade Prismatic, when measured according to CIE 54.2 using CIE standard illuminant A, conforms to Table 3 of EN 12899-1:2007 and ETA 10/0118 and 12/0550 for Class RA1 materials (Table A).

Geometry of measurements		Color					
α	β_1 ($\beta_2=0$)	White	Yellow	Red	Green	Blue	Brown
0,2°	+5°	70	50	14,5	9	4	1
	+30°	30	22	6	3,5	1,7	0,3
	+40°	10	7	2	1,5	0,5	#
0,33°	+5°	50	35	10	7	2	0,6
	+30°	24	16	4	3	1	0,2
	+40°	9	6	1,8	1,2	#	#
2°	+5°	5	3	1	0,5	#	#
	+30°	2,5	1,5	0,5	0,3	#	#
	+40°	1,5	1,0	0,5	0,2	#	#

Table A: Minimum Coefficient of Retroreflection [cd/(lx · m²)]

The above angular definitions apply for the CIE Goniometer system (co-planar geometry). The sheeting shall be mounted in 0° or 90° orientation on the goniometer (as shown below in figure 1).



3M™ Engineer Grade Prismatic Reflective Sheeting Series 3430 is approved for the manufacturing of

The initial chromaticity coordinates and luminance factors conform to Class CR2 of EN 12899-1:2007 for Class RA1 materials (Table B).

Color	1		2		3		4		Luminance factor
	x	y	x	y	x	y	x	y	β
White	0,305	0,315	0,335	0,345	0,325	0,355	0,295	0,325	$\geq 0,35$
Yellow	0,494	0,505	0,470	0,480	0,493	0,457	0,522	0,477	$\geq 0,27$
Red	0,735	0,265	0,700	0,250	0,610	0,340	0,660	0,340	$\geq 0,05$
Blue	0,130	0,086	0,160	0,086	0,160	0,120	0,130	0,120	$\geq 0,01$
Green	0,110	0,415	0,150	0,415	0,150	0,455	0,110	0,455	$\geq 0,04$
Brown	0,455	0,397	0,523	0,429	0,479	0,373	0,558	0,394	$0,09 \geq \beta \geq 0,03$

Table B: Chromaticity and luminance factors

Printed Colors

For printed color areas on white sheeting, when processed according to 3M™ recommendations, the coefficients of retroreflection shall not be less than 70% of the value for the corresponding color in table A. The chromaticity coordinates and luminance factors shall conform to table B.

This complies with requirements in EN 12899-1 and ETA 10/0118 and ETA 12/0550.

Surface Pattern

The Engineer Grade Prismatic sheeting is differentiated from other prismatic or encapsulated lens sheeting by the distinctive surface pattern and the visible integral ‘EGP’ marking.

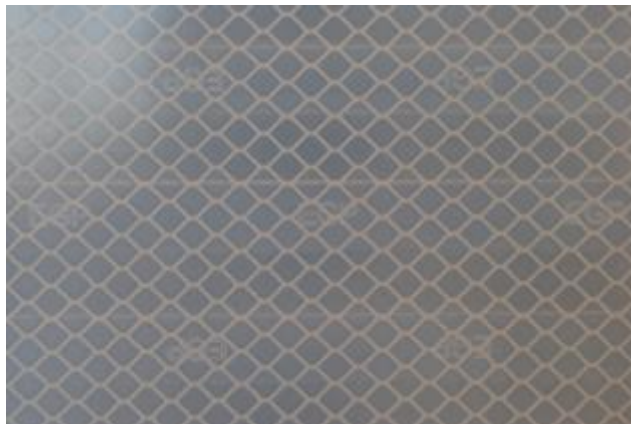


Figure 1 – Sheeting is positioned at 90° orientation

Orientation

Engineer Grade Prismatic is designed to be an effective sheeting regardless of its orientation on the substrate or ultimate orientation after installation.

However, because the efficiency of light return from cube corner reflectors is not equal at all rotation angles, the sheeting should be positioned in 0° or 90° application orientation on the completed sign when wide entrance angle performance is important for a given sign type or situation.

Application

Engineer Grade Prismatic sheeting should be conditioned prior to application to provide a minimum sheeting temperature of 18°C throughout the roll or sheeting stack.

The sheeting should be applied with mechanical squeeze roll applicators to properly prepared substrates.

If the application is done by hand, use firm pressure with a rubber roller or equivalent to obtain maximum initial adhesion. Use multiple, heavy overlapping strokes. Re-roll all edges. For further information refer to Information Folder IF 1.4, 1.5 and 1.6.

Splices

Engineer Grade Prismatic sheeting should be butt spliced when more than one piece of sheeting is used on one piece of substrate. The sheeting pieces should not touch each other. A splice gap of up to 1.5 mm is acceptable. This is to prevent buckling as the sheeting expands in extreme temperature and humidity exposure.

Substrates

For traffic sign use, product application is limited to properly prepared aluminum (see Information Folder 1.7). The substrate should be conditioned prior to application to provide a minimum surface temperature of 15°C.

Extrusions are to be wrapped and flat panel signs are to be carefully trimmed, so that sheeting from adjacent panels do not touch on assembled signs. Users are urged to carefully evaluate all other substrates for adhesion and sign durability. Engineer Grade Prismatic sheeting is designed primarily for applications to flat substrates. Rivets or bolts should also support any use that requires a radius of curvature of less 130 mm.

Sign failures caused by the substrate or improper surface preparation are not the responsibility of 3M.

Compatible Products

Screenprint Applications

- 3M™ Process Colors 880I
- 3M™ Process Colors 880N

Digital Printing Applications

- 3M™ Piezo Inkjet Ink Series 8800UV
(for Durst Rho 161TS and 162TS printer)
- 3M™ Protective Overlay Film 1140

Copy Part Applications

- 3M™ Scotchcal™ Opaque Graphic Film 100-12
- 3M™ ElectroCut™ Film Series 1170
- 3M™ TFEC 260 D

All Applications

- Selected 3M application tapes

Important: Screen-printed sign faces must be sufficiently ventilated during the filling of the drying rack or immediately run through a conveyor. If the print is not ventilated properly, the solvents may damage the top film of the sheeting. Refer to Product Bulletin 880 and Information Folder 1.8 for more details. Care should be taken to avoid flexing Series 3430 sheeting before and especially after screening. Convert from series 880I to series 880N when ink triggered cracking first appears in your shop.

General Performance Considerations

The performance and durability of 3M™ Engineer Grade Prismatic Reflective Sheeting Series 3430 will depend upon a number of factors including (but not limited to):

- Selection, preparation and temperature of the substrate
- Application procedures
- Geographic area
- Exposure and atmospheric conditions (e.g. snow, frost)
- Correct combination of sheeting, ink and overlay film
- Ink formulation
- Ink drying/curing methods
- Cleaning and maintenance methods

Warranty

3M™ Engineer Grade Prismatic Reflective Sheeting Series 3430 sold by 3M to be used for permanent traffic control signs and devices is warranted for a period up to 7 years from date of application (concrete definition of the period is subject to the terms of sale) to be free of

defects in material and workmanship, subject to the following provisions:

If Sheeting Series 3430 is processed and applied to a vertical $\pm 10^\circ$ surface in accordance with all 3M application and fabrication procedures provided in 3M's product and information folders, technical memos (which will be furnished to the agency upon request), including the exclusive use of 3M matched component systems, process colors, overlay films and recommended application equipment.

Important Notice to Purchaser

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. Before using, user shall determine the suitability of the product for its intended use, and user 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 authorized personnel of seller and manufacturer.

Literature Reference

Instructions for Squeeze Roll Applicator	IF 1.4
Hand Application Instructions	IF 1.5
Instructions for Hand Squeeze Roll Applicator	IF 1.6
Sign Base Materials	IF 1.7
Instructions for using 3M Process Colors	IF 1.8
Cutting, Matching, Premasking and Prespacing Instructions	IF 1.10
Storage and Packaging	IF 1.11
3M Process Color 880I	PB 880I
3M Process Color 880N	PB880N

For Further Assistance

For help on specific questions relating to 3M™ reflective products, please contact your local 3M Technical Service person or contact:

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**Amendment to the Declaration of Performance
'3M Engineer Grade Prismatic 3430'**

This declaration covers the product 'Microprismatic retroreflective sheeting'. Sign plates or complete assemblies of fixed vertical road traffic signs according to EN 12899-1:2007 can be manufactured with the following products and product combinations, according to ETA 10/0118 and ETA 12/0550.

Components	Trade name	Colours/code
Micro-prismatic retro-reflective sheeting	3M™ Engineer Grade Prismatic Reflective Sheeting Series 3430	White 3430 Red 3432 Yellow 3431 Green 3437 Blue 3435
Coloured overlay film	Electrocut Film series 1170	Yellow 1171 Red 1172 Blue 1175 Green 1177 Brown 1179 Dark Green 1176
Process colour	3M™ Process Colour Series 880 I or N	Yellow 884 I or N Red 882 I or N Blue 883 I or N Green 888 I or N French Red 889 I or N
Process colour for digital printing	Piezo Inkjet Ink Series 8800 UV	Yellow Red Blue Green Brown Orange
Protective Overlay films	3M™ Protective Overlay Film 1140	Clear

Colours	Chromaticity Coordinates				Luminance Factor β	
	1	2	3	4		
White	x	0.305	0.335	0.325	0.295	Level: ≥ 0.40
Tolerance sphere	y	0.315	0.345	0.355	0.325	
Results White 3430	x*	0.3027			0.58	
	y*	0.3210				
Yellow	x	0.494	0.470	0.513	0.545	Level: ≥ 0.24
Tolerance sphere	y	0.505	0.480	0.437	0.454	
Results Yellow 3431	x*	0.5056			0.34	
	y*	0.4731				
Red	x	0.735	0.700	0.610	0.660	Level: ≥ 0.03
Tolerance sphere	y	0.265	0.250	0.340	0.340	
Results Red 3432	x*	0.6316			0.07	
	y*	0.3194				
Green	x	0.110	0.170	0.170	0.110	Level: ≥ 0.03
Tolerance sphere	y	0.415	0.415	0.500	0.500	
Results Green 3437	x*	0.1353			0.06	
	y*	0.4463				
Blue	x	0.130	0.160	0.160	0.130	Level: ≥ 0.01
Tolerance sphere	y	0.090	0.090	0.140	0.140	
Results Blue 3435	x*	0.1407			0.05	
	y*	0.1099				

The samples also meet the requirements of classes CR1 and CR2, as defined in EN 12899-1:2007 (Clause 4.1)
* Average of three test results (historical data)

Table A1.1: Daylight Chromaticity and Luminance Factor, initial

Colours	Chromaticity Coordinates				Luminance Factor β	
	1	2	3	4		
White	x	0.355	0.305	0.285	0.335	Level: ≥ 0.40
Tolerance sphere	y	0.355	0.305	0.325	0.375	
Results White 3430	x*	0.3029			0.6064	
	y*	0.3221				
Yellow	x	0.545	0.487	0.427	0.465	Level: ≥ 0.24
Tolerance sphere	y	0.454	0.423	0.483	0.534	
Results Yellow 3431	x*	0.4876			0.4175	
	y*	0.4803				
Red	x	0.735	0.674	0.569	0.655	Level: ≥ 0.03
Tolerance sphere	y	0.265	0.236	0.341	0.345	
Results Red 3432	x*	0.6013			0.0654	
	y*	0.3150				
Green	x	0.007	0.248	0.177	0.026	Level: ≥ 0.03
Tolerance sphere	y	0.703	0.409	0.362	0.399	
Results Green 3437	x*	0.1548			0.0659	
	y*	0.4348				
Blue	x	0.078	0.150	0.210	0.137	Level: ≥ 0.01
Tolerance sphere	y	0.171	0.220	0.160	0.038	
Results Blue 3435	x*	0.1487			0.0527	
	y*	0.1208				

The samples also meet the requirements of class CR1, as defined in EN 12899-1:2007 (Clause 4.1)
* Average of three test results (historical data)

Table A1.2: Daylight Chromaticity and Luminance Factor, after weathering



High Intensity Prismatic Reflective Sheeting Series 3930

Product Bulletin 3930

January 2013

Replaces PB 3930 dated January 2012

Description

3M™ High Intensity Prismatic Reflective Sheeting Series 3930 is a non-metalized microprismatic lens reflective sheeting designed for production of reflective durable traffic control signs, work zone devices and delineators that are exposed vertically in service. Applied to properly prepared sign substrates, 3M high intensity prismatic sheeting provides long-term reflectivity and durability. Series 3930 sheeting is available in the following colors.

Color	Product Code
White	3930
Yellow	3931
Red	3932
Orange	3934
Blue	3935
Green	3937
Brown	3939
Color – TT Series	
White – thermal transfer (TT) printable	3930TT
Yellow – TT printable	3931TT

Table A Daytime color specification limits¹

Color	x		y		x		y		Daytime Luminance Limit	
	x	y	x	y	x	y	x	y	Min.	Max.
White	0.303	0.300	0.368	0.366	0.340	0.393	0.274	0.329	27	
Yellow	0.498	0.412	0.557	0.422	0.479	0.520	0.438	0.472	15	45
Red	0.648	0.351	0.735	0.265	0.629	0.281	0.565	0.346	2.5	15
Orange	0.558	0.352	0.636	0.364	0.570	0.429	0.506	0.404	10	30
Blue	0.140	0.035	0.244	0.210	0.190	0.255	0.065	0.216	1	10
Green	0.026	0.399	0.166	0.364	0.286	0.446	0.207	0.771	3	12
Brown	0.430	0.340	0.610	0.390	0.550	0.450	0.430	0.390	1	9

¹The four pairs of chromaticity coordinates determine the acceptable color in terms of the CIE 1931 Standard Colorimetric System.

Photometrics

Daytime Color (x,y,Y)

The chromaticity coordinates and total luminance factor of the retroreflective sheeting conform to Table A.

Color Test – Ordinary Colored Sheeting

Conformance to standard chromaticity (x, y) and luminance factor (Y %) requirements shall be determined by instrumental method in accordance with ASTM E 1164 on sheeting applied to smooth aluminum test panels cut from Alloy 6061-T6 or 5052-H38. The values shall be determined on a HunterLab ColorFlex 45/0 spectrophotometer. Computations shall be done for CIE Illuminant D65 and the 2° standard observer.²

²The instrumentally determined color values of retroreflective sheeting can vary significantly depending on the make and model of colorimetric spectrophotometer as well as the color and retroreflective optics of the sheeting (David M. Burns and Timothy J. Donahue, Measurement Issues in the Color Specification of Fluorescent Retroreflective Materials for High Visibility Traffic Signing and Personal Safety Applications, Proceedings of SPIE: Fourth Oxford Conference on Spectroscopy, 4826, pp. 39-49, 2003). For the purposes of this document, the HunterLab ColorFlex 45/0 spectrophotometer shall be the referee instrument.

Coefficients of Retroreflection (R_A)

The values in Table B are minimum coefficients of retroreflection expressed in candelas per lux per squaremeter (cd/lux/m²).

Test for Coefficients of Retroreflection

Conformance to coefficient of retroreflection requirements shall be determined by instrumental method in accordance with ASTM E-810 “Test Method for Coefficient of Retroreflection of Retroreflective Sheeting”, and per E-810 the values of 0° and 90° rotation are averaged to determine the R_A in Table B.

Table B

Minimum Coefficient of Retroreflection R_A for new fluorescent sheeting (cd/lux/m²)

-4° Entrance Angle ³	Observation Angle ⁴	
	0.2°	0.5°
White	560	200
Yellow	420	150
Red	84	30
Orange	210	75
Green	56	21
Blue	30	13
Brown	18	7.5
30° Entrance Angle ³		
White	280	100
Yellow	210	75
Red	42	15
Orange	105	37
Green	28	10
Blue	14	6
Brown	8.5	3.5

³Entrance Angle – The angle from the illumination axis to the retroreflector axis. The retroreflector axis is an axis perpendicular to the retroreflective surface.

⁴Observation Angle – The angle between the illumination axis and the observation axis.

Printed Colors and Overlay Films

For screenprinted or thermally transfer printed transparent color areas on white sheeting when processed according to 3M recommendations, the coefficients of retroreflection shall not be less than 70% of the value for the corresponding color in Table B. For white sheeting covered with 3M™ ElectroCut™ Film Series 1170 when processed according to 3M recommendations, the coefficients of retroreflection shall not be less than 100% of the value for the corresponding color in Table B. The color chromaticity and luminance shall conform to Table A on page 1.

Entrance Angularity Performance in Regard to Orientation

High intensity prismatic reflective sheeting is designed to be an effective wide angle reflective sheeting regardless of its orientation on the substrate or ultimate orientation of the sign after installation. Signs and applied copy (letters, arrows, borders and shields) can be fabricated and installed using the application orientation that most efficiently utilizes the reflective sheeting.

Note: For multi-panel signs it is recommended that all background panels be sheeted such that the sheeting direction is the same for all panels.

Fabrication Lines

The manufacture of prismatic sheeting results in lines being present in the product. In high intensity prismatic sheeting these lines are slightly thicker than the seal pattern legs. Fabrication lines are noticeable in shop light but are not observable on the road either in daylight or at night under typical use conditions (Figure 1).

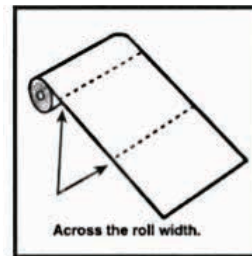


Figure 1 – Fabrication Lines

Adhesive

Series 3930 sheeting has a pressure-sensitive adhesive that is recommended for application at temperatures of 65°F (18°C) or higher.

Adhesive and Film Properties

Standard Test Panels

Unless otherwise specified herein, sheeting shall be applied to test panels and conditioned in accordance with ASTM D4956 and test methods and conditions shall conform to ASTM D4956.

Properties

The following properties shall conform to the requirements in ASTM D4956.

1. Adhesion
2. Outdoor weathering
 - retained coefficient of retroreflection
 - colorfastness

3. Shrinkage
4. Flexibility
5. Liner removal
6. Impact resistance
7. Night time color

In addition, Series 3930 sheeting will conform to the following properties.

1. Gloss

Test Method – Test in accordance with ASTM D523 using a 60° glossmeter.

Requirement – Rating not less than 50.

2. 2. Optical Stability

Test Method – Apply a 3 inch x 6 inch sample to a test panel. Measure R_A then place it in an oven at $71^\circ\text{C} \pm 3^\circ\text{C}$ ($160^\circ\text{F} \pm 5^\circ\text{F}$) for 24 hours followed by conditioning at standard conditions for 2 hours. Remeasure R_A .

Requirement – The sheeting shall retain a minimum of 85% and a maximum of 115% of the original coefficient of retroreflection.

Sign Fabrication Methods

Application

Series 3930 sheeting incorporates a pressure sensitive adhesive and should be applied to the sign substrate at temperature of $65^\circ\text{F}/18^\circ\text{C}$ or higher by any of the following methods:

Mechanical squeeze roll applicator – refer to 3M Information Folder (IF) 1.4. Application to extrusions that are edge wrapped requires sufficient softening of the sheeting. This can be accomplished by directing additional heat to the “next to last” edge roller. This practice will increase productivity and minimize cracking.

Hand squeeze roll applicator – refer to 3M IF 1.6.

Application of Series 3930 sheeting for complete signs or backgrounds must be done with a roll laminator, either mechanical or hand driven.

Hand Application

Hand application is recommended for legend and copy only. Refer to 3M Information Folder 1.5 for more details.

Hand applications will show some visual irregularities, which are objectionable to aesthetically critical customers. These are more noticeable on darker colors. To obtain a close-up uniform appearance, a roll laminator must be used.

All direct applied copy and border **MUST** be cut at all metal joints and squeegeed at the joints.

Splices

Series 3930 sheeting must be butt spliced when more than one piece of sheeting is used on one piece of substrate. The sheeting pieces should not touch each other. This is to prevent buckling as the sheeting expands in extreme temperature and humidity exposure.

Double Faced Signs

The sheeting on the bottom side of a double faced sign can be damaged if rolled through a squeeze roll applicator with an unprotected steel bottom roller. The use of a semi-soft flat sheet between the steel roller and the applied sign face will provide protection from damage. A material such as a rubber mat, tag board or cardboard is recommended.

Substrates

For traffic sign use, substrates found to be most reliable and durable are properly prepared aluminum sheets and extrusions. **Users are urged to carefully evaluate all other substrates for adhesion and sign durability.** Other substrates that may be satisfactory for proper application of sheeting will have the following characteristics:

- Clean
- Smooth
- Flat
- Rigid
- Dimensionally stable
- Weather resistant
- Non-porous
- High surface energy (passes water break test)

Refer to Information Folder 1.7 for surface preparation recommendations. Substrates with low surface energy may require additional preparation such as flame treatment, mechanical abrasion or use of adhesion promoters prior to sheeting application. Guide sign extrusions may be edge wrapped. Flat panels or unwrapped extrusions are to be carefully trimmed so that sheeting from adjacent panels does not touch on assembled signs.

High intensity prismatic sheeting is designed primarily for applications to flat substrates. Any use that requires a radius of curvature of less than five inches should also be supported by rivets or bolts. Plastic substrates are not recommended where cold shock performance is required. **Sign failures caused by the substrate or improper surface preparation are not the responsibility of 3M.**

Imaging

High intensity prismatic sheeting may be processed into traffic signs by any of the imaging methods described below. 3M assumes no responsibility for failure of sign face legends or backgrounds that have been processed with non-3M process colors or matched component imaging materials other than those listed below.

Screen Processing

Series 3930 sheeting may be screen processed into traffic signs before or after mounting on a sign substrate, using 3M Process Colors Series 880I or Series 880N. Series 880I or 880N process colors can be screened at 60-100°F (16-38°C) at relative humidity of 20-50%. A PE 157 screen mesh with a fill pass is recommended. Refer to Information Folder 1.8 for details. No clear coating is required and is not recommended. Use of other process colors series is not recommended. **Care should be taken to avoid flexing high intensity prismatic sheeting before and especially after screening to eliminate the possibility of cracking from improper handling techniques.**

Thermal Transfer Printing

High intensity prismatic TT series sheeting may be imaged with 3M™ Thermal Transfer Ribbon Series TTR2300 in conjunction with the Matan SprinG3 or Matan Spot4 thermal transfer printers. For regulated traffic signs, Series TTR2300 Spot Traffic Colors are to be applied using these printers and must be covered with 3M™ ElectroCut™ Film 1170. Refer to Product Bulletin TTR2300 for more information.

3M™ ElectroCut™ Film

3M™ ElectroCut™ Film Series 1170 may be used to provide transparent colored background copy for traffic control signs on high intensity prismatic sheeting. Refer to Product Bulletin 1170 for fabrication procedures.

Applied Cut-Out Copy

High intensity prismatic cut letters may be applied to series 3930 sheeting background to create a sign legend. Such cut-out copy may be directly applied to the background sheeting, or may be applied in a demountable form. Direct applied copy must be cut at all panel seams and carefully trimmed back so that sheeting from adjacent panels does not touch on assembled signs. Refer to Information Folder 1.10 for more information.

Note: *It is recommended to fabricate all but the largest signs using 1170 electronic cuttable overlay film (ECOF) instead of direct applied copy.*

Additional Imaging Options for Work Zone Signs

Vinyl Graphic Films

Scotchcal™ Vinyl Series 3650, Series 7720 and Series 7725 may be used to provide copy for traffic control signs on high intensity prismatic sheeting (typically orange, white or yellow sheeting) for use in construction work zones. Refer to Scotchcal™ product literature for more information.

Latex Ink Jet Printing

Series 3930 sheeting to be used in work zone signs may be imaged with HP 789 series black latex ink in conjunction with the HP Designjet L25500 Printer, or with 792 series black latex ink in conjunction with the HP Designjet L26500 Printer. Refer to Information Folder 3.4 for more information.

Note: *With the exception of 3M branded products, 3M does not represent that any printer or printer accessory recommended in 3M literature will meet customer requirements, any federal, state or local regulations or any applicable safety standards. Such determination is the responsibility of the printer owner.*

Cutting

Series 3930 sheeting may be cut into letters and shapes of at least 3 inches in height and stroke widths of at least 1/2 inch. Smaller sizes are not recommended. Sealing cut edges of Series 3930 sheeting is not required.

Plotter Cutting

Programmable knife cut (electronic cutting)

1. Flat bed plotters can either die cut or kiss cut and offer the most consistent reliable performance.
2. Friction Fed plotter. Kiss cut only. Success has been achieved using plotters that have 600 grams of down force and a 60° cutting blade. Additional drive wheels may need to be added to improve tracking. An alternative procedure is to cut sheeting from the liner side. Blade force and knife depth must be set to score but not cut through the topfilm. Break apart individual copy or apply premask to retain spacing.

Other Cutting Methods

Series 3930 sheeting may be hand cut or die cut one sheet at a time, and band sawed or guillotined in stacks. Cutting equipment such as guillotines and metal shears, which have pressure plates on the sheeting when cutting, may damage the optics. Padding the pressure plate and easing it down onto the sheets being cut will significantly reduce damage. Maximum stack height for cutting Series 3930 sheeting is 1 ½ inch or 50 sheets. Details on cutting can be found in Information Folder 1.10.

Storage and Packaging

Series 3930 sheeting should be stored in a cool, dry area, preferably at 65-75°F (18-24°C) and 30-50% relative humidity and should be applied within one year of purchase. Rolls should be stored horizontally in the shipping carton. Partially used rolls should be returned to the shipping carton or suspended horizontally from a rod or pipe through the core. Unprocessed sheets should be stored flat. Finished signs and applied blanks should be stored on edge.

Screen processed signs must be protected with SCW 568 slipsheet paper. Place the glossy side of the slipsheet against the sign face and pad the face with closed cell packaging foam. Double faced signs must have the glossy side of the slipsheet against each face of the sign.

Unmounted screened faces must be stored flat and interleaved with SCW 568 slipsheet, glossy side against the sign face.

Avoid banding, crating, or stacking signs. Package for shipment in accordance with commercially accepted standards to prevent movement and chafing. Store sign packages indoors on edges.

Panels or finished signs must remain dry during shipment and storage. If packaged signs become wet, unpack immediately and allow signs to dry. Refer to Information Folder 1.11 for instructions on packing for storage and shipment.

Installation

Nylon washers are required when twist style fasteners are used to mount the sign.

Cleaning

Signs that require cleaning should be flushed with water, then washed with a detergent solution and soft bristle brush or sponge. Avoid pressure that may damage the sign face. Flush with water following washing. Do not use solvents to clean signs. Refer to 3M Information Folder 1.10.

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 any materials prior to handling or use.

General Performance Considerations

The durability of high intensity prismatic Series 3930 sheeting and finished signs using 3M Matched Component materials will depend upon substrate selection and preparation, compliance with recommended application procedures, geographic area, exposure conditions, and maintenance. Maximum durability of Series 3930 sheeting can be expected in applications subject to vertical exposure on stationary objects when processed and applied to properly prepared aluminum according to 3M recommendations provided in Information Folder 1.7. The user must determine the suitability of any nonmetallic sign backing for its intended use. **Sign failures caused by the substrate or improper surface preparation are not the responsibility of 3M.** Applications to unprimed, excessively rough or non-weather resistant surfaces or exposure to severe or unusual conditions can shorten the performance of such applications. Signs in mountainous areas that are covered by snow for prolonged periods may also have reduced durability. 3M process colors and ElectroCut™ Film, when used according to 3M recommendations, are generally expected to provide performance comparable to colored reflective sheeting. Custom colors, certain lighter colors, heavily toned colors or blends containing yellow or gold may have reduced durability. Atmospheric conditions in certain geographic areas may result in reduced durability.

Periodic sign inspection and regular sign replacement are strongly recommended in order for sign owners to establish their own effective service life expectation, beyond the warranty period.

3M has tested HP Designjet Printers and black latex inks: L25500 printer/series 789 black ink, and L26500 printer/series 792 black ink; and when applied within parameters defined in IF 3.4 the resulting sign performance is considered to be commensurate with typically expected sign life. However, this imaging system is not covered as part of the 3M Matched Component system noted in the General Warranty Terms.

3M Basic Product Warranty and Limited Remedy

3M™ High Intensity Prismatic Reflective Sheeting Series 3930 (“Product”) is warranted to be free of defects in materials and manufacture at the time of shipment and to meet the specifications stated in this Product Bulletin. If Series 3930 Sheeting is proven not to have met the Basic Warranty on its shipment date, then a buyer’s exclusive remedy, and 3M’s sole obligation, at 3M’s option, will be refund or replacement of the sheeting.

General Warranty Terms:

1. 3M makes the Additional Warranty (as defined below) as to any traffic control and guidance sign in the United States and Canada (“Sign”) made with 3M™ High Intensity Prismatic Reflective Sheeting Series 3930 (“Product”) and the Matched Component materials listed in Table E. Any Additional Warranty is contingent on all components involved in that Additional Warranty being stored, applied, installed, and used only as 3M recommends in its Product Bulletins and Other Product Information.
2. The Basic Warranty and any applicable Additional Warranty are collectively referred to as the “3M Warranty.” EXCEPT TO THE EXTENT PROHIBITED BY APPLICABLE LAW, THE 3M WARRANTY IS MADE IN LIEU OF ALL OTHER WARRANTIES, RIGHTS OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND THOSE ARISING FROM A COURSE OF DEALING, CUSTOM OR USAGE OF TRADE. A BUYER IS RESPONSIBLE FOR DETERMINING IF A PRODUCT IS SUITABLE FOR ITS PARTICULAR PURPOSE AND APPLICATION METHODS.
3. A Sign’s failure to meet the 3M Warranty must be solely the result of the Product or the matched component materials’ design or manufacturing defects. 3M has no obligation under the 3M Warranty if a sign failure is caused by: improper fabrication, handling, maintenance or installation; non-vertical applications where the Sign face is more than +/- 10% from vertical; use of any material or product not made by 3M or not included in Table E; use of application equipment not recommended by 3M; failure of sign substrate; loss of adhesion due to incompatible or improperly prepared substrate; exposure to chemicals, abrasion and other mechanical damage; snow burial or any other sign burial; collisions, vandalism or malicious mischief.

4. 3M reserves the right to determine the method of replacement, and any replacement Product will have the remainder of the original Product’s unexpired 3M Warranty. Claims made under this warranty will be honored only if
 - The Sign was dated upon completion of fabrication (“Fabrication Date”) using a permanent method (sticker, permanent marker or crayon, metal stamp, etc.)
 - 3M is notified of a 3M Warranty claim during any applicable Warranty Period and the owner or fabricator provides the information reasonably required by 3M to verify if a 3M Warranty is applicable.

Additional Warranty and Limited Remedy

1. The Additional Warranty for a Sign made with the Product is that the Sign will: (a) remain effective for its intended use when viewed from **a moving vehicle under normal day and night driving conditions by a driver with normal vision**, and (b) after cleaning, will meet the **minimum values for coefficient of retroreflection stated in Table C** for Table C’s applicable Warranty Period measured from the Sign’s Fabrication Date.

Table C

Minimum Percent Retained of Table B

Initial R_A for applicable Warranty Period for white, yellow, red, green, blue and brown

Warranty Period	Minimum Percentage R_A Retained
1-7 Years	80%
8-10 Years	70%

2. If any Sign made with the Product is proven not to have met the Additional Warranty, then a buyer’s **exclusive remedy**, and 3M’s sole obligation, at 3M’s option:
 - a. if this occurs within seven years after the Fabrication Date, then 3M will, at its expense, restore the Sign’s surface to its **original effectiveness**; or
 - b. if this occurs during the remainder of the Additional Warranty Period, then 3M will furnish only the necessary 3M sheeting Product and matched component materials quantity to restore the Sign’s surface to its original effectiveness.

Additional Warranty & Limited Remedy for 3934 Orange Product

- The Additional Warranty for a Sign made with 3934 orange sheeting (Orange Product) is that the Sign will: (a) **remain effective for its intended use when viewed from a moving vehicle under normal day and night driving conditions by a driver with normal vision;** (b) after cleaning, will retain the coefficient of retroreflection stated in Table D for three years measured from Fabrication Date; and (c) after cleaning, the Product will **maintain daytime luminance equal to or greater than the minimums specified in Table A.**

Table D

Minimum Coefficient of Retroreflection for 3934 Orange sheeting Product (cd/lux/m²) (0.2° observation and -4° entrance)

Warranty Period	Minimum R _A
Orange	80

If any Sign made with the Product is proven not to have met the Additional Warranty, then a buyer's **exclusive remedy**, and 3M's sole obligation, at 3M's option, is that 3M will provide pro-rated replacement of the 3M materials.

Table E

Matched Component Materials.

Matched Components	
Process Colors	Series 880I
Process Colors	Series 880N
Thermal Transfer Ribbons – Spot Traffic Colors only*	Series TTR2300
ElectroCut™ Film	Series 1170
Premium Protective Overlay Film	Series 1160
Slipsheet	SCW 568
Prespacing Tape	SCPS-2
Premasking Tape	SCPM-3
Transfer Tape	TPM-5

*must be covered with 3M™ ElectroCut™ Film 1170

Refer to 3M Information Folders and Product Bulletins for detailed information about recommended application procedures and equipment.

Other Product Information

Always confirm that you have the most current version of the applicable Product Bulletin, Information Folder or Other Product Information.

IF 1.4	Instructions for Interstate Squeeze Roll Applicator
IF 1.5	Hand Application Instructions
IF 1.6	Hand Squeeze Roll Applicator
IF 1.7	Sign Base Surface Preparation
IF 1.8	Process Color Application Instructions
IF 1.10	Cutting, Premasking, and Prespacing
IF 1.11	Sign Maintenance Management
PB 880I	Process Color 880I
PB 880N	Process Color 880N
PB 1170	ElectroCut™ Film
PB TTR2300	Thermal Transfer Ribbons Series TTR2300
PB 1160	Protective Overlay Film 1160 Ink Jet Imaging with HP Designjet L25500
IF 3.4	Printer and HP 789 Series latex Inks

Limitation of Liability

3M WILL NOT UNDER ANY CIRCUMSTANCES BE LIABLE TO A BUYER FOR DIRECT (other than the applicable Limited Remedy stated above), SPECIAL, INCIDENTAL, INDIRECT OR CONSEQUENTIAL DAMAGES (INCLUDING, WITHOUT LIMITATION, LOSS OF PROFITS) IN ANY WAY RELATED TO A PRODUCT OR THIS PRODUCT BULLETIN, REGARDLESS OF THE LEGAL OR EQUITABLE THEORY ON WHICH SUCH DAMAGES ARE SOUGHT.

ASTM Test Methods are available from ASTM International, West Conshohoken, PA.

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, 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.

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Traffic Safety and Security Division

3M™ Diamond Grade™ DG³ Reflective Sheeting Series 4000

Product Bulletin Series 4000

May 2017

1 Description

3M Diamond Grade DG³ Reflective Sheeting Series 4000 features the most efficient retroreflective prism design currently available from 3M for use on vertical traffic control signs and delineators to return light to drivers under a diverse set of nighttime viewing geometries encountered by the driving public. Series 4000, as manufactured by 3M (“Sheeting”), meets the stringent retroreflective requirements given in the ASTM D4956-16 standard for Type XI retroreflective sheeting.

For detailed features and benefits of the Sheeting, please refer to the 3M Traffic Safety and Security Division website (<http://www.3M.com/TSS/>).

The Sheeting is available in the following colors.

Table 1. Product Codes by Color

Color	Product Code
White	4090
Yellow	4091
Red	4092
Blue	4095
Green	4097
Brown	4099
Fluorescent Yellow – FY	4081
Fluorescent Yellow-Green – FYG	4083
Fluorescent Orange – FO	4084
White – Thermal transfer printable	4090TT
Yellow – Thermal transfer printable	4091TT
Fluorescent Yellow – Thermal transfer printable	4081TT
Fluorescent Yellow-Green – Thermal transfer printable	4083TT

2 Specifications

The sheeting conforms to all current performance requirements of ASTM D4956-16 for the Type XI retroreflective sheeting.

Additionally, the Sheeting meets the following specifications.

2.1 Legibility

A traffic control and guidance sign (“**Sign**”) made with the Sheeting used for both Sign background and cut-out copy will remain legible when viewed from a moving vehicle under normal day and night driving conditions by not excessively fading, discoloring, cracking, crazing, peeling, and blistering during the legibility periods in the locations as given in Table 2. Sign must be manufactured, installed, and maintained as recommended in the applicable 3M Information Folders listed in Section 9, and legibility must be assessed after the Sign is cleaned as described in [3M Information Folder 1.11](#). Legibility Period is measured from the initial Sign fabrication date (“Fabrication Date”), and varies by the location of the Sign as shown in Table 2.

Table 2. Sheeting legibility periods by sheeting and geographic Sign location

Sheeting	Geographic Location	Legibility Period [from Fabrication Date]
4090, 4091, 4092, 4095, 4097, 4099, 4090TT, 4091TT (Non-fluorescent Colors)	US & Canada	Up to 12 Years
4081, 4081TT, 4083, 4083TT (Fl. Yellow and Fl. Yellow-Green)	Alabama, Arizona, Florida, Georgia, Hawaii, Louisiana, Mississippi, New Mexico, South Carolina, and Texas	Up to 7 Years
	Canada and US except for the above States	Up to 10 Years
4084 (Fluorescent Orange)	US & Canada	Up to 3 Years

2.2 Gloss

The Sheeting has a rating of 50 or higher when tested in accordance with ASTM D523 using a 60° glossmeter.

2.3 Optical Stability

The Sheeting applied to a 3-inch x 6-inch sample to a test panel retains a minimum of 85% to a maximum of 115% of its initial coefficient of retroreflection at 0.2 degree observation and (-4) degree entrance angle, after being placed in an oven at 71° C ± 3° C (160° F ± 5° F) for 24 hours followed by conditioning at standard room temperature for two hours.

2.4 Coefficient of Retroreflection (R_A)

The Sheeting applied, processed, installed, maintained, and cleaned as recommended in the applicable 3M Information Folders listed in Section 9 of this product bulletin will retain the coefficients of retroreflection¹ at or above the values given in Table 3 and on a traffic control and guidance Sign in the US and Canada, for the period given in Table 3 and measured from the Fabrication Date.

¹ Conformance to coefficient of retroreflection requirements shall be determined by instrumental method in accordance with ASTM E810 “Test Method for Coefficient of Retroreflection of Retroreflective Sheeting”, and per E810, the values of 0° and 90° rotation are averaged to determine the R_A in Table 3 and Table 4.

Table 3. Minimum Retained coefficient of retroreflection (R_A , [$\text{cd}/\text{lx}/\text{m}^2$]) for Sheeting over time**

Sheeting	Years (from Fabrication Date)	Minimum Retained Coefficient of Retroreflection [$\text{cd}/\text{lx}/\text{m}^2$]
4090, 4091, 4092, 4095, 4097, 4090 (Non-fluorescent colors)	On Fabrication Date	ASTM D4956-16 Type XI
	Up to 7 Years	80% of ASTM D4956-16 Type XI
	8-12 Years	70% ASTM D4956-16 Type XI
4081, 4081TT, 4083, 4083TT (Fluorescent Yellow, Fluorescent Yellow-Green)	On Fabrication Date	ASTM D4956-16 Type XI
	Up to 7 Years/10 Years**	70% of ASTM D4956-16 Type XI
4084 (Fluorescent Orange)	On Fabrication Date	ASTM D4956-16 Type XI
	Up to 3 Years	70% of ASTM D4956-16 Type XI

**The retained coefficient of retroreflection applies only for 7 years after Fabrication Date for the following states: Alabama, Arizona, Florida, Georgia, Hawaii, Louisiana, Mississippi, New Mexico, South Carolina, and Texas. For all other locations the retained coefficient of retroreflection is for 10 years.

3 System of Matched Components

The Sheeting is compatible with a wide range of 3M screen print and digital inks, translucent films, overlay films and other processing components. For a complete list of matched components for the Sheeting, please see the [3M MCS Warranty Bulletin](#).

4 Physical Properties

4.1 Fabrication Lines

The manufacturing process of the Sheeting results in periodic lines in the product (Figure 1). Fabrication lines may be noticeable in shop light but do not impact Sign functionality on the road either in daylight or at night under typical use conditions.

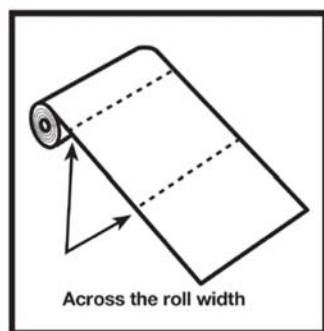


Figure 1. Fabrication Lines

4.2 Adhesive

Sheeting comes with a pressure-sensitive adhesive that is recommended for application at temperatures of 65° F (18° C) or higher.

5 Processing, Storage, Packaging, and Cleaning

For processing, storage, packaging, and cleaning information, please refer to [3M Information Folder 1.11](#).

6 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, contact 3M by mail, or for urgent requests call 1-800-364-3577.

7 Warranty Information

7.1 3M Warranty

3M warrants to the manufacturer of the Sign (“Sign Manufacturer”) that the Sheeting will meet the specifications described in section 2 of this Product Bulletin (“3M Warranty”).

7.2 3M MCS™ Warranty, MCS Warranty for Traffic

For warranty on screen-printed or digitally printed Sheeting, or Sheeting imaged using translucent films, please refer to the [3M MCS Warranty Bulletin](#).

7.3 3M Warranty Terms and Conditions

- The Sheeting must be stored, processed, applied, and maintained as described in this product bulletin and in accordance with all applicable, written 3M procedures provided in the applicable 3M Information Folders listed in Section 9.
- A failure to meet the 3M Warranty must be solely the result of design or manufacturing defect in the 3M Sheeting, and not a result of (a) outside causes including improper fabrication, handling, packing, storing, shipping, maintenance or installation; (b) non-vertical applications where the Sign is more than +/- 10° from vertical; (c) use of any material or product not recommended by 3M in this product bulletin, in the 3M Information Folders listed in Section 9, or in applicable 3M Technical Memorandums; (d) use of application equipment not recommended by 3M; (e) failure of Sign substrate; (f) loss of adhesion due to incompatible or improperly prepared substrate; (g) exposure to chemicals, abrasion and other mechanical damage; (h) snow burial or any other Sign burial; (i) collisions, vandalism or malicious mischief; or (j) an act of God.
- Claims made under this warranty will be honored only if (a) the Sign was dated with the Fabrication Date using a permanent method (sticker, marker, metal stamp, etc.), (b) 3M is notified in writing of the claim within thirty days of discovery, (c) 3M is provided with the information reasonably required to validate the claim, and (d) 3M is permitted to verify the cause of the failure.
- 3M is not responsible for any additional warranties that the Sign Manufacturer offers to its customers that is beyond the 3M Warranty.

7.4 Exclusive Limited Remedy

Valid claims under the 3M Warranty will receive either the Sign Restoration or Materials Replacement as detailed in Table 4.

Sign Restoration

During the Sign Restoration period as provided in Table 4, if a Sheeting is proven to not meet the 3M Warranty, then the Sign Manufacturer’s exclusive remedy, and 3M’s sole obligation, at 3M’s option, shall be that 3M, at its expense, will either refund the Sign Manufacturer’s total original cost of the Sign, or refabricate the Sign, including (i) Sheeting and (ii) the aluminum Sign substrate (as needed). However, 3M will not provide other hardware or labor to install the replacement Sign. The Fabrication Date of the replacement Sign will be considered to be the original Fabrication Date of the Sign it replaces under the 3M Warranty.

Materials Replacement

During the Materials Replacement period as provided in Table 4, if a Sheeting is proven to not meet the 3M Warranty, then the Sign Manufacturer’s exclusive remedy, and 3M’s sole obligation, at 3M’s option, shall be that 3M, at its expense, will either refund the Sign Manufacturer’s total original cost of the Sheeting, or provide the necessary Sheeting quantity to restore the Sign’s surface. However, 3M will not provide the substrate or any labor to refabricate or reinstall the Sign.

Table 4. Sheeting type, geographic location, and type of limited remedy as a function of the age of Sign

Sheeting	Geographic Location of Sign	Limited Remedy Period [years from Fabrication Date]	
		Sign Restoration	Materials Replacement
4090, 4091, 4092, 4095, 4097, 4099, 4090TT, 4091TT (Non-fluorescent colors)	US & Canada	Up to 7 Years	Years 8-12
4081/4083, 4081TT/4083TT (Fl. Yellow and Fl. Yellow-Green)	Alabama, Arizona, Florida, Georgia, Hawaii, Louisiana, Mississippi, New Mexico, South Carolina, and Texas	Up to 5 Years	Years 6-7
	Canada and US other than the above States	Up to 7 Years	Years 8-10
4084 (Fluorescent Orange)	US & Canada	---	Years 0-3

7.5 Disclaimer

THE 3M WARRANTY IS MADE IN LIEU OF ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OR CONDITION OF MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE, OR ANY IMPLIED WARRANTY ARISING OUT OF A COURSE OF DEALING OR OF PERFORMANCE, CUSTOM OR USAGE OF TRADE.

7.6 Limitation of Liability

Except for the limited remedy stated above, and except where prohibited by law, 3M will not be liable for any loss or damage arising from the Signs or any 3M product, whether direct, indirect, special, incidental or consequential damages (including but not limited to lost profits, business or revenue in any way), regardless of the legal theory asserted including warranty, contract, negligence or strict liability.

8 Other Product Information

Always confirm that you have the most current version of the applicable product bulletin, information folder or other product information from 3M's Website at <http://www.mmm.com/tss>.

9 Literature References

- [3M IF 1.4](#) Instructions for Interstate Squeeze Roll Applicator
- [3M IF 1.5](#) Hand Application Instructions
- [3M IF 1.6](#) Hand Squeeze Roll Applicator
- [3M IF 1.7](#) Sign Base Surface Preparation
- [3M IF 1.10](#) Cutting, Premasking, and Prespacing
- [3M IF 1.11](#) Sign Maintenance Management
- [3M PB 1170](#) 3M ElectroCut™ Film Series 1170

ASTM Test Methods are available from ASTM International, West Conshohocken, PA.

For Information or Assistance

Call: 1-800-553-1380

In Canada Call:

1-800-265-1840

Internet:

<http://www.3m.com/roadwaysafety>

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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.



Traffic Safety and Security Division
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Diamond Grade™

DG³ Reflective Sheeting Tollway Purple 4058

Data Sheet

January 2014

Description

3M™ Diamond Grade™ DG³ Reflective Sheeting Tollway Purple 4058 is a full cube retroreflective sheeting designed for the production of traffic control signs that are exposed vertically in service.

Applied to properly prepared sign substrates Diamond Grade DG³ reflective sheeting provides long-term retroreflectivity and durability.

Photometrics

Daytime Color (x, y, Y)

The chromaticity coordinates and total luminance factor of the retroreflective sheeting conform to Table A.

Table A - Daytime Color Specification Limits¹

Color	x	y	x	y	x	y	x	y	Daytime Luminance Limit (Y%)	
									Min.	Max.
Purple	0.302	0.064	0.310	0.210	0.380	0.255	0.468	0.140	2.0	10

¹The four pairs of chromaticity coordinates determine the acceptable color in terms of the CIE 1931 Colorimetric System.

Color Test – Ordinary Colored Sheeting

Conformance to standard chromaticity (x, y) and luminance factor (Y %) requirements should be determined by instrumental method in accordance with ASTM E 1164 on sheeting applied to smooth aluminum test panels cut from Alloy 6061-T6 or 5052-H38. The values should be determined on a HunterLab ColorFlex 45/0 spectrophotometer. Computations should be done for CIE Illuminant D65 and the 2° standard observer.²

²The instrumentally determined color values of retroreflective sheeting can vary significantly depending on the make and model of colorimetric spectrophotometer as well as the color and retroreflective optics of the sheeting (David M. Burns and Timothy J. Donahue, Measurement Issues in the Color Specification of Fluorescent Retroreflective Materials for High Visibility Traffic Signing and Personal Safety Applications, Proceedings of SPIE: Fourth Oxford Conference on Spectroscopy, 4826, pp. 39-49, 2003). For the purposes of this document, the HunterLab ColorFlex 45/0 spectrophotometer should be the referee instrument.

Coefficients of Retroreflection (R_A)

The values in Table B are initial minimum coefficients of retroreflection expressed in candelas per lux per square meter (cd/lux/m^2).

Test for Coefficients of Retroreflection

Conformance to coefficient of retroreflection requirements should be determined by instrumental method in accordance with ASTM E-810 “Test Method for Coefficient of Retroreflection of Retroreflective Sheeting”, and per E-810 the values of 0° and 90° rotation are averaged to determine the R_A in Table B.

Table B - Minimum Coefficient of Retroreflection R_A for new 4058 sheeting (cd/lux/m^2)

	Observation Angle ⁴		
	0.2°	0.5°	1.0°
-4° Entrance Angle ³	23	17	4.8
30° Entrance Angle ³	8.8	6.0	1.8

³ Entrance Angle – The angle from the illumination axis to the retroreflector axis. The retroreflector axis is an axis perpendicular to the retroreflective surface.

⁴ Observation Angle – The angle between the illumination axis and the observation axis.

General Performance Considerations

The durability of 3M™ Diamond Grade™ DG³ Reflective Sheeting Tollway Purple 4058 will depend upon substrate selection and preparation, compliance with recommended application procedures, geographic area, exposure conditions, and maintenance. Maximum durability of tollway purple 4058 sheeting can be expected in applications subject to vertical exposure on stationary objects when processed and applied to properly prepared aluminum according to 3M recommendations provided in Information Folder 1.7 on Sign Substrate Surface Preparation. The user must determine the suitability of any nonmetallic sign backing for its intended use.

Applications to unprimed, excessively rough or non-weather-resistant surfaces, or exposure to severe or unusual conditions can shorten the performance of such applications. Signs in mountainous areas that are covered by snow for prolonged periods may also have reduced durability. Atmospheric conditions in certain geographic areas may result in reduced durability.

Periodic sign inspection and regular sign replacement are strongly recommended in order for agencies to establish their own effective service life expectation.

Limitations of Liability

3M WILL NOT UNDER ANY CIRCUMSTANCES BE LIABLE TO A BUYER FOR DIRECT, SPECIAL, INCIDENTAL, INDIRECT OR CONSEQUENTIAL DAMAGES (INCLUDING, WITHOUT LIMITATION, LOSS OF PROFITS) IN ANY WAY RELATED TO A PRODUCT, REGARDLESS OF THE LEGAL OR EQUITABLE THEORY ON WHICH SUCH DAMAGES ARE SOUGHT.

ASTM Test Methods are available from ASTM International, West Conshohoken, PA.

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, 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.

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Series 7725

Product Description

- 2-mil cast, vinyl film

Product Features

- Pressure-sensitive permanent adhesive
- Same color on both sides
- Transparent synthetic liner resists moisture absorption and static build up
- Lays flat for easier assembly of multi-color graphics
- Superior cutting as small as 0.25 inch (0.64 cm) and weeding
- Ideal for prespaced and electronically cut, screen printed or used in narrow width thermal transfer printing systems
- Expected Performance Life of 8 years (unwarranted period for unprinted film with no graphic protection, applied to a flat, vertical, outdoor surface)

Recommended Types of Graphics and End Uses

See 3Mgraphics.com/warranties for a complete list of compatible products that are approved by 3M for use with the base film covered in this Bulletin and used for the creation of a graphic that may be eligible for the 3M™ MCS™ Warranty.

- Prespaced and electronically cut graphics
- Commercial and industrial graphic applications, including emblems, vehicle graphics, labels, striping, general signage, and two-way window markings
- Thermal transfer printed graphics

Recommended Compatible Products

See 3Mgraphics.com/warranties for a complete list of compatible products that are approved by 3M for use with the base film covered in this Bulletin and used for the creation of a graphic that may be eligible for the 3M™ MCS™ Warranty.

Screen Printing Inks for 3M™ MCS™ Warranty

- [3M™ Screen Printing Ink Series 1900 \(Solvent\)](#), line color only
- [3M™ Screen Printing UV Ink Series 9800](#), line color only

Graphic Protection

- [3M™ Screen Print Gloss Clear 1920DR](#)
- [3M™ Screen Print Matte Clear 1930](#)
- [3M™ Screen Print UV Gloss Clear 9800CL](#)
- [3M™ Screen Print Matte Clear 9730UV](#)
- [3M™ Screen Print UV Gloss Clear 9740i](#)

Application Tapes

See [3M Instruction Bulletin AT-1](#) to determine what application tape is recommend for your film or finished graphic.

Quick Links

- [3M Graphics Warranties](#)
- [Technical Information Selector](#)
- [Safety Data Sheets \(SDS\)](#)
- [Flammability \(ASTM E84 Reports\)](#)
- [Videos](#)

Some of these links lead to web-based resources that are not product-specific.

Characteristics

These are typical values for unprocessed product. Processing may change the values.

Physical Characteristics

Characteristic	Value																		
Material	Cast vinyl, glossy finish																		
Opacity	Opaque																		
Film Color	See "Colors" on page 3																		
Thickness	Without adhesive: 2 mil (0.05 mm) With adhesive: 2.5 – 3.5 mils (0.063 – 0.09 mm)																		
Adhesive	Pressure sensitive																		
Adhesive Color	Clear																		
Liner	Transparent synthetic																		
Adhesion, Typical 24 hours after application	<table> <tbody> <tr> <td>ABS</td> <td>4 pounds/inch (0.7 kg/cm)</td> </tr> <tr> <td>Acrylic</td> <td>4 pounds/inch (0.7 kg/cm)</td> </tr> <tr> <td>Acrylic enamel</td> <td>4 pounds/inch (0.7 kg/cm)</td> </tr> <tr> <td>Fruehauf pre-painted panels</td> <td>4 pounds/inch (0.7 kg/cm)</td> </tr> <tr> <td>Polycarbonate</td> <td>4 pounds/inch (0.7 kg/cm)</td> </tr> <tr> <td>Urethane paints</td> <td>4 pounds/inch (0.7 kg/cm)</td> </tr> <tr> <td>Aluminum, alodine</td> <td>8 pounds/inch (1.4 kg/cm)</td> </tr> <tr> <td>Chrome</td> <td>5 pounds/inch (0.9 kg/cm)</td> </tr> <tr> <td>Polypropylene</td> <td>3 pounds/inch (0.5 kg/cm)</td> </tr> </tbody> </table>	ABS	4 pounds/inch (0.7 kg/cm)	Acrylic	4 pounds/inch (0.7 kg/cm)	Acrylic enamel	4 pounds/inch (0.7 kg/cm)	Fruehauf pre-painted panels	4 pounds/inch (0.7 kg/cm)	Polycarbonate	4 pounds/inch (0.7 kg/cm)	Urethane paints	4 pounds/inch (0.7 kg/cm)	Aluminum, alodine	8 pounds/inch (1.4 kg/cm)	Chrome	5 pounds/inch (0.9 kg/cm)	Polypropylene	3 pounds/inch (0.5 kg/cm)
ABS	4 pounds/inch (0.7 kg/cm)																		
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Chrome	5 pounds/inch (0.9 kg/cm)																		
Polypropylene	3 pounds/inch (0.5 kg/cm)																		
Tensile Strength	5 pounds/inch at 73 °F (0.9 kg/cm at 23 °C)																		
Chemical Resistance	<ul style="list-style-type: none"> Resists mild alkalis, mild acids, and salt Excellent resistance to water (does not include immersion) 																		
Flammability	ASTM E84 test report: click here or go to the On-line Catalog at 3Mgraphics.com All available test reports: call 1-800-328-3908																		

Application Characteristics

Characteristic	Value
Finished Graphic Application Recommendation	Graphic Orientation: Vertical, non-vertical and horizontal Surface type: Flat, with and without rivets, simple curves Substrate type: Metal, glass, acrylic, polycarbonate, fiberglass, painted surfaces Application method: Wet Application temperature: (air and substrate): 50–100 °F (10–38 °C)
Applied Shrinkage	0.010 inches (0.3 mm) maximum
Temperature Range After Application	-40 to +225 °F (-40 to +107 °C) (not for extended periods of time at the extremes)
Graphic Removal	None, permanent

Colors

Solid Colors			Metallic and Transparent
10 White	53 Cardinal Red	101 Nimbus Gray	201 Slate
11 Pearl gray	54 Light Orange	103 Magenta	211 Charcoal
12 Black	56 Dark Green	105 Harvest Gold	217 Dark Blue
13 Tomato Red	57 Olympic Blue	107 Light Blue	227 Bright Blue
14 Bright Orange	58 Burgundy	117 Persian Blue	229 Copper
15 Bright Yellow	59 Putty	120 Satin Aluminum	239 Chocolate Brown
16 Khaki Green	61 Mid Gray	121 Light Gray	241 Gold
17 Vivid Blue	63 Geranium	127 Boat Blue	243 Steampunk Red
19 Deep Mahogany Brown	64 Apricot	131 Satin Gold	247 Petroleum Blue
20 Matte White	65 Light Lemon Yellow	136 Lime Green	249 Champagne
22 Matte Black	66 Forest Green	151 Traffic Gray	114 Transparent
23 Deep Red	69 Duranodic	177 Shadow Blue	
24 Terra Cotta	74 Red Orange	186 Bright Green	
25 Sunflower	77 Peacock Blue	187 Wedgewood Blue	
27 Indigo (Navy)	78 Plum	196 Apple Green	
29 Russet Brown	81 Stone Gray	197 Light Navy	
31 Medium Gray	86 Robin Egg Blue	263 Perfect match Red	
37 Sapphire Blue	89 Sandstone	273 Process Magenta	
38 Royal Purple	90 Antique White	276 Bottle Green	
39 Tan	91 Dove gray	293 Atomic Red	
41 Dark Gray	93 Imperial Red	307 Dark Aqua	
46 Kelly Green	96 Teal	357 Bermuda Blue	
47 Intense Blue	97 Soft Blue	397 Dark Blue	
48 Purple	98 Dark Violet		
49 Beige	99 Fawn		

Warranty Information

(i) IMPORTANT NOTE

Warranty information including limitations and exceptions and warranty periods for this product can be found at 3Mgraphics.com/warranties.

(i) IMPORTANT NOTE

Screen printed vehicle graphics require a liquid clear coat in order to be eligible for the 3M™ MCS™ Warranty. Liquid clear coats 1930 and 9730UV may haze, which is not covered by the 3M™ MCS™ Warranty.

(i) IMPORTANT NOTE

Graphics exposed to abrasive washing conditions, harsh cleaners or chemicals are not eligible for the 3M™ MCS™ Warranty.

Warranty Coverage Overview

The warranty coverage for eligible graphics is based on the user both reading and following all applicable and current 3M Graphics Product and Instruction Bulletins. The warranty period for eligible graphics is as stated in the 3M Graphics Warranties Matrices at the time that the film was purchased. Information found at 3Mgraphics.com/warranties includes:

- [3M Graphics Warranties Bulletin](#)
 - This bulletin contains information on limitations and exceptions, and warranty period reductions for 3M Graphics Warranties. The warranty period may be reduced and stipulations may apply for certain constructions and applications, and graphic exposures as covered in this Bulletin.
- [3M Graphics Warranties Selector](#)
 - Use this selector to search for your vertical warranty period by product number, ink type, and ink/printer platform.
- [U.S. Desert Southwest Region Map](#)
 - Use this map of hot, arid desert areas to determine if you are subject to reduced warranted durabilities.

The warranties set forth in this Bulletin are made in lieu of all other express or implied warranties, including any implied warranty of merchantability, fitness for a particular purpose, or arising out of a course of dealing, custom, or usage of trade.

3M Basic Product Warranty

3M Graphics Products are warranted to be free of defects in materials and manufacture at the time of shipment and to meet the specifications stated in its applicable 3M Graphics Product Bulletin and as further set forth in the [3M Graphics Warranties Bulletin](#).

Limited Remedy

The limited remedy applicable to each warranty is addressed in the 3M Graphics Warranties Bulletin found at 3Mgraphics.com/warranties.

Limitation of Liability

Except to the extent prohibited by law, 3M SHALL NOT UNDER ANY CIRCUMSTANCES BE LIABLE TO PURCHASER OR USER FOR ANY DIRECT (EXCEPT FOR THE LIMITED REMEDY PROVIDED HEREIN), INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, LABOR, NON-3M MATERIAL CHARGES, LOSS OF PROFITS, REVENUE, BUSINESS, OPPORTUNITY, OR GOODWILL) RESULTING FROM OR IN ANY WAY RELATED TO 3M'S GRAPHICS PRODUCTS, SERVICES, OR THIS BULLETIN. This limitation of liability applies regardless of the legal or equitable theory under which such losses or damages are sought.

Warranty Period Matrices (Film Colors 10, 12, 20, 22)

Table A. Warranty Period for Finished Graphics in a Standard U.S. Vertical Exposure.

Graphic Protection	No Printing			SOLVENT Ink Series 1900			UV Ink Series 9800			UV Ink Series 9800 Metallic		
	VEH	OUT	IN	VEH	OUT	IN	VEH	OUT	IN	VEH	OUT	IN
1920DR air dry	—	—	—	5	5	5	—	—	—	—	—	—
1920DR oven dry	—	—	—	6 ¹	6 ¹	6 ¹	—	—	—	—	—	—
1930	—	—	—	2	2	2	—	—	—	—	—	—
9740i	—	—	—	6	6	6	6	6	6	5	5	5
9730UV	—	—	—	3	3	3	3	3	3	—	—	—
9800CL	—	—	—	—	—	—	5	5	5	5	5	5
None	8	7	7	—	—	—	—	—	—	—	—	—

Warranty Period Matrices (Film Colors 114, 120, 131, 201, 211, 217, 227, 229, 239, 241, 243, 247, 249)

Table B. Warranty Period for Finished Graphics in a Standard U.S. Vertical Exposure.

Graphic Protection	No Printing			SOLVENT Ink Series 1900			UV Ink Series 9800			UV Ink Series 9800 Metallic		
	VEH	OUT	IN	VEH	OUT	IN	VEH	OUT	IN	VEH	OUT	IN
1920DR air dry	—	—	—	5	5	5	—	—	—	—	—	—
1920DR oven dry	—	—	—	5 ¹	5 ¹	5 ¹	—	—	—	—	—	—
1930	—	—	—	2	2	2	—	—	—	—	—	—
9740i	—	—	—	5	5	5	5	5	5	5	5	5
9730UV	—	—	—	3	3	3	3	3	3	—	—	—
9800CL	—	—	—	—	—	—	5	5	5	5	5	5
None	5	5	5	—	—	—	—	—	—	—	—	—

Warranty Period Matrices (All other film colors)

Table C. Warranty Period for Finished Graphics in a Standard U.S. Vertical Exposure.

Graphic Protection	No Printing			SOLVENT Ink Series 1900			UV Ink Series 9800			UV Ink Series 9800 Metallic		
	VEH	OUT	IN	VEH	OUT	IN	VEH	OUT	IN	VEH	OUT	IN
1920DR air dry	—	—	—	5	5	5	—	—	—	—	—	—
1920DR oven dry	—	—	—	6 ¹	6 ¹	6 ¹	—	—	—	—	—	—
1930	—	—	—	2	2	2	—	—	—	—	—	—
9740i	—	—	—	6	6	6	6	6	6	5	5	5
9730UV	—	—	—	3	3	3	3	3	3	—	—	—
9800CL	—	—	—	—	—	—	5	5	5	5	5	5
None	6	6	6	—	—	—	—	—	—	—	—	—

1. Warranty requires oven drying the last color of ink series 1900 and screen print 1920DR for 2 hours at 150 °F (65 °C).

Reduced Warranty Period for Other Graphic Exposures

For other graphic exposures, determine the applicable reduced warranty period by multiplying the standard warranty period (in years) for your graphic construction as shown in the applicable warranty period tables by the percentage shown for the intended graphic exposure. See "Exposure Types" on page 3 of the 3M Graphics Warranties Bulletin for graphic exposure definitions.

Table D. Reduced Warranty Period for Other Graphic Exposures

If the Graphic Exposure is:	Use this Percentage of Vertical Exposure, Warranty Period	Calculation Examples
Desert Southwest Vertical	70%	0.7 x 7 years = 4.9 years
U.S. Horizontal	0%	0 x 4 years = 0 years

Legibility Warranty - Only for Fleet Graphics with Horizontal Exposure and Selected Constructions

Applications subjected to maximum sunlight and environmental conditions used on rooftops of commercially-owned fleet vehicles where identification from the air is needed are warranted for legibility only for the following constructions. The finished graphic will change color, lose gloss and chalk, which is not covered by warranty.

Film Colors: 10, 11, 12, 13, 14, 15, 20, 22, 53		Horizontal Exposure	
Ink Series	Clear	U.S.	U.S. Desert Southwest
No printing	None	5	3

Additional Limitations

See the 3M Graphics Warranties Bulletin at 3MGraphics.com/warranties, for terms, additional limitations of your warranty, if any, information on reduced warranties for different exposures, and limitations of liability.

Factors that Affect Graphic Performance Life

The actual performance life of a graphic is affected by:

- the combinations of graphics materials used.
- complete ink drying or curing.
- selection, condition and preparation of the substrate.
- surface texture.
- application methods.
- angle and direction of sun exposure.
- environmental conditions.
- cleaning or maintenance methods.

Graphics Manufacturing



Before using any equipment, always read the manufacturer's instructions for safe operation.

Thermal Transfer Printing

Formulations and processing conditions can affect ink durability. Refer to the 3M Product and Instruction Bulletins for your ink limitations and proper usage.

This film can be imaged with narrow width thermal transfer printing systems. Refer to the equipment manufacturer's literature for details.

Screen Printing

Formulations and processing conditions can affect ink durability. Refer to the Product and Instruction Bulletins for your ink for limitations and proper usage.

Whether you apply screen print clears with traditional screening methods or roller coating, use equipment designed to handle high viscosity materials and make sure the coating is evenly applied to the specifications in the clear's 3M Instruction Bulletin.

Cutting

See [3M Instruction Bulletin 4.1](#) for Sheeting, Scoring and Film Cutting details.

Weeding

The excess film should be weeded (removed) as soon after cutting as practical. This is to minimize the effect of possible adhesive flow 24 or more hours after cutting.

Graphic Protection

Graphic protection may improve the appearance, performance and durability of the graphic. Click on the graphic protection options listed in the "Recommended Compatible Products" on page 1 or see the [3M Graphics Market Product Catalog](#), for more information.

Application Tapes

There are two types of application tapes. See [3M Instruction Bulletin AT-1](#) to determine what application tape is recommended for your film or finished graphic.

Premasking Tape

Increases stiffness during application while preventing stretching and damage. Use when little or no liner is exposed. See [3M Instruction Bulletin 4.3](#) for complete details.

Prespacing Tape

Holds cut and weeded letters or graphics in place during application and after removing the film liner, while preventing stretching and damage. Use when large amounts of liner are exposed. See [3M Instruction Bulletin 4.3](#) for complete details.

Application and Installation

In addition to other 3M Bulletins specified in this document, the following Bulletins provide details that you may need to successfully apply a graphic.

- [3M Instruction Bulletin 3.11](#). Screen Printing, 3M™ Screen Printing Ink Series 1900 four color and Screen Print Clear VI0402.
- [3M Instruction Bulletin 3.12](#). Screen Printing, 3M™ Screen Printing Ink Series 1900 Line Color and Screen Print Clear VI0402.
- [3M Instruction Bulletin 3.20](#). Screen Printing, 3M™ Screen Printing UV Ink Series 9800 for Line Color Only.
- [3M Instruction Bulletin 3.21](#). Screen Printing, 3M™ Screen Printing UV Ink Series 9800 for Four Color Only.
- [3M Instruction Bulletin 5.5](#) Application, General Procedures for Interior and Exterior Dry Application
- [3M Instruction Bulletin 5.7](#). Application, Wet Method for Translucent, Inkjet, Screen Printed and Cut Graphics.

Maintenance and Cleaning

Use a cleaner designed for high-quality painted surfaces. The cleaner must be wet, non-abrasive, without solvents, and have a pH value between 3 and 11 (neither strongly acidic nor strongly alkaline). See [3M Instruction Bulletin 6.5](#) for details.

Removal

This film uses a permanent adhesive. This film is not easily or cleanly removable. See [3M Instruction Bulletin 6.5](#) for details.

Shelf Life, Storage and Shipping

Shelf Life

The shelf life is **never more than 3 years** from the date of manufacture on the original box.

If you process the film, the shelf life is changed to **1 year** from the processing date, but not later than the 3 year maximum from the manufacturing date.

Storage Conditions

- 40° to 100°F (4° to 38°C)
- Out of sunlight
- Clean, dry area
- Original container
- Bring the film to print room temperature before using

Shipping Finished Graphics

Flat, or rolled printed side out on 5 inch (13 cm) or larger core. This helps prevent the liner, and, if used, the application tape from popping off.

Health and Safety



CAUTION

When handling any chemical products, read the manufacturers' container labels and the Safety Data Sheets (SDS) for important health, safety and environmental information. To obtain SDS sheets for 3M products go to 3M.com/SDS, or by mail or in case of an emergency, call 1-800-364-3577 or 1-651-737-6501.

When using any equipment, always follow the manufacturers' instructions for safe operation.

Bulletin Change Summary

For the most current 3M Technical Information available to successfully use this product, please view this Bulletin electronically and click on the blue underlined links to view the relevant documents. This Bulletin has been substantially changed. Please read the entire Bulletin thoroughly.

Release R APR-2016:

- Updated Product Bulletin to new format.
- Updated color options, see "Colors" on page 3.

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Fax 787-620-3018

Traffic Safety and Security Division

3M™ Vehicle Safety Markings Series 823i

Series 823i

Product Bulletin 823i
August 2016

Replaces PB 823i FYG and PB 823i dated January 2016

Description

3M™ Vehicle Safety Markings Series 823i is an impact resistant prismatic lens reflective sheeting pre-coated with pressure sensitive adhesive and currently meets or exceeds the reflectivity requirements of EN 12899-1:2007 for Class RA2. Series 823i is intended for use on clean, smooth, relatively non-porous, weather resistant surfaces when prepared as detailed in [3M Information Folder 4.9](#).

Features

- Impact resistant, metalized flexible retroreflective sheeting.
- Excellent angularity.
- Similar daytime and nighttime appearance.
- Suited for application over flat or simple curved surfaces.
- Up to 3 years durability.

Color and Dimension

Table 1. Product Codes by Color

Product Code	Color
823i-10	White
823i-11	Yellow
823i-12	Red
823i-15	Blue
823i-83i	Fluorescent Yellow-Green
823i VWM	Red/White Chevron
823i CWM	Red/White Chevron

Roll dimensions: 1220 mm x 45.7 m

Specifications

Coefficient of Retroreflection

The initial minimum coefficient of retroreflection, when measured according to CIE 54.2 using CIE standard illuminant A, conforms to Table 4 of EN 12899-1:2007 Class RA2 which is given below in Table 2.

Table 2. Minimum Coefficient of Retroreflection (cd/lx/m²)

Geometry of measurements		Color				
α	β_1	White	Yellow	Red	Blue	Fluorescent Yellow-Green
	($\beta_2=0$)					
0.2°	+5°	250	170	45	20	170
	+30°	150	100	25	11	100
	+40°	110	70	15	8	70
0.33°	+5°	180	120	25	14	120
	+30°	100	70	14	8	70
	+40°	95	60	13	7	60
2°	+5°	5	3	1	0.2	3
	+30°	2.5	1.5	0.4	--	1.5
	+40°	1.5	1.0	0.3	--	1.0

The above angular definitions apply for the CIE Goniometer system (co-planar geometry). The sheeting shall be mounted in 0° or 90° rotation on the goniometer (0° is the direction the roll is unwound).

Chromaticity Coordinates and Luminance Factor

The initial chromaticity and luminance factor conform to Class CR2 of EN 12899-1:2007 for Class RA2 materials as given in Table 3 below.

Table 3. Chromaticity and Luminance Factors

Color	Chromaticity Coordinates								Luminance Factor
	1		2		3		4		
	x	y	x	y	x	y	x	y	β
White	0.305	0.315	0.335	0.345	0.325	0.355	0.295	0.325	≥ 0.27
Yellow	0.494	0.505	0.470	0.480	0.513	0.437	0.545	0.454	≥ 0.16
Red	0.735	0.265	0.700	0.250	0.610	0.340	0.660	0.340	≥ 0.03
Blue	0.130	0.090	0.160	0.090	0.0160	0.140	0.130	0.140	≥ 0.01
Fluorescent Yellow-Green	0.387	0.610	0.356	0.494	0.398	0.452	0.460	0.540	≥ 0.40

Recommended Application and Use

Series 823i is intended for retroreflective vehicle markings. Typical applications include the manufacturing of safety markings according to DIN 30710.

Series 823i features 3M™ Comply™ with Controltac™ Liner which greatly improves ease of installation. For installation instructions please see 3M Information Folder 4.8.

Storage

- Cool, dry area out of direct sunlight.
- Temperature 65-75° F (18-24° C), humidity 30-50%.
- Store rolls horizontally, in carton or in original packaging.

Limitations

Series 823i is not intended for:

- Regulatory traffic signs.
- Graphics made for automotive Original Equipment Manufacturers (OEM); please contact 3M Automotive Division for alternatives.
- Flexible Prismatic Vehicle Markings Series 823i are not designed to perform on stainless steel substrates.

Compatible Products

For screen print applications, use [3M™ Process Color Series 990](#).

Health and Safety Information

Read all health hazard, precautionary, and first aid statements found in the Safety Data Sheet (SDS), Article Information Sheet and/or product label of chemicals prior to handling or use. Consult local regulations and authorities for possible restrictions. Visit us at www.3M.com/us and select SDS search to obtain current Safety Data Sheets.

Warranty

3M™ Vehicle Safety Markings Series 823i (“Product”) is warranted (“Basic Warranty”) to be free of defects in materials and manufacture at the time of shipment and to meet the specifications stated in this product bulletin. If the Product is proven not to have met the Basic Warranty on its shipment date, then a buyer’s exclusive remedy, and 3M’s sole obligation, at 3M’s option, will be refund or replacement of the Product.

Product will remain visible for a period of up to three years by resisting excessive fading, cracking, blistering or peeling in normal use.

Terms and Conditions

- Product must be processed and applied to a vertically-mounted ($\pm 20^\circ$) 3M™ recommended substrate as described in this product bulletin and in accordance with all 3M procedures provided in this product bulletin and 3M Information Folders (including but not limited to IF 4.8), and applicable technical memos (which will be furnished to the manufacturer upon request).
- Any third-party imaging or altering of the Product not endorsed by 3M™ will void the 3M Warranty.
- A Product’s failure to meet the 3M Warranty must be solely the result of design or manufacturing defects in the Product and not of (a) outside causes including improper storage, fabrication, handling, maintenance or installation; (b) use of process colors, thinners, coatings or other chemicals not recommended by 3M; (c) use of application procedures not recommended by 3M; (d) exposure to chemicals or solvents not recommended by 3M; (e) abrasion and other physical damage; (f) snow or any other burial of the marking; (g) collisions, vandalism or malicious mischief; (h) failure to cut markings around rivets, seams and body panels; (i) or an act of God.
- 3M reserves the right to determine the method of replacement. Replacement product will carry the unexpired warranty of the Product it replaces.
- Claims made under this warranty will be honored only if 3M is presented with a traceable record of the Product’s Installation Date. Claims made under this warranty will be honored only if 3M is notified of a potential failure within thirty days of discovery, reasonable information requested by 3M is provided, and 3M is permitted to verify the cause of the failure.

Exclusive Limited Remedy

If the Product is proven not to have met the 3M™ Warranty during the Warranty Period, then the purchaser’s and user’s exclusive remedy, and 3M’s sole obligation, at 3M’s option shall be that 3M will issue a refund or provide replacement of the Product.

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Literature Reference

IF 4.8 3M Vehicle Safety Markings Series 823i

[IF 4.9](#) 3M Diamond Grade™ and Flexible Prismatic Conspicuity Markings
Application Instructions For Trucks, Trailers and Specialty Vehicles

For Information or Assistance

Call: 1-800-553-1380

In Canada Call:

1-800-265-1840

Internet:

<http://www.3m.com/roadwaysafety>

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