



USCGFP Reflective Sheeting for U.S. Coast Guard Devices

Series USCGFP

Description

Approved for use by the United States Coast Guard.

3M™ USCGFP Reflective Sheatings are designed for approved Coast Guard devices, dayboards and buoys 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.

USCGFP markings have excellent angularity that allows them to be seen at angles up to and beyond 45° from perpendicular.

Markings are available in size rolls of 1 inch up to 48 inch widths by 50 yards. Also available in letters and numbers.

Properties

Color:	White	USCGFP30
	Yellow	USCGFP31
	Red	USCGFP32
	Orange	USCGFP34
	Green	USCGFP37

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™ USCGFP material are designed to be effective wide angle reflective markings regardless of the orientation on the substrate. 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

Proper application techniques should always be followed to insure optimal product performance. The following recommendations will help ensure that maximum adhesion is achieved when applying 3M USCGFP to those substrates approved per USCG Specification G-SEC-393A; mild painted steel, molded polyethylene, densified ionomer foam, aluminum sheet, cast vinyl, AC Ext, AB Marine, and Medium Density plywood.

- When applying to flat surfaces, such as dayboards, a hand squeeze roll applicator is recommended to insure consistent lamination pressures and a wrinkle free application.
- When applying sheeting to painted surface, allow paint to fully cure. Check with the paint manufacturer for cure time and testing procedures.
- Apply USCGFP to clean, dry surfaces. Clean application surface with a clean towel and

isopropyl alcohol prior to application. For more information, contact 3M Technical Service (1-800-553-1380).

- When using a PA1 squeegee for hand applications to nonflat surfaces a low friction sleeve is recommended on the squeegee. Apply sheeting to substrate with squeegee using firm, overlapping strokes. Resqueegee all edges.
- Apply sheeting to smooth and clean surface free of loose paint, welding slag, rust, corrosion, dirt, crevices, and raised surface impressions.
- 3M™ Scotch-Grip™ 1357 High Performance Contact Adhesive may be used if additional adhesion is desired. 3M Scotch-Grip 1357 high performance adhesive provides a long bonding range and excellent initial strength on many substrates. Contact 1-800-553-1380 to order.

Maintenance

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 USCGFP 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 USCGFP 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.

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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