



Diamond Grade™ DG³ Barricade Sheeting

Series 444/446 Orange and White Prestriped Sheeting For Use on Barricades

Product Bulletin 444/446

April 2011

Replaces PB DG6 dated July 2007

Description

3M™ Diamond Grade™ DG³ Barricade Sheeting Series 444/446 is prestriped orange and white (OW) sheeting intended for reflectorizing work zone traffic control barricades. Series 444/446 OW sheeting is designed for use on aluminum or wood substrates as detailed in Information Folder 1.7.

Although series 444/446 OW sheetings have worked well on some flat plastic substrates, the variability of plastics precludes making any general recommendations regarding application to them. Users must assess for themselves the suitability of 444/446 OW series sheetings on plastic substrates.

Diamond Grade sheeting series 444/446 OW consists of impact resistant prismatic lens reflective sheetings precoated with aggressive pressure sensitive adhesive and available in the following prestriped configurations:

Table I - Barricade Sheeting Configuration

	<u>Orange/White</u>
6" left stripe	446-6L OW
6" right stripe	446-6R OW
4" left stripe	444-4L OW
4" right stripe	444-4R OW

Note: "Left" sheetings have stripes that slope from upper left to lower right and are placed on the right to move traffic to the left. Right sheetings are the opposite.

Photometric - Coefficients of Retroreflection

The values in Table II are minimum coefficients of retroreflection expressed in candelas per foot candle per square foot (candelas per lux per square meter).

Table II

**Minimum Coefficient of Retroreflection R_A
Candelas per Foot Candle per Square Foot
or Candelas per Lux per Square Meter
(Average 0° and 90° Rotation)**

Observation ¹ Entrance ²		<u>White</u>	<u>Orange</u>
<u>Angle</u>	<u>Angle</u>		
0.2	-4	570	300
0.2	+30	210	120
0.2	+45	65	35
0.5	-4	400	80
0.5	+30	150	75
0.5	+45	30	18

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.

Measurements are made in accordance with ASTM E810 "Standard Test Method for Coefficient of Retroreflection of Retroreflective Sheeting". The observation angles shall be 0.2° and 0.5°, the entrance angle (B₁) shall be -4°, +30°, and +45°, and the entrance angle (B₂) = 0°. All measurements shall be made after cleaning according to 3M recommendations.

**Table III
Color Specification Limits ** (Daytime)**

Color	1		2		3		4		Reflectance Limit (Y) (%)	
	<u>x</u>	<u>y</u>	<u>x</u>	<u>y</u>	<u>x</u>	<u>y</u>	<u>x</u>	<u>y</u>	<u>Min.</u>	<u>Max.</u>
White	.303	.300	.368	.366	.340	.393	.274	.329	40	
Orange	.558	.352	.636	.364	.570	.427	.506	.404	7	27

** The four pairs of chromaticity coordinates determine the acceptable color in terms of the CIE 1931 standard colorimetric system measured with standard illuminant D65.

Color

Colors of the sheeting applied to aluminum test panels shall conform to the requirements of Table III when measured in accordance with ASTM E 1164. The values shall be determined on a Hunter Color Flex Model 45/0 spectrophotometer with option CMR 559 or equivalent. Computations shall be done in accordance with ASTM E308 for the 2° observer.

Recommended Application Procedures

Series 444/446 OW sheetings may be applied to barricade panels using a squeeze roll applicator or by hand.

The application temperature (and substrate temperature) should exceed 60°F. If hand applied, sheeting should be applied with firm pressure using a plastic squeegee or rubber roller.

3M recognizes that some customers will choose to apply 444/446 OW series sheetings to plastic substrates. Without endorsement of the use of such substrates, some comments regarding their use can be made.

Plastics, including fiberglass laminates, vary as to type, composition, and manufacture, so that their use as an application surface requires careful evaluation under actual use conditions. Some plastics embrittle on exposure and some plastics contain migrating constituents that may contaminate the adhesive or cause sheeting discoloration and adversely affect performance. Also, some plastics are affected by ingredients in the sheeting adhesives that migrate into the panel. Sheetting must NOT be applied to transparent or translucent materials as light transmission may adversely affect adhesion.

Information Folder 1.7 may provide further insight into applications on plastic substrates.

Note: Care must be taken to avoid stretching series 444/446 OW sheetings during application.

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

The durability of Series 444/446 OW barricade sheeting will depend upon many factors including, but not limited to, substrate selection and preparation, compliance with recommended application procedures, geographic area, exposure conditions, and maintenance.

The user must determine the suitability of this material on any specific substrate (plastic, metal, or wood) for its intended use. Maximum durability can be obtained by following the recommendations contained in Information Folder 1.7 on Sign Base Surface Preparation. Applications on unprimed, excessively rough or non-weather-resistant surfaces, some plastics, or exposure to severe or unusual conditions can reduce the durability of such applications.

Warranty

3M warrants that Diamond Grade™ DG³ Barricade Sheeting Series 444/446 OW sold by 3M to be used as components for traffic control devices will remain effective for its intended use for three years, subject to the following provisions:

If a Diamond Grade DG³ barricade sheeting is applied to barricade blank materials in accordance with all 3M application and fabrication procedures provided in 3M's product bulletins, information folders and technical memos (which will be furnished upon request), including the exclusive use of 3M recommended application equipment; and if the barricade panel deteriorates within three years due to natural causes to the extent that:

1) the panel is ineffective for its intended purpose when viewed from a moving vehicle under normal day and night driving conditions by drivers with normal vision, or 2) the coefficient of retroreflection is less than 50% of the values given in Table II, 3M's sole responsibility and purchaser's and user's exclusive remedy shall be that 3M will provide pro-rata replacement of the 3M materials.

Conditions

Such failure must be solely the result of design or manufacturing defects in the Diamond Grade™ DG³ barricade sheeting and not of outside causes such as: improper fabrication, handling, maintenance or installation; use of application equipment not recommended by 3M; failure of substrate; exposure to chemicals, abrasion and other mechanical damage from fasteners used to mount the barricade panel; collisions, vandalism or malicious mischief.

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

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

Claims made under this warranty will be honored only if the panels have been dated at the time of sheeting application, which constitutes the start of the warranty period.

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 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.

Literature

Sign Base Surface Preparation IF 1.7

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