



Designation: D4956 – 19

Standard Specification for Retroreflective Sheeting for Traffic Control¹

This standard is issued under the fixed designation D4956; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This specification covers flexible, non-exposed glass-bead lens and microprismatic, retroreflective sheeting designed for use on traffic control signs, delineators, barricades, and other devices. This specification does not address inks, overlays, or other imaging methods that may be applied to retroreflective sheeting material to create traffic signs or other devices.

1.2 Although this specification provides photometric requirements for retroreflective sheeting under evaluation, minimum performance requirements of in-service signs or other devices are outside the scope of this document.

1.3 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.4 The following safety hazards caveat pertains only to the test methods portion, Section 7, of this specification. *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

¹ This specification is under the jurisdiction of ASTM Committee D04 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.38 on Highway Traffic Control Materials.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

- B209 Specification for Aluminum and Aluminum-Alloy Sheet and Plate
- B209M Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
- B449 Specification for Chromates on Aluminum
- D2794 Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
- E284 Terminology of Appearance
- E308 Practice for Computing the Colors of Objects by Using the CIE System
- E808 Practice for Describing Retroreflection
- E810 Test Method for Coefficient of Retroreflection of Retroreflective Sheeting Utilizing the Coplanar Geometry
- E811 Practice for Measuring Colorimetric Characteristics of Retroreflectors Under Nighttime Conditions
- E991 Practice for Color Measurement of Fluorescent Specimens Using the One-Monochromator Method
- E1164 Practice for Obtaining Spectrometric Data for Object-Color Evaluation
- E1247 Practice for Detecting Fluorescence in Object-Color Specimens by Spectrophotometry
- E1347 Test Method for Color and Color-Difference Measurement by Tristimulus Colorimetry
- E1349 Test Method for Reflectance Factor and Color by Spectrophotometry Using Bidirectional (45°:0° or 0°:45°) Geometry
- E2152 Practice for Computing the Colors of Fluorescent Objects from Bispectral Photometric Data
- E2153 Practice for Obtaining Bispectral Photometric Data for Evaluation of Fluorescent Color
- E2301 Test Method for Daytime Colorimetric Properties of Fluorescent Retroreflective Sheeting and Marking Materials for High Visibility Traffic Control and Personal Safety Applications Using 45°:Normal Geometry
- E3165 Test Method for Nighttime Retroreflected Chromaticity of Retroreflective Sheeting
- G7/G7M Practice for Atmospheric Environmental Exposure Testing of Nonmetallic Materials
- G113 Terminology Relating to Natural and Artificial Weathering Tests of Nonmetallic Materials
- G147 Practice for Conditioning and Handling of Nonmetallic Materials for Natural and Artificial Weathering Tests

G151 Practice for Exposing Nonmetallic Materials in Accelerated Test Devices that Use Laboratory Light Sources
G155 Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials

2.2 Other Standards:

ISO 4892-2:2006 Plastics—Methods of Exposure to Laboratory Light Sources—Part 2: Xenon-Arc Lamps³

ISO 4892-2:2006/Amd.1:2009 Plastics—Methods of Exposure to Laboratory Light Sources—Part 2: Xenon-Arc Lamps³

EN 12899-1:2007 Fixed, Vertical Road Traffic Signs—Part 1: Fixed Signs⁴

3. Terminology

3.1 *Definitions*—Definitions of terms are as described in Terminology **E284**, Practice **E808**, and Terminology **G113**.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *reboundable sheeting, n*—retroreflective material intended to be attached to flexible, impact-resistant plastic devices, such as traffic drum-like channelizing devices.

4. Classification

4.1 Retroreflective sheeting shall consist of a white or colored sheeting having a smooth outer surface and that essentially has the property of a retroreflector over its entire surface. There are nine types and five classes of retroreflective sheeting. Types are determined by conformance to the retroreflectance, color, and durability requirements listed in 6.1 and may be of any construction providing that those requirements are met. Type designation is provided as a means for differentiating functional performance. Typical examples of applications are provided for descriptive information only and are not intended to be limitations or recommendations. Common identifiers for each type are listed in 4.2.

4.1.1 The typical applications for the retroreflective sheeting addressed in this specification are:

| Type | Typical Application |
|------|------------------------------------------------------------------------------|
| I | Highway signing, construction-zone devices, and delineators |
| II | Highway signing, construction-zone devices, and delineators |
| III | Highway signing, construction-zone devices, and delineators |
| IV | Highway signing, construction-zone devices, and delineators |
| V | Delineators |
| VI | Temporary roll-up signs, warning signs, traffic cone collars, and post bands |
| VII | This type designation has been replaced with Type VIII |
| VIII | Highway signing, construction-zone devices, and delineators |
| IX | Highway signing, construction-zone devices, and delineators |
| X | This type designation has been replaced with Type VIII |
| XI | Highway signing, construction-zone devices, and delineators |

4.2 Retroreflective sheeting shall be classified as follows (the type sequence is not indicative of performance level):

4.2.1 *Type I*—A retroreflective sheeting referred to as “engineering grade” that is typically an enclosed lens glass-bead retroreflective material or a microprismatic retroreflective element material.

Applications for this material include permanent highway signing, construction zone devices, and delineators.

4.2.2 *Type II*—A retroreflective sheeting referred to as “super engineer grade” that is typically an enclosed lens glass-bead retroreflective material or a microprismatic retroreflective element material. Applications for this material include permanent highway signing, construction zone devices, and delineators.

4.2.3 *Type III*—A retroreflective sheeting referred to as “high-intensity” that is typically manufactured as an encapsulated glass-bead retroreflective material or as a microprismatic retroreflective element material. Applications for this material include permanent highway signing, construction zone devices, and delineators.

4.2.4 *Type IV*—A retroreflective sheeting referred to as “high-intensity” that is typically an unmetallized microprismatic retroreflective element material. Applications for this material include permanent highway signing, construction zone devices, and delineators.

4.2.5 *Type V*—A retroreflective sheeting referred to as “super high-intensity” that is typically a metallized microprismatic retroreflective element material. This sheeting is typically used for delineators.

4.2.6 *Type VI*—An elastomeric retroreflective sheeting without adhesive. This sheeting is typically a vinyl microprismatic retroreflective material. Applications include orange temporary roll-up warning signs, traffic cone collars, and post bands.

4.2.7 *Type VII*—The use of a designation as Type VII has been discontinued.

4.2.8 *Type VIII*—A retroreflective sheeting typically manufactured as an unmetallized cube corner microprismatic retroreflective element material. Applications for this material include permanent highway signing, construction zone devices, and delineators.

4.2.9 *Type IX*—A retroreflective sheeting typically manufactured as an unmetallized cube corner microprismatic retroreflective element material. Applications for this material include permanent highway signing, construction zone devices, and delineators.

4.2.10 *Type X*—The use of a designation as Type X has been discontinued.

4.2.11 *Type XI*—A retroreflective sheeting typically manufactured as an unmetallized cube corner microprismatic retroreflective element material. Applications for this material include permanent highway signing, construction zone devices, and delineators.

NOTE 1—All retroreflective sheetings, but especially microprismatic sheetings, may have unique performance characteristics outside of the range of the standard geometries presented in the tables that define the types. Certain applications may require the use of a particular product within a particular type in order to achieve a desired level of retroreflectivity in a given situation. In these cases, information concerning additional performance characteristics must be obtained.

4.3 *Backing Classes*—The backing required for retroreflective sheeting shall be classified as follows:

4.3.1 *Class 1*—The adhesive backing shall be pressure sensitive, require no heat, solvent, or other preparation for adhesion to smooth, clean surfaces.

³ Available from International Organization for Standardization (ISO), ISO Central Secretariat, BIBC II, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland, <http://www.iso.org>.

⁴ Available from European Committee for Standardization (CEN), Avenue Marnix 17, B-1000, Brussels, Belgium, <http://www.cen.eu>.