



Designation: D7942 – 15 (Reapproved 2023)

Standard Specification for Thermoplastic Pavement Markings in Non Snow Plow Areas¹

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1. Scope

1.1 This specification covers a reflectorized thermoplastic-based pavement striping material of the class that is applied to the road surface in a molten state by screed/extrusion or ribbon extrusion means. Retroreflectivity of the pavement marking compound is achieved initially by surface application of retroreflective optics at the time of pavement marking application. Upon cooling to normal pavement temperature, the pavement marking material produces an adherent reflectorized stripe of specified thickness and width capable of resisting deformation by traffic. The pavement marking compound includes retroreflective optics (glass beads or composite optics, or both) that are incorporated into the material at the time of manufacture that provide retroreflective properties during the service life of the material.

1.1.1 This specification is limited to:

1.1.1.1 Longitudinal applications in non snow plow areas,

1.1.1.2 Standard (non-profile) pavement marking applications, and

1.1.1.3 Applications on smooth asphalt or concrete surfaces. Asphalt seal coat applications, which use large aggregate resulting in a very rough, open grade finish, are excluded from this specification.

1.1.2 This specification includes:

1.1.2.1 Compositional and physical property requirements of the thermoplastic pavement marking material,

1.1.2.2 Requirements for the optics that are used to reflectorize the thermoplastic pavement marking material after application,

1.1.2.3 Field performance requirements for the installed thermoplastic pavement markings, and

1.1.2.4 Material application requirements.

1.2 The values stated in inch-pounds units are to be regarded as the standard except where noted in the document.

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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The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 *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.*

1.4 *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

D36/D36M Test Method for Softening Point of Bitumen (Ring-and-Ball Apparatus)

D92 Test Method for Flash and Fire Points by Cleveland Open Cup Tester

D4960 Test Method for Evaluation of Color for Thermoplastic Pavement Marking Materials

D6628 Specification for Color of Pavement Marking Materials

D7307 Practice for Sampling of Thermoplastic Pavement Marking Materials

D7308 Practice for Sample Preparation of Thermoplastic Pavement Marking Materials

D7585/D7585M Practice for Evaluating Retroreflective Pavement Markings Using Portable Hand-Operated Instruments

D7735 Test Method for Type A Durometer Hardness Testing of Thermoplastic Pavement Marking at Elevated Temperatures

E313 Practice for Calculating Yellowness and Whiteness Indices from Instrumentally Measured Color Coordinates

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.

E1710 Test Method for Measurement of Retroreflective Pavement Marking Materials with CEN-Prescribed Geometry Using a Portable Retroreflectometer

G155 Practice for Operating Xenon Arc Lamp Apparatus for Exposure of Materials

2.2 *AASHTO Standards*:³

AASHTO M 247 Standard Specification for Glass Beads Used in Traffic Paints

AASHTO T 250 Standard Method of Test for Thermoplastic Traffic Line Material

3. Terminology

3.1 Definitions:

3.1.1 *binder*—mixture of rosins, synthetic resins, waxes, polymers, and plasticizers that form the continuous phase in the pavement marking compound.

3.1.2 *pavement marking compound*—a homogeneous mixture of binder, fillers, extenders, pigments, and intermixed retroreflective optics.

3.1.3 *retroreflective optics*:

3.1.3.1 *glass beads*—spherical glass manufactured for use with pavement marking materials to provide retroreflective properties to the marking, allowing them to be visible when viewed at night under automobile headlights.

(1) *small glass beads*—also referred to as standard glass beads. This can refer to a number of products of various sizes, but as defined in this document it refers to a glass bead product meeting the requirements of AASHTO M 247 Type 1 or Type 2.

(2) *large glass beads*—these glass beads meet the requirements of AASHTO M 247 Type 3, Type 4, or Type 5 as called for in the specification.

(3) *high refractive index glass beads*—these glass beads typically meet the requirements of AASHTO M 247 Type 1 or Type 2 except the refractive index of the glass bead is between 1.90 and 1.95.

3.1.3.2 *composite optics*—a multi-component retroreflective particle comprised of a pigmented core (typically white or yellow) combined with very small glass or ceramic beads having a refractive index of between 1.90 and 2.4).

3.1.3.3 *non AASHTO glass beads*—a manufacturer may provide a product outside the requirements found under 3.1.3.1 in which case the performance requirements of this specification must still be met.

3.1.4 *thermoplastic pavement markings*—a pavement marking compound brought to a molten state by heating to the manufacturer's recommended temperature under agitation and then applied to the pavement while in the molten state. Retroreflective optics are applied (dropped on) to the surface of the molten marking immediately after application to provide initial retroreflectivity.

4. Classification

4.1 The thermoplastic pavement markings are classified into categories with specific retroreflectivity performance levels. See 9.6.

4.2 The annex contains application recommendations for typical installations to meet each performance class.

4.3 The thermoplastic pavement markings can be provided with a contrast marking process consisting of a black thermoplastic pavement marking that improves the visual marking contrast for daytime visibility.

5. Ordering Information

5.1 The purchaser must specify the pavement marking class when ordering. In addition the purchaser has the option of requiring a contrast marking application.

6. Materials and Manufacture

6.1 The thermoplastic material shall be available in white, yellow, and black.

6.2 The thermoplastic material shall be homogeneously composed of pigment, filler, resins, and optics.

6.3 *Glass Beads General Requirements*—Glass beads shall provide the marking with good night visibility without compromising day visibility and be of a composition designed to be highly resistant to traffic wear and to the effects of weathering.

6.4 *Intermix Glass Beads*—The glass beads shall conform to the requirements of AASHTO M 247 Type 1, Type 2, or Type 3 and shall be either uncoated or have an adhesion promoting coating.

6.5 *Drop-on Glass Beads*—The drop-on beads shall meet the requirements of AASHTO M 247 as required in this specification. When a double-drop application of glass beads is required, the larger beads shall be placed on the top surface of the thermoplastic first followed by the application of the smaller beads.

6.5.1 *Specific Properties*—The AASHTO M 247 Type 3, Type 4, and Type 5 glass beads used for drop-on beads shall have an adhesion promoting coating. AASHTO M 247 Type 1 and Type 2 glass spheres used for drop-on beads shall have a coating which will provide enhanced adhesion, moisture resistance, and proper embedment in the pavement marking.

6.6 *Composite Optics*—The composite optics shall be provided according to the manufacturer's specifications.

6.7 The thermoplastic material shall not deteriorate on contact with sodium chloride, calcium chloride or other de-icing chemicals or because of oil content of paving materials or oil droppings.

6.8 *Composition*—The pigment, beads, and filler shall be uniformly dispersed in the resin. The material shall be free from all skins, dirt, and foreign objects.

6.9 *Set Time*—When applied at a temperature range of 412 ± 12 °F (211 ± 7 °C) and thickness of up to 0.125 in. (4.736 mm) the material shall set to bear traffic in not more

³ Available from American Association of State Highway and Transportation Officials (AASHTO), 444 N. Capitol St., NW, Suite 249, Washington, DC 20001, <http://www.transportation.org>.