



Designation: D7308 – 17

Standard Practice for Sample Preparation of Thermoplastic Pavement Marking Materials¹

This standard is issued under the fixed designation D7308; 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.

1. Scope

1.1 This practice covers the proper preparation of test specimens of thermoplastic pavement marking materials obtained to ensure test results are representative of the material being tested.

1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

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 and health 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

D7307 Practice for Sampling of Thermoplastic Traffic Marking Materials

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *thermoplastic pavement marking material, n*—a highly filled 100 % total solids highway marking material that when heated to a molten state can be extruded or sprayed onto a road surface and when cooled forms a solid, durable delineator.

¹ This practice is under the jurisdiction of ASTM Committee D01 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.44 on Traffic Coatings.

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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.

4. Summary of Practice

4.1 The thermoplastic pavement marking material is prepared for the testing of various physical and chemical properties as outlined in the governing specification by melting a sample of the traffic marking material to its application temperature under continuous agitation. Depending upon the requirements of the governing specification the sample can then be exposed to the required heating time and conditions prior to the preparation of the test specimens or the test specimens may be prepared immediately after the material has reached application temperature.

4.2 If required by the governing specification that the sample be subjected to an extended period of heating prior to the preparation of the test specimen in order to determine the effect of heat history upon various physical or chemical properties, the sample must be melted down in the prescribed manner outlined in this practice prior to being subjected to such conditions.

5. Significance and Use

5.1 This practice provides a standard procedure for the preparation of thermoplastic pavement marking material test specimens prior to testing for various properties as called for in the governing specification. Specimens that are prepared using this standard methodology yield test results that are consistent with the material from which it was sampled. Test results from specimens can be used to determine compliance of the thermoplastic pavement marking material to the specification. This practice can also be used by manufacturers of these materials to prepare specimens for testing to determine the uniformity of thermoplastic pavement marking materials from batch to batch.

5.2 This practice does not address any issues related to specific testing of the thermoplastic pavement marking materials for any physical or chemical property.

6. Apparatus

6.1 *Procedure A (Preferred):*

6.1.1 *Stainless Steel 4000 ml Beaker, 150 by 230-mm diameter high. Alternatively an unlined 0.95 L (1 qt) or 3.48 L (1 gal) can may be used depending on the sample size.*

6.1.2 *Heating Mantle* of sufficient size. Note that aluminum foil may be used to serve as somewhat of a gasket if an unlined metal can is to be used in the heating mantle in place of the stainless steel beaker.

6.1.3 *Temperature Indicator*.

6.1.4 *Thermocouple, iron*.

6.1.5 *Mechanical Stirrer*, capable of stirring. The stirrer should consist of two impellers with a diameter of approximately 63.5 mm mounted on a 7.95-mm diameter shaft of sufficient length.

6.1.6 *Aluminum Lid* to cover the top of the container with a slot to clear the shaft of the mechanical stirrer and the thermocouple.

6.1.7 *Stainless Steel Ladles* with a pouring spout, 60-ml capacity.

6.1.8 *Tachometer* to measure shaft speed of the mechanical mixer.

6.2 *Procedure B (Alternate)*:

6.2.1 *Hot Plate* with a maximum temperature setting of approximately 550°C and with sufficient top plate surface area as to extend beyond the surface area of the bottom of the container to be used for melting the sample.

6.2.2 *Unlined Cans*, 0.95 L (1 qt) or 3.48 L (1 gal) as required by the specified sample size.

6.2.3 *Spatula*.

6.2.4 *Gloves*.

6.2.5 *Tongs*.

6.2.6 *Thermometer* (capable of measuring up to 450°F).

7. Hazards

7.1 Following this practice requires one to work with materials that are heated to very high temperatures (350 to 450°F). Care must be taken to prevent accidental burns.

7.2 Consult the SDS for the thermoplastic pavement marking material being tested to understand the proper way to handle any accidental burns.

7.3 Wear protective clothing, thermal resistant gloves, and eye protection.

8. Procedure

8.1 Obtaining a representative sample is critical in determining the suitability of the material being tested in meeting the required specification or in determining the batch-to-batch consistency of the thermoplastic pavement marking material. Obtain a representative sample by following Practice **D7307**. The size of the sample being tested may vary depending upon the objective of the person conducting the test, varying from an approximate 0.95 L (1 qt) or 1 000 g sample to a 3.48 L (1 gal) or 4 000 g sample. An approximate 0.95 L (1 qt) or 1 000 g sample should be the minimum sample size tested.

8.2 *Procedure A (Preferred)*:

8.2.1 This procedure covers the melting of thermoplastic pavement marking material using a heating mantle and a mechanical stirrer. This procedure simulates closely what occurs in the actual use of this material.

8.2.1.1 Set up the apparatus as shown in **Fig. 1**. Wire the heating mantle power cord to the temperature indicator con-

troller in accordance with the manufactures instructions. Mount the controller-indicator in a panel that can be wall mounted to keep the unit away from heat, dirt, and vibrations. When the unit is ready for operation, make a test melt in order to set the proportional band and other adjustment to give a controlled temperature of $218 \pm 1^\circ\text{C}$ ($425 \pm 2^\circ\text{F}$), or to an alternate temperature as called for in the governing specification.

8.2.1.2 Place one-third to one-half of the granular sample into the container residing in the heating mantle. Attach the stirring shaft to the mechanical stirrer.

8.2.1.3 Turn on the power to the heating mantle and the controller. Start the variable speed mechanical stirrer when the thermoplastic material has softened sufficiently.

8.2.1.4 Slowly add the remainder of the granular sample at a rate so as to maintain continuous stirring.

8.2.1.5 After the entire granular sample has been added to the container set the speed of the mechanical stirrer with the tachometer to a speed of about 100 rpm. Cover the container using the aluminum lid, positioning the lid such that it clears the mixer shaft and the thermocouple.

8.2.1.6 Allow the material to heat and mix until it reaches a temperature of approximately $218 \pm 1^\circ\text{C}$ ($425 \pm 2^\circ\text{F}$), or to an alternate temperature as called for in the governing specification.

8.2.1.7 Using a 60 ml (2 oz.) ladle remove some of the molten thermoplastic material while under agitation and prepare the test specimens as required by the specific test method that is to be used.

8.2.1.8 If required by the specification, the sample can be maintained at the required temperature for the required period of time prior to the preparation of the test specimens.

8.3 *Procedure B (Optional)*:

8.3.1 This option covers the melting of thermoplastic pavement marking material using a hot plate and manual stirring.

8.3.1.1 Place an empty can of sufficient size to melt the sample on the hot plate set on high. The surface of the hotplate should extend beyond the area covered by the bottom surface of the can. Failure to use a hot plate with sufficient top plate area can cause the top plate to crack.

8.3.1.2 Add approximately one-fifth of the granular thermoplastic into the container and allow the material to heat, stirring regularly with a spatula.

8.3.1.3 Once the material is molten continue to add dry material incrementally with constant agitation in order to keep the material molten and avoid scorching.

8.3.1.4 After all of the dry material has been added continue to stir the material with the spatula checking the temperature regularly with a thermometer.

8.3.1.5 When the material reaches 425°F, maintain the temperature between 400 and 425 degrees for approximately 10 min with constant stirring.

8.3.1.6 Remove the material from the hotplate and prepare the test specimens as required by the specific test methods that are to be used.

8.3.1.7 If required by the specification, the sample can be maintained at the required temperature for the required period of time prior to the preparation of the test specimens. If the

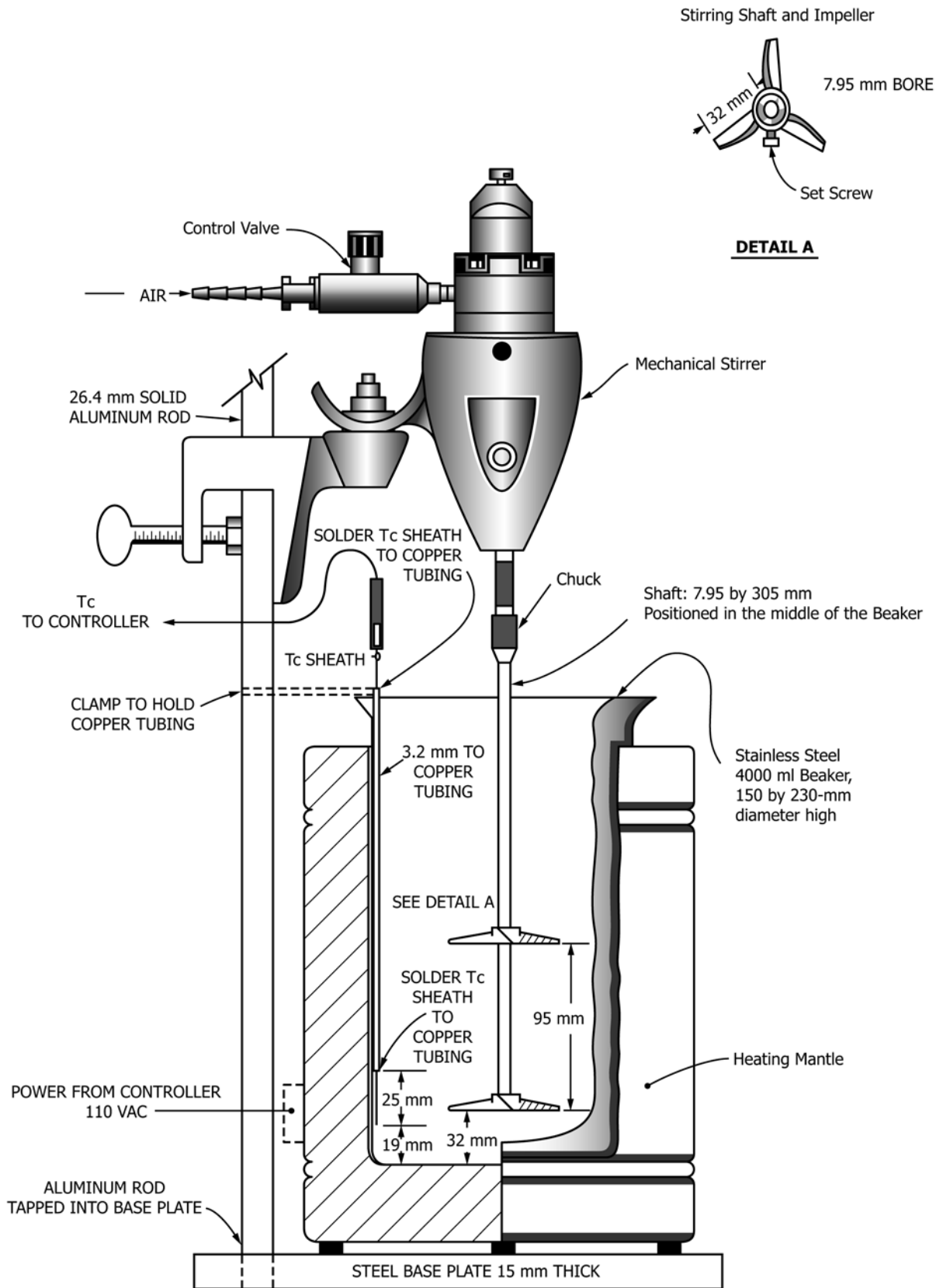


FIG. 1 Thermoplastic Melter Apparatus

sample is maintained in a temperature controlled oven without agitation the sample should be well stirred to ensure material homogeneity prior to pouring the test specimens.

9. Keywords

9.1 sample preparation; thermoplastic pavement markings

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