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Standard Test Method for Float Test for Bituminous Asphalt Materials¹

This standard is issued under the fixed designation D139; 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 test method covers the float test for bituminous asphalt materials.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.3 **Warning**—Mercury has been designated by EPA and many state agencies as a hazardous material that can cause central nervous system, kidney, and liver damage. Mercury, or its vapor, may be hazardous to health and corrosive to materials. Caution should be taken when handling mercury and mercury-containing products. See the applicable product Material Safety Data Sheet (MSDS) for details and EPA's website (<http://www.epa.gov/mercury/faq.htm>) for additional information. Users should be aware that selling mercury or mercury-containing products, or both, in your state may be prohibited by state law.

1.4 The text of this standard references notes and footnotes which provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the standard.

1.5 *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, safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use. For a specific precaution statement, see 6.1.*

1.6 *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

- [C670 Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials](#)
- ~~[D244 Test Methods and Practices for Emulsified Asphalts](#)~~
- [D3666 Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials](#)
- [D6997 Test Method for Distillation of Emulsified Asphalt](#)
- [E1 Specification for ASTM Liquid-in-Glass Thermometers](#)
- [E230/E230M Specification for Temperature-Electromotive Force \(emf\) Tables for Standardized Thermocouples](#)
- [E879 Specification for Thermistor Sensors for General Purpose and Laboratory Temperature Measurements](#)
- [E1137/E1137M Specification for Industrial Platinum Resistance Thermometers](#)

¹ This test method is under the jurisdiction of ASTM Committee D04 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.44 on Rheological Tests.

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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.

2.2 *IEC Standard:Standards:*³

[IEC 60854/60584 Methods of Measuring the Performance of Ultrasonic Pulse-Echo Diagnostic Equipment Thermocouples—Part 1: EMF Specifications and Tolerances](#)
[IEC 60751 Industrial Platinum Resistance Thermometers and Platinum Temperature Sensors](#)

3. Summary of Test Method

3.1 A plug of ~~bitumen~~asphalt is cast in a tapered collar. The assembled float and collar is then floated in the testing bath at the specified temperature. The time, in seconds, between placing the apparatus on the water and the water breaking through the material shall be taken as a measure of the consistency of the material under examination.

4. Significance and Use

4.1 The float test characterizes the flow behavior or consistency of certain ~~bituminous~~asphalt materials.

4.2 This test method is useful in determining the consistency of ~~bitumen~~asphalt as one element in establishing the uniformity of certain shipments or sources of supply.

NOTE 1—The quality of results produced by this standard is dependent on the competence of the personnel performing the procedure and the capability, calibration, and maintenance of the equipment used. Agencies that meet the criteria of Specification D3666 are generally considered capable of competent and objective testing, sampling, inspection, etc. Users of this standard are cautioned that compliance with Specification D3666 alone does not completely ensure reliable results. Reliable results depend on many factors; following the suggestions of Specification D3666 or some similar acceptable guidance provides a means of evaluating and controlling some of those factors.

5. Apparatus

5.1 *Float*—The float (**Fig. 1**) shall be made of aluminum or aluminum alloy and shall be in accordance with the following requirements:

	Min	Normal	Max
Mass of float, g	37.70	37.90	38.10
Total height of float, mm	34.0	35.0	36.0
Height of rim above lower <u>side of shoulder, mm</u>	26.5	27.0	27.5
side of shoulder, mm			
Thickness of shoulder, mm	1.3	1.4	1.5
Diameter of opening, mm	11.0	11.1	11.2

5.2 *Collar*—The collar (**Fig. 1**) shall be made of brass and shall be in accordance with the following requirements:

	Min	Normal	Max
Mass of collar, g	9.60	9.80	10.00
Over-all height of collar, mm	22.3	22.5	22.7
Overall height of collar, mm	22.3	22.5	22.7
Inside diameter at bottom, mm	12.72	12.82	12.92
Inside diameter at top, mm	9.65	9.70	9.75

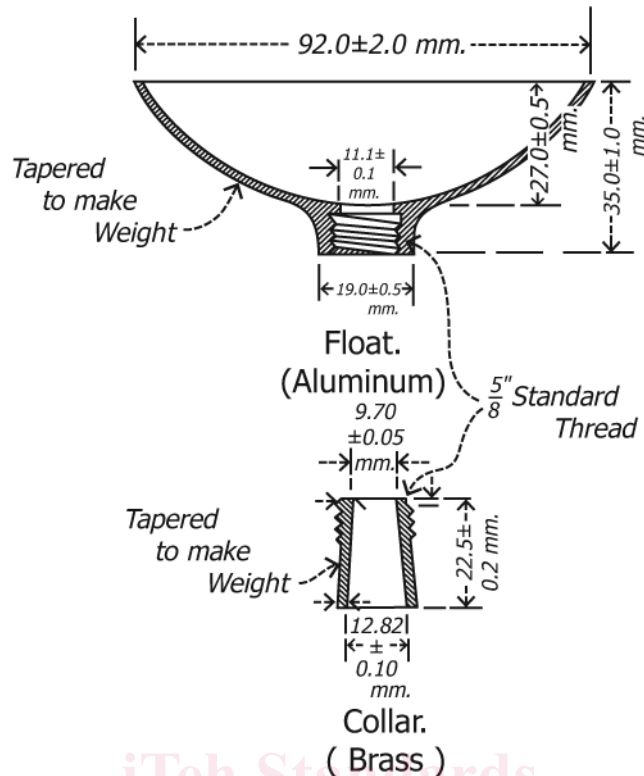
The top of the collar shall screw up tightly against the lower side of the shoulder.

5.3 *Verification of Assembly*—The assembled float and collar, with the collar filled flush with the ~~bottom~~asphalt and weighted to a an approximate total mass of 53.2 g, shall float upon water with the rim 8.5 ± 1.5 mm above the surface of the water. This adjustment of the total mass of the assembly is for the purpose only of standardizing/verifying the depth of immersion in the testing ~~bath:bath~~ and shall be verified when a new float/collar set is placed into service.

NOTE 2—Sand or other similar materials may be added to the filled asphalt collar to achieve the total mass specified in 5.3.

5.4 *Thermometric Device—Thermometers*—An ASTM Low Softening Point Thermometer, graduated in Celsius degrees as specified, having a range from -2 to $+80^{\circ}\text{C}$ and conforming to the requirements for Thermometer 15C, as prescribed in

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.



Mass of Float, 37.90 ± 0.20 g.

Mass of Collar, 9.80 ± 0.20 g.

FIG. 1 Float Test Apparatus

Specification Thermometers shall be used to measure temperature in the ranges of use and with accuracies as defined for each test parameter. E1, or equivalent thermometric device.

5.4.1 The thermometer for measuring the temperature of the water bath shall have a temperature range of at least 0 to 80 °C and an accuracy of ± 0.25 °C.

NOTE 3—Thermometer types suitable for use include Specification E1 mercury thermometers; Specification E879 thermistor thermometer; Specification E1137/E1137M Pt-100 RTD platinum resistance thermometer, Class A; or IEC 60751 Pt-100 RTD platinum resistance thermometer, Class AA.

5.4.2 A thermometer consisting of K-type 30 AWG gauge thermocouple and a meter capable of reading 25 to 260 °C. The thermocouple shall be 61 to 76 cm in length. This thermometer shall conform to the temperature/voltage tables of the National Institute of Standards and Technology and to the IEC 60854 standards for K-, J-, and T-type thermocouples, shall have a temperature range of at least 0 to 260 °C and an accuracy of ± 1.0 °C.

NOTE 4—Thermometer types suitable for use include Specification E1 mercury thermometers; Specification E230/E230M thermocouple thermometer, Type T, Special Class; or IEC 60584 thermocouple thermometer, Type T, Class 1.

5.5 Testing Bath—A circular or rectangular bath of at least 185 mm in internal diameter and containing water at least 185 mm in depth; or a rectangular bath with minimum internal dimensions of 150 mm width and 300 mm length, and containing water diameter or width respectively. The depth of the bath shall be at least 150 mm, allowing for the depth of the water to be at least 110 mm in depth. The height of the surface of the container bath above the water shall be at least 40 mm. The bath shall be heated by electric, gas, or other suitable means, able to maintain the specified test temperature within ± 0.5 °C. A stand or other suitable support shall be available to hold the thermometric device thermometer in the proper position (40 ± 2 mm) in the bath during the test, as stated in 6.1.

5.6 Water Bath at 5 °C—5 °C—A water bath of suitable dimensions to submerge the assembled float apparatus maintained at 5.0 ± 1.0 °C which may be accomplished by means of melting ice.