



Designation: D 3289 – 97

Standard Test Method for Density of Semi-Solid and Solid Bituminous Materials (Nickel Crucible Method)¹

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1. Scope

1.1 This test method covers the determination of the density of semi-solid and solid bituminous materials by weighing in air and in water.

NOTE 1—An alternate method for determining the density of semi-solid and solid bituminous materials is Test Method D 70. For materials which are too fluid for use of this method, use Test Method D 3142.

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

1.3 *This standard does not purport to address 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.*

2. Referenced Documents

2.1 ASTM Standards:

C 670 Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials²

D 70 Test Method for Density of Semi-Solid and Solid Bituminous Materials (Pycnometer Method)³

D 140 Practice for Sampling Bituminous Materials³

D 3142 Test Method for Density of Liquid Asphalts (Hydrometer Method)³

D 4311 Practice for Determining Asphalt Volume Correction to a Base Temperature³

E 1 Specification for ASTM Thermometers⁴

3. Terminology

3.1 *density*—the mass per unit volume of a material.

3.2 *relative density*—the ratio of the mass of a given volume of a material to the mass of the same volume of water at the same temperature. (Note 2)

NOTE 2—Relative density is also called specific gravity.

¹ This test method is under the jurisdiction of ASTM Committee D-4 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.47 on Miscellaneous Asphalt Tests.

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² *Annual Book of ASTM Standards*, Vol 04.02.

³ *Annual Book of ASTM Standards*, Vol 04.03.

⁴ *Annual Book of ASTM Standards*, Vol 14.03.

4. Summary of Test Method

4.1 The sample is placed in a nickel crucible and weighed in air, and then in water at the test temperature. The density is calculated from the mass of the sample and its apparent mass when weighed in water.

5. Significance and Use

5.1 Values of density are used for converting volumes to units of mass, and for correcting measured volumes from the temperature of measurement to a standard temperature using Practice D 4311.

6. Apparatus

6.1 *Crucible*, nickel, high-form, 30-mL capacity, about 43 mm in height by 41 mm in diameter.

6.2 *Bath*, constant-temperature, capable of maintaining the test temperature within $\pm 0.1^\circ\text{C}$.

6.3 *Thermometer*, calibrated liquid in glass, total immersion-type, of suitable range with graduations at least every 0.1°C and a maximum scale error 0.1°C as prescribed in Specification E 1. Thermometers commonly used are 63C. Any other thermometer device of equal accuracy may be used.

6.4 *Balance*, capable of weighing to 0.001 g. It shall be fitted with a pan straddle and a wire basket, as shown in Fig. 1.

6.5 *Basket and Pan Straddle*, capable of holding the crucible in air or in water by suspending from the balance beam, as shown in Fig. 1. The basket may be made out of soft 0.81-mm copper wire or equivalent. The straddle may be made out of about 0.81-mm aluminum sheeting formed to provide support of the beaker while permitting free movement of the pan.

7. Material

7.1 *Water*—Freshly boiled and cooled distilled or deionized water.

8. Sampling

8.1 Take samples in accordance with Practice D 140. The sample shall be free of foreign substances.

8.2 Thoroughly mix the sample before removing a representative portion for testing.

9. Procedure

9.1 Place the clean, dry nickel crucible in the wire basket