



Designation: D 2840 - 69

AMERICAN SOCIETY FOR TESTING AND MATERIALS

Standard Method of Test for AVERAGE TRUE PARTICLE DENSITY OF HOLLOW MICROSPHERES¹

This Standard is issued under the fixed designation D 2840; 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.

1. Scope

1.1 This method covers the determination of the average true particle density of hollow microspheres of the type used in syntactic foam buoyancy materials.

2. Summary of Method

2.1 This method consists of placing a known weight of the material under test into one of two airtight chambers of equal volume in an air comparison pycnometer. The air pressures in both chambers are increased to a maximum and made equal by means of pistons with calibrated movement. The difference in volume is the volume of the material under test and can be read directly, then used to calculate the density.

3. Significance

3.1 The density of hollow microspheres is directly related to the density of a syntactic foam in which they are a component.

3.2 This test is accurate and rapid and is therefore suitable for in-process quality control, specification acceptance, research, and development.

3.3 When used in conjunction with an acceptable bulk density test, this test can be used to estimate the density possible in syntactic foams, assuming no breakage of the microspheres.

4. Definitions

4.1 *syntactic foam*—a material consisting of hollow sphere fillers in a resin matrix.

4.2 *microspheres*—for the purposes of this method, spheres 1 mm or smaller in diameter.

5. Interferences

5.1 Moist samples can cause shifting of zero tare. All samples must be dry.

5.2 This procedure is not applicable to microspheres that are gas permeable under the conditions of test.

6. Apparatus

6.1 *Balance*, capable of weighing to 0.01 g.

6.2 *Air Comparison Pycnometer*,² or comparable equipment.

7. Sampling

7.1 Sampling procedure for this material is critical since the microspheres can segregate due to both size and density distributions. The sampling procedure recommended is described in ASTM Method D 2841, for Sampling Hollow Microspheres.³

8. Sample

8.1 Three samples, each of approximately 25 cm³ bulk volume, shall be brought to thermal equilibrium with the pycnometer in the testing room.

9. Calibration of Apparatus

9.1 Before starting a series of readings allow the pycnometer to come to thermal

¹ This method is under the jurisdiction of ASTM Committee D-20 on Plastics. A list of members may be found in the ASTM Yearbook. This standard is the direct responsibility of Subcommittee D-20.60 on Syntactic Foams.

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² Beckman Model 930 Air Comparison Pycnometer has been found satisfactory for this purpose.

³ *Annual Book of ASTM Standards*, Part 27.