



Designation: D 5965 – 96

Standard Test Methods for Specific Gravity of Coating Powders¹

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1. Scope

1.1 These test methods cover three procedures for determining the specific gravity (see definition) of coating powders, as follows:

TEST METHOD A—For Testing Coating Powders, Excluding Metallics

TEST METHOD B—For Tests Requiring Greater Precision than Test Method A, Including Metallics, Using Helium Pycnometry

TEST METHOD C—For Theoretical Calculation Based on Raw Material Specific Gravities

1.2 Test Method A can be used as a less expensive method with reduced accuracy for determining the specific gravity of coating powders, excluding metallics.

1.3 The ideal gas law forms the basis for all calculations used in the Test Method B determination of density of coating powders.

1.4 Test Method B includes procedures that provided acceptable results for samples analyzed during round robin testing.

1.5 Test Method B uses SI units as standard. State all numerical values in terms of SI units unless specific instrumentation software reports surface area using alternate units. Many instruments report density as g/cm³, instead of using SI units (kg/m³).

1.6 *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.* For specific hazards statement see Section 6.

2. Referenced Documents

2.1 ASTM Standards:

D 3924 Specification for Standard Environment for Conditioning and Testing Paint, Varnishes, Lacquers, and Related Materials²

D 5382 Guide to Evaluation of Optical Properties of Powder Coatings³

E 691 Practice for Conducting an Interlaboratory Study to

Determine the Precision of a Test Method⁴

3. Terminology

3.1 Definitions:

3.1.1 Definitions 3.1.1 and 3.1.3 are from Guide D 5382.

3.1.2 *coating powders*—finely divided particles of organic polymer that generally contain pigments, fillers, and additives and that remain finely divided during storage under suitable conditions.

3.1.3 *meniscus*—curved upper surface of a liquid column that is concave when the containing walls are wetted by the liquid.

3.1.4 *powder coatings*—coatings that are protective, decorative, or both; that are formed by the application of a coating powder to a substrate and fused into continuous films by the application of heat or radiant energy.

3.1.5 *pycnometer*—instrument designed to measure the volume of solid materials using Archimedes' principle of fluid displacement. The displaced fluid is a helium gas.

3.1.6 *specific gravity*—(1) strict definition: the density of a substance relative to that of water. (2) practical, as used in this test method—The numerical value of the density when the latter is expressed in grams per millilitre.

4. Significance and Use

4.1 Test Method A is a less expensive method of determining specific gravity of coating powders, excluding metallics, that produced less precise results than Test Method B.

4.2 Test Method B provides better precision at higher cost and includes metallics, although different models produced different grand averages for each of the three samples tested.

4.3 Test Method C is commonly used by the powder coating industry to estimate the coverage of a powder coating at a given thickness, using the theoretical specific gravity calculated from those of the raw materials.

5. Reagents

5.1 *Purity*—Wetting vehicles should be of reagent grades.

5.2 *Helium*—Shall be understood to mean high purity of 99.9995 %.

¹ These test methods are under the jurisdiction of ASTM Committee D-1 on Paint and Related Coatings, Materials, and Applications and are the direct responsibility of Subcommittee D01.51 on Powder Coatings.

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² *Annual Book of ASTM Standards*, Vol 06.01.

³ *Annual Book of ASTM Standards*, Vol 06.02.

⁴ *Annual Book of ASTM Standards*, Vol 14.02.