



Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement¹

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This standard has been approved for use by agencies of the Department of Defense.

1. Scope*

1.1 These test methods describe the determination of the specific gravity (relative density) and density of solid plastics in forms such as sheets, rods, tubes, or molded items.

1.2 Two test methods are described:

1.2.1 *Test Method A*—For testing solid plastics in water, and

1.2.2 *Test Method B*—For testing solid plastics in liquids other than water.

NOTE 1—Alternatively, Test Method D 1505 may be applied to many such forms, as well as to films and sheeting.

1.3 The values stated in SI units are to be regarded as the standard.

1.4 *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.*

NOTE 2—This standard is not equivalent to ISO 1183 Method A.

2. Referenced Documents

2.1 ASTM Standards:

D 618 Practice for Conditioning Plastics and Electrical Insulating Materials for Testing²

D 891 Test Methods for Specific Gravity, Apparent, of Liquid Industrial Chemicals³

D 1505 Test Method for Density of Plastics by the Density-Gradient Technique²

D 1622 Test Method for Apparent Density of Rigid Cellular Plastics²

D 1898 Practice for Sampling of Plastics⁴

¹ These test methods are under the jurisdiction of ASTM Committee D20 on Plastics and are the direct responsibility of Subcommittee D20.70 on Analytical Methods (Section D20.70.01).

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² *Annual Book of ASTM Standards*, Vol 08.01.

³ *Annual Book of ASTM Standards*, Vol 15.05.

⁴ Discontinued. See 1998 *Annual Book of ASTM Standards*, Vol 08.01.

D 4968 Guide for Annual Review of Test Methods and Specifications for Plastics²

E 1 Specification for ASTM Thermometers⁵

E 12 Terminology Relating to Density and Specific Gravity of Solids, Liquids, and Gases⁶

E 380 Practice for Use of the International System of Units (SI) (the Modernized Metric System)⁷

E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method⁷

3. Terminology

3.1 *General*—The units, symbols, and abbreviations used in these test methods are in accordance with Practice E 380.

3.2 Definitions:

3.2.1 *specific gravity (relative density)*—the ratio of the mass in air of a unit volume of the impermeable portion of the material at 23°C to the mass in air of equal density of an equal volume of gas-free distilled water at the same temperature; the form of expression shall be:

$$\text{Specific gravity (relative density) } 23/23^{\circ}\text{C} \\ (\text{or sp gr } 23/23^{\circ}\text{C})$$

NOTE 3—This definition is essentially equivalent to the definition for apparent specific gravity and apparent density in Terminology E 12, because the small percentage difference introduced by not correcting for the buoyancy of air is insignificant for most purposes.

3.2.2 *density*—the mass in air in kilograms per cubic metre of impermeable portion of the material at 23°C. The form of expression shall be:

$$D^{23}, \text{ kg/m}^3 \text{ (Notes 3-5)}$$

NOTE 4—The SI unit of density, as defined in Practice E 380 is kg/m³. To convert density in g/cm³ to density in kg/m³, multiply by 1000.

NOTE 5—Specific gravity 23/23°C can be converted to density 23°C, kg/m³, by use of the following equation:

$$D^{23^{\circ}\text{C}}, \text{ kg/m}^3 = \text{sp gr } 23/23^{\circ}\text{C} \times 997.5$$

⁵ *Annual Book of ASTM Standards*, Vol 14.03.

⁶ Discontinued. See 1995 *Annual Book of ASTM Standards*, Vol 15.05.

⁷ *Annual Book of ASTM Standards*, Vol 14.02.

*A Summary of Changes section appears at the end of this standard.