



Standard Test Method for Rubber Chemicals—Density¹

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1. Scope

1.1 This test method covers the determination of the density of solid chemicals used as rubber additives during processing and manufacture. It is intended for determining the density of the rubber chemical itself and not for the determination of the effective density of the chemical in a rubber.

1.2 The values stated in SI units shall be regarded as standard.

1.3 *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.*

2. Referenced Documents

2.1 ASTM Standards:

E 1 Specification for ASTM Thermometers²

E 300 Practice for Sampling Industrial Chemicals³

3. Summary of Test Method

3.1 The density of the test specimen is obtained via wet pycnometry.

4. Significance and Use

4.1 The density of a rubber chemical is used for calculating the rubber compound volume, which is used to determine the cost of a rubber product. The density may also be used as a raw material control tool.

5. Apparatus

5.1 Pycnometer, 50-cm³ capacity.

NOTE 1—The weld type with the cap seal on the outside of the neck of the bottle is preferred because there is less danger of trapping air just under the capillary tube than with types having the ground seal on the inside of the neck. The stopper may contain a thermometer. However, the control of the temperature is through the adjustment of the water bath rather than by this thermometer.

5.2 *Water Bath*, maintained at $25 \pm 0.5^\circ\text{C}$ and equipped with a stirring device.

5.3 *Pressure Meter*—A gage or manometer that is accurate to 0.2 kPa, is required to measure the differential pressure between the outside and inside of the system.

5.3.1 Alternatively, a device for measuring the absolute pressure inside the system can be used. The range of the measuring device should be at least 100 kPa for differential pressure meters and at least 10 kPa for absolute pressure meters.

5.4 *Desiccator*—A glass desiccator constructed with heavy walls to withstand a differential pressure of 100 kPa and with an opening at the side or top. The desiccator should be enclosed in a sturdy box or shield to prevent possible injury to the operator.

5.5 *Vacuum Pump*—An oil-filled, motor-driven pump, capable of reducing the absolute pressure of the system to 2 kPa.

5.6 *Thermometer*, having a minimum range from 10 to 30°C and graduated in 0.1°C divisions. ASTM Solidification Point Thermometer having a range from 0 to 30°C and conforming to the requirements for Thermometer 90C as prescribed in Specification E 1, may be used.

5.7 *Weighing Bottle*—A wide-mouth, cylindrical, glass weighing bottle (about 30 mm in height and 70 mm in diameter) provided with a ground-glass stopper.

6. Sampling

6.1 Select a representative sample of the chemical to be tested in accordance with the appropriate section of Practice E 300.

6.2 *Mesh Size*—Rubber chemicals are generally in the form of powders that require no further treatment. Grind any lumps, pellets, etc., to pass a 149-μm sieve prior to the determination.

6.3 *Drying*—It is not necessary to dry rubber chemicals, unless it is known that they contain sufficient water to interfere with an accurate density measurement. If necessary, dry to constant mass at least 10°C below the melting point but not above 110°C .

7. Immersion Liquid

7.1 An immersion liquid should be chosen in which no portion of the rubber chemical (major component, impurity, or added component) is soluble and which will not react with any portion of the rubber chemical. Refined white kerosene of narrow boiling range and low evaporation rate may sometimes be used. Other immersion liquids such as ethylene glycol, tetrahydronaphthalene, etc., may be suitable. If an immersion liquid cannot be found that meets these solubility requirements,

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² *Annual Book of ASTM Standards*, Vol 14.03.

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