



Designation: **D1622—08 D1622/D1622M – 14**

## Standard Test Method for Apparent Density of Rigid Cellular Plastics<sup>1</sup>

This standard is issued under the fixed designation ~~D1622~~**D1622/D1622M**; 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 reappraisal. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reappraisal.

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

### 1. Scope\*

1.1 This test method covers the density of a cellular plastic. Density can be evaluated as the apparent overall density (includes forming skins) or by apparent core density (forming skins removed).

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values ~~given in parentheses are for information only~~ stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the 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.*

NOTE 1—This test method is equivalent to ISO 845.

### 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

[D618 Practice for Conditioning Plastics for Testing](#)

[D883 Terminology Relating to Plastics](#)

[E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method](#)

2.2 *ISO Standard:*

[ISO 845 Cellular Plastics and Rubbers—Determination of Apparent \(Bulk\) Density](#)<sup>3</sup>

### 3. Terminology

3.1 For definitions of terms associated with plastic materials, see Terminology [D883](#).

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *apparent core density (of a cellular plastic)*—the weight in air per unit volume of a sample, after all forming skins have been removed.

3.2.2 *apparent overall density (of a cellular plastic)*—the weight in air per unit volume of a sample, including all forming skins.

~~3.1.3 When density or apparent density is used in reference to a cellular plastic, without further qualification, it shall be interpreted as follows:~~

~~3.1.3.1 density shall be interpreted as being the apparent overall density if the material is to be used with forming skins intact.~~

~~3.1.3.2 density shall be interpreted as the apparent core density if the forming skins have been, or will be, removed before the material is used.~~

### 4. Significance and Use

4.1 If the material to be tested includes forming skins, the apparent overall density, or the apparent core density, or both, shall be determined. If the material does not have forming skins, the term overall density is not applicable.

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee [D20](#) on Plastics and is the direct responsibility of Subcommittee [D20.22](#) on Cellular Materials - Plastics and Elastomers.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For Annual Book of ASTM Standards volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>3</sup> Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

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

4.2 This test method is also applicable to spray foam materials.

4.3 Before proceeding with this test method, reference shall be made to the specification of the material being tested. Any test specimen preparation, conditioning, dimensions, or testing parameters, or combination thereof, covered in the relevant ASTM materials specification shall take precedence over those mentioned in this test method. If there are no relevant ASTM material specifications, then the default conditions in this method apply.

4.4 When density or apparent density is used in reference to a cellular plastic, without further qualification, it shall be interpreted as follows:

4.4.1 *density*—shall be interpreted as being the *apparent overall density* if the material is to be used with forming skins intact.

4.4.2 *density*—shall be interpreted as the *apparent core density* if the forming skins have been, or will be, removed before the material is used.

## 5. Apparatus

5.1 *Analytical Balance or Scale*, capable of weighing the specimens to the nearest  $\pm 0.1\%$ .

5.2 *Micrometer Dial Gage, Gauge, Caliper, or Steel Rule*, suitable for measuring dimensions of the specimen to  $\pm 0.1\%$ .

5.3 *Dual Component Spray Equipment*, designed to meter the materials.

## 6. Test Specimen

6.1 The specimen shall be of a shape whose volume can be readily calculated, and not less than  $16.4\text{ cm}^3$  ( $1.0\text{ in.}^3$ ) in volume.

6.2 If the sample is a single object whose weight and volume can be measured accurately, using the total weight and total volume may be used to determine the sample density. density is acceptable. In this case, the test specimen is the entire sample.

6.3 When testing spray foam materials, specimens shall be prepared as follows:

6.3.1 Test specimens shall be taken from finished foam samples that have been sprayed from compounds in accordance with 6.3.2.

6.3.2 ~~The Spray the sample compounds should be sprayed at room temperature between (between 20 to 24°C, unless 24°C), unless alternative conditions are otherwise agreed upon by the contractual parties. Spray equipment shall be adjusted to the best spray pattern and optimum performance. Spray apply a minimum 1.27-cm ([0.5-in.] 1/2-in.) layer of foam to a 0.95-cm by 63.5-cm by 63.5-cm (3/8-in. by 24-in. by 24-in.) primed plywood base or other suitable substrate. substrate approximately 0.95-cm by 63.5-cm by 63.5-cm [0.375-in. by 25-in. by 25-in.]. After a minimum of 5 min; minutes, spray apply a second layer of at least 3.8 cm (1.5 1/2 in.-in.) in thickness.~~

6.3.3 Cut ~~a~~ an approximate 2.54-cm (1-in.) [1-in.] thick specimen from the second layer. For calculation of core density, remove the bottom layer and the top skin. For calculation of the apparent overall density, cut a specimen that includes the forming skin.

6.4 If separate test specimens are cut from the sample, a minimum of three shall be used. The specimens shall be taken from locations distributed throughout the sample.

6.5 When apparent overall density is determined using specimens cut from a larger sample, the ratio of forming skin area to total volume shall be the same for the test specimens as for the sample.

## 7. Conditioning

7.1 ~~Conditioning—Unless Condition~~ the test specimens at  $23 \pm 2^\circ\text{C}$  and  $50 \pm 10\%$  relative humidity for not less than 40 h prior to test in accordance with Procedure A of Practice D618, unless otherwise specified by the contract or relevant ASTM material specification, condition the test specimens at  $23 \pm 2^\circ\text{C}$  ( $73.4 \pm 3.6^\circ\text{F}$ ) and  $50 \pm 5\%$  relative humidity for not less than 24 h prior to the test. material specifications. In cases of disagreement, the tolerances shall be  $\pm 1^\circ\text{C}$  and  $\pm 5\%$  relative humidity.

7.2 ~~Test Conditions—Conduct tests in the standard laboratory atmosphere of 23 ± 2°C (73.4 ± 3.6°F) and 50 ± 5%~~  $23 \pm 2^\circ\text{C}$  ( $73.4 \pm 3.6^\circ\text{F}$ ) and  $50 \pm 10\%$  relative humidity, unless otherwise specified in this specification or by the contract or relevant ASTM materials specification material specification. In cases of disagreement, the tolerances shall be  $\pm 1^\circ\text{C}$  and  $\pm 5\%$  relative humidity.

## 8. Number of Specimens

8.1 A minimum of three specimens shall be tested, unless the entire sample is measured as a single specimen (see Section 6).

## 9. Procedure

9.1 Weigh the test specimen on a balance or scale to a precision of  $\pm 0.1\%$ .

9.2 Measure specimens with a caliper or a dial-type ~~gage~~ gauge having a foot with a minimum area of  $6.5\text{ cm}^2$  ( $1\text{ in.}^2$ ). Hold the pressure of the dial foot to  $2.7 \pm 0.7\text{ kPa}$  ( $0.4[0.4 \pm 0.1\text{ psi};\text{psi}]$ ), unless such pressure indents the specimen. In these cases, the pressure shall be reduced accordingly. When a sliding caliper ~~gage~~ gauge is used, the proper setting shall be that point at which the measuring faces of the ~~gage~~ gauge contact the surfaces of the specimen without compressing them. Do not use a steel rule for