Designation: D 3748 – ~~98~~03

Standard Practice for Evaluating High-Density Rigid Cellular ~~Thermoplastics~~ Plastics[1]

This standard is issued under the fixed designation D 3748; 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. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This practice covers the basic test procedures for determination of the physical properties and reporting of data for high-density rigid cellular plastics.

1.2 *This standard does not pur~~m~~port 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 practice and ISO Standard 9054 are not technically equivalent.

[1] This practice is under the jurisdiction of ASTM Committee D~~-~~20 on Plastics and is the direct responsibility of Subcommittee D20.22 on Cellular Materials—Plastics and Elastomers.

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

2. Referenced Documents

2.1 *ASTM Standards:*[2] [3]

C 177 Test Method for Steady-State Heat-Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot Plate Apparatus

C 518 Test Method for Steady-State Heat-Flux Measurements and Thermal Transmission Properties by Means of Heat Flow Meter Apparatus

D 149 Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies

D 570 Test Method for Water Absorption of Plastics

D 618 Practice for Conditioning Plastics ~~and Electrical Insulating Materials~~ for Testing

D 638~~M~~ Test Method for Tensile Properties of ~~Plastics [Metric]~~[5] Plastics

D 648 Test Method for Deflection Temperature of Plastics Under Flexural Load

D 695 Test Method for Compressive Properties of Rigid Plastics

D 696 Test Method for Coefficient of Linear Thermal Expansion of Plastics between -30°C and 30°C with a Vitreous Silica Dilatometer

D 790 Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

D 883 Terminology Relating to Plastics

D 1622 Test Method for Apparent Density of Rigid Cellular Plastics

3. Significance and Use

3.1 This practice provides appropriate testing methods, and a specific data reporting procedure for high-density rigid cellular ~~thermoplastics.~~ plastics.

4. Terminology

4.1 *Definitions:*

4.1.1 *cellular plastics*—plastics containing numerous small cavities (cells), interconnecting or not, distributed throughout the mass. These cells cannot be mechanically assembled, but are produced through the "in situ" plastics processing methods.

4.1.2 *density, apparent*—the mass, in air, of a unit volume of a material.

4.1.3 *high density*—greater than ~~20 lb/ft~~ 320 kg/m ^{3} ~~or 320 kg/m^3~~(0.32 g/cm^3) or 20 lb/ft^3 apparent density.

4.1.4 *rigid*—having an apparent flexural modular greater than 689.5 MPa ~~(~~ [100 000 psi~~)~~] when tested at 23°C in accordance with Test Methods D 790.

4.1.5 *skin*—a relatively dense layer at the surface of a cellular polymeric material.

~~4.1.6 *thermoplastic, n*—a plastic that repeatedly can be softened by heating and hardened by cooling through a temperature range characteristic of the plastic, and that in softened state can be shaped by flow into articles by molding or extrusion.~~

~~4.1.7 For~~

4.1.6 For definitions of other terms used in this practice, refer to Terminology D 883.

5. Sample Preparation

5.1 ~~S~~Prepare samples ~~m~~ in one of two way ~~be~~s:

(a) process sample~~d~~s directly into proper size specimens, or

(b) prepare~~d~~ samples from larger sections as specified in each individual test.

~~5.2 The report section should be precise as to~~

5.2 Report the precise manner of sample preparation.

6. Conditioning

6.1 Condition specimens prior to testing in accordance with Procedure A of Practice D 618.

7. Number of Test Specimens

7.1 Cellular plastics are often nonuniform in density distribution; therefore, ~~there should be~~ a minimum of five specimens needs to be tested per testing method to obtain representative values.

8. Test Methods

8.1 Where technically suitable, reference is made to existing ASTM test methods. Otherwise, comments or changes are outlined in accordance with this practice.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] For referenced ASTM standards, visit the ASTM Web Site, www.astm.org, or contact ASTM Customer Service at service@astm.org. For Annual Book of ASTM ~~Standards, Vol 04.06.~~ Standards volume information, refer to the standard's Document Summary page on the ASTM web site.

8.2 *Apparent Density*— Test Method D 1622.
8.3 *Compressive Strength*—Test Method D 695.
8.4 *Tensile Properties*—Test Method D 638.
8.5 *Coefficient of Linear Thermal Expansion*—Test Method D 696.
8.6 *Apparent Flexural Properties* —Test Methods D 790.
8.7 *Deflection Temperature*—Test Method D 648.
8.8 *Dielectric Breakdown Voltage and Dielectric Strength*—Test Methods D 149
8.9 *Thermal Conductivity*—Test Methods C 177 or C 518.

NOTE 2—Use Test Method C 518 ~~should~~ only ~~be used~~ for materials having densities less than 900 kg/m^3.

8.10 *Water Absorption Rate*—Test Method D 570.

9. Report

9.1 Report the following information:
9.1.1 Complete identification of the tested material as to material supplier and nomenclature, source of samples, lot or run number, and type of part.
9.1.2 Type of manufacturing process used to make the part, for example, extrusion, injection molding, casting, etc.
9.1.3 Technique used to prepare the test specimens, for example, directly-molded or extruded, cut from larger part and edges tensile cut, etc.
9.1.4 Number of uncut skins on the specimen when in test (refers to skins not cut in sample preparation).
9.1.5 Location of skins (cut and uncut) while the specimen is in test, that is, horizontal, vertical, none, etc.
9.1.6 Dimensions (length, width, thickness) of the specimen.
9.1.7 Apparent density. If the apparent density varies, report the maximum, minimum, average, and density within 12.7 mm ~~(~~ [0.5 in.~~)~~] of the test area.
9.1.8 Conditioning temperature and time.
9.1.9 Date of the test.

10. Keywords

10.1 high density; rigid cellular ~~plastics; thermoplastics~~ plastics

SUMMARY OF CHANGES

~~Committee D-20 has identified~~
This section identifies the location of selected changes to this ~~practice since~~ practice. For the ~~last issue~~ convenience of the user, Committee D20 has highlighted those changes that may impact the use of this practice~~:~~. This section may also include descriptions of the changes or reasons for the changes, or both.

D 3748 - 03:
(*1*) The title was changed from thermoplastics to plastics.
(*2*) The standard safety caveat was added.
(*3*) The reference to D638M was changed to D638.
(*4*) The term “plastics” replaced “thermoplastics” in the Scope and Significance and Use sections.
(*5*) Non-mandatory language was removed from Sections 5 and 7, and Note 2.
D 3748 – 98:
(*1*) The ISO equivalency statement was changed.
(*2*) The word “weight” was replaced with “mass” in the definition of apparent density.
(*3*) The name of the jurisdictional subcommittee was updated.
(*4*) Summary of Changes section was added.