Designation: D3575 – 08

StandardTest Methods for Flexible Cellular Materials Made From Olefin Polymers[1]

This standard is issued under the fixed designation D3575; 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.

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

1. Scope

1.1 These test methods apply to flexible closed cell materials made from olefin polymers or blends of olefin polymers with other polymers as defined in Section 3.

1.2 These test methods cover test procedures only. Product requirements are outlined in Specification D4819.

1.3 Unless specifically stated otherwise, by agreement between the purchaser and supplier, all tests shall be performed in accordance with the test methods specified in this standard.

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

1.5 *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 or regulatory limitations prior to use.*

NOTE 1—This standard and ISO 7214 address the same subject matter, but differ in technical content.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

C177 Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus

C518 Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus

D412 Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension

D624 Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers

D1056 Specification for Flexible Cellular Materials—Sponge or Expanded Rubber

D1349 Practice for Rubber—Standard Temperatures for Testing

D1596 Test Method for Dynamic Shock Cushioning Characteristics of Packaging Material

D1667 Specification for Flexible Cellular Materials—Poly (Vinyl Chloride) Foam (Closed-Cell)

D2863 Test Method for Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index)

D4483 Practice for Evaluating Precision for Test Method Standards in the Rubber and Carbon Black Manufacturing Industries

D4819 Specification for Flexible Cellular Materials Made From Polyolefin Plastics

F355 Test Method for Impact Attenuation of Playing Surface Systems and Materials

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *blend*—mixture of olefin polymers with other monomer(s) or polymer(s) in which at least 51 mass percent is the olefin polymer.

3.1.2 *cellular material, flexible*—a cellular organic polymeric material that will not rupture when a specimen 200 by 25 by 25 mm (8 by 1 by 1 in.) is bent around a 25-mm (1-in.) diameter mandrel at a uniform rate of one lap in 5 s at a temperature between 18 and 29°C.

3.1.3 *constant compression creep*—the time-dependent change in thickness of a material under a constant compressive stress or compression force.

3.1.4 *olefin polymers*—polymers made by the polymerization of olefins or copolymerization of olefins with other monomers, the olefins being at least 51 mass percent.

4. Summary of Test Methods

4.1 Table 1 contains a list of all the assigned suffix letters that may be used in describing the cellular products covered by these test methods.

[1] These test methods are under the jurisdiction of ASTM Committee D20 on Plastics and are the direct responsibility of Subcommittee D20.22 on Cellular Materials - Plastics and Elastomers.

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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.

TABLE 1 Suffix Letter Designations

NOTE 1—These suffix letters have been assigned by Subcommittee D11.33 and are consistent with those in Specifications D1056 and D1667.

Suffix Letter	Property	Section
A	Heat resistance	10 – 17
B	Compression set under constant deflection	
C	Ozone or weather resistance	
D	Compression deflection	18 – 25
E	Oil resistance	
F	Low temperature	
G	Tear resistance	26
H	Flex resistance	
I	Not assigned because of similarity to numeral 1	
J	Abrasion resistance	
K	Adhesion capability	
L	Water absorption	27 – 33
M	Flammability resistance	34
N	Impact resistance	
O	Electrical properties	
P	Staining resistance	
Q	Not assigned because of similarity to letter O	
R1	Resilience	
R2	Energy absorption	35
S	Thermal stability	36 – 43
T	Tensile strength and elongation	44
U	Not assigned	
V	Thermal conductivity	45 and 46
W	Density	47 – 50
X	Not assigned	
Y	Not assigned	
Z	Special requirements	
AA	Buoyancy	51 – 57
BB	Constant compressive creep	58 – 65
CC	Dynamic cushioning	66 and 67
DD	Open cell	
EE	Not assigned	
FF	Water vapor transmission	

4.2 These test methods do not contain test methods for all the suffix letters listed in Table 1. Where the test method is not included, it shall be arranged between the purchaser and supplier.

4.3 Test methods included in this standard are indicated in Table 1 by showing the applicable section numbers after the suffix letter.

4.4 In cases involving referee decisions, SI units shall be used.

5. Significance and Use

5.1 The test procedures provide a standard method of obtaining data for research and development, quality control, acceptance and rejection under specifications, and special purposes.

5.2 The data obtained by these test methods are applicable to the material under conditions of the particular test and are not necessarily the same as obtained in other environments or use conditions.

6. Sampling

6.1 When possible, use the completed manufactured product for the tests specified. Randomly select representative samples of the lot being examined, as required.

6.2 Extruded or molded shapes or sizes too small for cutting standard test specimens are difficult to classify or test by these test methods and will usually require special testing procedures or the use of standard test sheets.

6.3 When it is necessary or advisable to obtain test specimens from the article, as in those cases where the entire sample is not required or adaptable for testing, specify the method of cutting and the exact position from which specimens are to be taken. The apparent density and the state of crosslinking may vary in different parts of the finished product, especially if the article is of complicated shape or of varying thickness, and these factors affect the physical properties of the specimens. Also, the apparent density is affected by the number of cut surfaces as opposed to the number of skin-covered surfaces on the test specimen.

6.4 When the finished product does not lend itself to testing or to the taking of test specimens because of complicated shape, small size, metal or fabric inserts, solid covers, adhesion to metal, or other reasons, prepare standard test sheets. When differences due to the difficulty in obtaining suitable test specimens from the finished part arise, the manufacturer and purchaser may agree on acceptable deviations. This can be done by comparing the results of standard test specimens and those obtained on actual parts.

6.5 If the material to be tested is anisotropic, prepare the test specimens so as to measure the property in the direction of interest in the application.

7. Conditioning

7.1 Conduct tests under known conditions of temperature and humidity or as specified in the individual test procedure. In case of dispute, conduct the test at a temperature of 23 ± 2°C (73.4 ± 3.6°F) and in an atmosphere of 50 ± 5 % relative humidity. The product shall be conditioned, undeflected, and undistorted, at the temperature and humidity of test for at least 24 h before being tested.

7.2 It is recommended, for referee purposes, that all tests shall be performed 96 h or more after the foam has been manufactured.

8. Measurement of Test Specimens

8.1 Measure dimensions up to and including 25 mm (1 in.) using a dial-type gauge with a minimum foot area of 650 mm^2 (1 $in.^2$). Pressure on the foot shall be held to 190 ± 50 Pa (0.028 ± 0.007 psi).

NOTE 2—Where foam is appreciably compressed by this test method, foot area and loading shall be as agreed upon between the purchaser and the supplier.

NOTE 3—Thickness of materials having irregular surface characteristics shall be measured as agreed upon between the purchaser and the supplier.

8.2 Dimensions over 25 mm (1 in.) may be measured with a dial gauge, scale, or tape. Take care not to distort the test specimen.

8.3 The scale, tape, or gauge shall be graduated to permit measurements within ±1 % of the dimension to be measured.

8.4 Results reported shall be the average of a minimum of three equally spaced measurements of length and width and for