Designation: D 4819 – 96

Standard Specification for Flexible Cellular Materials Made From Polyolefin Plastics[1]

This standard is issued under the fixed designation D 4819; 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 specification applies to flexible closed-cell materials made from polyolefin plastics and blends of polyolefin plastics as defined in Section 3.

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

1.3 In case of conflict between the provisions of this specification and those of detailed specifications for a particular product, the latter shall take precedence. These detailed specifications for the flexible closed-cell polyolefin plastic foams should state the particular test or tests desired.

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

1.5 This specification does not contain test procedures or values for all the suffix letters listed in Table 1 and Table 2. Where the procedure is not described in this specification or special limits are desired, or both, the test procedures and values must be arranged between the purchaser and the supplier.

1.6 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

NOTE 1—There is no similar or equivalent ISO standard.

TABLE 1 Suffix Letter Designations

A	Heat resistance
B	Compression set under constant deflection
C	Ozone or weather resistance
D	Compression deflection
E	Oil resistance
F	Low temperature
G	Tear resistance
H	Flex resistance
I	Not assigned
J	Abrasion resistance
K	Adhesion capability
L	Water absorption
M	Flammability resistance
N	Impact resistance
O	Electrical properties
P	Staining resistance
Q	Not assigned
R_1	Resilience
R_2	Shock absorption
S	Thermal stability
T_1	Tensile strength
T_2	Ultimate elongation
U	Not assigned
V	Thermal conductivity
W	Density
X	Not assigned
Y	Not assigned
Z	Special requirements
AA	Buoyancy
BB	Compressive creep
CC	Dynamic cushioning
DD	Open cell
EE	Not assigned
FF	Water vapor transmission

2. Referenced Documents

2.1 *ASTM Standards:* [2]

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

D 412 Test Methods for Vulcanized Rubbers and Thermoplastic Rubbers and Thermoplastic Elastomers—Tension

D 624 Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers

D 1596 Test Method for Dynamic Shock Cushioning Characteristics of Packaging Materials

D 2863 Test Method for Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index)

D 3575 Test Methods for Flexible Cellular Materials Made from Olefin Polymers

E 96 Test Methods for Water Vapor Transmission of Materials

F 355 Test Method for Shock Absorbing Properties of Playing Surface Systems and Materials

[1] This specification is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.22 on Cellular Plastics.

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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 2 Property Limits for Flexible Cellular Polyolefin Materials

Suffix Letter	Property	Test Method	Units	Maximum or Minimum	Suffix Numbers and Limiting Values								
					1	2	3	4	5	6	7	8	9
B	Compression set	D 3575	%	max	...	5	10	15	20	25	30	35	...
D	Compression deflection	D 3575	kPa (psi)		15	30	40	70	105	170	275	...	...
				min	2.0	4.0	6.0	10	15	25	40		
G	Tear strength	D 3575 or D 624[A]	N/M (lb/in.)		7.0	14	20	27	40	55	68	...	...
				min	5.0	10	15	20	30	40	50		
L	Water absorption	D 3575	kg/m^2		...	0.20	0.30	0.40	0.50	1.00	...	...	...
			(lb/ft^2)	max		0.04	0.06	0.08	0.10	0.20			
M_1	Flammability-ease of ignition-LOI	D 3575 or D 2863[A]	% O_2	min	...	15	20	25	30	...	...	...	...
M_2	Flammability-burn rate	MVSS–302	mm/min		...	...	50	100	150	255	...	...	...
			(in./min)	max			2.0	4.0	6.0	10.0			
R_2	Shock absorption-Procedure A 25 mm (1 in.) thick samples	F 355	G's[B]	max	...	25	50	75	100	150	200	...	...
S	Thermal stability-dimensions[C]	D 3575	±%change	max	1	2	5	10	15	...	...	...	...
T_1	Tensile strength	D 3575 or D 412[A]	kPa (psi)		...	140	275	345	415	550	690	...	...
				min		20	40	50	60	80	100		
T_2	Ultimate elongation	D 3575 or D 412[A]	%	min	...	25	50	75	100	150	200	...	...
V	Thermal conductivity, 25 mm (1 in.) thick at 24°C (75°F), mean temperature 30°C (86°F), temperature differential	D 3575 Method B or C 518[A]	W/(mK) (BTU-in./(1·h·ft^2·°F)	max	...	0.040 0.28	0.046 0.32	0.052 0.36	0.058 0.40	0.063 0.44	...	...	...
W	Density	D 3575	kg/m^3	nominal	25	30	50	65	80	95	130	160	...
			(lb/ft^3% , ±)	max/min	1.5	2.0	3.0	4.0	5.0	6.0	8.0	10.0	
					30/25	30/25	25/25	25/25	25/25	25/25	40/25	45/25	
AA	Buoyancy, 24 h exposure at 23°C (73°F), under 50 mm (2.0 in.) water head	D 3575 or UL1191[A]	kg/m^3 (lb/ft^3)	min	...	830 52	880 55	910 57	945 59	960 60	...	...	...
BB	Compressive creep, 7 kPa (1.0 psi) load at 23°C (73°F) for 1000 h	D 3575	%	max	...	2.0	4.0	6.0	10	15	...	...	...
CC_1	Dynamic cushioning, 50 mm (2.0 in.) thick, 7 kPa (1 psi) loading, 600 mm (23.6 in.) drop, 23°C (73°F)	D 3575 or D 1596[A]	G's[B]	max	...	...	30	40	50	60	80	...	...
CC_2	Dynamic cushioning, same conditions as *CC*, except for 14 kPa (2 psi) loading	D 3575 or D 1596[A]	G's[B]	max	...	...	30	40	50	60	80	...	...
CC_4	Dynamic cushioning, same conditions as CC_1 except for 28 kPa (4 psi) loading	D 3575 or D 1596[A]	G's[B]	max	...	...	30	40	50	60	80	...	...
FF	Water vapor transmission	E 96	ng/(Pa·s·m)		...	...	0.3	0.4	0.6	0.9	1.8	...	...
			(perm-in.)	max			0.2	0.3	0.4	0.6	1.2		

[A] Methods shown are equivalent.
[B] G = The dimensionless ratio of missile acceleration during impact to the acceleration of gravity (see Test Method F 355).
[C] Plus (+) sign indicates growth, minus (–) sign indicates shrinkage.

2.2 *Motor Vehicle Safety Standard:*

MVSS-302 Flammability of Vehicle Interior Materials—Passenger Cars, Multipurpose Passenger Vehicles, Trucks and Buses[3]

2.3 *UL Standard:*

UL1191 Standard for Components for Personal Flotation Devices[4]

3. Terminology

3.1 *Definitions:*

[3] Available from Department of Transportation, Washington, DC.

[4] Available from Underwriter's Laboratories, Inc., 12 Laboratory Dr., PO Box 13995, Research Triangle Park, NC 27709-3995.