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## Standard Specification for Rigid Cellular Polystyrene Geofoam<sup>1</sup>

This standard is issued under the fixed designation D 6817; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This specification covers the types, physical properties and dimensions of rigid cellular polystyrene intended for use as geofoam.

1.2 This specification does not cover the layout, placement and workmanship for proper installation and performance of rigid cellular polystyrene geofoam.

1.3 Rigid cellular polystyrene geofoam covered by this specification may need protection from certain chemicals, environmental exposure, and concentrated loads. Additional design considerations may include thermal conductivity and buoyancy. Guidelines regarding these end use considerations are included in Appendix X1.

1.4 *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 requirements prior to use.*

### 2. Referenced Documents

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

C 165 Test Method for Measuring Compressive Properties of Thermal Insulations

C 203 Test Methods for Breaking Load and Flexural Properties of Block-Type Thermal Insulation

C 303 Test Method for Dimensions and Density of Preformed Block and Board-Type Thermal Insulation

C 390 Practice for Sampling and Acceptance of Thermal Insulation Lots

C 578 Specification for Rigid, Cellular Polystyrene Thermal Insulation

D 1621 Test Method for Compressive Properties Of Rigid Cellular Plastics

D 1622 Test Method for Apparent Density of Rigid Cellular Plastics

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

### 3. Terminology

3.1 *Definitions:*

3.1.1 Terms used in this specification are defined in Terminology D 4439.

3.1.2 *geofoam*—block or planar rigid cellular foam polymeric material used in geotechnical engineering applications.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *EPS, XX*—number designation for expanded polystyrene geofoam Type(s) having a minimum density of XX kg/m<sup>3</sup>(lb/ft<sup>3</sup>).

3.2.2 *XPS, XX*—number designation for extruded polystyrene geofoam Type(s) having a minimum density of XX kg/m<sup>3</sup>(lb/ft<sup>3</sup>).

3.2.3 *RCPS*—letter designation for EPS and XPS rigid cellular polystyrene geofoam covered by this specification.

### 4. Ordering Information

4.1 Acquisition documents shall specify the following:

4.1.1 Title, number and year of this specification.

4.1.2 Type, as per Table 1, or minimum density required.

4.1.3 Total product volume required of each Type, or minimum density.

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee D35 on Geosynthetics and is the direct responsibility of Subcommittee D35.03 on Permeability and Filtration.

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<sup>2</sup> 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.

Type	EPS12	EPS15	EPS19	EPS22	EPS29
Density, min., -kg/m <sup>3</sup> (lb/ft <sup>3</sup> )	11.2 (0.70)	14.4 (0.90)	18.4 (1.15)	21.6 (1.35)	28.8 (1.80)
Compressive Resistance, min., -kPa (psf) at 1 %	15 (2.2)	25 (3.6)	40 (5.8)	50 (7.3)	75 (10.9)
Compressive Resistance, min., -kPa (psf) at 5 %	35 (5.1)	55 (8.0)	90 (13.1)	115 (16.7)	185 (26.8)
Compressive Resistance, min., -kPa (psf) at 10 % <sup>A</sup>	40 (5.8)	70 (10.2)	110 (16.0)	135 (19.6)	235 (34.1)
Flexural Strength, min., -kPa (psf)	69 (10.0)	172 (25.0)	207 (30.0)	276 (40.0)	345 (50.0)
Oxygen index, min., -volume %	24.0	24.0	24.0	24.0	24.0

Type	EPS12	EPS15	EPS19	EPS22	EPS29	EPS39	EPS46	XPS20	XPS21	XPS26	XPS29	XPS36	XPS48
Density, min., -kg/m <sup>3</sup> (lb/ft <sup>3</sup> )	11.2 (0.70)	14.4 (0.90)	18.4 (1.15)	21.6 (1.35)	28.8 (1.80)	38.4 (2.40)	45.7 (2.85)	19.2 (1.20)	20.8 (1.30)	25.6 (1.60)	28.8 (1.80)	35.2 (2.20)	48.0 (3.00)
Compressive Resistance, min., -kPa (psf) at 1 %	15 (2.2)	25 (3.6)	40 (5.8)	50 (7.3)	75 (10.9)	103 (15.0)	128 (18.6)	20 (2.9)	35 (5.1)	75 (10.9)	105 (15.2)	160 (23.2)	280 (40.6)
Compressive Resistance, min., -kPa (psf) at 5 %	35 (5.1)	55 (8.0)	90 (13.1)	115 (16.7)	170 (24.7)	241 (35.0)	300 (43.5)	85 (12.3)	110 (16.0)	185 (26.8)	235 (34.1)	335 (48.6)	535 (77.6)
Compressive Resistance, min., -kPa (psf) at 10 % <sup>A</sup>	40 (5.8)	70 (10.2)	110 (16.0)	135 (19.6)	200 (29.0)	276 (40.0)	345 (50.0)	104 (15.0)	104 (15.0)	173 (25.0)	276 (40.0)	414 (60.0)	690 (100.0)
Flexural Strength, min., -kPa (psf)	69 (10.0)	172 (25.0)	207 (30.0)	276 (40.0)	345 (50.0)	414 (60.0)	414 (60.0)	276 (40.0)	276 (40.0)	414 (60.0)	414 (60.0)	517 (75.0)	689 (100.0)
Oxygen index, min., -volume %	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0

All yield occurs prior to 10% deformation, report compressive resistance and deformation at yield in addition to the compressive resistance at 1%, 5% and 10% deformation.

<sup>A</sup>For products that have an external skin, testing shall be undertaken with skins intact.

**TABLE 1 Physical Property Requirements of RCPS Geofoam<sup>A, B</sup>**

Type	EPS12	EPS15	EPS19	EPS22	EPS29	EPS39	EPS46	XPS20	XPS21	XPS26	XPS29	XPS36	XPS48
Density, min., kg/m <sup>3</sup> (lb/ft <sup>3</sup> )	11.2 (0.70)	14.4 (0.90)	18.4 (1.15)	21.6 (1.35)	28.8 (1.80)	38.4 (2.40)	45.7 (2.85)	19.2 (1.20)	20.8 (1.30)	25.6 (1.60)	28.8 (1.80)	35.2 (2.20)	48.0 (3.00)
Compressive Resistance, min., kPa (psi) at 1 %	15 (2.2)	25 (3.6)	40 (5.8)	50 (7.3)	75 (10.9)	103 (15.0)	128 (18.6)	20 (2.9)	35 (5.1)	75 (10.9)	105 (15.2)	160 (23.2)	280 (40.6)
Compressive Resistance, min., kPa (psi) at 5 %	35 (5.1)	55 (8.0)	90 (13.1)	115 (16.7)	170 (24.7)	241 (35.0)	300 (43.5)	85 (12.3)	110 (16.0)	185 (26.8)	235 (34.1)	335 (48.6)	535 (77.6)
Compressive Resistance, min., kPa (psi) at 10 % <sup>A</sup>	40 (5.8)	70 (10.2)	110 (16.0)	135 (19.6)	200 (29.0)	276 (40.0)	345 (50.0)	104 (15.0)	104 (15.0)	173 (25.0)	276 (40.0)	414 (60.0)	690 (100.0)
Flexural Strength, min., kPa (psi)	69 (10.0)	172 (25.0)	207 (30.0)	276 (40.0)	345 (50.0)	414 (60.0)	414 (60.0)	276 (40.0)	276 (40.0)	414 (60.0)	414 (60.0)	517 (75.0)	689 (100.0)
Oxygen index, min., volume %	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0

<sup>A</sup>If yield occurs prior to 10% deformation, report compressive resistance and deformation at yield in addition to the compressive resistance at 1%, 5% and 10% deformation.

<sup>B</sup>For products that have an external skin, testing shall be undertaken with skins intact.