



EPS No.1010

Subject: ASTM Standard and Foam-Control EPS

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Foam-Control EPS (expanded polystyrene) is a rigid cellular polystyrene material that is used for building insulation, geotechnical applications (geofoam), as a component of structural insulated panels, as a component of exterior insulation finish systems, and a number of other applications. EPS in each of these end use applications requires different performance properties upon which a product selection would be made.

In order to promote uniformity of specification for expanded polystyrene in these various applications, ASTM has developed multiple standard specifications for EPS. This bulletin describes the three main ASTM standard specifications that cover expanded polystyrene.

ASTM C 578 Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation

ASTM C 578 is the standard that is referenced in the design and applicability of EPS materials for general insulation needs. This specification covers the types, physical properties, and dimensions of cellular polystyrene intended for use as thermal insulation.

Foam-Control EPS is available in 7 different "Types" as specified in ASTM C 578. These are Type XI, I, VIII, II, IX, XIV, and XV. In addition to thermal properties, such as R-value; physical properties such as compressive resistance, flexural strength, water vapor permeance, and water absorption are requirements of ASTM C578. The performance requirements for the various Types of Foam-Control EPS can be seen in the tables attached to this bulletin.

ASTM D 2430 Standard Specification For Expanded Polystyrene ("EPS") Thermal Insulation Boards For Use In Exterior Insulation and Finish Systems ("EIFS")

ASTM D2430 is a standard for EPS boards used in Exterior Insulation and Finish Systems ("EIFS"). The specification covers requirements for board dimensions and manufacturing requirement specific to the EIFS industry. The boards are specified to be 2' in width and 4' in length, the standard size required for the EIFS industry. Boards in compliance with ASTM D 2430 must fully comply with the Type I re-

quirements of ASTM C 578. No additional material properties are required by ASTM D 2430. Thus, the Type I referenced properties from ASTM C 578 are applicable to EPS manufactured in conformance with ASTM D 2430.

ASTM D 6817 Standard Specification for Rigid Cellular Polystyrene Geofoam

The title for ASTM D6817 is clear that this specification is for Geofoam applications. Geofoam is the commonly accepted term for lightweight foam materials used in geotechnical applications. ASTM D6817 specifically defines geofoam as a "block or planar rigid cellular foam polymeric material used in geotechnical engineering applications." ASTM D 6817 is the definitive standard that should be referenced in the design and applicability of EPS materials for geotechnical applications. This specification covers the types and physical properties of cellular polystyrene intended for use as Geofoam.

Foam-Control EPS Geofoam is available in 7 different "Types" as specified in ASTM D6817. These are Type EPS12, EPS15, EPS19, EPS22, EPS29, EPS39, and EPS46. The key material property specified by ASTM D 6817 is the compressive resistance at 1% deformation. This is the normally accepted design load for geofoam.

In addition to compressive resistance at 1% deformation, compression resistance at 5% and 10% is also available. The compression resistance at these higher percentage of compression are applicable to the very specific design and use of EPS in compressible application. Flexural strength, a key quality control measure, is also included. The performance requirements for the various Types of Foam-Control EPS Geofoam are shown in the tables attached to this bulletin. Please also refer to Foam-Control EPS Geofoam technical bulletin no. 5001.

The standards referenced in this bulletin are copyrighted by ASTM. If you require of any of the above reference standards, please visit ASTM at their website, www.astm.org to purchase a copy.



Foam-Control EPS Insulation Properties									
Product			<div>FOAM CONTROL</div> 50	<div>FOAM CONTROL</div> 100	<div>FOAM CONTROL</div> 130	<div>FOAM CONTROL</div> 150	<div>FOAM CONTROL</div> 250	<div>FOAM CONTROL</div> 400	<div>FOAM CONTROL</div> 600
Compressive Strength ^{1,2} @ 10% deformation, min. ASTM D1621		psi (kPa)	5 (35)	10 (69)	13 (90)	15 (104)	25 (173)	40 (276)	60 (414)
R-value ¹ , Thermal Resistance, per inch, ASTM C518	25°F	°F·ft²·h/Btu (°K·m²/W)	3.6 (0.63)	4.4 (0.77)	4.5 (0.80)	4.8 (0.84)	5.0 (0.88)	5.0 (0.88)	5.1 (0.90)
	40°F	°F·ft²·h/Btu (°K·m²/W)	3.4 (0.60)	4.2 (0.73)	4.3 (0.75)	4.6 (0.80)	4.8 (0.84)	4.8 (0.84)	4.9 (0.86)
	75°F	°F·ft²·h/Btu (°K·m²/W)	3.2 (0.56)	3.9 (0.68)	3.9 (0.69)	4.2 (0.73)	4.4 (0.77)	4.4 (0.77)	4.5 (0.78)
Density, Nominal ASTM C303		lb/ft³ (kg/m³)	0.75 (12)	1.0 (16)	1.25 (20)	1.5 (24)	2.0 (32)	2.5 (40)	3.0 (48)
Flexural Strength ¹ , min. ASTM C203		psi (kPa)	10 (69)	25 (173)	30 (208)	35 (242)	50 (345)	60 (414)	75 (517)
Water Vapor Permeance ¹ of 1.0 in. thickness, max., perm ASTM E96			5.0	5.0	3.5	3.5	2.5	2.5	2.5
Water Absorption ¹ by total immersion, max., volume % ASTM C272			4.0	4.0	3.0	3.0	2.0	2.0	2.0
Flame Spread ASTM E84			<25	<25	<25	<25	<25	<25	<25
Smoke Developed ASTM E84			<450	<450	<450	<450	<450	<450	<450
ASTM C578 Compliance, Type			XI	I	VIII	II	IX	XIV	XV

¹ Please refer to ASTM C578 specification for complete information.

² Compressive strength is measured at 10 percent in accordance with ASTM C578. A safety factor is required to prevent long-term creep for sustained loads. For static loads, a safety factor of 3:1 is recommended.

Foam-Control EPS Geofoam Properties								
Property		ASTM D6817						
		EPS12	EPS15	EPS19	EPS22	EPS29	EPS39	
Density ¹ , min.	lb/ft ³ (kg/m ³)	0.70 (11.2)	0.90 (14.4)	1.15 (18.4)	1.35 (21.6)	1.80 (28.8)	2.40 (38.4)	
Compressive Resistance ¹ @ 1% deformation, min.	psi psf (kPa)	2.2 320 (15)	3.6 520 (25)	5.8 840 (40)	7.3 1050 (50)	10.9 1570 (75)	15.0 2160 (103)	
Elastic Modulus ¹ , min	psi (kPa)	220 (1500)	360 (2500)	580 (4000)	730 (5000)	1090 (7500)	1500 (10300)	
Flexural Strength ¹ , min.	psi (kPa)	10.0 (69)	25.0 (172)	30.0 (207)	40.0 (276)	50.0 (345)	60.0 (414)	
Water Absorption ¹ by total immersion, max.,	volume %	4.0	4.0	3.0	3.0	2.0	2.0	
Oxygen Index ¹ , min.	volume %	24.0	24.0	24.0	24.0	24.0	24.0	
Bouyancy Force	lb/ft ³ (kg/m ³)	61.7 (990)	61.5 (980)	61.3 (980)	61.1 (980)	60.6 (970)	60.0 (960)	
Additional Properties for Compressible Applications								
Compressive Resistance ¹ @ 5% deformation, min.	psi psf (kPa)	5.1 730 (35)	8.0 1150 (55)	13.1 1890 (90)	16.7 2400 (115)	24.7 3560 (170)	35.0 5040 (241)	
Compressive Resistance ¹ @ 10% deformation, min.	psi psf (kPa)	5.8 840 (40)	10.2 1470 (70)	16.0 2300 (110)	19.6 2820 (135)	29.0 4180 (200)	40.0 5760 (276)	

¹ See ASTM D6817 Standard for test methods and complete information



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