

PermaTherm

EPS

PermaTherm EPS is a closed cell, lightweight, resilient, foamed plastic composed of hydrogen and carbon atoms. PermaTherm EPS has a compressive strength of 10-60 psi for most construction applications. Within that range PermaTherm EPS can be molded to meet specific application requirements.

Applied in roofs, walls, and foundations, PermaTherm EPS has a successful history of efficient use in industrial, commercial, cold storage and residential construction. Where energy efficiency and cost effectiveness have long been primary design considerations, architects have made PermaTherm EPS the dominant thermal insulation.

Long-term Insulation Value

PermaTherm EPS insulation (1.0 pcf) provides a typical R-value of 4.17 per inch (k-factor=0.24) at a

mean temperature of 40°F, and a typical R-value of 3.85 per inch (k-factor=0.26) at a mean temperature of 75°F. The higher the R-value, the higher the insulating effect. When properly installed and protected from moisture, the R-value of PermaTherm EPS insulation remains constant. The R-value will not decrease with age. As a result, the thermal resistance, or R-value of PermaTherm EPS may be used without any adjustment for aging.

Moisture Resistance

A study by the Energy Materials Testing Lab (EMTL) has shown that EPS insulation material installed in well constructed roofs does not absorb appreciable moisture, even under conditions characteristic of prolonged, cold, damp winters. The small amount of moisture absorbed (an average of 0.2% by weight) has little or no effect on the compressive or flexural strength and the EPS insulation retains between 95% and 97% of its thermal efficiency.

Though EPS has low water vapor transmission, EPS is not a vapor barrier. Rather, it "breathes" and, therefore needs no costly venting as do some other relatively impermeable insulation materials which could otherwise trap moisture within walls and roof assemblies.

Temperature Cycling

PermaTherm EPS is able to withstand the abuse of temperature cycling, assuring long-term performance. In a series of tests conducted by Dynatech Research and Development Co. Cambridge, Mass., core specimens removed from existing freezer walls, some as old as 16 years, demonstrate EPS freeze thaw cycles without loss of structural integrity or other physical properties.

Typical Physical Properties of PermaTherm EPS Insulation

Specification Reference:	ASTM C 578-92	Type I	Type VIII	Type II	Type IX	
Property	Units	ASTM Test				
Density, minimum	(pcf)	D303 or D 1622	0.90	1.15	1.35	1.80
Density Range			0.90-1.14	1.15-1.34	1.35-1.79	1.80-2.20
Thermal Conductivity	at 25 F	C177 Or C518	0.23	0.22	0.21	0.20
K Factor	at 40 F	@ 1.625"	0.24	0.235	0.22	0.21
	at 75 F		0.26	0.255	0.24	0.23
Thermal Resistance	at 25 F	@ 1.625"	4.35	4.54	4.76	5.00
R-value*	at 40 F	6 8	4.17	4.25	4.55	4.76
	at 75 F		3.85	3.92	4.17	4.35
Strength Properties						
Compressive 10% Deformation	psi	D 1621	10 - 14	13 - 18	15 - 21	25 - 33
Flexural	psi	C 203	25 - 30	30 - 38	40 - 50	50 - 75
Tensile	psi	D 1623	16 - 20	17 - 21	18 - 22	23 - 27
Shear	psi	D 723	18 - 22	23 - 25	26 - 32	33 - 37
Shear Modulus	psi		280 - 320	370 - 410	460 - 500	600 - 640
Modulus of Elasticity	psi		180 - 220	250 - 310	320 - 360	460 - 500
Moisture Resistance						
WVT	perm. in.	E 96	2.0 - 5.0	1.5 - 3.5	1.0 - 3.5	0.6 - 2.0
Absorption (vol.)	%	C 272	< 4.0	< 3.0	< 3.0	< 2.0
Capillarity	—	—	none	none	none	none
Coefficient of Thermal Expansion	in./in.)(f)	D 696	0.000035	0.000035	0.000035	0.000035
Maximum Service Temperature						
Long term exposure	F		167	167	167	167
Intermittent exposure			180	180	180	180
Oxygen Index	%	D 2863	24.0	24.0	24.0	24.0

R-value is a measure of resistance to heat flow. The higher the R-value, the greater the insulating effect.