



Material Properties: Expanded Poly-Styrene (EPS)

Mechanical Properties: Foam Core

The mechanical properties of EPS depend largely upon density; in general, strength characteristics increase with density as illustrated in Table 1. However, such variables as grade of raw material used, geometry of the molded part and processing conditions will affect package properties and performance. Therefore, Table 1 properties represent typical values; variables inherent to any given test specimen may result in properties +/- 10-15% from the listed values.

Table 1 – Typical Properties of Expanded Polystyrene (70° F Test Temp)

Density (pcf)	Stress (10% Compression) (psi)	Flexural Strength (psi)	Tensile Strength (psi)	Shear Strength (psi)
1.0	13	29	31	31
1.5	24	43	51	53
2.0	30	58	62	70
2.5	42	75	74	92
3.0	64	88	88	118
3.5	67	105	98	140
4.0	80	125	108	175

It should be noted that compressive strengths listed in Table 1 are not ultimate values at either a yield point or failure. Table 1 represents values at 10% deformation which is considered to be the minimum value of energy absorption under impact.

Typical Properties of High Density Molded EPS

Property	Units	ASTM Test	Results	
			3.0 pcf	4.5 pcf
Density	pcf		3.0 pcf	4.5 pcf
Thermal Conductivity	BTU/hr	C518	0.224	0.239
40°FK factor at 75°F	Ft ² /°F/in		0.235	0.242
Compression Resistance				
10% deformation			50-70	70-90
5% deformation	psi	D1621	45-60	60-80
2% deformation			15-20	20-40
Flexural Strength	psi	D790	90-120	130-200
Water Absorption (by volume)	%	D570	2.0	1.7
Coefficient of Linear Expansion	in./in.°F	D696	2.7x10 ⁻⁵	2.8x10 ⁻⁵
Shear Strength	psi	D732	55	80
Tensile Strength	psi	D1623	70-90	130-140

This information was provided by Huntsman. Material supplier used is either Huntsman or BASF. Densities are monitored by weight and destructive testing. Molds are over packed with a minimum density of 4.0 pcf. Average molded density: 4.3 pcf.