Engineering Properties of High Density Polyethylene

General Properties	English Units	SI Units
CAS Number	25213-02-9	25213-02-9
Molecular Weight	0.062 lbs	28.0 g
Density	0.0336-0.0349 lbs/in^3	0.930-0.965 g/cm^3
Melt Density	0.267 lbs/in^3	0.764 g/cm^3
Bulk Density		
Pellets	36 – 40 lbs/ft^3	577 - 640 kg/m^3
Flake	31 – 35 lbs/ft^3	497 – 561 kg/m^3
Permeability Coefficients:		
Water (@25°C)	17x10^{-12}in^2/sec^2-atm	13x10^{-10}cm^2/(sec-cm Hg)
Oxygen (@ 30°C)	1.4x10^{-12}in^2/sec^2-atm	1.06x10^{-10}cm^2/(sec-cm Hg)
Carbon Dioxide (@30°C)	4.6x10^{-12}in^2/sec^2-atm	3.5x10^{-10}cm^2/(sec-cm Hg)
Nitrogen (@30°C)	0.35x10^{-12}in^2/sec^2-atm	0.27x10^{-10}cm^2/(sec-cm Hg)
Water Absorption @24 h Immersion	0.03%	0.03%
Mechanical Properties		
Modulus of Elasticity (Young's Modulus)		
Homopolymer	150,000 psi	1,035 N/mm^2
Copolymer	60,000 – 145,000 psi	400 – 1,000 N/mm^2
Poisson's Ratio	0.5	0.5
Hardness, Shore D Scale	55 – 70	55 – 70
Coefficient of Friction	0.29	0.29
Thermal Properties		
DSC Melting Point		
Homopolymer	275 °F	135 °C
Copolymer	230 – 273 °F	110 – 134 °C
Specific Heat (@ 23°C)		2.25 kJ/kg °K
Heat of Fusion		
Homopolymer		245 kJ/kg
Copolymer		140 – 232 kJ/kg
Thermal conductivity		
Homopolymer		0.49 W m /°K
Copolymer		0.40 – 0.47 W m /°K
Vicat Softening Temperature		
Homopolymer	270 °F	132 °C
Copolymer	233 – 266 °F	112 – 130 °C
Coefficient of Linear Thermal		
Expansion	12 x 10^{-5} in/(in °F)	12 x 10^{-5} cm/(cm °C)
Shrinkage	0.018 -0.020 in/in	0.046 – 0.051 cm/cm

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Typical Properties of High Density Polyethylene

Flammability Properties	English Units	SI Units
Auto-ignition Temperature	>650 °F	>340 °C
Energy Required for Ignition		>2,500 kj/m2
Fuel Value Content	19,900 BTU/lb.	
Ignition Temperature – Cloud	790 °F	420 °C
Minimum Radiant Flux for Ignition		20 kW/m^2
Smoke Specific Extension Area	1,855 – 3,320 $ft^2/lb.$	380 – 610 m^2/kg
Soot Yield	0.06–0.09 lbs. soot/lb polymer	0.03–0.04 kg soot/kg polymer

Electrical Properties	English Units	SI Units
Volume Resistivity	6 x 10^5 Ohm-cm	6 x 10^5 Ohm-cm
Dielectric Constant	2.30 – 2.32 x 10^5 Hertz	2.1 – 2.3 x 10^5 Hertz
Dielectric Strength	600 – 700 Volts/mil	600 – 700 Volts/mil
Power Factor	<0.0001 kHz	<0.0001 kHz
Dissipation Factor		
@ 10 kHz	<0.0005 h	<0.0005 h
@ 1 MHz	<0.0005 h	<0.0005 h
@ 1 GHz	<0.0005 – 0.002 h	<0.0005 – 0.002 h
Arc Resistance	136 – 185 s	136 – 185 s

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