

## High-Density Polyethylene (HDPE or PEHD)

Reference Information supplied by our sources

### HDPE

#### GENERAL DESCRIPTION

Polyethylenes are semi-crystalline materials with excellent chemical resistance, good fatigue and wear resistance, and a wide range of properties (due to differences in length of the polymer chain.) Polyethylenes are easy to distinguish from other plastics because they float in water.

#### GENERAL PROPERTIES OF POLYETHYLENES

Polyethylenes provide good resistance to organic solvents, degreasing agents and electrolytic attack. They have a higher impact strength, but lower working temperatures and tensile strengths than polypropylene. They are light in weight, resistant to staining, and have low moisture absorption rates.

#### POLYETHYLENE GRADES

##### Low Density Polyethylene (LDPE)

This extruded material offers good corrosion resistance and low moisture permeability. It can be used in applications where corrosion resistance is important, but stiffness, high temperatures, and structural strength are not. A highly flexible product, LDPE is used widely in orthopaedic products, or where mobility without stress fatigue is desired. LDPE is also frequently used in consumer packaging, bags, bottles, and liners.

##### High Density Polyethylene (HDPE)

Representing the largest portion of the polyethylene applications, HDPE offers excellent impact resistance, light weight, low moisture absorption, and high tensile strength. HDPE is also non-toxic and non-staining and meets FDA and USDA certification for food processing.

##### Ultra High Molecular Weight Polyethylene (UHMW PE)

Light weight (1/8 the weight of mild steel), high in tensile strength, and as simple to machine as wood, UHMW PE is the ideal material for many wear parts in machinery and equipment as well as a superb lining in material handling systems and storage containers. UHMW PE is self-lubricating, shatter resistant, long-wearing, abrasion and corrosion resistant. It meets FDA and USDA acceptance for food and pharmaceutical equipment and is a good performer in applications up to 180 °F (82 °C) or when periodically cleaned with live steam or boiling water to sterilize.

## TYPICAL PROPERTIES of POLYETHYLENE

ASTM or UL test	Property	LDPE	HDPE	UHMW
<b>PHYSICAL</b>				
D792	Density (lb/in <sup>3</sup> ) (g/cm <sup>3</sup> )	0.033 0.92	0.035 0.96	0.034 0.93
D570	Water Absorption, 24 hrs (%)	<0.01	<0.01	<0.01
<b>MECHANICAL</b>				
D638	Tensile Strength (psi) at 72°F	1,400	4,600	5,800
D638	Tensile Strength (psi) at 150°F	400	400	400
D638	Tensile Modulus (psi)	57,000	200,000	80,000
D638	Tensile Elongation at Break (%)	100	400	300
D790	Flexural Strength at Yield (psi)	1,500	4,600	3,500
D790	Flexural Modulus (psi)	29,000	174,000	88,000
D695	Compressive Strength (psi)	1,400	4,600	3,000
D695	Compressive Modulus (psi)	54,000	100,000	80,000
D732	Shear Strength (psi)	-	-	3,000
D785	Hardness, Shore D	D45	D69	D62-D66
D256	IZOD Notched Impact (ft-lb/in)	No Break	1.3	No Break
<b>THERMAL</b>				
D696	Coefficient of Linear Thermal Expansion (x 10 <sup>-5</sup> in./in./°F)	-	6	11
D648	Heat Deflection Temp (°F / °C) at 66 psi at 264 psi	120 / 48 116 / 46	170 / 76 176 / 80	203 / 95 180 / 82
D3418	Approx. Melting Temperature (°F / °C)	244 / 118	260 / 125	275 / 136
-	Max Operating Temp (°F / °C)	160 / 71	180 / 82	180 / 82
C177	Thermal Conductivity (BTU-in/ft <sup>2</sup> -hr-°F) (x 10 <sup>-4</sup> cal/cm-sec-°C)	- -	- -	2.84 10.0
UL94	Flammability Rating	HB	HB<	HB
<b>ELECTRICAL</b>				
D149	Dielectric Strength (V/mil) short time, 1/8" thick	460-700	450-500	2300
D150	Dielectric Constant at 1 MHz	2.25-2.30	2.30-2.35	2.30-2.35
D150	Dissipation Factor at 1 kHz	0.0002	0.0002	0.0005
D257	Surface Resistivity (ohm/square) at 50% RH	> 10 <sup>15</sup>	> 10 <sup>15</sup>	> 10 <sup>15</sup>
D495	Arc Resistance (sec)	135-160	200-250	250-350

NOTE: The information contained herein are typical values intended for reference and comparison purposes only. They should NOT be used as a basis for design specifications or quality control. Contact us for manufacturers' complete material property datasheets. All values at 73°F (23°C) unless otherwise noted.