

Overview of materials for High Density Polyethylene (HDPE), Ultra High Molecular Weight

Category : Polymer , Thermoplastic , Polyethylene (PE) , HDPE , High Density Polyethylene (HDPE), UHMW PE Ultra High Molecular Weight

Material Notes:

This property data is a summary of similar materials in the MatWeb database for the category "High Density Polyethylene (HDPE), Ultra High Molecular Weight". Each property range of values reported is minimum and maximum values of appropriate MatWeb entries. The comments report the average value, and number of data points used to calculate the average. The values are not necessarily typical of any specific grade, especially less common values and those that can be most affected by additives or processing methods.

Order this product through the following link:

http://www.lookpolymers.com/polymer_Overview-of-materials-for-High-Density-Polyethylene-HDPE-Ultra-High-Molecular-Weight.php

Physical Properties	Metric	English	Comments
Density	0.920 - 1.45 g/cc	0.0332 - 0.0524 lb/in ³	Average value: 0.946 g/cc Grade Count:147
Water Absorption	0.000 - 0.200 %	0.000 - 0.200 %	Average value: 0.0538 % Grade Count:50
Moisture Absorption at Equilibrium	0.000 - 0.200 %	0.000 - 0.200 %	Average value: 0.0624 % Grade Count:38
Water Absorption at Saturation	0.000 - 0.200 %	0.000 - 0.200 %	Average value: 0.0434 % Grade Count:67
Particle Size	10.0 - 710 µm	10.0 - 710 µm	Average value: 175 µm Grade Count:16
Viscosity Test	470 - 4300 cm ³ /g	470 - 4300 cm ³ /g	Average value: 2730 cm ³ /g Grade Count:8
Environmental Stress Crack Resistance	300 - 600 hour	300 - 600 hour	Average value: 500 hour Grade Count:3
	>= 600 hour @Temperature 50.0 - 50.0 °C	>= 600 hour @Temperature 122 - 122 °F	Average value: 700 hour Grade Count:4
Oxidative Induction Time (OIT)	>= 50.0 min @Temperature 210 - 210 °C	>= 50.0 min @Temperature 410 - 410 °F	Average value: 50.0 min Grade Count:1
Molecular Weight	300000 - 9.20e+6 g/mol	300000 - 9.20e+6 g/mol	Average value: 4.97e+6 g/mol Grade Count:39
Melt Flow	0.100 - 12.0 g/10 min	0.100 - 12.0 g/10 min	Average value: 3.08 g/10 min Grade Count:18
Outgassing - Total Mass Loss	0.140 %	0.140 %	Average value: 0.140 % Grade Count:16
Surface Tension	55.0 dynes/cm	55.0 dynes/cm	Average value: 55.0 dynes/cm Grade Count:6

Mechanical Properties	Metric	English	Comments
Hardness, Shore D	54.0 - 120	54.0 - 120	Average value: 63.6 Grade Count:127
Ball Indentation Hardness	24.0 - 57.0 MPa	3480 - 8270 psi	Average value: 36.9 MPa Grade Count:48
Tensile Strength, Ultimate	16.0 - 4200 MPa	2320 - 609000 psi	Average value: 74.0 MPa Grade Count:86
	35.0 - 35.0 MPa @Temperature 32.0 - 32.0 °C	5080 - 5080 psi @Temperature 89.6 - 89.6 °F	Average value: 35.0 MPa Grade Count:1
Tensile Strength, Yield	0.130 - 40.0 MPa	18.9 - 5800 psi	Average value: 18.4 MPa Grade Count:80
Elongation at Break	25.0 - 800 %	25.0 - 800 %	Average value: 219 % Grade Count:132
Elongation at Yield	8.00 - 350 %	8.00 - 350 %	Average value: 27.3 % Grade Count:29
Creep Strength	3.20 - 13.0 MPa	464 - 1890 psi	Average value: 9.74 MPa Grade Count:29
Modulus of Elasticity	0.300 - 1.30 GPa	43.5 - 189 ksi	Average value: 0.720 GPa Grade Count:75
Flexural Yield Strength	11.0 - 40.0 MPa	1600 - 5800 psi	Average value: 21.1 MPa Grade Count:42
Flexural Modulus	0.400 - 1.45 GPa	58.0 - 210 ksi	Average value: 0.796 GPa Grade Count:35
Compressive Yield Strength	4.00 - 82.7 MPa	580 - 12000 psi	Average value: 14.5 MPa Grade Count:56
Compressive Modulus	0.290 - 0.689 GPa	42.0 - 100 ksi	Average value: 0.557 GPa Grade Count:25
Shear Strength	33.1 MPa	4800 psi	Average value: 33.1 MPa Grade Count:9
Izod Impact, Notched	4.00 - 5340 J/cm	7.50 - 10000 ft-lb/in	Average value: 13.0 J/cm Grade Count:29
Izod Impact, Unnotched	0.641 J/cm - NB	1.20 ft-lb/in - NB	Average value: 0.641 J/cm Grade Count:6
	5338.47 - 5338.47 J/cm @Temperature -40.0 - -40.0 °C	10001.1 - 10001.1 ft-lb/in @Temperature -40.0 - -40.0 °F	Grade Count:1
Izod Impact, Notched (ISO)	12.0 - 100000 kJ/m ²	5.71 - 47600 ft-lb/in ²	Average value: 110 kJ/m ² Grade Count:14
Charpy Impact Unnotched	1.00 J/cm ² - NB	4.76 ft-lb/in ² - NB	Average value: 3.77 J/cm ² Grade Count:30
			Average value: 11.7 J/cm ² Grade

Charpy Impact, Notched Mechanical Properties	2.50 J/cm ² - NB Metric	11.9 ft-lb/in ² - NB English	Count:57 Comments
	3.00 - 3.00 J/cm ² @Temperature -20.0 - - 20.0 °C	14.3 - 14.3 ft-lb/in ² @Temperature -4.00 - - 4.00 °F	Average value: 3.00 J/cm ² Grade Count:1
Coefficient of Friction	0.0200 - 0.350	0.0200 - 0.350	Average value: 0.143 Grade Count:114
	0.180 - 0.180 @Temperature 60.0 - 60.0 °C	0.180 - 0.180 @Temperature 140 - 140 °F	Average value: 0.180 Grade Count:1
Coefficient of Friction, Static	0.0800 - 0.200	0.0800 - 0.200	Average value: 0.148 Grade Count:40
Tensile Creep Modulus, 1 hour	370 - 550 MPa	53700 - 79800 psi	Average value: 446 MPa Grade Count:7
Tensile Creep Modulus, 1000 hours	180 - 270 MPa	26100 - 39200 psi	Average value: 229 MPa Grade Count:7
K Factor (Wear Factor)	1.00e-9 - 110	1.00e-9 - 110	Average value: 75.7 Grade Count:7
Limiting Pressure Velocity	0.0500 - 0.210 MPa- m/sec	1430 - 6000 psi-ft/min	Average value: 0.0852 MPa-m/sec Grade Count:38
Compression Set	1.10 - 1.60 % @Temperature 80.0 - 80.0 °C	1.10 - 1.60 % @Temperature 176 - 176 °F	Average value: 1.35 % Grade Count:1

Thermal Properties	Metric	English	Comments
CTE, linear	20.0 - 200 µm/m-°C	11.1 - 111 µin/in-°F	Average value: 191 µm/m-°C Grade Count:110
Specific Heat Capacity	1.84 - 2.30 J/g-°C	0.440 - 0.550 BTU/lb-°F	Average value: 1.87 J/g-°C Grade Count:8
Thermal Conductivity	0.330 - 4.00 W/m-K	2.29 - 27.8 BTU-in/hr- ft ² -°F	Average value: 0.462 W/m-K Grade Count:60
Melting Point	127 - 255 °C	260 - 491 °F	Average value: 136 °C Grade Count:101
Maximum Service Temperature, Air	70.0 - 135 °C	158 - 275 °F	Average value: 85.4 °C Grade Count:103
Deflection Temperature at 0.46 MPa (66 psi)	65.0 - 95.0 °C	149 - 203 °F	Average value: 71.2 °C Grade Count:14
Deflection Temperature at 1.8 MPa (264 psi)	42.0 - 47.0 °C	108 - 117 °F	Average value: 44.3 °C Grade Count:51
Vicat Softening Point	76.0 - 270 °C	169 - 518 °F	Average value: 92.7 °C Grade Count:16

Electrical Properties	Metric	English	Comments
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Electrical Properties	Metric	English	Comments
Surface Resistance	100 - 1.00e+15 ohm-cm	100 - 1.00e+15 ohm-cm	Average value: 1.07e+14 ohm-cm Grade Count:83
Dielectric Constant	2.10 - 3.00	2.10 - 3.00	Average value: 2.54 Grade Count:30
Dielectric Strength	27.6 - 100 kV/mm	701 - 2540 kV/in	Average value: 54.8 kV/mm Grade Count:49
Dissipation Factor	0.000190 - 0.00100	0.000190 - 0.00100	Average value: 0.000578 Grade Count:22
Dielectric Loss Index	0.000100 - 0.00100	0.000100 - 0.00100	Average value: 0.000317 Grade Count:8
Arc Resistance	180 - 240 sec	180 - 240 sec	Average value: 210 sec Grade Count:3
Comparative Tracking Index	600 V	600 V	Average value: 600 V Grade Count:12

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