

# Polyethylene (PE) (LDPE, MDPE, HDPE and UHMW)

## IAPD THERMOPLASTICS RECTANGLE

### SEMI-CRYSTALLINE COMMODITY THERMOPLASTICS

TYPICAL PROPERTIES OF POLYETHYLENE (PE)					
ASTM Test	Property	Low-Density	Medium-Density	High-Density	Ultra-High-Molecular-Weight
PHYSICAL					
D792	Specific gravity	0.910-0.925	0.926-0.940	0.941-0.965	0.928-0.941
D792	Specific volume (in <sup>3</sup> /lb)	30.4-29.9	29.9-29.4	29.4-28.7	29.4
D570	Water absorption, 24 h, 1/8-in thk (%)	<0.01	<0.01	<0.01	<0.01
MECHANICAL					
D638	Tensile strength (psi)	600-2,300	1,200-3,500	3,100-5,500	4,000-6,000
D638	Elongation (%)	90-800	50-600	20-1,000	200-500
D638	Tensile modulus (10 <sup>5</sup> psi)	0.14-0.38	0.25-0.55	0.6-1.8	0.20-1.10
D790	Flexural modulus (10 <sup>5</sup> psi)	0.08-0.60	0.60-1.15	1.0-2.0	1.0-1.7
D256	Impact strength, Izod (ft-lb/in of notch)	No break	0.5-16	0.5-20	No break
D785	Hardness, Rockwell R	10	15	65	67
THERMAL					
C177	Thermal conductivity (10 <sup>-4</sup> cal-cm/sec-cm <sup>2</sup> -°C)	8.0	8.0-10.0	11.0-12.4	11.0
D696	Coefficient of thermal expansion (10 <sup>-5</sup> in/in-°F)	5.6-12.2	7.8-8.9	6.1-7.2	7.8
D648	Deflection temperature (°F)				
	At 264 psi	90-105	105-120	110-130	118
	At 66 psi	100-121	120-165	140-190	170
ELECTRICAL					
D149	Dielectric strength (V/mil)				
	Short time, 1/8-in thk	460-700	460-650	450-500	900*
D150	Dielectric constant				
	At 1 kHz	2.25-2.35	2.25-2.35	2.30-2.35	2.30-2.35
D150	Dissipation factor				
	At 1 kHz	0.0002	0.0002	0.0003	0.0002
D257	Volume resistivity (ohm-cm)				
	At 73°F, 50% RH	10 <sup>15</sup>	10 <sup>15</sup>	10 <sup>15</sup>	10 <sup>18</sup>
D495	Arc resistance (s)	135-160	200-235	—	—
OPTICAL					
D542	Refractive index	1.51	1.52	1.54	—
D1003	Transmittance (%)	4-50	4-50	10-50	—

\*kV/cm.

**TYPICAL PROPERTIES OF POLYETHYLENE (PE)**

<b>ISO Test</b>	<b>Property</b>	<b>Low-Density</b>	<b>Medium-Density</b>	<b>High-Density</b>	<b>Ultra-High-Molecular-Weight</b>
PHYSICAL					
ISO1183	<b>Specific gravity</b>	0.910-0.925	0.926-0.940	0.941-0.965	0.928-0.941
ISO1183	<b>Specific volume</b> (cm <sup>3</sup> /g)	1.094-1.076	1.076-1.058	1.058-1.033	1.058
ISO62	<b>Water absorption</b> , 24 h, 3.1mm thk (%)	<0.01	<0.01	<0.01	<0.01
MECHANICAL					
ISO527	<b>Tensile strength</b> (MPa)	4.14-15.86	8.27-24.13	21.37-37.92	27.58-41.37
ISO527	<b>Elongation</b> (%)	90-800	50-600	20-1,000	200-500
ISO527	<b>Tensile modulus</b> (MPa)	96.53-262	172-379	413-1241	137-758
ISO178	<b>Flexural modulus</b> (MPa)	55.16-413	413-793	689-1378	689-1172
ISO180	<b>Notched izod impact strength</b> (J/m)	No break	27-854	27-1068	No break
ISO2039	<b>Hardness</b> , Rockwell R	10	15	65	67
THERMAL					
ISO8302	<b>Thermal conductivity</b> ((W)/(mK))	0.35	—	0.43	—
ISO11359	<b>Coefficient of thermal expansion</b> (10 <sup>-4</sup> m/m-°C)	0.90-1.99	1.70-1.82	1.65-1.79	1.79
ISO75	<b>Deflection temperature</b> (°C)				
	At 1.8 MPa	32-41	41-49	43-54	48
	At 0.45 MPa	38-49	49-74	60-88	77
ELECTRICAL					
IEC243	<b>Dielectric strength</b> (kV/mm)				
	Short time, 3.1mm thk	18.1-27.5	18.1-25.6	17.7-19.7	35.4
IEC250	<b>Dielectric constant</b>				
	At 1 kHz	2.25-2.35	2.25-2.35	2.30-2.35	2.30-2.35
IEC250	<b>Dissipation factor</b>				
	At 1 kHz	0.0002	0.0002	0.0003	0.0002
IEC93	<b>Volume resistivity</b> (ohm-cm)				
	At 23°C, 50% RH	10 <sup>15</sup>	10 <sup>15</sup>	10 <sup>15</sup>	10 <sup>18</sup>
ASTM D495	<b>Arc resistance</b> (s)	135-160	200-235	—	—
OPTICAL					
ISO489	<b>Refractive index</b>	1.51	1.52	1.54	—
ISO489	<b>Transmittance</b> (%)	4-50	4-50	10-50	—
*kV/cm.					