

## TYPICAL PROPERTIES OF POLYETHYLENE (PE)

| ASTM Test  | Property   | Low-Density (LDPE) | Medium-Density (MDPE) | High-Density (HDPE) | Ultra-High-Molecular-Weight (UHMW-PE) |
|------------|--|--------------------|-----------------------|---------------------|---------------------------------------|
| 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, Shore D  | 10                 | 15                    | 65                  | 60-63                                 |
| 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)**

| ISO Test   | Property  | Low-Density (LDPE) | Medium-Density (MDPE) | High-Density (HDPE) | Ultra-High-Molecular-Weight (UHMW-PE) |
|------------|---|--------------------|-----------------------|---------------------|---------------------------------------|
| 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, 3.1 mm 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> , Shore D   | 10                 | 15                    | 65                  | 60-63                                 |
| 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           | 2                                     |
| 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, 3.1 mm thk  | 18.1-27.5          | 18.1-25.6             | 17.7-19.7           | 35.4-45                               |
| 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.