# Polymer Selection Guide Chart

INDUSTRIAL MOLDED RUBBER PRODUCTS

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Polymer - Common Name | | | Natural Rubber | Synthetic Rubber | Neoprene | Nitrile (High) | Nitrile (Med.High) | SBR | Butyl | Urethane | Hypalon | EPDM | Fluorocarbon | Silicone |
| Chemical Name | | | Polyisoprene | Synthetic Polyisoprene | Chloroprene | Butadiene Acrylonitrile | Butadiene Acrylonitrile | Styrene Butadiene | Isobutylene Isoprene | Polyester / Polyether | Chlorosulfonated Polyethylene | Ethylene Propylene | Fluorinated Hydrocarbon | Polysiloxane |
| ASTM D-2000 Classification | | | AA | AA | BC, BE | BF, BG, BK | BF, BG | AA, BA | AA, BA | BG | CE | CA | HK | FC, FE, GE |
| Coefficient of Thermal Expansion - 10-5 Per F (Gum) | | | 37 | 37 | 34 | 39 | 39 | 37 | 32 | 27 | 27 | 32 | 88 | 45 |
| Weight of Base Polymer | | lb/in3 | 0.033 | 0.033 | 0.045 | 0.036 | 0.036 | 0.034 | 0.033 | 0.045 | 0.043 | 0.031 | 0.067 | 0.040 |
| | | Specific Gravity | 0.92 | 0.91 | 1.25 | 1.00 | 1.00 | 0.94 | 0.92 | 1.25 | 1.18 | 0.86 | 1.86 | 1.1 - 1.6 |
| Original Physical Properties @ 70 F | Durometer Range, Shore A | | 20 - 100 | 30 - 90 | 20 - 95 | 20 - 95 | 20 - 95 | 30 - 100 | 40 - 90 | 35 - 100 | 45 - 100 | 30 - 90 | 55 - 90 | 25 - 90 |
| | Tensile Strength, PSI | | 3500 | 3500 | 3000 | 3000 | 3000 | 3000 | 3000 | 6000 | 3000 | 2500 | 2000 | 1500 |
| | Elongation, % | | 700 | 650 | 600 | 600 | 600 | 600 | 850 | 750 | 500 | 600 | 300 | 700 |
| | Compression Set | | A | A | B | B | B | B | C-B | D | C-B | B-A | B-A | B-A |
| | Resilience | | A | A | A | B | B | B | C | C-A | C | B | C | D-A |
| | Permeability Coef.-Nitrogen, 10-8 cm2 sec-1 atm-1 | | 6.12 | 6.12 | 0.89 | 0.18 | 0.31 | 4.8 | 0.25 | 0.95 / 16 | 0.7 TO 0.9 | 6.4 | 0.2 | 200 |
| | Electrical Resistivity (Polymer) | | A | A | C | D-C | D-C | A | A | B | B | A | B | A |
| | Creep, Drift, or Strain Relaxation | | A | B | B | B | B | A | C | C-A | C | C-B | B | C-A |
| Overall Properties | Mechanical Properties | Impact Strength | A | A | B | C | C | A | B | B-A | B | B | B | D-C |
| | | Abrasion Resistance | A | B | A | A | A | A | C | A | A | B | B | C-B |
| | | Tear Resistance | A | A | B | B | B | C | B | A | B | C | B | C-B |
| | | Cut Growth | A | A | B | B | B | B | A | A | B | B | B | C-B |
| | Temperature Data | (Hot) Tensile Strength, % Decrease 212 F | -32 | -44 | -50 | -50 | -55 | -44 | -57 | -56 | -57 | -49 | -72 | -12 |
| | | (Hot) Tensile Strength, % Decrease 350 F | -84 | NA | -74 | -75 | -76 | -72 | -87 | -83 | -82 | -78 | -87 | -41 |
| | | (Hot) Elongation, % Decrease 212 F | +17 | +6 | -35 | -30 | -35 | -25 | -10 | -32 | -49 | -21 | -33 | -29 |
| | | (Hot) Elongation, % Decrease 350 F | -33 | NA | -45 | -57 | -60 | -47 | -32 | -54 | -69 | -48 | -63 | -48 |
| | | Strain Relaxation at 212 F | B | B | B | B | B | B | C | D | C | C-B | B-A | A |
| | | Heat Aging at 212 F | B-C | B-C | B-A | B | B | B | B-A | B | B-A | A | A | A |
| | | Flame Resistance | D | D | B-A | D-C | D | D | D | D | B-A | D | A | A |
| | | Low Temperature - Stiffening - F | -20 T -50 | -20 TO -50 | +10 TO -50 | +30 TO -20 | 0 TO -40 | 0 TO -50 | -10 TO -40 | -10 TO -30 | -30 TO -50 | -20 TO -50 | +10 TO -10 | -60 TO -180 |
| | | Low Temperature - Brittle Point - F | -80 | -80 | -85 | -40 | -85 | -80 | -80 | -60 TO -200 | -70 | -90 | -60 | -90 TO -180 |
| | Environmental | Weather - Sunlight Aging | D | NR | B | D | D | D | A | A | A | A | A | A |
| | | Oxidation | B | B | A | B | B | C | A | B | A | A | A | A |
| | | Ozone Cracking | NR | NR | A | C | C | NR | A | A | A | A | A | A |
| | | Radiation | B | C-B | B | B | B | B | B | B | B | B | C-B | C-B |
| | | Water | A | A | B | A | B | B-A | A | C-B | B | A | A | A |
| | | Steam | B | B | B | C-B | C-B | C | B-A | D | B | A | B | C-B |
| | General | Alkali Dilute / Concentrated | A/C-B | C-B/C-B | A/A | B/B | B/B | C-B/C-B | A/A | C/D | A/A | A/A | A | A/A |
| | | Acid Dilute / Concentrated | A/C-B | C-B/C-B | A/A | B/B | B/B | C-B/C-B | A/A | C/D | A/A | A/A | B/C | B/C |
| | | Ketones, Oxygenated Solvents | B | B | C | D | D | B | A | D | B | B-A | NR | B-C |
| | | Chlorinated Hydrocarbons, Degreasers | NR | NR | D | C-B | C | NR | NR | C-B | D | NR | A | NR |
| | | Aliphatic Hydrocarbons, Kerosene, etc. | NR | NR | C | A | A | NR | NR | B | C | NR | A | D-C |
| | | Aromatic Hydrocarbons, Benzol, Toluol, etc. | NR | NR | B | B-A | B | NR | NR | C | B | NR | A | NR |
| | | LP Gases, Fuel Oils | NR | NR | B | A | A | NR | NR | C-B | B | NR | A | C |
| | | Alcohols | B-A | B | A | C-B | C-B | B | B-A | B | A | B-A | C-A | C-B |
| | | Brake Fluids, Non-Petroleum Base | B-A | B | C | NR | NR | B-A | B | NR | C | B-A | C | A |
| | | Synthetic Lubricants - Diester | NR | NR | D | B-A | D | NR | NR | D | D | NR | A | NR |
| | | Animal and Vetable Oils | D-B | D-B | B | B | B | D-B | B-A | A | B | B | A | A |
| | Hydraulic Fluids | Petroleum Base | NR | NR | D-C | B-A | C-B | NR | NR | B | C-B | NR | A | NR |
| | | Water Glycol | B-A | B-A | B | C | B | B | B-A | C-B | B | A | A | A |
| | | Silicate Ester | B-A | B-A | B | B | B | B-A | B-A | NR | B | B-A | A | NR |
| | | Phosphate Ester | B | B | C | D | D | B | A | NR | C | A (to 300F) | B-A | B |
| | Lbricating Oils | High Aniline (190 +) | NR | NR | B | B | A | NR | NR | A | A | NR | A | C |
| | | Low Aniline Point | NR | NR | A | A | A | NR | NR | B | B | NR | A | B |
| | Refrigerants | Ammonia | B | B | A | B | B | B | B | D | B | B | NR | A |
| | | Fluorinated | R-12, 13, 22 | R-12, 13, 22 | R-11,12,13,21,22 | R-11, 12, 13 | R-11, 12, 13 | R-12, 13, 22 | R-12, 13, 22 | R-12 | R-11, 12, 13, 22 | R-12, 13, 22 | R-11, 12 13 | NR |
| | | Methyl Chloride | D | D | NR | NR | NR | D | C | NR | NR | D | B | NR |
| | Refrigerants + Oil | Fluorinated | NR | NR | R-11, 12, 22 | R-11, 12 | R-11, 22 | NR | NR | R-12, -13/NR | R-11, 12, 22 | NR | R-11, 12 | NR |
| Taste | | | C-B | C-B | C-B | C-B | C-B | C-B | C-B | B | C-B | B | C-B | B |
| Odor | | | B-A | B | C-B | B | B | B | B | B | B | B | B | B |
| Non-Staining | | | A | A | B-A | D-C | C-B | D-B | B | B | A | B | C-B | A |
| Bonding to Rigid Materials | | | A | A | B-A | B-A | B-A | A | C-A | C-B | A | C-B | C-B | B-A |

A = Excellent B = Good C = Fair D = Use with caution NR = Not recommended