

Properties of Elastomers

Properties	Natural Rubber	Ethylene Propylene	Neoprene	Nitrile
TENSILE STRENGTH (psi):				
Pure Gum	Over 3000	Below 1000	Over 3000	Below 1000
Black Loaded Stocks	Over 3000	Over 3000	Over 3000	Over 2000
Hardness Range (Shore A)	20-90	30-90	10-95	20-95
Specific Gravity (Base Material)	0.93	0.86	1.23	1.00
Vulcanizing Properties	Excellent	Very Good	Excellent	Excellent
Adhesion to Fabrics	Excellent	Poor	Excellent	Good
Tear Resistance	Good	Good	Good	Fair
Abrasive Resistance	Excellent	Good	Excellent	Good
Compression Set	Good	Good	Fair to Good	Good
REBOUND:				
Cold	Excellent	Excellent	Very Good	Good
Hot	Excellent	Excellent	Very Good	Good
Dielectric Strength	Excellent	Excellent	Very Good	Poor
Electrical Insulation	Good to Excellent	Good	Fair to Good	Poor
Permeability to Gases	Fair	Fair to Poor	Low	Fair
ACID RESISTANCE:				
Dilute	Fair to Good	Excellent	Very Good	Good
Concentrated	Fair to Good	Good	Good	Good
SOLVENT RESISTANCE:				
Aliphatic Hydrocarbons	Poor	Poor	Good	Excellent
Aromatic Hydrocarbons	Poor	Poor	Fair	Good
Oxygenated (ketones, etc.)	Good	Good	Poor	Poor
Lacquer Solvents	Poor	Good	Poor	Fair
Swelling in Lubricating oil	Poor	Poor	Good	Very Good
RESISTANCE TO:				
Oil and Gasoline	Poor	Poor	Good	Excellent
Animal & Vegetable Oils	Poor to Good	Good	Good	Excellent
Water Absorption	Very Good	Excellent	Good	Fair to Good
Oxidation	Good	Excellent	Excellent	Good
Ozone	Fair	Excellent	Excellent	Fair
Sunlight Aging	Poor	Very Good	Very Good	Poor
Heat Aging	Fair	Excellent	Good	Very Good
Flame	Poor	Poor	Good	Poor
Heat	Good	Excellent	Excellent	Excellent
Cold	Excellent	Excellent	Good	Good
Temperature Range (°C)	-55 - +90	-50 - +150	-40 -+100	-40 -+100
Major Attributes:	Resilience	General Purpose	Oil & Gas Resistance, Weatherability	Oil Resistance
ASTM D-2000 Classification	AA	DA	BC	BG

Elastomer Selection

Physical Properties and Relative Performance Characteristics of Elastomers

NON-OIL RESISTANT				OIL RESISTANT	
	Chemical Name	<i>Natural Rubber</i> <i>Cis 1, 4 Polyisoprene</i>	<i>EPDM, EPT, EPR</i> <i>Ethylene-Propylene</i>	<i>Neoprene</i> <i>Polychloroprene</i>	<i>Nitrile, Buana N</i> <i>Butadiene-Acrylonitrile</i>
	<i>ASTM Designation</i> <i>ASTM/SAE Class (es)</i>	<i>NR</i> <i>AA</i>	<i>EPDM</i> <i>AA, BA, CA, DA</i>	<i>CR</i> <i>BC, BE, CH, BA</i>	<i>NBR</i> <i>BC, BE, BF, BG, BK, CH</i>
Physical Properties:	<i>Durometer Range A Tensil, max. psi (Mpa) Elongation, max %</i> <i>Specific Gravity</i> <i>Compression Set</i>	<i>30-100</i> <i>4000+(28.0)</i> <i>700</i> <i>0.91</i> <i>Good-Excellent</i>	<i>35-100</i> <i>2500 (24.5)</i> <i>500</i> <i>0.86</i> <i>Good-Excellent</i>	<i>30-90</i> <i>3000 (28.0)</i> <i>800</i> <i>1.23</i> <i>Good</i>	<i>30-100</i> <i>3000 (28.0)</i> <i>600</i> <i>0.98</i> <i>Good</i>
Environmental Properties:	<i>Electrical Resistivity</i> <i>Flame Resistance</i> <i>Gas Impermeability</i> <i>Impact Resistance</i> <i>Abrasion Resistance</i> <i>Tear Resistance</i> <i>Continuous Temp Max</i> <i>Intermittent Temp Max</i> <i>Stiffening Point Temp</i> <i>Brittle Point Temp</i> <i>Weatherability</i> <i>Oxidation Resistance</i> <i>Ozone Resistance</i> <i>300 °F Steam Resistance</i>	<i>Excellent</i> <i>Poor</i> <i>Good</i> <i>Excellent</i> <i>Excellent</i> <i>Excellent</i> <i>175 °F</i> <i>210 °F</i> <i>-30° F</i> <i>-75° F</i> <i>Fair-Good</i> <i>Good</i> <i>Poor</i> <i>Poor</i>	<i>Excellent</i> <i>Poor</i> <i>Good</i> <i>Good</i> <i>Good</i> <i>Fair</i> <i>250 °F</i> <i>325 °F</i> <i>-40° F</i> <i>-90° F</i> <i>Excellent</i> <i>Good-Excellent</i> <i>Excellent</i> <i>Excellent</i>	<i>Poor-Good</i> <i>Good-Excellent</i> <i>Good</i> <i>Good</i> <i>Good</i> <i>Good</i> <i>225 °F</i> <i>300 °F</i> <i>-40 °F</i> <i>-60 °F</i> <i>Excellent</i> <i>Fair-Good</i> <i>Good</i> <i>Poor</i>	<i>Poor-Fair</i> <i>Poor-Fair</i> <i>Good-Excellent</i> <i>Good</i> <i>Excellent</i> <i>Good</i> <i>200 °F</i> <i>300 °F</i> <i>0 °F</i> <i>-50 °F</i> <i>Good</i> <i>Fair-Good</i> <i>Poor-Good</i> <i>Poor</i>
Immersion Properties:	<i>Aliphatics (Isooctane)</i> <i>Aromatics (Toluene)</i> <i>Halogenated Solvents</i> <i>Gasoline (Unleaded)</i> <i>Gasohol (Ethyl)</i> <i>Alcohols</i> <i>Wagner Brake Fluid</i> <i>Transmission Fluid</i> <i>Silicate Hydraulic Fluid</i> <i>Phosphate Hydraulic Fluid</i> <i>Water</i> <i>Acids (Cold 20%)</i> <i>Bases (Cold 20%)</i>	<i>Poor</i> <i>Poor</i> <i>Poor</i> <i>Poor</i> <i>Poor</i> <i>Excellent</i> <i>Good</i> <i>Poor</i> <i>Poor</i> <i>Poor</i> <i>Excellent</i> <i>Fair</i> <i>Good</i>	<i>Poor</i> <i>Poor</i> <i>Poor</i> <i>Poor</i> <i>Poor</i> <i>Excellent</i> <i>Excellent</i> <i>Poor</i> <i>Poor</i> <i>Excellent</i> <i>Excellent</i> <i>Excellent</i> <i>Excellent</i>	<i>Fair-Good</i> <i>Poor</i> <i>Poor</i> <i>Poor</i> <i>Poor</i> <i>Excellent</i> <i>Excellent</i> <i>Good</i> <i>Excellent</i> <i>Poor</i> <i>Good</i> <i>Fair</i> <i>Good</i>	<i>Good-Excellent</i> <i>Good-Excellent</i> <i>Poor</i> <i>Good-Excellent</i> <i>Good-Excellent</i> <i>Excellent</i> <i>Fair</i> <i>Excellent</i> <i>Good</i> <i>Poor</i> <i>Good-Excellent</i> <i>Fair</i> <i>Good</i>