

## Polymer's Guide to Selecting and Specifying Rubber Compounds

The information presented below should only be used as a general guide as the information listed on most parts has been based on published literature from various Polymer suppliers. ie. Dupont, General Electric Co. as well as other rubber manufacturers. We are unable to guarantee their accuracy and assume no liability for use thereof.

There are many variable factors to be considered before accepting a general elastomer compound for a particular service. Due to the number of variations in compounds and the various affects of changes in temperature, durometer and service conditions. Polymer's policy is that the customer should test and determine suitability of the particular elastomer compound for his application.

### Buna-N

Common Name	Buna N, Nitrile, NBR
ASTM D-2000 Classification	BF, BG, BK
Military (MIL-STD 417)	SB
Chemical Definition	Butadiene Acrylonitrile

#### General Characteristics

Durometer Range (Shore A)	20 - 95
Tensile Range (P.S.I.)	200 - 3000
Elongation (Max. %)	600
Compression Set	Good
Resilience - Rebound	Good
Abrasion Resistance	Excellent
Tear Resistance	Good
Solvent Resistance	Good to Excellent
Oil Resistnace	Good to Excellent
Low Temperature Usage (F <sup>o</sup> )	+30 <sup>o</sup> to -40 <sup>o</sup>
High Temperature Usage (F <sup>o</sup> )	to 250 <sup>o</sup>
Aging Weather - Sunlight	Poor
Adhesion to Metals	Good to Excellent

#### Comment

Nitrile (Buna-N) is a general purpose oil resistant polymer which has good solvent, oil, water and hydraulic fluid resistance, good compression set, abrasion resistance and tensile strength. Nitrile should not be used in highly polar solvents such as acetone, and MEK, ozone, chlorinated hydrocarbons and nitro hydrocarbons.

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### EPR

Common Name	EPR, EPT, EPDM
ASTM D-2000 Classification	CA
Military (MIL-STD 417)	RS
Chemical Definition	Ethylene Propylene

#### General Characteristics

Durometer Range (Shore A)	30 - 90
Tensile Range (P.S.I.)	500 - 2500
Elongation (Max. %)	600
Compression Set	Good
Resilience - Rebound	Good
Abrasion Resistance	Good
Tear Resistance	Fair
Solvent Resistance	Poor
Oil Resistnace	Poor
Low Temperature Usage (F°)	-20° to -60°
High Temperature Usage (F°)	to 350°
Aging Weather - Sunlight	Excellent
Adhesion to Metals	Fair to Good

#### Comment

Ethylene Propylene is a polymer with outstanding properties. It has exceptionally good weather aging and ozone resistance; excellent water and chemical resistance; excellent resistance to gas permeability, and excellent resistance to aging due to exposure to steam; and heat, resistance excellent up to 350°F. Ethylene Propylene is a polymer where oil and solvent resistance is poor, however, it is fairly good in ketones and alcohols. It is not recommended for food applications or exposure to aromatic hydrocarbons. The above information is only designed for reference information. To determine exact compound, you should supply exact physicals to your rubber supplier.

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### Neoprene

Common Name	Neoprene
ASTM D-2000 Classification	BC, BE
Military (MIL-STD 417)	SC
Chemical Definition	Polychloroprene
General Characteristics	
Durometer Range (Shore A)	20 - 95
Tensile Range (P.S.I.)	500 - 3000
Elongation (Max. %)	600
Compression Set	Good
Resilience - Rebound	Excellent
Abrasion Resistance	Excellent
Tear Resistance	Good
Solvent Resistance	Fair
Oil Resistnace	Fair
Low Temperature Usage (F°)	+10° to -50°
High Temperature Usage (F°)	to 250°
Aging Weather - Sunlight	Good
Adhesion to Metals	Good to Excellent

### Comment

Neoprene is an all purpose polymer with many desirable characteristics. It has additional plus features: high resilience with low compression set; flame resistant; compounds free of sulphur are easily made; and animal and vegetable oil resistant generally not affected by moderate chemicals, fats, greases and many oils and solvents.

Neoprene is generally attacked by strong oxidizing acids, esters, ketones, chlorinated aromatic and nitro hydrocarbons.

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### SBR

Common Name	SBR, GRS
ASTM D-2000 Classification	AA, BA
Military (MIL-STD 417)	RS
Chemical Definition	Styrene Butadiene
General Characteristics	
Durometer Range (Shore A)	30 - 100
Tensile Range (P.S.I.)	500 - 3000
Elongation (Max. %)	600
Compression Set	Good
Resilience - Rebound	Good
Abrasion Resistance	Excellent
Tear Resistance	Fair
Solvent Resistance	Poor
Oil Resistnace	Poor
Low Temperature Usage (F°)	0° to -50°
High Temperature Usage (F°)	to 225°
Aging Weather - Sunlight	Poor
Adhesion to Metals	Excellent

### Comment

SBR is a low cost non-oil resistant material. It has good water resistance and resilience up to 70 durometer; compression set becomes poorer with higher durometer; generally satisfactory for most moderate chemicals and wet or dry organic acids. SBR is not recommended for ozone, strong acids, oils, greases, fats and most hydrocarbons.

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### Fluoro Elastomers

Common Name	Fluoro Elastomers
Trade Names	Viton, Fluorel
ASTM D-2000 Classification	HK
Military	MIL-R-25897, and MIL-R-83248
Chemical Definition	Fluorinated Hydrocarbon
<b>General Characteristics</b>	
Durometer Range (Shore A)	60 - 90
Tensile Range (P.S.I.)	500 - 2000
Elongation (Max. %)	300
Compression Set	Good
Resilience - Rebound	Fair
Abrasion Resistance	Good
Tear Resistance	Good
Solvent Resistance	Excellent
Oil Resistnace	Excellent
Low Temperature Usage (F <sup>o</sup> )	+10 <sup>o</sup> to -10 <sup>o</sup>
High Temperature Usage (F <sup>o</sup> )	400 <sup>o</sup> to 600 <sup>o</sup> depending on time and service condition
Aging Weather - Sunlight	Excellent
Adhesion to Metals	Good

### Comment

Fluoro Elastomers have heat resistance up to 600°F, and resistance to a wide range of oils and solvents; especially all aliphatic, aromatic and halogenated hydrocarbons, acids, animal and vegetable oils.

Vi-Chem is not recommended for ketones, low molecular weight esters and nitro containing compounds.

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### Silicone

Common Name	Silicone
ASTM D-2000 Classification	FC, FE, GE
Military (MIL-STD 417)	TA
Chemical Definition	Polysiloxane
General Characteristics	
Durometer Range (Shore A)	30 - 90
Tensile Range (P.S.I.)	200 to 1500
Elongation (Max. %)	700
Compression Set	Good
Resilience - Rebound	Good
Abrasion Resistance	Fair to Poor
Tear Resistance	Poor
Solvent Resistance	Poor
Oil Resistnace	Fair to Poor
Low Temperature Usage (F <sup>o</sup> )	-60 <sup>o</sup> to -150 <sup>o</sup>
High Temperature Usage (F <sup>o</sup> )	to 450 <sup>o</sup>
Aging Weather - Sunlight	Excellent
Adhesion to Metals	Good

### Comment

Silicone Rubber has a great many variations and can be compounded to meet any number of applications. Silicone can be compounded to have tensile in the area of 1500 PSI and tear up to 200 lbs.; low compression set and good resilience; moderate solvent resistance; excellent heat resistance; good release characteristics; extreme low temperature properties; and can be highly resistant to oxidation and ozone attack.

Silicone is generally attacked by most concentrated solvents, oils, concentrated acids and dilute sodium hydroxide.

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### Fluorosilicone

Common Name	Fluorosilicone
ASTM D-2000 Classification	FK
Military	MIL-R-25988, Amend. 2
Chemical Definition	Fluorosilicone

#### General Characteristics

Durometer Range (Shore A)	50 - 80
Tensile Range (P.S.I.)	500 to 800
Elongation (Max. %)	300
Compression Set	Good
Resilience - Rebound	Excellent
Abrasion Resistance	Poor
Tear Resistance	Poor
Solvent Resistance	Fair
Oil Resistnace	Good
Low Temperature Usage (F <sup>o</sup> )	-80 <sup>o</sup>
High Temperature Usage (F <sup>o</sup> )	300 <sup>o</sup>
Aging Weather - Sunlight	Excellent
Adhesion to Metals	Poor

#### Comment

Fluorosilicone is considerably more expensive than silicone, however it is developed for special applications where general resistance to oxidizing chemicals, aromatic and chlorinated solvent bases is required.

Fluorosilicone is not recommended and is generally attacked when exposed to brake fluids, hydrazine and ketones. Fluorosilicone should not be confused with silicone in regard to high heat resistance.