

NATURAL RUBBER

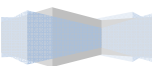
Common Names _____ Natural Rubber
 ASTM D2000 Classification _____ AA
 Military (MIL-STD 417) _____ RN
 Chemical Definition _____ Polyisoprene

GENERAL CHARACTERISTICS

Durometer Range _____	20 – 100
Tensile Range (P.S.I.) _____	500 – 3500
Elongation (Max. %) _____	700
Compression Set _____	Excellent
Resilience – Rebound _____	Excellent
Abrasion Resistance _____	Excellent
Tear Resistance _____	Excellent
Solvent Resistance _____	Poor
Oil Resistance _____	Poor
Low Temperature Usage _____	-20° to -60°
High Temperature Usage _____	up to 175°
Aging Weather – Sunlight _____	Poor
Adhesion to Metals _____	Excellent

COMMENT

Natural Rubber has many good characteristics. It has high resilience, good compression set, good roll building behavior, and molding properties; very good friction surface, but not a fine smooth surface when ground; high tear strength, low crack growth; usable for ketones and alcohol, and good low temperature properties. Natural Rubber is not recommended for oil and solvent resistance and ozone attacks it.



SBR

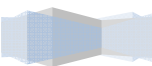
Common Names _____ SBR, Buna-S, GRS
ASTM D2000 Classification _____ AA, BA
Military (MIL-STD 417) _____ RS
Chemical Definition _____ Styrene Butadiene

GENERAL CHARACTERISTICS

Durometer Range _____ 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 Resistance _____ Poor
Low Temperature Usage _____ 0° to -50°
High Temperature Usage _____ up 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.



GENERAL CHARACTERISTICS OF COMMON POLYMERS

BUTYL

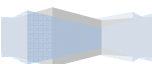
Common Names _____ Butyl
ASTM D2000 Classification _____ AA, BA
Military (MIL-STD 417) _____ RS
Chemical Definition _____ Isobutylene Isoprene

GENERAL CHARACTERISTICS

Durometer Range _____ 40 – 90
Tensile Range (P.S.I.) _____ 500 – 3000
Elongation (Max. %) _____ 850
Compression Set _____ Fair to Good
Resilience – Rebound _____ Fair
Abrasion Resistance _____ Fair
Tear Resistance _____ Good
Solvent Resistance _____ Poor
Oil Resistance _____ Poor
Low Temperature Usage _____ -10° to -60°
High Temperature Usage _____ up to 250°
Aging Weather – Sunlight _____ Excellent
Adhesion to Metals _____ Good

COMMENT

Butyl rubber is impermeable to most common gasses and has good resistance to sunlight and ozone. Butyl is normally satisfactory when exposed to animal and vegetable oils and oxidizing chemicals. Butyl is not recommended for use with petroleum solvent, coal tar and aromatic hydrocarbons.



EPR

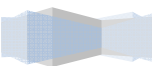
Common Names _____	EPDM, EPR, EPT
ASTM D2000 Classification _____	CA
Military (MIL-STD 417) _____	RS
Chemical Definition _____	Ethylene Propylene

GENERAL CHARACTERISTICS

Durometer Range _____	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 Resistance _____	Poor
Low Temperature Usage _____	-20° to -60°
High Temperature Usage _____	up 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.



BUNA-N

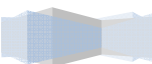
Common Names _____	Buna-N, Nitrile, NBR
ASTM D2000 Classification _____	BF, BG, BK
Military (MIL-STD 417) _____	SB
Chemical Definition _____	Butadiene Acrylonitrile

GENERAL CHARACTERISTICS

Durometer Range _____	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 Resistance _____	Good to Excellent
Low Temperature Usage _____	30° to -40°
High Temperature Usage _____	up to 250°
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, MEK, ozone, chlorinated hydrocarbons and nitro hydrocarbons.



NEOPRENE

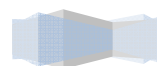
Common Names _____	Neoprene
ASTM D2000 Classification _____	BC, BE
Military (MIL-STD 417) _____	SC
Chemical Definition _____	Polychloroprene

GENERAL CHARACTERISTICS

Durometer Range _____	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 Resistance _____	Fair
Low Temperature Usage _____	10° to -50°
High Temperature Usage _____	up 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.



URETHANE

Common Names _____	Urethane, Polyurethane
ASTM D2000 Classification _____	BG
Military (MIL-STD 417) _____	SB
Chemical Definition _____	Polyester/Polyether Urethane

GENERAL CHARACTERISTICS

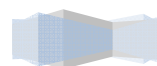
Durometer Range _____	35 – 100
Tensile Range (P.S.I.) _____	500 – 6000
Elongation (Max. %) _____	750
Compression Set _____	Poor
Resilience – Rebound _____	Good
Abrasion Resistance _____	Excellent
Tear Resistance _____	Excellent
Solvent Resistance _____	Poor
Oil Resistance _____	Good
Low Temperature Usage _____	-10° to -30°
High Temperature Usage _____	up to 175°
Aging Weather – Sunlight _____	Excellent
Adhesion to Metals _____	Fair to Good

COMMENT

The **castable** types of Polyurethane have excellent abrasion resistance; good compression set at high hardness levels; low friction surface; tensile strengths up to 6000 PSI; good ozone resistance; good oil and solvent resistance; and poor heat and hot water resistance.

The **millable** types of Polyurethane are in wide use today. Through the use of reinforcing pigments and other chemicals, desirable characteristics can be obtained to fit a variety of applications: wear resistance is excellent and greatly superior to most other polymers; the surface is of low friction nature; oil resistance is good and equivalent to the better nitriles but is not recommended for use in water or heat above 175°F; plus good ozone resistance and low rebound characteristics.

Urethane is not normally attacked by moderate chemicals and hydrocarbons. It is generally attacked by concentrated acids, ketones, esters, chlorinated and nitro hydrocarbons.



SILICONE

Common Names _____	Silicone
ASTM D2000 Classification _____	FC, FE, GE
Military (MIL-STD 417) _____	TA
Chemical Definition _____	Polysiloxane

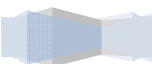
GENERAL CHARACTERISTICS

Durometer Range _____	30 – 90
Tensile Range (P.S.I.) _____	200 – 1500
Elongation (Max. %) _____	700
Compression Set _____	Good
Resilience – Rebound _____	Good
Abrasion Resistance _____	Fair to Poor
Tear Resistance _____	Poor
Solvent Resistance _____	Poor
Oil Resistance _____	Fair to Poor
Low Temperature Usage _____	-60° to -150°
High Temperature Usage _____	up to 450°
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.



FLUROSILICONE

Common Names _____	Fluorosilicone
ASTM D2000 Classification _____	FK
Military (MIL-STD 417) _____	MIL – R – 25988, Amend. 2
Chemical Definition _____	Fluorosilicone

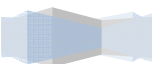
GENERAL CHARACTERISTICS

Durometer Range _____	50 – 80
Tensile Range (P.S.I.) _____	500 – 800
Elongation (Max. %) _____	300
Compression Set _____	Good
Resilience – Rebound _____	Excellent
Abrasion Resistance _____	Poor
Tear Resistance _____	Poor
Solvent Resistance _____	Fair
Oil Resistance _____	Good
Low Temperature Usage _____	-80°
High Temperature Usage _____	up to 300°
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.



FLURO ELASTOMERS

Common Names _____ Viton®, Fluoro Elastomer, FKM
 ASTM D2000 Classification _____ HK
 Military (MIL-STD 417) _____ MIL – R – 25897 and MIL – R - 83248
 Chemical Definition _____ Fluorinated Hydrocarbon

GENERAL CHARACTERISTICS

Durometer Range _____	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 Resistance _____	Excellent
Low Temperature Usage _____	+10° to -10°
High Temperature Usage _____	400° to 600°
Aging Weather – Sunlight _____	Excellent
Adhesion to Metals _____	Good

COMMENT

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

Fluro Elastomers are not recommended for ketones, low molecular weight esters and nitro containing compounds.

