PREMLENE™ SHEET RUBBER

Rubber Characteristics

PROPERTIES	ASTM DESIGNATIONS	Durometer (Shore A)	Specific Gravity (Polymer)	Tensile Strength Max-psi (Mpa)	Low Temperature Brittle Point (Celsius) (Fahrenheit)	Resilience	Compression Set	Heat Aging	Abrasion Resistance	Tear Strength	Flame Retardant Properties	Weathering Characteristics	Oxidation Resistance	Ozone Resistance	Oil Resistance	Acid Resistance	Resistance to Alkali Substances	Key Characteristics	Further Comments
Ethylene Propylene Diene	EPDM	40-90	0.86	2000 (13.8)	-58 (-70)	G to E	G	E	G	P	P	E	E	E	P	E	E	Ozone resistance good extendibility	Very water resistant, and this resistance is maintained to high temperatures (up to 180c in steam, for peroxide cures). The highest temperature resistance is achieved by using peroxide cured grades. Has excellent resistance to atmospheric ageing, oxygen and ozone up to about 150c. It has good resistance to most water-based chemicals and to vegetable-based hydraulic oils. It has poor resistance, however, to mineral oils and di-ester based lubricants.
Nitrile Rubber	NBR	40-90	1.00	2500 (17.3)	-51 (-60)	G	G	G	G	F	P	F to P	G	F	E	G	G	Oil and fuel resistance	At temperatures up to 100c or, with special compounding, up to 120c, nitrile rubber provides an economic material having a high resistance to aliphatic hydrocarbon oils and fuels. From the different grades available, the higher the acrylonitrile (ACN) content, the higher the oil resistance, but the poorer the low temperature flexibility. It has high resilience and high wear resistance but only moderate strength. It has limited weathering resistance, and poor aromatic oil resistance. It can generally be used down to about -30c, but special grades can operate at lower temperatures.
Polychloroprene	CR	40-90	1.24	2500 (17.3)	-54 (-65)	G to E	F to G	G	G	G	G	G to E	G to E	G to E	G	G to E	G to E	Flame and weather resistance	Has a generally good balance of mechanical properties and fatigue resistance, second only to natural rubber, but with superior chemical, oil, and heat resistance. It is widely used in general engineering applications. It is less resistant than natural rubber to low temperature stiffening but can be compounded to improve this property. It has good ozone resistance. It is suitable for use with mineral oils and greases and dilute acids and alkalis, but is unsuitable in contact with fuels. It has generally poorer set and creep than natural rubber.
Natural Rubber	NR	30-90	.92	3500 (24.1)	-58 (-70)	E	G	F	E	E	P	P	G	P	P	F to G	F to G	Tensile strength and tear resistance	The outstanding strength of natural rubber has maintained its position as the preferred material in many engineering applications. It has a long fatigue life and high strength, even without reinforcing fillers. Other than for thin sections, it can be used to approximately 100c, and sometimes above. It can maintain flexibility down to -60c if compounded for the purpose. It has good creep and stress relaxation resistance and is low cost. It's chief disadvantage is it's poor oil, oxygen and ozone resistance, although these latter disadvantages can be ameliorated by chemical protection.
Polyisoprene	IR	30-90	.92	3000 (20.7)	-58 (-70)	G to E	G	F	E	G	P	P	G	P	P	F to G	F to G	Synthetic natural rubber	The same polymer as natural rubber, but made synthetically. Essentially similar in properties to natural rubber, it may be somewhat weaker because it is not 100% the CIS isomer.
Styrene Butadiene Rubber	SBR	40-90	.94	2500 (17.3)	-58 (-70)	G	G	F to G	G to E	F	P	P	F	P	P	F to G	F to G	Abrasion resistance	This is the highest volume general purpose synthetic rubber. It is very weak unless reinforcing fillers are incorporated. With suitable fillers, it is a strong rubber, although not approaching natural rubber or polychloroprene. Otherwise, it has similar chemical and physical properties to natural rubber, with generally better abrasion resistance but poorer fatigue resistance.
Butyl Rubber	IIR	40-80	.92	2000 (13.8)	-58 (-70)	P	F	G to E	G	G	P	G to E	E	G to E	P	E	E	Low gas permeability BIIR & CIIR offer improved cure characteristics	This rubber has very high impermeability to gases and is hence used for the inner tubes and linings of pneumatic tires and in vacuum and high pressure applications. It has an unusually broad loss peak so that, despite having a glass transition temperature as low as -65c, it displays high damping at ambient temperatures. It has good ozone, weathering, heat and chemical resistance. Not suitable for use in contact with mineral oils.
Chlorobutyl Rubber	CIIR																		Similar in properties to butyl rubber, but with improved ozone and environmental resistance and greater stability at high temperatures. Improved compatibility with other rubber types in blends.
Polybutadiene	BR	40-80	.93	2000 (13.8)	-73 (-100)	E	G	F to G	F	G	P	F	F	P	P	F	F	Excellent resilience, typically blended with other polymers	This material has a very low glass transition temperature in the region of -75c to -100c. This results in a very low hysterisis and good flexibility at ambient temperatures and these properties are maintained to low temperatures. It has high abrasion resistance in severe conditions. Mainly used in tires in blends with natural rubber and SBR.
Silicone	MQ	40-80	.95 - 1.6	1500 (10.3)	-68 to -118 (-90 to -180)	F to E	F to G	E	P	P	F to G	E	E	E	F	G	E	Broad service temperature range	The outstanding property of this material is it's very wide temperature range. Typically, the range is -60c to 200c, with PMQ down to -90c. It does not have very good physical properties, but the properties it does have are retained to high temperatures. It is used in room temperature vulcanizing (RTV) sealants for joints. Beware corrosion if acetic acid is present as a curing agent.
Fluoroelastomer	FKM	55-90	1.85	2000 (13.8)	-40 (-40)	F to G	F to G	E	G	F	E	E	E	E	E	G to E	P to G	Heat and chemical resistance	This is a family of rubbers designed for very high temperature operation. They can operate continuously somewhat in excess of 200c depending on the grade, and intermittently to temperatures as high as 300c. They have outstanding resistance to chemical attack by oxidation, acids and fuels. They have good oil resistance. However, at the high operating temperatures they are weak, so that any design must provide adequate support against applied forces. They have limited resistance to steam, hot water, methanol, and other highly polar fluids. They are attacked by amines, strong alkalis and many freons. There are standard and special grades, the latter can be designed to have special properties such as improved low-temperature resistance.
Hydrogenated Nitrile	HNBR	45-90	.98-1.00	3000 (20.7)	-34 (-30)	G	G	G to E	G	F to G	P	G	G to E	E	E	G	G	Similar to NBR. Best in high flex, high tensile applications	Properties depend on the acrylonitrile (ACN) content and on the degree of hydrogenation. They can be tailored to particular applications but have the general advantage over standard nitrile rubber of having higher temperature resistance and higher strength. They have good high temperature oil and chemical resistance and are resistant to amines. They are suitable for use in methanol and methanol/hydrocarbon mixtures if the correct ACN level is selected. They have good resistance to hot water and steam. They can have excellent mechanical properties, including strength, elongation, tear, abrasion resistance, compression set and extrusion resistance. For the best properties, peroxide curing is used, unless low hysteresis is required. They are reported to be satisfactory up to temperatures around 180c in oil. Fully saturated grades have excellent ozone resistance. They have poor resistance to some oxygenated solvents and aromatic hydrocarbons.

Legend: P=Poor F=Fair G=Good E=Excellent