KELSEAL Rubber

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Materials

Listed below is an overview of commonly specified rubber compounds. As such, the information presented here is necessarily general in nature and abbreviated. However, Kelseal Rubber Mouldings Group Pty Ltd not only offers these compounds in a variety of hardness, but many others as well. For complete details on our available compounds, please contact us

Kelseal Rubber Compounds	Other Descriptions
Butyl Rubber	IIR
Chloroprene Rubber	Neoprene® (duPont); CR; polychloroprene
Ethylene Propylene	EP; EPDM; Vistalon® (ExxonMobil)
Natural Rubber	NR; Hevea
Nitrile Rubber	Buna N; NBR; Paracril® (Uniroyal)
SBR	SBR; Duradene® (Firestone)
Silicone Rubber	Silastic® (Dow Corning); MQ; VMQ; PMQ
Viton® ETP (duPont)	"ExtVitonreme"
Specialty Compounds	
FDA Materials	Food Approved Usage

Butyl Rubber

Description

Butyl rubber is a specialty rubber more frequently specified for its physical properties than chemical resistance. It has excellent shock absorption and vibration damping capabilities. Butyl's unusually low gas permeability makes it ideal for vacuum applications, while its high degree of unsaturation make it inherently resistant to atmospheric elements such as ozone and UV radiation. Additionally, butyl is thermally stable and has a relatively high coefficient of friction.

Composition

Butyl Rubber

*Physical Properties**

	Excellent	Good	Fair	Poor
Abrasion resistance		•		
Compression Set		•		
Elongation		•		
Flame resistance		•		

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	Excellent	Good	Fair	Poor
Gas permeability	•			
Low temperature flexibility	•			
Tear resistance			•	
Tensile strength			•	

*Chemical Resistance**

	Excellent	Good	Fair	Poor
Ketones		•		
Ozone	•			
Petroleum oils and fuels				•
Silicone Fluids		•		
Weather	•			

Operating Temperature

-40 to 135 °C (-40 to 275 °F)

Chloroprene Rubber (Common Name NEOPRENE)

Description

Chloroprene (commonly known as "Neoprene") is one of the oldest synthetic elastomers. Introduced in 1931, it is used in a variety of applications due to its ability to resist both oils and oxidation. The oil resistance, however, depends significantly on the type of oil. Chloroprene has good resistance to naphthenic and paffaffinc oils of high molecular weight, but swells excessively in aromatic oils of low molecular weight. Vulcanizates of chloroprene display little significant change after prolonged outdoor exposure. Because of its chlorine content, flame resistance is superior to that of most other rubbers. Some chloroprene vulcanizates, especially O-Rings, sometimes exhibit distortion due to crystallization of the rubber at room temperature. This effect can be completely reversed by warming the parts in low heat. Chloroprene is especially well suited to rubber-to-metal bonding.

Composition

Chloroprene Rubber

*Physical Properties**

	Excellent	Good	Fair	Poor
Abrasion	•			

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	Excellent	Good	Fair	Poor
resistance				
Compression Set		•		
Elongation		•		
Flame resistance		•		
Gas permeability		•		
Low temperature flexibility		•		
Tear resistance			•	
Tensile strength		•		

*Chemical Resistance**

	Excellent	Good	Fair	Poor
Aromatic & oxygenated solvents				•
Automotive refrigerants	•			
Dilute acids	•			
Dilute alkalis	•			
Ozone	•			
Steam			•	
Water		•		
Weather	•			

Operating Temperature

-40 to 135 °C (-40 to 275 °F)

Ethylene Propylene (Common Name EPDM)

Description

Ethylene-Propylene rubber is a low cost, versatile compound that functions well in both low and high operating temperature environments. Moderate to good resistance to a variety of chemicals make it the compound of choice for a variety of applications. EPDM's chemically saturated polymer chain accounts for its superior resistance to degradation. However, use is limited by its incompatibility with petroleum-based fluids. EPDM can be cured with sulphur or peroxide, although applications with high heat requirements should use peroxide cured compounds. Peroxide curing also produces vulcanizates with superior compression set than that of the sulphur cures. Reinforcing agents are especially important in Ethylene-Propylene polymers because it lacks gum strength. Therefore, high tensile and tear properties are

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achieved through high loading. EPDM is a ter polymer, not to be confused with the copolymer EPM, which can only be peroxide cured due to its completely saturated polymer backbone.

Composition

Ethylene Propylene

*Physical Properties**

	Excellent	Good	Fair	Poor
Abrasion resistance		•		
Compression Set		•		
Elongation		•		
Flame resistance		•		
Gas permeability	•			
Low temperature flexibility	•			
Tear resistance			•	
Tensile strength		•		

*Chemical Resistance**

	Excellent	Good	Fair	Poor
Alcohols		•		
Dilute acids	•			
Dilute alkalis	•			
Gasoline				•
Hydraulic fluids		•		
Oxygenated solvents		•		
Ozone	•			
Petroleum oils and greases				•
Steam	•			
Water	•			
Weather	•			

Operating Temperature

–54 to 149 °C (-65 to 300 °F)

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Natural Rubber

Description

Natural Rubber, or NR, was the first commercially viable elastomer ever developed and is still the only non-synthetic rubber in widespread use. Natural rubber currently accounts for almost 40% of the world's elastomer consumption, as it is frequently blended with other rubbers to derive an ideal combination of properties. Derived from a liquid of the Hevea tree, NR latex is a low cost material that may contain relatively high levels of organic and inorganic impurities. It is ideal for applications that require good resistance to abrasion, gouging and cut growth. Also, because it experiences little heat build up during flexing, it is also commonly specified when shock and dynamic load requirements are deemed critical. Natural rubber is tough, long lasting and can be compounded for service at temperatures as low as -65°F. It is also easily bonded to metal and fabrics.

Composition

Natural Rubber

*Physical Properties**

	Excellent	Good	Fair	Poor
Abrasion resistance	•			
Compression Set	•			
Elongation	•			
Flame resistance				•
Gas permeability			•	
Low temperature flexibility	•			
Tear resistance	•			
Tensile strength		•		

*Chemical Resistance**

	Excellent	Good	Fair	Poor
Air		•		
Alcohols		•		
Dilute acids and bases		•		
Gasoline				•
Hydrocarbon solvents				•

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	Excellent	Good	Fair	Poor
Oil				•
Oxidation		•		
Ozone				•
Radiation			•	
Steam			•	
Sunlight				•
Water	•			

Operating Temperature

–51 to 121 °C (-60 to 250 °F)

Nitrile Rubber

Description

On a cost basis, nitrile, or NBR, rubber is the least expensive of the oil resistant elastomers. As a result, nitrile is one of the most widely used rubber materials due to its combination of low cost, resistance to many chemicals, and good physical properties. The acrylonitrile content of this highly polar elastomer provides excellent oil and gas permeation resistance, which increases as the level of ACN increases. Unfortunately, an increase in the acrylonitrile content compromises low temperature flexibility, and increases compound hardness. Typical ACN content ranges from 18% to 50%. Nitrile should not be exposed to direct sunlight or moderate to high levels of atmospheric ozone, as rapid deterioration will result. However, NBR will accept many antidegradants, most notably PVC, which offer some degree of improvement of these properties. Nitriles are usually sulphur cured, but peroxide curing is also possible, resulting in improved compression set.

Composition

Nitrile Rubber

*Physical Properties**

	Excellent	Good	Fair	Poor
Abrasion resistance	•			
Compression Set		•		
Elongation		•		
Flame resistance				•
Gas permeability		•		
Low temperature		•		

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	Excellent	Good	Fair	Poor
flexibility				
Tear resistance		•		
Tensile strength		•		

*Chemical Resistance**

	Excellent	Good	Fair	Poor
Brake fluid				•
Dilute acids		•		
Dilute alkalis		•		
Hydraulic fluids		•		
Ketones				•
Ozone				•
Petroleum oils	•			
Silicone Fluids	•			
Steam			•	
Strong acids				•
Transmission fluids		•		
Water	•			
Weather				•

Operating Temperature

–40 to 121 °C (-40 to 250 °F)
*

SBR

Description

Styrene-Butadiene rubber is much like natural rubber in many of its properties and is one of the lowest cost and highest volume elastomers available. Although its physical properties are somewhat less than natural rubber, SBR is tougher and slightly more resistant to heat and flex cracking. Much of its usage is in tire treads especially blended with other polymers. It can readily be substituted for natural rubber in many applications, thereby achieving significant cost savings. SBR is sometimes referred to as "GR-S" or Government Rubber-Styrene, as its development began as a wartime emergency, necessitated by an interrupted supply of natural rubber. SBR is actually a generic term covering a wide variety of synthetic rubbers differing not

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only in the styrene-butadiene ratio, but also in the type of polymerisation by which they are made.

Composition

SBR

*Physical Properties**

	Excellent	Good	Fair	Poor
Abrasion resistance		•		
Compression Set			•	
Elongation		•		
Flame resistance				•
Gas permeability			•	
Low temperature flexibility		•		
Tear resistance		•		
Tensile strength		•		

*Chemical Resistance**

	Excellent	Good	Fair	Poor
Acetone		•		
Air			•	
Alcohols		•		
Diester oils				•
Glycol		•		
Mineral oil				•
Oxidation		•		
Ozone				•
Silicone Fluids				•
Steam		•		
Water		•		
Weather			•	

Operating Temperature

–54 to 107 °C (-65 to 225 °F)

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Silicone Rubber

Description

Silicone Rubber is an inorganic rubber whose ability to retain its physical properties at elevated temperatures is superior to most other materials. It is also flexible at very low temperatures however its relatively poor tensile, tear strength and abrasion resistance limits use to static applications. These weaknesses can be improved somewhat by reinforcement with fine, high surface area fillers which are compatible chemically with the silicone polymer itself. Silicone does possess extraordinary resistance to oxidation and ozone degradation due to the absence of unsaturated double bonds in the polymer backbone. Since it is fully saturated, only peroxides can be used for hot vulcanization processes. Resistance of silicone vulcanizates to gas permeation is generally considered to be poor, as much as 100 times greater than nitrile or butyl, but it is frequently specified in food and beverage applications as it does not impart any taste or odour. However, the automotive industry accounts for almost 50% of silicone usage in the U.S. annually.

Composition

Silicone Rubber

*Physical Properties**

	Excellent	Good	Fair	Poor
Abrasion resistance				•
Compression Set		•		
Elongation	•			
Flame resistance		•		
Gas permeability				•
Low temperature flexibility	•			
Tear resistance				•
Tensile strength				•

*Chemical Resistance**

	Excellent	Good	Fair	Poor
Dilute acids		•		
Dilute alkalis	•			
Ketones				•

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	Excellent	Good	Fair	Poor
Ozone	•			
Petroleum oils				•
Steam			•	
Vegetable oils	•			
Water			•	
Weather	•			

Operating Temperature

–54 to 232 °C (-65 to 450 °F)

Viton® ETP (duPont)

Description

Viton® ETP, or Viton® Extreme, is resistant to the same fluids as high fluorine FKMs such as aliphatic and aromatic hydrocarbons, hydraulic fluids, motor oils, fuels, etc., but is also resistant to strong bases and polar fluids such as potassium hydroxide, ketones, MTBE and complex solvent mixtures. In fact, Viton® ETP has the broadest fluid resistance of any FKM polymer on the market, making it ideal for severe service environments. Although costly, it can frequently be substituted for far more expensive perfluoroelastomers, at a fraction of the cost.

Composition

Viton® ETP (duPont)

*Physical Properties**

	Excellent	Good	Fair	Poor
Abrasion resistance		•		
Compression Set		•		
Elongation		•		
Flame resistance		•		
Gas permeability	•			
Low temperature flexibility			•	
Tear resistance		•		
Tensile strength		•		

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	Excellent	Good	Fair	Poor
Elongation		•		
Flame resistance		•		
Gas permeability	•			
Low temperature flexibility			•	
Tear resistance		•		
Tensile strength		•		

*Chemical Resistance**

	Excellent	Good	Fair	Poor
Acetic acid		•		
Acetone		•		
Amines				•
Butyl acetate		•		
Concentrated Bases	•			
Ethylene diamine			•	
KOH	•			
Nitric acids	•			
Polar solvents	•			
Tetrahydrofuran			•	
Toluene	•			
Water			•	

Operating Temperature

–23 to 205 °C (-10 to 400 °F)

FDA COMPOUNDS

The rubber compounds in the following list all comply with Paragraph 177.2600 of Title 21, sub-paragraphs a) through d), Code of Federal Regulations, "Rubber Articles Intended for Repeated Use". Those materials which have also been formulated for use with milk are so indicated. It should be noted that the Food and Drug Administration does not actually approve any rubber compounds. Rather it publishes a list of permissible ingredients and the maximum allowable concentration of each. These ingredients are broken down into the following categories: Elastomers, Vulcanization Agents, Accelerators, Retarders, Activators, Antioxidants and Antiozonants, Plasticizers, Fillers, Colors, Lubricants, Emulsifiers, and Miscellaneous. It is the responsibility of the manufacturer, or its

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compound supplier, to ensure that FDA compounds are formulated according to these guidelines, and are produced under conditions of good manufacturing practices.

Unless otherwise specified, all compounds in the list are black in color and sulfur cured. In addition to these compounds, all of RT Dygert's NSF (National Sanitation Foundation) certified compounds, and 3-A Sanitary compounds also meet FDA formulation requirements. Finally, nearly all of our silicone compounds are also FDA compliant.