



This Table Provides Us with a Guide to the Materials for O-Rings and Seals Most Suited to Our Motor Cars

O-Ring Material Reference Guide

<u>Material</u>	<u>Recomended Use</u>	<u>Not Recomend For</u>	<u>Mechanical Properties</u>
<p>Buna-N (Nitrile)</p> <p>Standard: 70 Durometer Black Temperature Range: -35°F to 250°F Least Expensive / Readily Available</p>	<p>Silicone Greases / Oils Water Petroleum Oils / Fuels Ethylene Glycol Fluids</p>	<p>Ketones (MEK) Halogenated Hydrocarbons Auto / Aircraft Brake Fluids Strong Acids Sunlight, Ozone, Weathering</p>	<p>Good Wear Resistance Good Compression Set Resistance Good Short-Term Resilience Good Permeation Resistance</p>
<p>Viton® (Fluorocarbon Type A)</p> <p>Standard: 75 Durometer Black Temperature Range: -15°F to 400°F</p>	<p>Vacuum Most Acids / Chemicals Halogenated Hydrocarbons Di-Ester Lubricants Petroleum Oils / Fuels Silicone Oils / Greases</p>	<p>Ketones (MEK) Auto / Aircraft Brake Fluids Amines (Ammonia) Acetone, Skydrol, Ethyl Acetate Hot Water and Steam Low Molecular Esters and Ethers</p>	<p>Good Wear Resistance Excellent Comp. Set Resistance Moderate Short-Term Resilience Excellent Permeation Resistance</p>
<p>Silicone</p> <p>Standard: 70 Durometer Orange Temperature Range: -65°F to 450°F</p>	<p>Dry Heat Wide Temperature Range Sunlight, Ozone, Weathering Odorless and Non-Toxic</p>	<p>Ketones (MEK) Acids Silicone Oils Brake Fluids</p>	<p>Poor Wear Resistance Excellent Comp. Set Resistance Poor Short-Term Resilience Excellent Permeation Resistance</p>
<p>EPDM (Ethylene Propylene)</p> <p>Standard: 70 Durometer Black Temperature Range: -60°F to 250°F</p>	<p>Sunlight, Ozone, Weathering Hot Water and Steam Auto / Aircraft Brake Fluids Some Acids ans Bases Ketones ans Alcohols Plumbing</p>	<p>Petroleum Oils Fuels</p>	<p>Good Wear Resistance Good Comp. Set Resistance Moderate Short-Term Resilience Good Permeation Resistance</p>
<u>Material</u>	<u>Recomended Use</u>	<u>Not Recomend For</u>	<u>Mechanical Properties</u>
<p>Chemraz® / Kalrez® / Simriz® (Perfluoroelastomer)</p> <p>Various Compounds Designed for Specific Applications Temperature Range: -10°F to 615°F</p>	<p>High Temperature Resistance Excellent Chemical Resistance Low Out Gassing Chlorine Wet/Dry Petroleum Oil Chlorinated Hydrocarbons</p>	<p>Molten metals Gaseous Alkali Metals Halogenated Freons/Fluids Uranium Hexafluoride</p>	<p>Good Wear Resistance Good Comp. Set Resistance Moderate Short-Term Resilience Good Permeation Resistance</p>
<p>Neoprene® (Chloroprene)</p> <p>Standard: 70 Durometer Black Temperature Range: -35°F to 250°F</p>	<p>Refrigerants (Freon) Ammonia Some Petrolium Oils Dilute Acids Silicone ester Lubricants</p>	<p>Ketones (MEK) Gasoline Auto / Aircraft Brake Fluids</p>	<p>Good Wear Resistance Moderate Comp. Set Resistance Moderate Short-Term Resilience Good Permeation Resistance</p>

Urethane Standard: 90 Durometer Translucent Temperature Range: -65°F to 200°F	Drive Belts Some Petroleum Oils Some Hydrocarbon Fuels Oxygen / Ozone	Ketones (MEK) Acids Auto / Aircraft Brake Fluids Chlorinated Hydrocarbons Water	Excelet Wear Resistance Poor Comp. Set Resistance Excelet Short-Term Resilience
Fluorosilicone Standard: 70 Durometer Blue Temperature Range: -80°F to 450°F	Jet Fuel Dry Heat Wide Temperature Range Some Petroleum Oils Clorinated Solvents	Ketones (MEK) Phosphate Esters Some Acids Auto / Aircraft Brake Fluids Amines (Ammonia)	Poor Wear Resistance ModerateComp. Set Resistance Moderate Short-Term Resilience Poor Permeation Resistance
Teflon Encapsulated O-Ring Covered with Teflon Tube Usually Silicone or Viton®	Depends on O-Ring Core Chemical Resistance Heat Resistance	Depends on O-Ring Core	Good Wear Resistance Good Short-Term Resilience Good Permeation Resistance
Teflon® Standard: Non-Elastic White Temperature Range: -250°F to 450°F	Chemical Resistance Fuel Resistance Low Coefficient of Friction	Non-Elastic	Good Wear Resistance Low Coefficient of Friction
<u>Material</u>	<u>Recomended Use</u>	<u>Not Recomend For</u>	<u>Mechanical Properties</u>

Basic Raw Materials

Nitrile (NBR)

The most common nitrile copolymer blend is the compound known as **Buna-N**. It has a very good resistance to **petroleum based hydraulic oils**. Buna-N and also works well with **fuels like diesel or gasoline**. Nitrile seals have a good resistance to compression set, but their flexibility suffers to some extent in the lower temperature range. The seals made from this material have a low resistance to ozone and must be stored carefully in most of the environments. The working temperatures are -40° F to +240° F.

Ethylene-Propylene (EPDM)

Ethylene-Propylene is used for sealing phosphate ester hydraulic fluids like Skydrol. It is not suitable for petroleum based fluids, but is highly effective for use with steam, acetone, dilute acids and alkalis. Specially compounded, it can be made suitable for **automobile brake systems**. The temperature ranges from -20° F to +300° F.

Silicone (VMQ)

Silicone is an elastomer that is made from silicon, oxygen, hydrogen and carbon. The main use of this material is in static seals employed in a wide (-75° F to +450° F) range of temperatures. It has high resistance to dry heat, ultraviolet light and ozone. This material is not recommended for dynamic situations due to poor abrasion resistance and high friction characteristics.

Fluorocarbon (FKM) - VITON®

VITON is the registered trademark of DuPont Dow Elastomer. Fluorocarbon combines high temperature resistance with an excellent chemical resistance. It is excellent for use with alcohol and aromatic fuels and highly resistant to ultraviolet light and ozone. This material is not recommended for the use in low temperatures or in aircraft hydraulic fluids. Its temperature range is -20° F to +400° F.

Urethane (AU, EU)®

Formulated of copolymers of ether or ester based urethanes, this material is used in a wide application of seals, wipers, back-up rings, cushions, bumpers and a myriad of other uses. Highly resistant to oil swell, ozone, oxidation and abrasion, it also has excellent cut resistance. Highly resilient, urethanes also have high tensile strength and elongation properties. Urethanes remain an excellent choice in hydraulic systems using petroleum based fluids. Most urethane seals remain flexible and efficient in temperatures ranging from - 65° F to +200° F with some able to withstand intermittent temperatures up to +300° F.

PTFE - Teflon®

Teflon is the registered trademark of DuPont Dow Elastomer. Most PTFE seals, in order to retain their toughness and flexibility, are fortified with short glass fibre, bronze flashes, carbon, graphite, or a combination of these fillers. Because of lack of resilience (memory) in PTFE, an energiser is most often employed to obtain the desired fit. Benefits are chemical inertness, high heat resistance, low temperature flexibility, low running friction, and non-adhesive characteristics. Temperatures to +500° F are obtainable but are often reduced by the filler or energiser employed.



The Rolls-Royce Owners' Club of Australia