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## O-Ring Materials

Materials include:

Nitrile (Buna/NBR)

Fluoroelastomer (FPM/FKM/Fluorocarbon/Viton® Du Pont & Dow Elastomers)

Silicone (VMQ)

Fluorosilicone (FVMQ)

EPDM

Chloroprene/Neoprene

PTFE

Polyurethane (PU)

Perfluoroelastomers (FFKM - Kalrez®, Chemraz®, Isolast® and Perlast® and others)

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### **NITRILE or BUNA N (NBR) MEDIUM NITRILE**

TEMP RANGE -30°C to +100°C with excursion to +135°C

Resistance to mineral based fluids is excellent, although resistance to fuels is not usually good enough. Strength, resistance, abrasion and heat resistance are reasonable. Low temperature resistance is adequate for most applications but weathering or ozone contact will result in crazing and cracking, particularly under tensile stress or flexure. This grade of nitrile is the most commonly used of all polymers in hydraulic sealing.

Recommended for:

General purpose sealing

Petroleum oils and fluids

Cold water

*Not Recommended for:*

Halogenated Hydrocarbons (Carbon Tetrachloride Trichlorethylene)

Nitro Hydrocarbons (Nitrobenzene, Aniline)

Phosphate Ester Hydraulic Fluids (Skydrol, Fyrquel, Pydraul)

Ketones (MEK, Acetone)

Strong Acids

Ozone

Automotive Brake Fluid

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### **HIGH NITRILE**

TEMP RANGE -30°C to +100°C

Resistance to mineral based fluids is excellent and to hydrocarbon fuels is good.

Strength, resilience abrasion and high temperature resistance are reasonable but performance at low temperature is poor. Primarily used in contact with aromatic fuels and mineral oils.

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### **LOW NITRILE**

TEMP RANGE -50°C to +100°C

Low Nitrile has some resistance to mineral based fluids but the main advantage is its low

temperature capability. Strength, resilience and abrasion resistance are reasonable.

Note: It is important to remember that all Nitriles are non-resistant to castor based and non-mineral brake fluids and should never be used in applications employing these fluids.

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## **FLUOROCARBON RUBBER**

TEMP RANGE -20°C to +200°C

Commonly known as FPM (alternative to Viton ® Du Pont & Dow Elastomers). It has high temperature capabilities, excellent resistance to hydraulic oils, petrols and many chemicals, including weathering and ozone conditions.

Fluorocarbon O-Rings should be considered for seal use in automobile and other mechanical devices requiring maximum resistance to elevated temperature and to many functional fluids.

Recommended for use with:

Petroleum Oils  
Di ester Based Lubricants  
Silicate Ester Base Lubricants  
Silicone Fluids and Greases  
Halogenated Hydrocarbons (Carbon Tetrachloride. Trichloro - Ethylene)  
Selected Phosphate Ester Fluids  
Acids

*Not* recommended for use with:

Ketones  
Skydrol fluids  
Amines, Anhydrous Ammonia  
Hot hydrofluoric or Chlorosulfonic Acids

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## **SILICONE RUBBER**

TEMP RANGE -60°C to +200°C

Silicone has poor tensile strength, tear resistance and abrasion resistance. Silicones possess excellent resistance to temperature extremes. Silicone's retention of properties at high temperatures is superior to other elastic materials.

Silicones are recommended for:

Dry heat  
High - aniline point oils  
Chlorinated DI - phenyls  
Food processing applications  
Excellent ozone resistance.  
Water (Low temperature only)

Silicones are *not* recommended for:

Most Petroleum fluids  
Ketones (MEK, Acetone)  
Steam.

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## **ETHYLENE PROPYLENE RUBBER (EPR or EPDM) WRAS/FDA OR COMMERCIAL**

TEMP RANGE -50°C to +120°C

Excellent resistance to weathering and ozone, water and steam, with good performance in castor and some phosphate ester based fluids. It's low and high temperature capability is good, having excellent resistance to set with good resilience.

Boiling water and steam are considered among the most difficult conditions to seal and until the introduction of EPDM around 1961 no adequate elastomeric material was available. This polymer is now used to a large extent in central heating systems replacing the outdated

gland material. Also high temperature braking systems employing castor based fluids for mouldings subjected to weathering and ozone and for seals in chemical plant due to its good chemical resistance.

It should NEVER be used in contact with mineral based fluids or DI ester based lubricants, due to excessive swell and deterioration.

When lubrication is required silicone grease or fluids should be used.

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## **P.T.F.E. POLYTETRAFLUORETHYLENE**

TEMP RANGE -195°C to +250°C

P.T.F.E. is an extremely inert material and is unaffected by virtually every known chemical including almost all acids, alkalis and solvents.

These exceptional properties make P.T.F.E. an ideal material for O-ring Back up Rings. It's cold flow characteristics under permanent strain are usually a disadvantage in P.T.F.E. O-rings, e.g. It has little memory to return to its original form.

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## **F.E.P. ENCAPSULATED O-RINGS FPM** (alternative to Viton ® Du Pont & Dow Elastomers) or **SILICONE**

F.E.P. FPM TEMP RANGE -20°C to +204°C F.E.P. SILICONE TEMP RANGE -60°C to +204°C

An encapsulated O-ring comprises an elastomer energising core, which has a seamless jacket made from fluoropolymer.

The elastomeric core may be Fluorocarbon (FPM or Silicone). The jacket is made from Teflon

® Du Pont F.E.P. (Fluorinated - ethylene - propylene).

Why are Encapsulated 'O-Rings needed?

There are certain applications which prohibit the use of conventional rubber O-ring Seals.

The use of hostile chemicals or extreme temperature (both high and low) during various processes can make effective sealing very difficult.

The main advantage Encapsulated 'O-Rings have over solid P.T.F.E. is that it has the chemical inertness whilst with its energising core, the O-ring returns to its original form.

Recommended for use in:

Chemical Processing and Production  
Oil Extraction (on shore and off shore)  
Petrochemical Refining  
Pharmaceutical Production  
Food and Drink Processing  
Paint and Die Manufacturing  
Cosmetics and Perfumery  
Automotive Components  
Aerospace Engineering

*Not* Recommended for:

Dynamic use where high speeds and poor finishes are encountered.

Where the housing design requires excessive stretch or collapse of the O-ring during installation.

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## **KALREZ®** Du Pont & Dow Elastomers

TEMP RANGE -50°C to +315°C

This material has outstanding chemical resistance and a temperature capability up to +350°C (intermittent). Wherever rubber components are exposed to aggressive chemicals or high temperatures Kalrez® Perfluoroelastomer parts last longer. Kalrez® parts have virtually universal chemical resistance. They are far more resistant to swelling, a key cause of seal failure, and other forms of chemical attack than other elastomers. Kalrez® has the chemical inertness of P.T.F.E. and the elasticity of rubber.