H&H SEAL AND PRODUCTS

O-ring Elastomers

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O-ring Elastomers

NBR

NBR is the most commonly used material for o-rings because of its good mechanical properties, its resistance to lubricants and greases and its relatively low cost. The physical and chemical resistance properties of NBR materials are determined by the acrylonitrile (ACN) content of the base polymer which can vary between 18% and 50%. Low ACN content ensures good flexibility at low temperatures, but offers limited resistance to oils and fuels. As the ACN content increases, the low temperature flexibility reduces and the resistance to oils and fuels improves.

Physical and chemical resistance properties of NBR materials are also affected by the cure system of the polymer. Peroxide-cured materials have improved physical properties, chemical resistance and thermal properties as compared to sulfur-donor-cured materials.

Standard grades of NBR are typically resistant to mineral oil-based lubricants and greases, many grades of hydraulic fluids, aliphatic hydrocarbons, silicone oils and greases and water to about 176°F.

NBR is generally not resistant to aromatic and chlorinated hydrocarbons, fuels with a high aromatic content, polar solvents, glycol-based brake fluids and non-flammable hydraulic fluids (HFD). NBR also has low resistance to ozone, weathering and aging, but in many applications this has no negative effect.

Typical heat resistance:
Sulfur cured up to 250°F / Peroxide cured up to 275°F
Cold flexibility down to -40°F.

HNBR

Hydrogenated Nitrile Butadiene Rubber (HNBR), is also known as Highly Saturated Nitrile (HSN), is special class of nitrile rubber (NBR) that has been hydrogenated to increase saturation of the butadiene segment of the carbon polymer backbone. Subsequent improvements to the material properties, over that of a nitrile rubber (NBR), include greater thermal stability, broader chemical resistance, and greater tensile strength. HNBR is classified by ASTM as a DH-type polymer. This classification indicates 302°F service temperature as well as less than 30% swell in IRM 903 oil. HNBR can be formulated to meet application temperatures ranging between -58°F and 325°F.

FKM

FKM materials are noted for their very high resistance to heat and a wide variety of chemicals. Other key benefits include excellent resistance to aging and ozone, very low gas permeability and the fact that the materials are self-extinguishing.

Standard FKM materials have excellent resistance to mineral oils and greases, aliphatic, aromatic and chlorinated hydrocarbons, fuels, non-flammable hydraulic fluids (HFD) and many organic solvents and chemicals.

In addition to the standard FKM materials, a number of specialty materials with different monomer compositions and fluorine content (65% to 71%) are available that offer improved chemical or temperature resistance and/or better low temperature performance.

FKM materials are generally not resistant to hot water, steam, polar solvents, glycol-based brake fluids and low molecular weight organic acids.

FKM can be formulated to meet application cold flexibility temperatures ranging between -50°F and 400°F.

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Aflas

Most commonly known as AFLAS® or Viton® Extreme™; Tetrafluoroethylene Propylene (FEPM or TFE/P) is a fluorinated rubber. It has excellent resistance to a wide variety of chemicals, both acids and bases. It works well at elevated temperatures and has very good resistance to petroleum fluids. AFLAS® has excellent steam and hot water resistance.
The raw material cost for FEPM is relatively high and it is difficult to process. Like most other fluoropolymers, FEPM does not have especially good low temperature properties. The temperature range for FEPM compounds is 15° to 475° F. FEPM compounds in a hardness range of 70 to 90 durometer. Black is the standard color, but some others are available.

Perfluoroelastomer (FFKM)

Is most commonly known by the DuPont trade name Kalrez®. Perfluoroelastomer compounds offer the widest range of chemical and solvent resistance as well as very high operating temperatures (up to 575° F). The low temperature range is only -20°F to +20°F depending on the compound. Food and medical grades are offered.

The price of products made from Perfluoroelastomers tend to be very high due to the raw material cost, so this polymer is used for specialty applications only. Thermal expansion needs to be considered when using Perfluoroelastomers at elevated temperatures. Perfluoroelastomer compounds are available in hardness range of 70 to 90 durometer. Black is the standard color, but white is available.

EPDM

EPDM materials generally have a high resistance to hot water, steam, aging and chemicals, and are suitable for a wide range of application temperatures. They are divided into sulfur-cured and peroxide-cured types.

Peroxide-cured compounds are suitable for higher temperatures and have much lower compression sets.

EPDM has good resistance to hot water and steam, detergents, caustic potash solutions, sodium hydroxide solutions, silicone oils and greases, many polar solvents and many diluted acids and chemicals. Special formulations are excellent for use with glycol-based brake fluids. EPDM materials are unsuitable for use with all mineral oil products—lubricants, oils, fuels.

Heat resistance varies:
300°F dry air or 400°F in water/steam.
Cold flexibility down to -70°F.
Special formulations up to 500°F

Silicone

Silicone rubbers are noted for their ability to be used over a wide temperature range and for excellent resistance to ozone, weathering and aging. Compared with most other sealing elastomers, the physical properties of silicones are poor. Generally, silicone materials are physiologically harmless so they are commonly used by the food and drug industries.

Standard silicones are resistant to water (to 248°F), aliphatic engine and transmission oils and animal and plant oils and fats.

Silicones are generally not resistant to fuels, aromatic mineral oils, steam (short term to 248°F possible), silicone oils and greases, acids or alkalis.

Heat resistance varies:
Up to 400°F
Cold Flexibility down to -65°F
Special formulations down to -175°F

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Fluorosilicone

Although fluorosilicone elastomers have the same mechanical properties as silicones, they are far more resistant to oils and fuels. The temperature range of applications is somewhat more restricted than that of silicones.

Heat resistance varies:
Up to 350°F max
Cold Flexibility down to -100°F

Polyurethane

Polyurethanes differ from classic elastomers in that they have much better mechanical properties. In particular they have a high resistance to abrasion, wear and extrusion, a high tensile strength and excellent tear resistance. Polyurethanes are generally resistant to aging and ozone, mineral oils and greases, silicone oils and greases, nonflammable hydraulic fluids HFA & HFB, water up to 122°F and aliphatic hydrocarbons.

Heat resistance varies:
Up to 180°F
Cold Flexibility down to -40°F

PTFE

We machine o-rings sizes that are standard, metric or custom. PTFE (Polytetrafluoroethylene) offers the following characteristics over thermoplastic and thermoset compounds, making it a unique problem solving solution for sealing applications:
Low coefficient of friction
Wide temperature range
Chemically inert
Dry running capability
Resist temperature cycling
High surface speeds
Low water absorption
Low dielectric constant and dissipation factor
Heat resistance:
Up to 600°F

Cold Flexibility down to -450°F

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