

Ningbo TianYi Chemical Industrial(T.C.I) Co., Ltd

地址:浙江省宁波市会展路 181号 Add: No.181,HuiZhan Road ,Ningbo city, China 315000 电话: (Tel)86-574-87990349 , 传真 (Fax):86-574-88193499 邮编 (P.C):315000

Rubber Bearings



Rubber Bearings

Rubber bearings mainly used for pump shafts. Bearings with metal housing (shell) are also available

ELASTOMER RUBBER COMPOUNDS TYPES AND REFERENCES						
General Description	Chemical Description	Abbreviation (ASTM 1418)	ISO/DIN 1629	Other Trade names & Abbreviations	ASTM D2000 Designations	
Nitrile	Acrylonitrile-butadiene rubber	NBR	NBR	Buna-N	BF, BG, BK, CH	
Hydrogenated Nitrile	Hydrogenated Acrylonitrile-butadiene rubber	HNBR	(HNBR)	HNBR	DH	
Ethylene-Propylene	Ethylene propylene diene rubber	EPDM	EPDM	EP, EPT, EPR	BA, CA, DA	
Fluorocarbon	Fluorocarbon Rubber	FKM	FPM	Viton ®, Fluorel ®	HK	
Chloroprene	Chloroprene rubber	CR	CR	Neoprene	BC, BE	
Silicone	Silicone rubber	VMQ	VMQ	PVMQ	FC, FE, GE	
Fluorosilicone	Fluorosilicone rubber	FVMQ	FVMQ	FVMQ	FK	
Polyacrylate	Polyacrylate rubber	ACM	ACM	ACM	EH	
Ethylene Acrylic	Ethylene Acrylic rubber	AEM	AEM	Vamac ®	EE, EF, EG, EA	
Styrene-butadiene	Styrene-butadiene rubber	SBR	SBR	SBR	AA, BA	
Polyurethane	Polyester urethane / Polyether urethane	AU / EU	AU / EU	AU / EU	BG	
Natural rubber	Natural rubber	NR	NR	NR	AA	

 ${\tt Vamac~@ ~and ~Viton~@ ~are ~registered ~trademarks ~of ~E.~I.~du~Pont~de~Nemours~and~Company~or~affiliates.}$

Fluorel ® is a registered trademark of Dyneon LLC

General Properties of Elastomer Classes & Rubber Compounds:

Very Good = 1	Good = 2	Average = 3	Poor = 4	Temperature in °F
Basic Property	NBR HNB	BR EPDM FKM CR A	ACM AEM SBR AU/F	EU VMQ FVMQ NR



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Economy of Material	1	4	2	3	2	3	4	1	3	3	4	1
Compression Set Resistance	1	1	1	1	2	4	2	2	3	2	2	1
Resilience (Rebound)	2	2	2	2	2	3	2	2	2	2	2	1
Tear Strength	2	1	2	2	2	3	2	3	2	4	3	1
Heat Aging Resistance	3	2	2	1	3	1	1	3	1	1	1	3
Ozone Resistance	4	2	2	1	2	2	1	4	1	1	1	4
Resistance to Oil & Grease	2	2	4	1	2	1	3	4	2	3	1	4
Fuel Resistance	4	3	4	2	4	1	4	4	3	4	2	4
Water Swell Resistance	2	2	1	2	3	4	2	1	4	1	1	1
Gas Impermeability	2	2	3	2	2	3	2	3	2	4	4	3
Dynamic Service / Abrasion Res.	2	2	2	3	2	2	2	1	1	4	4	1
High Temperature - Standard	212	300	300	390	250	300	300	212	175	450	400	220
High Temperature - Special	250	-	-	-	-	-	-	-	-	480	-	-
Low Temperature - Standard	-22	- 22	-60	5	-40	-60	-40	-50	-60	-75	-75	-60
Low Temperature - Special	-60	-40	-	-30	-	-	-	-	-	-	-	-

Due to the number of interacting forces, it is STRONGLY RECOMMENDED THAT YOUR ELASTOMER SELECTION BE RIGOROUSLY TESTED IN THE ACTUAL APPLICATION, performance assumptions must be checked so that you are certain that all variables have been carefully considered.

checked so that you are certain that all variables i	lave been carefull	y constdered.		
NATURAL RUBBER (NR)				
	Temperature Range (dry heat)			
	low	high		
Natural rubber is a product coagulated from the latex of the rubber tree, hevea brasiliensis. Natural rubber features low compression set, high	-51 °C	220 °F 104 °C		
tensile strength, resilience, abrasion and tear resistance, good friction	Application Advantages			
good vibration dampening characteristics.	 excellence compression set good resilience and abrasion good surface friction properties 			
Primary Uses	Application Disadvanta	ges		
O-rings, rubber seals and custom molded rubber components for: » rubber to metal bonded vibration isolators and mounts » automotive diaphragms » FDA applications for food and beverage seals	» poor resistance to atta » poor ozone, UV resist			
FLUOROSILICONE (FVMQ)				



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	Temperature Range (dry heat)		
	low	high	
Fluorosilicones combine most of the attributes of silicone with resistance to petroleum oils and hydrocarbon fuels. Low physical strength and abrasion resistance combined with high	-75 °F -59 °C	450 °F 232 °C	
friction limit fluorosilicone to static seals.	Application Advantages	S	
Fluorosilicones are used primarily in aircraft fuel systems.	» excellent extreme tem » excellent compression » very clean, low odor a	set resistance	
Primary Uses	Application Disadvanta	ges	
O-rings, rubber seals and custom molded rubber components for: » seals (static) for extreme temperature applications » food applications » medical devices » FDA applications	» typically not good f friction properties and p	or dynamic seals due to poor abrasion resistance	
SILICONE (VMQ)			
	Temperature Range (dry heat)		
Silicone is a semi-organic elastomer with outstanding resistance to extremes of temperature with corresponding resistance to compression		high	
set and retention of flexibility. Silicone elastomers provide excellent resistance to ozone, oxygen, and moisture. Low physical strength and abrasion resistance combined with high	-75 °F -59 °C	450 °F 232 °C	
friction properties limit silicone to static seal applications.	Application Advantages		
Silicone utilizes a flexible siloxane backbone rather than a carbon backbone like many other elastomers and has very low glass transition temperatures.	» excellent extreme temperature properties » excellent compression set resistance » very clean, low odor and taste		
Primary Uses	Application Disadvanta	ges	
O-rings, rubber seals and custom molded rubber components for: » seals (static) for extreme temperature applications » food applications » medical devices » FDA applications	» typically not good for dynamic seals friction properties and poor abrasion resis		
POLYURETHANE (AU) (EU)			
Millable polyurethane exhibits excellent abrasion resistance and tensile	Temperature Range (dry	y heat)	



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strength as compared to other elastomers providing superior performance in hydraulic applications with high pressures, abrasive contamination and shock loads. Fluid compatibility is similar to that of nitrile at	low	high	
temperatures up to approximately 175 °F. At higher temperatures, polyurethane has a tendency to soften and lose both strength and fluid		175 °F 79 °C	
resistance advantages over other elastomers.	Application Advantages		
	 » excellent strength and abrasion resistance » good resistance to petroleum oils » good weather resistance 		
Primary Uses	Application Disadvantag	ges	
O-rings, rubber seals and custom molded rubber components for: » seals for high hydraulic pressure » highly stressed parts subject to wear	» poor resistance to wate » poor high temperature		
STYRENE BUTADIENE (SBR)			
	Temperature Range (dry	heat)	
Styrene-Butadiene (SBR) is a copolymer of styrene and butadiene.		high	
SBR compounds have properties similar to those of natural rubber. SBRs primary custom molded application is the use in hydraulic brakes system		212 °F 100 °C	
seals and diaphragms, with the major of the industry usage coming from	Application Advantages		
the Tire Industry. SBR features excellent resistance to brake fluids, and good water resistance.	» good resistance to brak » good resistance to water	er	
Primary Uses	Application Disadvantag	ges	
O-rings, rubber seals and custom molded rubber components for: » hydraulic brake systems seals and diaphragms » plumbing applications	» poor weather resistanc » poor petroleum oil and		
ETHYLENE ACRYLIC (AEM)			
Ethylene-acrylic (Vamac ®) is a terpolymer of ethylene, methyl acrylate,	Temperature Range (dry heat)		
and an acid-containing monomer as a cure site. It exhibits properties similar to those of Polyacrylate, but with extended low temperature range and with enhanced mechanical properties.	low	high	
Ethylene-acrylic offers a high degree of oil, ozone, UV and weather resistance.	- 40 °F - 40 °C	300 °F 149 °C	
	- +v C	1 1 7 C	



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O-rings, rubber seals and custom molded rubber components for: » Automotive sealing applications. » Automotive transmissions » Power steering seals POLYACRYLATE (ACM) Polyacrylates are copolymers of ethyl and acrylates which exhibit excellent resistance to petroleum fuels and oils and can retain their purpoperties when sealing petroleum oils at continuous high temperatures up to 300 °F. These properties make polyacrylates suitable for use in automotive automatic transmissions, steering systems, and other applications where petroleum and high temperature resistance are required. Polyacrylates also exhibit resistance to cracking when exposed to ozone and sunlight. Polyacrylates are not recommended for applications where the elastomer will be exposed to brake fluids, chlorinated hydrocarbons, alcohol, or glycols. Primary Uses O-rings, rubber seals and custom molded rubber components for: » Automotive transmissions. » Automotive transmissions. » Automotive transmissions. NeOprene homopolymer of chlorobutadiene and is unusual in that it is moderately resistant to both petroleum oils and weather (ozone, UV, oxygen). This qualifies neoprene uniquely for certain sealing applications where many other materials would not be satisfactory. Primary Uses Application Disadvantages » poor compression set performance relative to NBR » lesser water resistance and low temperature performance than some other elastomers Temperature Range (dry heat) low high -40 °F -51 °C Application Advantages » poor compression set performance relative to NBR » lesser water resistance and low temperature performance than some other elastomers NEOPRENE / CHLOROPRENE (CR) Neoprene homopolymer of chlorobutadiene and is unusual in that it is moderately resistant to both petroleum oils and weather (ozone, UV, dow high -40 °F -40 °C -40 °F -40 °C	·····		•••••••	
* excellent heat aging characteristics * good dynamic property retention over a wide temperature range * resistance to transmission fluids, water, glycol mixtures, and alkalies * Application Disadvantages* O-rings, rubber seals and custom molded rubber components for: * Automotive sealing applications. * Automotive reasmissions * Automotive reasmissions * Automotive reasmissions * POLYACRYLATE (ACM) Polyacrylates are copolymers of ethyl and acrylates which exhibit excellent resistance to petroleum fuels and oils and can retain their properties when sealing petroleum oils at continuous high temperatures up to 300 °F. These properties make polyacrylates suitable for use in applications where petroleum and high temperature resistance are required. Polyacrylates also exhibit resistance to cracking when exposed to ozone and sunlight. Polyacrylates are not recommended for applications where the elastomer will be exposed to brake fluids, chlorinated hydrocarbons, alcohol, or glycols. Primary Uses O-rings, rubber seals and custom molded rubber components for: * Automotive transmissions. * Temperature Range (dry heat) * Polyacrylates are not recommended for applications where the elastomer * resists flex cracking * good ozone resistance * good heat resistance * good heat resistance * propertion of the prop		Application Advantages	}	
O-rings, rubber seals and custom molded rubber components for: » Automotive sealing applications. » Automotive transmissions » Power steering seals POLYACRYLATE (ACM) Polyacrylates are copolymers of ethyl and acrylates which exhibit excellent resistance to petroleum fuels and oils and can retain their purpoperties when sealing petroleum oils at continuous high temperatures up to 300 °F. These properties make polyacrylates suitable for use in automotive automatic transmissions, steering systems, and other applications where petroleum and high temperature resistance are required. Polyacrylates also exhibit resistance to cracking when exposed to ozone and sunlight. Polyacrylates are not recommended for applications where the elastomer will be exposed to brake fluids, chlorinated hydrocarbons, alcohol, or glycols. Primary Uses O-rings, rubber seals and custom molded rubber components for: » Automotive transmissions. » Automotive transmissions. » Automotive transmissions. NeOprene homopolymer of chlorobutadiene and is unusual in that it is moderately resistant to both petroleum oils and weather (ozone, UV, oxygen). This qualifies neoprene uniquely for certain sealing applications where many other materials would not be satisfactory. Primary Uses Application Disadvantages » poor compression set performance relative to NBR » lesser water resistance and low temperature performance than some other elastomers Temperature Range (dry heat) low high -40 °F -51 °C Application Advantages » poor compression set performance relative to NBR » lesser water resistance and low temperature performance than some other elastomers NEOPRENE / CHLOROPRENE (CR) Neoprene homopolymer of chlorobutadiene and is unusual in that it is moderately resistant to both petroleum oils and weather (ozone, UV, dow high -40 °F -40 °C -40 °F -40 °C		 » excellent heat aging characteristics » good dynamic property retention over a wide temperature range » resistance to transmission fluids, water, glycol 		
Naturomotive sealing applications. **Automotive transmissions **Power steering seals **Polyacrylates are copolymers of ethyl and acrylates which exhibit excellent resistance to petroleum fuels and oils and can retain their properties when sealing petroleum oils at continuous high temperatures up to 300 °F. These properties make polyacrylates suitable for use in automotive automatic transmissions, steering systems, and other applications where petroleum and high temperature resistance are required. Polyacrylates also exhibit resistance to cracking when exposed to ozone and sunlight. Polyacrylates are not recommended for applications where the elastomer will be exposed to brake fluids, chlorinated hydrocarbons, alcohol, or glycols. Primary Uses O-rings, rubber seals and custom molded rubber components for: **Automotive transmissions. **Automotive transmissions.** **Application Disadvantages* **Poor compression set performance relative to NBR* **Neoprene homopolymer of chlorobutadiene and is unusual in that it is moderately resistant to both petroleum oils and weather (ozone, UV, applications where many other materials would not be satisfactory. **Temperature Range (dry heat)* **Indicate the properties which exhibit termination their properties when sealing and can retain their low high tows and can retain their properties when sealing and can retain their properties when sealing and can retain their low high tows and can retain their low high tows and can retain their low high tows and of the ship of the properties when sealing and can retain their low high tows and of the properties when sealing and can retain their low high tows and of the properties when sealing and can retain their low high tows and of the properties when sealing and can retain their low high tows and of the properties when sealing and can retain their low high temperature sealing and of the p	Primary Uses	Application Disadvanta	ges	
Polyacrylates are copolymers of ethyl and acrylates which exhibit excellent resistance to petroleum fuels and oils and can retain their properties when sealing petroleum oils at continuous high temperatures up to 300 °F. These properties make polyacrylates suitable for use in automotive automatic transmissions, steering systems, and other applications where petroleum and high temperature resistance are required. Polyacrylates also exhibit resistance to cracking when exposed to ozone and sunlight. Polyacrylates are not recommended for applications where the elastomer will be exposed to brake fluids, chlorinated hydrocarbons, alcohol, or glycols. Primary Uses O-rings, rubber seals and custom molded rubber components for: » Automotive transmissions. » Automotive steering systems Primary Uses O-prings, rubber seals and custom molded rubber components for: » Automotive steering systems NEOPRENE / CHLOROPRENE (CR) Neoprene homopolymer of chlorobutadiene and is unusual in that it is moderately resistant to both petroleum oils and weather (ozone, UV, oxygen). This qualifies neoprene uniquely for certain sealing applications where many other materials would not be satisfactory. Temperature Range (dry heat) high high high high high high high high high 60 °F 51 °C Application Advantages » petroleum fuel and oil resistance » resists flex cracking » good ozone resistance » good heat resistance » good heat resistance » poor compression set performance relative to NBR » lesser water resistance and low temperature performance than some other elastomers NEOPRENE / CHLOROPRENE (CR) Neoprene homopolymer of chlorobutadiene and is unusual in that it is moderately resistant to both petroleum oils and weather (ozone, UV, oxygen). This qualifies neoprene uniquely for certain sealing applications where many other materials would not be satisfactory.	O-rings, rubber seals and custom molded rubber components for: » Automotive sealing applications. » Automotive transmissions » Power steering seals	fluid, aromatic hydrocarbons or phosph		
Polyacrylates are copolymers of ethyl and acrylates which exhibit properties when sealing petroleum fuels and oils and can retain their properties when sealing petroleum oils at continuous high temperatures up to 300 °F. These properties make polyacrylates suitable for use in automotive automatic transmissions, steering systems, and other applications where petroleum and high temperature resistance are required. Polyacrylates also exhibit resistance to cracking when exposed to ozone and sunlight. Polyacrylates are not recommended for applications where the elastomer will be exposed to brake fluids, chlorinated hydrocarbons, alcohol, or glycols. Primary Uses O-rings, rubber seals and custom molded rubber components for: » Automotive transmissions. » Automotive transmissions. » Automotive steering systems NEOPRENE / CHLOROPRENE (CR) Neoprene homopolymer of chlorobutadiene and is unusual in that it is moderately resistant to both petroleum oils and weather (ozone, UV, oxygen). This qualifies neoprene uniquely for certain sealing applications where many other materials would not be satisfactory. Application Advantages **petroleum fuel and oil resistance **protroleum fuel a	POLYACRYLATE (ACM)			
excellent resistance to petroleum fuels and oils and can retain their properties when sealing petroleum oils at continuous high temperatures up to 300 °F. These properties make polyacrylates suitable for use in automotive automatic transmissions, steering systems, and other applications where petroleum and high temperature resistance are required. Polyacrylates also exhibit resistance to cracking when exposed to ozone and sunlight. Polyacrylates are not recommended for applications where the elastomer will be exposed to brake fluids, chlorinated hydrocarbons, alcohol, or glycols. Primary Uses O-rings, rubber seals and custom molded rubber components for: » Automotive transmissions. » Automotive transmissions. » Automotive steering systems NEOPRENE / CHLOROPRENE (CR) Neoprene homopolymer of chlorobutadiene and is unusual in that it is moderately resistant to both petroleum oils and weather (ozone, UV, oxygen). This qualifies neoprene uniquely for certain sealing applications where many other materials would not be satisfactory. In this qualifies neoprene uniquely for certain sealing applications where many other materials would not be satisfactory. In this qualifies neoprene uniquely for certain sealing applications where many other materials would not be satisfactory.	Dalvacrylates are conclumers of athyl and acrylates which exhibit	Temperature Range (dry	heat)	
automotive automatic transmissions, steering systems, and other applications where petroleum and high temperature resistance are required. Polyacrylates also exhibit resistance to cracking when exposed to ozone and sunlight. Polyacrylates are not recommended for applications where the elastomer will be exposed to brake fluids, chlorinated hydrocarbons, alcohol, or glycols. Primary Uses Application Disadvantages Porings, rubber seals and custom molded rubber components for: » Automotive transmissions. » Automotive steering systems NEOPRENE / CHLOROPRENE (CR) Neoprene homopolymer of chlorobutadiene and is unusual in that it is moderately resistant to both petroleum oils and weather (ozone, UV, applications where many other materials would not be satisfactory. Application Advantages » petroleum fuel and oil resistance » resists flex cracking » good ozone resistance » good heat resistance » poor compression set performance relative to NBR » lesser water resistance and low temperature performance than some other elastomers Temperature Range (dry heat) low high oxygen). This qualifies neoprene uniquely for certain sealing applications where many other materials would not be satisfactory.	excellent resistance to petroleum fuels and oils and can retain their properties when sealing petroleum oils at continuous high temperatures	low	high	
Application Advantages **petroleum fuel and oil resistance** **petroleum fuel and oil resistance** **pressit flex cracking** **pressit flex cra	automotive automatic transmissions steering systems and other	-60 °F		
Polyacrylates also exhibit resistance to cracking when exposed to ozone and sunlight. Polyacrylates are not recommended for applications where the elastomer will be exposed to brake fluids, chlorinated hydrocarbons, alcohol, or glycols. Primary Uses O-rings, rubber seals and custom molded rubber components for: Automotive transmissions. Automotive steering systems PROPRENE / CHLOROPRENE (CR) Neoprene homopolymer of chlorobutadiene and is unusual in that it is moderately resistant to both petroleum oils and weather (ozone, UV, oxygen). This qualifies neoprene uniquely for certain sealing applications where many other materials would not be satisfactory. Petroleum fuel and oil resistance * petroleum fuel and oil resistance * resists flex cracking * good ozone resistance * poor compression set performance relative to NBR * lesser water resistance and low temperature performance than some other elastomers * Poor compression set performance relative to NBR * lesser water resistance and low temperature performance than some other elastomers * Poor compression set performance relative to NBR * lesser water resistance and low temperature performance than some other elastomers * Poor compression set performance relative to NBR * lesser water resistance and low temperature performance than some other elastomers * Poor compression set performance relative to NBR * lesser water resistance and low temperature performance than some other elastomers * Poor compression set performance relative to NBR * lesser water resistance and low temperature performance than some other elastomers * Poor compression set performance relative to NBR * lesser water resistance and low temperature performance than some other elastomers * Poor compression set performance relative to NBR * lesser water resistance and low temperature performance than some other elastomers * Poor compression set performance relative to NBR * lesser water resistance and low temperature performance than some other elastomers * Poor compre	applications where petroleum and high temperature resistance are			
O-rings, rubber seals and custom molded rubber components for: » Automotive transmissions. » Automotive steering systems NEOPRENE / CHLOROPRENE (CR) Neoprene homopolymer of chlorobutadiene and is unusual in that it is moderately resistant to both petroleum oils and weather (ozone, UV, oxygen). This qualifies neoprene uniquely for certain sealing applications where many other materials would not be satisfactory. Neoprene homopolymer of chlorobutadiene and is unusual in that it is moderately resistant to both petroleum oils and weather (ozone, UV, oxygen). This qualifies neoprene uniquely for certain sealing applications where many other materials would not be satisfactory. Neoprene homopolymer of chlorobutadiene and is unusual in that it is moderately resistant to both petroleum oils and weather (ozone, UV, oxygen). This qualifies neoprene uniquely for certain sealing applications where many other materials would not be satisfactory.	Polyacrylates also exhibit resistance to cracking when exposed to ozone and sunlight. Polyacrylates are not recommended for applications where the elastomer will be exposed to brake fluids, chlorinated hydrocarbons, alcohol, or	» petroleum fuel and oil » resists flex cracking » good ozone resistance	resistance	
NBR Automotive transmissions. Automotive steering systems NEOPRENE / CHLOROPRENE (CR) Neoprene homopolymer of chlorobutadiene and is unusual in that it is moderately resistant to both petroleum oils and weather (ozone, UV, oxygen). This qualifies neoprene uniquely for certain sealing applications where many other materials would not be satisfactory. NBR NBR NBR Temperature Range (dry heat) low high -40 °F -40 °F -40 °F -40 °C 121°C	Primary Uses	Application Disadvanta	ges	
Neoprene homopolymer of chlorobutadiene and is unusual in that it is moderately resistant to both petroleum oils and weather (ozone, UV, oxygen). This qualifies neoprene uniquely for certain sealing applications where many other materials would not be satisfactory. Temperature Range (dry heat) low high - 40 °F - 40 °F - 40 °C 121°C	O-rings, rubber seals and custom molded rubber components for: » Automotive transmissions. » Automotive steering systems	NBR » lesser water resistance and low temperature		
moderately resistant to both petroleum oils and weather (ozone, UV, low high oxygen). This qualifies neoprene uniquely for certain sealing applications where many other materials would not be satisfactory. April 1	NEOPRENE / CHLOROPRENE (CR)			
moderately resistant to both petroleum oils and weather (ozone, UV, low high oxygen). This qualifies neoprene uniquely for certain sealing applications where many other materials would not be satisfactory. April 10	Neoprene homopolymer of chlorobutadiene and is unusual in that it is	Temperature Range (dry		
applications where many other materials would not be satisfactory 40°C 121°C	moderately resistant to both petroleum oils and weather (ozone, UV,	low		
NT ' 1 'C' 1 1 1 1 1 1 1	applications where many other materials would not be satisfactory.			
Application Advantages	Neoprene is classified as a general purpose elastomer which has	Application Advantages		



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relatively low compression set, good resilience and abrasion, and is flex cracking resistant. Neoprene has excellent adhesion qualities to metals for rubber to metal bonding applications. It is used extensively for sealing refrigeration fluids due to its excellence resistance to Freon® and ammonia.	» moderate resistance to » good resistance to ozo	one, UV, oxygen	
Primary Uses	Application Disadvantages		
O-rings, rubber seals and custom molded rubber components for: » refrigeration industry applications » general purpose seals, hose and wire	» moderate water resista » not effective in solven		
FLUOROCARBON (FKM)			
Fluorocarbon exhibits resistance to a broader range of chemicals combined with very good high temperature properties more so than any			
of the other elastomers. It is the closest available approach to a universal	low	high	
elastomer for sealing in the use of o-rings and other custom seals over other types of elastomers.	, a	390 °F	
Fluorocarbons are highly resistant to swelling when exposed to gasoline	- 15 °C	199 °C	
as well as resistant to degradation due to expose to UV light and ozone.	Application Advantages		
When exposed to low temperatures, fluorocarbon elastomers can become			
quite hard (-4 °F) but can be serviceable at low temperatures, although			
FKM compounds are not recommended for applications requiring good			
low temperature flexibility.	» good compression set resistance		
In addition to standard FKM materials, a number of special materials are	Application Disadvantages		
available with differing monomer compositions and fluorine content (65% to 71%) for improved low temperature, high temperature, or	» poor low temperature flexibility		
chemical resistance performance.	» poor resistance to hot water and steam		
Fluorocarbons exhibit low gas permeability making them well suited for	Modifications		
hard vacuum service and many formulations are self-extinguishing. FKM materials are not generally recommended for exposure to hot water, steam, polar solvents, low molecular weight esters and ethers, glycol based brake fluids, or hot hydrofluoric or chlorosulfonic acids.	» differing monomer compositions and fluorine content (65% to 71%) for improved low temperature, high temperature, or chemical resistance performance		
Primary Uses	Specialized Application	S	
O-rings, rubber seals and custom molded rubber components for » Automotive fuel handling » Aircraft engine seals » High temperature applications requiring good compression set » General industrial seals and gaskets	GFLT, GBLT, GLT, ETI	oolymer of fluorinated	
ETHYLENE-PROPYLENE (EPDM)			
Ethylene-propylene compounds are prepared from ethylene and	Temperature Range (dry	heat)	
propylene (EPM) and usually a third monomer (EPDM). These		high	
compounds are used frequently to seal in brake systems, and for sealing	-60 °F	300 °F	
hot water and steam. Ethylene propylene compounds have good	-51 °C	149 °C	
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resistance to mild acids, detergents, alkalis, silicone oils and greases,	Application Advantages		
ketones, and alcohols. They are not recommended for applications with petroleum oils, mineral oil, di-ester lubricants, or fuel exposure. Ethylene Propylene has gained wide seal industry acceptance for its	» good low temperature flexibility » excellent chemical resistance		
excellent ozone and chemical resistance properties and is compatible with many polar fluids that adversely affect other elastomers.	Application Disadvantages		
EPDM compounds are typically developed with a sulfur or peroxide cure	» poor petroleum oil and solvent resistance		
system. Peroxide-cured compounds are suitable for higher temperature	Modifications		
exposure and typically have improved compression set performance.	» sulfur-cured and pero » third comonomer EP and propylene EPM	xide-cured compounds DM, copolymer ethylene	
Primary Uses	Specialized Application	ıs	
O-rings, rubber seals and custom molded rubber components for: » Water system seals, faucets, etc. » Brake systems » Ozone exposure applications » Automotive cooling systems » General Industrial Use	» glycol-based brake sy » FDA approved applic » NBR NSF standard applications » NBR WRc, KTW was	ations d 61 for potable water	
HYDROGENATED NITRILE (HNBR)			
	Temperature Range (dry heat)		
	low	high	
HNBR is created by partially or fully hydrogenating NBR. The	-22 °F -30 °C	300 °F 149 °C	
hydrogenating process saturates the polymeric chain with accompanying			
improvements to the ozone, heat and aging resistance of the elastomer and improves overall mechanical properties. HNBR, like Nitrile, increasing the acrylonitrile content increase resistance to heat and petroleum based oils and fuels, but decreases the	 » excellent heat and oil resistance » improved fuel and ozone resistance (approximately 5X) over Nitrile » abrasion resistance 		
low temperature performance.	Application Disadvantages		
	 increased cold flow with hydrogenation decreased elasticity at low temperatures with hydrogenation over standard nitrile 		
Primary Uses	Modifications		
O-rings, rubber seals and custom molded rubber components for: » Oil resistant applications » Oil well applications » Fuel systems, automotive, marine, and aircraft » General Industrial Use	» acrylonitrile content (» peroxide vs. sulfur do	ACN) from 18% to 50% onor cure system	
NITRILE (NBR)			
Nitrile is the most widely used elastomer in the seal industry. The popularity of nitrile is due to its excellent resistance to petroleum	Temperature Range (dr	y heat) high	
F i	1-0	0- 	



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products and its ability to be compounded for service over a temperature range of -22°F to 212°F. Nitrile is a copolymer of butadiene and acrylonitrile. Variation in proportions of these polymers is possible to accommodate specific requirements. An increase in acrylonitrile content increases resistance to heat plus petroleum base oils and fuels but decreases low temperature flexibility. Military AN and MS O ring specifications require nitrile compounds with low acrylonitrile content to insure low temperature performance. Nitrile provides excellent compression set, tear, and abrasion resistance. The major limiting properties of nitrile are its poor ozone and weather resistance and moderate heat resistance, but in many application these are not limiting factors.	-30 °C 100 °C Application Advantages » excellent compression set, » superior tear resistance » abrasion resistance Application Disadvantages » poor weather resistance » moderate heat resistance	stem
Primary Uses	Specialized Applications	
O-rings, rubber seals and custom molded rubber components for: » Oil resistant applications » Low temperature applications » Fuel systems, automotive, marine, and aircraft » General Industrial Use	 » NBR NSF standard 61 for papplications » NBR WRc, KTW water application » NBR FDA white list compounds 	ions