

HYDRAULIC SEALS

Introduction of High polymer material

PTFE and filled PTFE

PCTFE

UHMWPE

PEEK

Introduction of Rubber material

NBR

FKM/FPM

EPDM

Introduction of high polymer material

1. PTFE and its filling modification

The melting point of PTFE is 327 °C, density is 2.18 ~ 2.3g/cm³, and shore hardness is D50 to D65, it has excellent chemical stability and self lubrication, it is the most widely used and the most variety of fluorine plastics. It has excellent overall performance. For example, resistant to high and low temperature, corrosion resistance, aging resistance, non adhesion, high insulation, high lubrication, no poison. However, PTFE has poor creep resistance, poor wear resistance, and large expansion coefficient. Therefore, it is usually necessary to overcome these defects by filling and modifying. Commonly used fillers are bronze, carbon fiber, glass fiber, graphite, MoS₂, polybenzoate, PEEK and so on. According to different conditions and uses, it can be filled with one or more of the material.

Pure PTFE products

Pure PTFE can be machined into support rings, back up rings, and other seals, with high temperature resistance, corrosion resistance, self-lubricating characteristics. But prone to creep and cause leakage under load, it's usually used in food, pharmaceutical and chemical industries.

Bronze filled PTFE products

Bronze is the most commonly used filler for PTFE, and the PTFE sealing modified by filling bronze has improved greatly in pressure resistance, wear resistance, thermal conductivity and creep resistance. For different performance requirements, different bronze composition, particle size and filling ratio can be chosen to meet the actual demand. The product is usually used to make wear rings, wear strips, oil cylinder seals and so on. The bronze may be corroded under strong acid conditions, so it is not recommended for use in strong acid conditions.

Carbon fiber filled PTFE products

The PTFE seal modified by carbon fiber has greatly improved the pressure resistance, wear resistance, creep resistance and tensile strength, meanwhile improved the hardness of the products, and suitable for rotary sealing, usually used for the production of spring energized seals, automobile transmission oil rings and so on. Carbon fibers may be oxidized and decomposed in a strong acid environment, so they are not recommended for use in strong acid conditions.

Glass fiber filled PTFE products

It has greatly improved in pressure resistance, wear resistance, creep resistance and tensile strength after filled the glass fiber for modified PTFE seal, meanwhile improved the hardness of the product, and suitable for rotary seal. Usually used for the production of back up rings, spring energized seals, automobile transmission oil rings and so on. Glass fiber may decompose in alkaline conditions, so it is not recommended for use in alkaline or water containing conditions.

Graphite or MoS2 modified filled PTFE products

The main purpose of filling graphite or MoS2 modification is to improve the pressure resistance, wear resistance, creep resistance and maintain the maximum low friction coefficient of PTFE and self lubrication characteristics. Usually filled with other fillers and can be individually filled, mainly used in the manufacture of spring energized seals, air cylinder seal, self-lubricating shaft sleeve and so on. Applicable to the condition of low friction coefficient or inconvenient to add lubricant.

Polybenzoate or PEEK filled PTFE products

It has greatly improved in pressure resistance, wear resistance, creep resistance and high temperature resistance after filled the Polybenzoate or PEEK, and especially has greatly improved the toughness and hardness in the high temperature environment. Suitable for the static seal, the dynamic seal and the self lubrication piston rings of the compressor for long time working in the high temperature environment.

2. PCTFE

The melting point of PCTFE is 210 ~ 230 °C, density is 2.1 ~ 2.18g/cm³, and shore hardness is D75 ~ D90, PCTFE has excellent rigidity and corrosion resistance, and its mechanical properties are superior to PTFE at room temperature, and it has high compression strength and small cold flow. It has a higher rebound rate at low temperature and has a good elastic restoring force, and maintain a certain degree of elasticity at -265 °C, it is one of the best material for ultra-low temperature combination property of polymers.

PCTFE is a crystalline polymer, so its mechanical properties are greatly affected by temperature, and it will be a certain difference base on different crystallinity and molecular weight, the tensile strength and hardness will increases with the advance of crystallization, but the elongation will decreases. Because of the poor fluidity of the melt, the grade with large molecular weight usually use compression molding and can't use extrusion molding.

PCTFE is an ideal sealing material under low temperature and high pressure conditions, it can be used for a long time in the range of -200 ~ 125 °C. PCTFE seals are of special use in the field of high and new technology, recommended for use in liquid oxygen, liquid nitrogen, liquefied natural gas and other low temperature conditions in the pipe, pumps, valves, joints and other fields.

3. UHMWPE

The melting point of UHMWPE is $130 \sim 136^{\circ}\text{C}$, density is 0.94g/cm^3 , and shore hardness is D40 \sim D60. It combines almost all of the advantages of plastic materials, impact resistance, wear resistance, chemical corrosion resistance, low friction coefficient, good self-lubricating performance. And it has excellent mechanical properties in ultra-low temperature environment, still has high impact property at -70°C , still maintain toughness and strength at -196°C , it hardly absorbent and non-swelling. It has better wear resistance and creep resistance than PTFE material, the mortar wear test proved that abrasion resistance of UHMWPE can reach 6.6 times of ordinary carbon steel.

The molecular weight of UHMWPE is less than 5 million and can be extruded molding after technical processing, the molecular weight of UHMWPE which is more than 5 million only can do compression molding.

The long term working temperature range of UHMWPE seals is $-180^{\circ}\text{C} \sim 70^{\circ}\text{C}$. Recommended for the working condition of high sliding performance requirements or poor lubrication, high wear resistance or prone to dry friction of water in mediums, also usually used in ultra-low temperature sealing environment. Its disadvantage is lack of tensile strength, poor high temperature resistance, low hardness and low thermal conductivity.

4. PEEK

The melting point of PEEK is 334°C , density is $1.265 \sim 1.32\text{g/cm}^3$, and shore hardness is D82 \sim D90, tensile Strength is higher than 92MPa. PEEK is a kind of special polymer material. It has high mechanical strength, high temperature resistance, impact resistance, flame retardant, acid and alkali resistance, hydrolysis resistance, wear resistance, fatigue resistance, radiation resistance and good electrical insulation performance. PEEK resin has high temperature performance and high melting point. The continuous use temperature can reach 260°C , and the load thermal deformation temperature up to 316°C after adding glass fiber or carbon fiber. PEEK resin has good toughness and rigidity, and it has excellent fatigue tolerance to the strain force, which is comparable to the alloy material.

Because of its excellent resistance to high temperature, self lubrication, wear resistance and fatigue resistance, it has become one of the most popular high performance engineering plastics. It is mainly used in aerospace, automotive industry, electronic and electrical, medical equipment and other fields.

PEEK has good mechanical properties, high temperature resistance, wear resistance and high pressure resistance, so it is commonly used to make compressor valve plate, piston rings, high temperature seals, sliding bearings and so on.

1. NBR

NBR is a kind of synthetic rubber produced by low temperature emulsion polymerization of butadiene and acrylonitrile, it has excellent oil resistance, high wear resistance, water resistance, air tightness and good bonding properties. NBR used in the range of $-30^{\circ}\text{C} \sim 100^{\circ}\text{C}$, and the service life will decrease when it is used at 120°C . It is widely used in the production of a variety of oil-resistant rubber products, O-Ring, washers, casing, cable plastic materials, etc. It is also an essential elastic material in the automotive, aviation, oil and other industries.

The disadvantages of NBR are low temperature resistance, poor ozone resistance, low insulation performance and low elasticity.













2. VITON (FKM/FPM)

Viton rubber is a synthetic rubber containing with fluorine atom. It has the characteristics of high temperature resistance, oil resistance, media resistance, and variety of chemical erosion resistance. And it has high chemical stability, which has the best performance for media resistant in one of the elastomer at present. The application for temperature ranges is from -20°C to 200°C . The low temperature ranges are from -15°C to -20°C for dynamic sealing. It's mainly used for producing oil seals, O-Rings, back up rings, O-Ring cords, rubber sheets, sealing rings and so on. The disadvantages of viton is poor performance for low temperature resistance and density is large.













3. EPDM

EPDM is a ternary polymer of Ethylene, Propylene, and Non-conjugated Diolefins. The main polymer chains are fully saturated, so that it can resist heat, light, oxygen, especially for ozone. It has high performances for oxidation resistance, weather resistance, electricity insulated, chemical corrosion resistance, attacked elasticity. It's mainly applied for the industry of oxygen resistant, water resistant, corrosion resistant and electrical insulation, for producing heat resistant conveyor belts, cables, antiseptic lining, sealing gaskets, door and window seals, and plastic modification and so on.








Rod Seals Series

Type	Figure	Technical Data			Application	Material	Action	Page
		Temp. Range °C	Speed ≤m/s	Pressure ≤MPa				
GSJ		-45/+200	15	60	Hydraulic equipment Standard cylinders General Machinery Machine tools	NBR/PTFE FKM/PTFE	Single	12
RSJ		-45/+200	15	60	Hydraulic equipment Standard cylinders General Machinery	NBR/PTFE FKM/PTFE	Single	Refer to GSJ
GSI		-45/+200	15	60	Hydraulic equipment Standard cylinders General Machinery Machine tools	NBR/PTFE FKM/PTFE	Double	18
GZT		-30/+200	15	60	Injection machine Valve Machine tools	NBR/PTFE FKM/PTFE	Double	Refer to GSI
GSW		-30/+200	15	60	Hydraulic equipment Standard cylinders Machine tools	NBR/PTFE FKM/PTFE	Single	24
GSJ-W		-30/+100	5	60	Heavy duty cylinders General Machinery Machine tools	NBR/PTFE FKM/PTFE	Single	27
TDI		-30/+100	1	45	Standard hydraulic cylinders	NBR/PTFE Polymer	Single	31
RDI		-30/+100	1	45	Standard hydraulic cylinders	NBR/PTFE Polymer	Double	34
MDI		-30/+100	1	25	Standard hydraulic cylinders	NBR/PTFE Polymer	Double	38
SPN		-30/+200	1.5	35	Standard hydraulic cylinders Construction machinery	NBR/PTFE FKM/PTFE	Double	41
SPNC		-30/+200	1.5	35	Standard hydraulic cylinders Construction machinery	NBR/PTFE FKM/PTFE	Double	43
SPNO		-30/+200	1.5	35	Standard hydraulic cylinders Construction machinery	NBR/PTFE FKM/PTFE	Double	47





Piston Seals Series

Type	Figure	Technical Data			Application	Material	Action	Page
		Temp. Range °C	Speed ≤m/s	Pressure ≤MPa				
GSF		-45/+200	15	60	Hydraulic equipment Standard cylinders General Machinery Machine tools	NBR/PTFE FKM/PTFE	Double	50
GSD		-45/+200	15	60	Hydraulic equipment Standard cylinders General Machinery Machine tools	NBR/PTFE FKM/PTFE	Single	56
DPT		-45/+200	15	60	Hydraulic equipment Injection machine Machine tools	NBR/PTFE FKM/PTFE	Double	Refer to GSF
SPG		-30/+200	1.5	35	Standard hydraulic cylinders Construction machinery	NBR/PTFE FKM/PTFE	Double	61
SPGC		-30/+200	1.5	35	Standard hydraulic cylinder Construction machinery	NBR/PTFE FKM/PTFE	Double	64
SPGO		-30/+200	1.5	35	Standard hydraulic cylinders Construction machinery	NBR/PTFE FKM/PTFE	Double	68
DPO		-30/+200	1.5	35	Standard hydraulic cylinders Construction machinery	NBR/PTFE FKM/PTFE	Double	71
DAQ		-30/+200	2	40	Standard hydraulic cylinders Accumulator Hydraulic press	NBR/PTFE FKM/PTFE	Double	74
DAQ2		-30/+200	3	60	Standard hydraulic cylinders Accumulator Hydraulic press	NBR/PTFE FKM/PTFE	Double	78
GSF-W		-30/+100	5	60	Standard hydraulic cylinders Heavy duty cylinder	NBR/PTFE FKM/PTFE	Double	81
GSD-W		-30/+100	5	60	Standard hydraulic cylinder Heavy duty cylinder	NBR/PTFE FKM/PTFE	Single	Refer to GSF-W
DDKK		-30/+200	1	45	Standard hydraulic cylinders Heavy duty cylinder	NBR/PTFE Polymer	Double	85






Piston Seals Series

Type	Figure	Technical Data			Application	Material	Action	Page
		Temp. Range °C	Speed ≤m/s	Pressure ≤MPa				
DKDF		-30/+200	1	45	Standard hydraulic cylinders Heavy duty cylinders	NBR/PTFE Polymer	Double	88
DGDA		-30/+100	1	45	Standard hydraulic cylinders	NBR/PTFE Polymer	Double	91
SPGW		-30/+100	1.5	40	Standard hydraulic cylinders Construction machinery Heavy duty cylinders	NBR/PTFE Polymer	Double	94
TPM/DBM		-30/+120	0.5	35	Standard hydraulic cylinders	NBR/PTFE Polymer	Double	97
OK		-30/+110	1	80	Heavy duty cylinders	NBR/therm - oplast	Double	101
DDA		-30/+100	1	45	Standard hydraulic cylinders	NBR/PTFE Polymer	Single	104
DDMA		-30/+100	1	25	Standard hydraulic cylinders	NBR/PTFE Polymer	Double	107





Rotary Seals Series

Type	Figure	Technical Data			Application	Material	Action	Page
		Temp. Range °C	Speed ≤m/s	Pressure ≤MPa				
GNS		-30/+200	1	30	Rotary distributor Standard hydraulic cylinder Machine tool	NBR/PTFE FKM/PTFE	Rotary	110
GRS		-30/+200	1	30	Rotary distributor Standard hydraulic cylinder Machine tool	NBR/PTFE FKM/PTFE	Rotary	114
OI		-35/+100	0.5	35	Rotary distributor Standard hydraulic cylinder Machine tool	NBR/PTFE FKM/PTFE	Rotary	118
OA		-35/+100	0.5	35	Rotary distributor Standard hydraulic cylinder Machine tool	NBR/PTFE FKM/PTFE	Rotary	121

























Scraper Seals Series



















Type	Figure	Technical Data			Application	Material	Action	Page
		Temp. Range °C	Speed ≤m/s	Pressure ≤MPa				
GSZ		-30/+200	5	-	Hydraulic equipment Ceramic machinery machine tool	NBR/PTFE FKM/PTFE	Single	124
GSZ2		-30/+200	5	-	Hydraulic equipment Ceramic machinery machine tool	NBR/PTFE FKM/PTFE	Single	128
DPT1		-30/+200	5	-	Hydraulic equipment Injection machine	NBR/PTFE FKM/PTFE	Single	132
DPT2		-30/+200	5	-	Hydraulic equipment Injection machine	NBR/PTFE FKM/PTFE	Single	136
KZT		-50/+200	1.5	-	Construction machinery	PTFE	Double	139

Bearing Elements Series

Type	Figure	Technical Data			Application	Material	Action	Page
		Temp. Range °C	Speed ≤m/s	Pressure ≤MPa				
GST		-60/+230	15	-	Standard hydraulic cylinder Ceramic machinery Heavy duty cylinder	PTFE	Guiding	142
DFI		-55/+255	3	-	Hydraulic equipment Ceramic machinery	PTFE	Guiding	144
DFA		-55/+255	3	-	Hydraulic equipment Ceramic machinery	PTFE	Guiding	147
DFAI		-55/+255	3	-	Hydraulic equipment Ceramic machinery	PTFE	Guiding	150

Variseals Series

Standard Groove					Widen groove				
Technical Data					Technical Data				
Temp. Range℃		Speed ≤m/s		Pressure≤MPa	Temp. Range℃		Speed ≤m/s		Pressure≤MPa
-40/+260		15		45	-40/+260		15		45
Type	Code				Type	Code			
Rod and Piston	DEPA				Rod and Piston	DEPB			
Rod	DRPA				Rod	DRPB			
Piston	DEGA				Piston	DEGB			
Material		PTFE and Spring			Material		PTFE and Spring		
Application		Food machinery/General machinery			Application		Food machinery/General machinery		
Action		Single			Action		Single		
Page		153							

Rotary Variseal					Face variseal				
Technical Data					Technical Data				
Temp. Range℃		Speed ≤m/s		Pressure≤MPa	Temp. Range℃		Speed ≤m/s		Pressure≤MPa
-40/+260		15		45	-40/+260		-		45
Type	Code				Type	Code			
Equal Altitude Lips/Rod	DTVA				Inner Seal	DDVI			
High and Low Lips/Rod	DTVB				Lateral Seal	DDVO			
Material		PTFE and Spring			Material		PTFE and Spring		
Application		Standard hydraulic cylinder/General machinery			Application		Seal joint/General machinery		
Action		Rotary			Action		Static		
Page		159							