

## 1. Lubricant and chemical resistance

○: Good △: OK ×: Bad

Variety of Rubbers (ASTM abbreviation)	Oil seal materials				The other packing materials					
	Acrylonitrile Butadiene Rubber [NBR]	Hydrogenated Nitrile Butadiene Rubber [HNBR]	ACM Rubber [ACM]	FKM Rubber [FKM]	FEPD Rubber [FEPM]	Ethylene Propylene Methylene Linkage [EPDM]	Chloroprene rubber [CR]	Natural Rubber [NR]	styrene-butadiene rubber [SBR]	Silicone Rubber [VMQ]
Oil resistance	○	○	○	○	○	×	△	×	×	△
Heat resistance	×	△	○-△	○	○	△	×	×	×	○
Abrasion resistance	○	○	△	△	△	△	○	○	○	×
Chemical resistance	△	△	×	○	○	○	△	×	×	△
Ozon resistance	×	△	×	○	○	○	○	×	×	○
Others	• Good oil and abrasion resistance • Poor ozone resistance	• Excellent heat resistance	• Good heat, oil and chemicals resistance • Poor water resistance	• Good heat, oil and chemicals resistance • Poor low temperature resistance	• Better chemicals and steam resistance than FKM	• Good weather and water resistance • Poor oil resistance • Difficult to be adhered	• Good weather resistance • Fair oil and chemicals resistance	• Good low temperature and abrasion resistance • Good elasticity and mechanical properties • Poor oil and ozone resistance	• Good abrasion resistance • Poor oil resistance	• Good low temperature and heat resistance • Poor mechanical properties and fuel oil resistance
Representative products	Oil seal O-ring Packing	Oil seal Packing	Oil seal Packing	Oil seal O-ring Diaphragm	Water seal O-ring Packing	Water seal Breaking-parts	Hose Belt Packing	Tires Balls Rolls Vibration-proofing materials	Tires Belt	High-temperature seal O-ring
Enable temperature range (°C)	-20 +100	-25 +120	-20 +160	-20 +230	-10 +200	-40 +150	-30 +100	-50 +80	-40 +80	-60 +200
Lubricants/Hydraulic oil	mineral oil	○	○	○	○	×	△	×	×	×
	gear oil	○	○	○	○	×	△	×	×	×
	hydraulic oil	○	○	○	○	×	×	×	×	△
	Water - glycol	△	○	×	△	○	○	×	×	△
	organophosphate oil	×	×	×	○	○	×	×	×	△
Grease	Lithium-based grease	○	○	○	○	×	○	×	×	○
	Urease-based grease	○	○	○	△	△	×	×	×	×
	silicon-based grease	○	○	○	○	○	○	○	○	×
Fuel oil	Heavy oil	○	○	△	○	×	×	×	×	×
	Light oil	○	○	○	○	×	△	×	×	×
	Paraffin oil	○	△	○	○	△	×	×	×	×
Bath/etic	gasoline	△	○	×	○	×	×	×	×	×
	Water	○	○	×	○	○	○	○	○	○
	Ethanol	△	△	×	○	○	○	○	○	△
	Methanol	△	△	×	×	○	○	○	○	○
	Ether	△	△	×	△	△	○	×	×	△
	Ketone	×	×	×	×	△	○	△	△	○
	Acid (Hydrochloric acid)	△	△	×	×	△	○	△	△	×
Alkalee (Sodium hydroxide, etc.)	○	○	×	○	○	○	○	○	○	

※These seals may not able to be used at above temperature condition.

Material plays an important role for seals, only appropriate selection could work the seal properties out to an extreme.

※Seal properties are related to which including design structure, bonding force, seal contact surface, material, and so forth. The first factor to be decided is material selection according to the surrounding conditions, oil leak and short life cycle always result from wrong selection of material.

## 2. Materials of common oil-seals

Temperature and rotation speed are two main factors for material selection. Refer to the following table

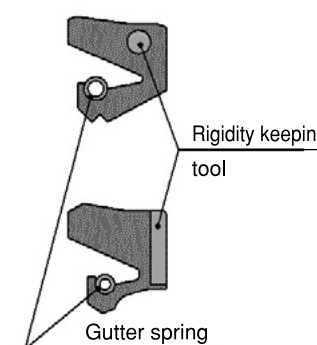
### ■ Specification of rubber materials used in oil seals

Rubber materials		NBR	HNBR	FKM	
Max. temp. for long time operation		80°C	100°C	180°C	
Physic properties	Normal test	Hardness (Duro-A)	70	70	70
		Tensile strength (MPa)	16.2	29.2	17.9
		Elongation (%)	430	300	330
	Aging test		80°C×72hours	100°C×72hours	180°C×72hours
		Hardness changed	+1	+4	0
		Percentage changed in tensile strength (%)	+6	+9	-3
Percentage changed in elongation (%)	+2	0	-9		

※For low temperature, chemical sealing or high rotation speed use, we have specialized materials for each condition. Please refer to our sales department.

## 3. Materials of metal ring

Material of the metal attached to the seal (prop ring, plate, metal ring, gutter spring, etc.) should be also selected feasible to the conditions.



Sealing materials	Metal ring	
	Rigidity keeping metal ring	Gutter spring
Oil	SWP/SPCC/SPHC	SWP
Grease	SWP/SPCC/SPHC	SWP
Pure water, sea water	SUS304	SUS304-WP
Chemical	SUS304	SUS304-WP

※※ Please select SUS316 for nonmagnetic metal ring

### ■ Types of Gutter springs

