

C. TYPES AND MAIN FEATURES OF NOK PACKINGS

- NOK provides various types of hydraulic seals, buffer rings, dust seals, and related products for reciprocating movement; rotating oil seals for high pressure; and seals for oscillating and rotating movement.
- Standard materials are offered for items in this catalog according to operating conditions.

(1) Hydraulic seals for reciprocal movement -1

Type	NOK type	Cross section	Standard material	Main applicable fluid	Feature	Dimension table (page)		
Special packing for piston seals	ODI		Iron rubber (U801)	General petroleum hydraulic fluid	• Designed for large section, applicable for wide pressure range	• Iron rubber (NOK's product name for polyurethane elastomer) U801, has excellent wear resistance and sealing ability.	61 ~ 67	
	OSI		Iron rubber (U801)		• Packings with a smaller section than ODI	69 ~ 71		
	OUIS		Iron rubber (U641)		• Designed for smaller section, and able to be fitted into integrated groove	• Heat resistant material is employed, also has a good water resistance and durability. • Improvement has been made to prevent damages caused by back pressure.	72 ~ 73	
	OUHR		Nitrile rubber (A505) (A567)	A505	• General petroleum hydraulic fluid oil • Water-glycol type hydraulic fluid oil • Oil-water emulsion type hydraulic fluid oil	• Improvement against stick slip has been made. • The friction resistance is low and an improvement has been made to prevent damages caused by back pressure. • Nitrile rubber that has excellent low temperature resistance is employed and can be used with special low temperature hydraulic fluid oil (MIL H 5606E).	74 ~ 75	
				A567	• Low temperature petroleum hydraulic fluid oil (General petroleum hydraulic fluid oil) Note: When using general petroleum-derived operating oil, we recommend A527.			
	SPG		① Sliding material Rareflon, PTFE (19YF) ② Back ring material Nitrile rubber (A980) Fluoro rubber (F201)	A980	• General petroleum hydraulic fluid oil • Water-glycol type hydraulic fluid oil • Oil-water emulsion type hydraulic fluid oil	• This is a standard type of combination seal for wide range of application.	77 ~ 80	
				F201	• General petroleum hydraulic fluid oil • Phosphate ester type hydraulic fluid oil			
	SPGW		① Sliding material Rareflon, PTFE (19YF) ② Backup ring material Polyamide resin (12NM or 80NP) ③ Back ring material Nitrile rubber (A980) Fluoro rubber (F201)	A980	• General petroleum hydraulic fluid oil • Water-glycol type hydraulic fluid oil • Oil-water emulsion type hydraulic fluid oil	• Rareflon (NOK product name of polytetrafluoro ethylene resin) is used for sliding material. This packing has low frictional resistance, eliminating stick slip and assuring high wear resistance.	• This is a seal for high pressure operation with improved ability of SPG for oil scraping off. • Backup ring material of polyamide resin assures high longevity.	81 ~ 83
				F201	• General petroleum hydraulic fluid oil • Phosphate ester type hydraulic fluid oil			
	SPGO		① Sliding material Rareflon, PTFE (19YF) ② Back ring material Nitrile rubber (A305) Fluoro rubber (F201)	A305	• General petroleum hydraulic fluid oil • Water-glycol type hydraulic fluid oil • Oil-water emulsion type hydraulic fluid oil	• Installation space is saved because of bi-directional sealing ability by single packing.	• This has the same performance as that of SPG. Installation space is saved because of JIS standard O ring.	85 ~ 87
F201				• General petroleum hydraulic fluid oil • Phosphate ester type hydraulic fluid oil				
SPGC		① Sliding material Rareflon, PTFE (31BF) ② Back ring material Nitrile rubber (A305) Fluoro rubber (F201)	A305	• General petroleum hydraulic fluid oil • Water-glycol type hydraulic fluid oil • Oil-water emulsion type hydraulic fluid oil	• This packing can be fitted on to O ring groove (JIS B 2406 P series). • This has less sliding friction than O ring to assure high longevity. • This can also be used for pneumatic equipment.	89 ~ 92		
			F201	• General petroleum hydraulic fluid oil				

TYPES AND MAIN FEATURES OF NOK PACKINGS

(1) Hydraulic seals for reciprocal movement - 2

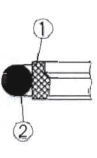
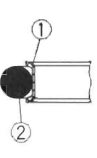






Type	NOK type	Cross section	Standard material	Main applicable fluid	Feature	Dimension table (page)			
Special packing for piston seals	OKH		Nitrile rubber (A566) (A567)	A566	<ul style="list-style-type: none"> • Installation space is saved because of bi-directional sealing ability by single packing. 	<ul style="list-style-type: none"> • Measures have been taken against stick slip. • Material with excellent cold resistance, nitrile rubber A567 is also available. This can be used for special low temperature oil (MIL H 5606E). This can also be used in combination with the BRL type. See the example of combinational use on page 51. 	—		
				A567				<ul style="list-style-type: none"> • Low temperature petroleum hydraulic fluid oil (General petroleum hydraulic fluid oil) Note: When using general petroleum-derived operating oil, we recommend A527. 	
	CPI		Iron rubber (U801)	<ul style="list-style-type: none"> • General petroleum hydraulic fluid oil 	<ul style="list-style-type: none"> • This packing is used for relatively low pressure operation. 	<ul style="list-style-type: none"> • Packing material, Iron rubber has excellent wear resistance. 	93 ~ 94		
CPH		Nitrile rubber (A102) (A103) (A104) (A505)	<ul style="list-style-type: none"> • General petroleum hydraulic fluid oil • Water-glycol type hydraulic fluid oil • Oil-water emulsion type hydraulic fluid oil 	<ul style="list-style-type: none"> • Packing material, nitrile rubber, has excellent oil resistance and reduces sliding friction. 			95 ~ 96		
Special packing for rod seals	IDI		Iron rubber (U801)		<ul style="list-style-type: none"> • General petroleum hydraulic fluid oil 	<ul style="list-style-type: none"> • Packings with large section can be used for wide range of pressure. 	<ul style="list-style-type: none"> • Packing material, Iron rubber U801 has excellent wear resistance and sealing ability. 	97 ~ 104	
	ISI		Iron rubber (U801) (U641)	<ul style="list-style-type: none"> • Packings with small section can be fitted in integrated groove. 				<ul style="list-style-type: none"> • Packing material, Iron rubber U801 has excellent wear resistance and sealing ability. 	105 ~ 107
	IUIS		Iron rubber (U801) (U641)						<ul style="list-style-type: none"> • Improvement is made to prevent damage caused by back pressure. • Heat resistant U641 is also available.
	IUH		Nitrile rubber (A505) (A567)	A505	<ul style="list-style-type: none"> • General petroleum hydraulic fluid oil • Water-glycol type hydraulic fluid oil • Oil-water emulsion type hydraulic fluid oil • Low temperature petroleum hydraulic fluid oil (General petroleum hydraulic fluid oil) Note: When using general petroleum-derived operating oil, we recommend A527. 	<ul style="list-style-type: none"> • Improvement is made to prevent the damages caused by back pressure. • Material with excellent cold resistance, nitrile rubber A567 is also available. This can be used for special low temperature oil (MIL H 5606E). 	110 ~ 111		
	A567								
	UNI		<ul style="list-style-type: none"> ① Sliding material Iron rubber (U801) ② Back ring material Silicon rubber (S813) (Combination)	<ul style="list-style-type: none"> • General petroleum hydraulic fluid oil • Low temperature petroleum hydraulic fluid oil 	<ul style="list-style-type: none"> • This packing is used for low temperature and high pressure operations. 	<ul style="list-style-type: none"> • Iron rubber is used for material and back ring can prevent the lack of interference at low temperature. 	112 ~ 113		
SPNO		<ul style="list-style-type: none"> ① Sliding material Rareflon, PTFE (19YF) ② Back ring material Nitrile rubber (A305) Fluoro rubber (F201) (Combination)	A305	<ul style="list-style-type: none"> • General petroleum hydraulic fluid oil • Water-glycol type hydraulic fluid oil • Oil-water emulsion type hydraulic fluid oil 			<ul style="list-style-type: none"> • This is a standard type of combination seal and can be used for wide range of operation. 	115 ~ 117	
			F201		<ul style="list-style-type: none"> • General petroleum hydraulic fluid oil • Phosphate ester type hydraulic fluid oil 	<ul style="list-style-type: none"> • Rareflon (NOK product name of polytetrafluoro ethylene resin) is used for sliding material. This packing has low frictional resistance, eliminating stick slip and assuring high wear resistance. 		—	
SPN		<ul style="list-style-type: none"> ① Sliding material Rareflon, PTFE (19YF) ② Back ring material Nitrile rubber (A980) Fluoro rubber (F201) (Combination)	A980	<ul style="list-style-type: none"> • General petroleum hydraulic fluid oil • Water-glycol type hydraulic fluid oil • Oil-water emulsion type hydraulic fluid oil 	<ul style="list-style-type: none"> • This has the same performance as SPNO. This is used in case the service range of pressure is wide and sliding speed is high. 		118 ~ 119		
			F201			<ul style="list-style-type: none"> • General petroleum hydraulic fluid oil • Phosphate ester type hydraulic fluid oil 	—		

Remark 1) Items with a “—” mark in the dimension table column have unique specifications. Please consult NOK before ordering since there is no dimension description.

Remark 2) Some of the packing profiles, especially small sizes, may not be fitted in the integrated groove.

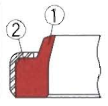
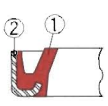

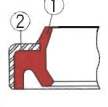
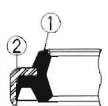
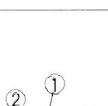

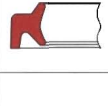
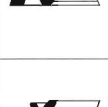

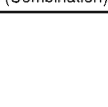
Remark 3) When using a special fluid, consult NOK.

(1) Hydraulic seals for reciprocal movement -3

Type	NOK type	Cross section	Standard material	Main applicable fluid	Feature	Dimension table (page)	
Special packing for rod seals	SPNS	 (Combination)	① Sliding material Rareflon, PTFE (55YF)	A305 • General petroleum hydraulic fluid oil • Water-glycol type hydraulic fluid oil • Oil-water emulsion type hydraulic fluid oil	• Rareflon (NOK product name of polytetrafluoro ethylene resin) is used for sliding material. This packing has low friction resistance eliminating stick slip and assuring high wear resistance.	121 ~ 123	
			② Back ring material Nitrile rubber (A305) Fluoro rubber (F201)			F201 • General petroleum hydraulic fluid oil • Phosphate ester type hydraulic fluid oil	—
	SPNC	 (Combination)	① Sliding material Rareflon, PTFE (31BF)	A305 • General petroleum hydraulic fluid oil • Water-glycol type hydraulic fluid oil • Oil-water emulsion type hydraulic fluid oil	• Rareflon (NOK product name of polytetrafluoro ethylene resin) is used for sliding material. This packing has low friction resistance eliminating stick slip and assuring high wear resistance. • Installation space is saved because of bi-directional sealing ability by single packing.	125 ~ 128	
			② Back ring material Nitrile rubber (A305) Fluoro rubber (F201)			F201 • General petroleum hydraulic fluid oil • Phosphate ester type hydraulic fluid oil	—
Packing for both piston and rod seals	UPI		Iron rubber (U801)	• General petroleum hydraulic fluid oil	• This can be used both for piston and rod seals. • This packing has large section and can be used for wide range of operations.	129 ~ 134	
	USI		Iron rubber (U593)			• This can be used both for piston and rod seals. • This packing has small section and can be fitted in integrated groove.	135 ~ 137
	UPH		Nitrile rubber (A505)	A505 • General petroleum hydraulic fluid oil • Water-glycol type hydraulic fluid oil • Oil-water emulsion type hydraulic fluid oil	• This can be used both for piston and rod seals. • This packing has large section and can be used for wide range of operations.	• Nitrile rubber and fluoro rubber are available for material to assure wide range of operating temperature. • Wide variation of size is available.	139 ~ 145
			Fluoro rubber (F357)	F357 • General petroleum hydraulic fluid oil • Phosphate ester type hydraulic fluid oil			
	USH		Nitrile rubber (A505)	A505 • General petroleum hydraulic fluid oil • Water-glycol type hydraulic fluid oil • Oil-water emulsion type hydraulic fluid oil	• This can be used both for piston and rod seals. • This packing has small section and can be fitted in integrated groove.	• This is a type with a smaller section of UPH.	147 ~ 149
			Nitrile rubber (A567)	A567 • Low temperature petroleum hydraulic fluid oil (General petroleum hydraulic fluid oil) Note: When using general petroleum-derived operating oil, we recommend A527.			—
			Fluoro rubber (F357)	F357 • General petroleum hydraulic fluid oil • Phosphate ester type hydraulic fluid oil			147 ~ 149
V99F		Fabric reinforced nitrile rubber (21AG)	21AG • General petroleum hydraulic fluid oil • Water-glycol type hydraulic fluid oil • Oil-water emulsion type hydraulic fluid oil • water	• This can be used for severe operating conditions by plying packings according to the operation pressure.	• This is a standard type of V packing.	151 ~ 155	
V96H		Nitrile rubber (A505)	A505 • General petroleum hydraulic fluid oil • Water-glycol type hydraulic fluid oil • Oil-water emulsion type hydraulic fluid oil • water	• Installation width is larger than U packings. Less sealing ability than U packings.	• Compared with V99F, this is selected in case the sealing performance is more important. • We recommend to use this in combination with V99F.	157 ~ 161	
		Fluoro rubber (F357)	F357 • General petroleum hydraulic fluid oil • Phosphate ester type hydraulic fluid oil • Agricultural chemicals			—	

TYPES AND MAIN FEATURES OF NOK PACKINGS

(2) Dust seals for reciprocal movement

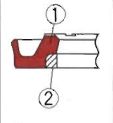
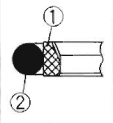
Type	NOK type	Cross section	Standard material	Main applicable fluid	Feature	Dimension table (page)	
Dust seals	DKI	 (Combination)	① Lip material Iron rubber (U801) ② Metal case material, Cold rolled steel plate sheet (SPCC)	• Outside dust	<ul style="list-style-type: none"> This is a seal to prevent entry of dust and protect equipment and maintain sealing performance of packings. 	163 ~ 165	
	DWI		① Lip material Iron rubber (U801) ② Metal case material, Cold rolled steel plate sheet (SPCC)			166 ~ 167	
	DWIR		① Lip material Iron rubber (U801) ② Metal case material, Cold rolled steel plate sheet (SPCC)			168 ~ 169	
	DKBI		① Lip material Iron rubber (U801) ② Metal case material, Cold rolled steel plate sheet (SPCC)			170 ~ 171	
	DKB		① Lip material Nitrile rubber (A795) (A980) Fluoro rubber (A975) ② Metal case material, Cold rolled steel plate sheet (SPCC)			A795	172 ~ 173
						A980	—
						F975	—
	DKH		① Lip material Nitrile rubber (A104) (A795) (A980) Fluoro rubber (A975) ② Metal case material, Cold rolled steel plate sheet (SPCC)			A104 A795	174 ~ 175
						A980	—
						F975	—
	DSI		Iron rubber (U801)			176 ~ 178	
	LBI		Iron rubber (U593)			179 ~ 180	
LBH		Nitrile rubber (A505) (A567) Fluoro rubber (F357)	A505	181 ~ 183			
			A567	—			
			F357	181 ~ 183			
LBHK		Nitrile rubber (A505) (A567)	A505	184 ~ 185			
			A567	—			
DSPB	 (Combination)	① Sliding material Rarefion, PTFE (55YF) ② Back ring material Nitrile rubber (A305) Fluoro rubber (F201)	A305	186 ~ 188			
			F201	—			

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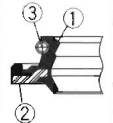
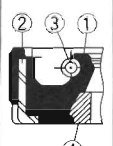
Remark 2) Some of the packing profiles, especially small sizes, may not be fitted in the integrated groove.

Remark 3) When using a special fluid, consult NOK.










(3) Buffer rings for reciprocal movement

Type	NOK type	Cross section	Standard material	Main applicable fluid	Feature	Dimension table (page)	
Buffer ring	HBY	 (Combination)	① Packing material Iron rubber (U801) (UH41) (UH05)	U801	<ul style="list-style-type: none"> • General petroleum hydraulic fluid oil 	<ul style="list-style-type: none"> • This is used in combination with rod packing to absorb the impact and fluctuating pressure at high load, to isolate high temperature fluid, and to improve the durability of the packing. 	189
			② Backup ring material Polyamide resin (12NM or 80NP)	U641			~ 190
				UH05			—
	HBT5	 (Combination)	① Sliding material Rarefion (19YF)	A626	<ul style="list-style-type: none"> • General petroleum hydraulic fluid oil • Water-glycol type hydraulic fluid oil • Oil-water emulsion type hydraulic fluid oil 	<ul style="list-style-type: none"> • This has the same function as that of HBY. • This has small friction resistance and suits for high speed, extremely short stroke operation. • A slit on the tapered surface (non-sliding surface) can leak back pressure. 	191
② Back ring material Nitrile rubber (A626) Fluoro rubber (F201)			F201	<ul style="list-style-type: none"> • General petroleum hydraulic fluid oil • Phosphate ester type hydraulic fluid oil 	~ 192		

(4) Oil seals for reciprocal movement



Type	NOK type	Cross section	Standard material	Main applicable fluid	Feature	Dimension table (page)
Seals for operation valve	SVY		① Lip material Nitrile rubber (A216) ② Metal case material Cold rolled steel plate sheet (SPCC) ③ Spring material Piano wires (SWP)	<ul style="list-style-type: none"> • General petroleum hydraulic fluid oil 	<ul style="list-style-type: none"> • This is a special seal mainly used for valve unit of industrial equipment. • This has an excellent sealing ability and low friction. 	—
Power steering seals	SCJY	 (Combination)	① Lip material Nitrile rubber (A297) ② Metal case material Cold rolled steel plate sheet (SPCC) ③ Spring material Stainless steel (SUS) ④ Backup ring Polyamide resin (60NP)	<ul style="list-style-type: none"> • General power steering fluid oil 	<ul style="list-style-type: none"> • This is a special seal mainly used for automobile power steering. • Backup ring of resin material is used to minimize lip deformation under high pressure. • Stainless steel is used for spring to maintain required interference and compression force of lip for long duration and high speed operation. 	—

(5) Relating products for reciprocal movement

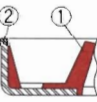
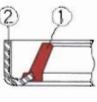
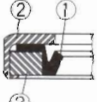
Type	NOK type	Cross section	Standard material	Main applicable fluid	Feature	Dimension table (page)
Wear rings	RYT		Rareflon, PTFE (05ZF)		<ul style="list-style-type: none"> This is used as bearing of piston to prevent its scoring or eccentricity and to improve the durability of the packings. 	193 ~ 194
	WR		Fabric reinforced phenolic resin (12RS) (15RS)	12RS 15RS		195 ~ 198
	WRT2		Rareflon, PTFE (08ZF)	<ul style="list-style-type: none"> General petroleum hydraulic fluid oil Water-glycol type hydraulic fluid oil Oil-water emulsion type hydraulic fluid oil Phosphate ester type hydraulic fluid oil Low temperature petroleum hydraulic fluid oil 		<ul style="list-style-type: none"> Rareflon (NOK product name of polytetrafluoro ethylene resin) is used for sliding material. This packing has low frictional resistance, eliminating stick slip.
Contamin seals	KZT		Rareflon, PTFE (05ZF)	<ul style="list-style-type: none"> Low temperature petroleum hydraulic fluid oil 	<ul style="list-style-type: none"> This is used in combination with piston packings and wear rings to prevent damages of packings caused by foreign object in oil within the cylinder and to assure long life of packings. When used in combination with rod packing and metal bush, damages of the rod can be prevented because of the foreign object submerging function of rareflon (NOK product name of polytetrafluoroethylene resin). One point cut is provided and oil pressure bypass slot is also provided to prevent pressure accumulation. 	199 ~ 201
Backup ring	BRT2		Rareflon, PTFE (19YF)		<ul style="list-style-type: none"> This is used to prevent extrusion of packings and to improve the pressure resistance of the packings. 	Described on the page of the applicable packing; and 202.
	BRT3		Rareflon (31BF)			
	BRN2		Polyamide resin (80NP)	<ul style="list-style-type: none"> General petroleum hydraulic fluid oil Phosphate ester type hydraulic fluid oil Low temperature petroleum hydraulic fluid oil 	<ul style="list-style-type: none"> Standard cutting shape is bias-cut (BRN2). If there are no problem for installation, no cut endless type (BRN3) can be also used. 	—
	BRN3					
	BRL		Polyamide resin (60NP)		<ul style="list-style-type: none"> This is a backup ring that also serves as a wear ring. It can be used as the OKH type wear ring and as an OKH backup ring. See the example of combinational use on page 51. 	—


Remark 1) Items with a “—” mark in the dimension table column have unique specifications. Please consult NOK before ordering since there is no dimension description.
 Remark 2) When using a special fluid, consult NOK.

(6) Rotating oil seals for high pressure

Type	NOK type	Cross section	Standard material	Main applicable fluid	Feature	Dimension table (page)	
Oil seals for rotating pressure	TCV		① Lip material Nitrile rubber (A795) Fluoro rubber (F584)	A795	• General petroleum hydraulic fluid oil	<ul style="list-style-type: none"> This is used for relatively small diameter and medium pressure operation. This is a standard type of oil seals for rotating pressure. This is used for relatively large diameter and high pressure operation. 	Refer to oil seal catalogue.
			② Metal case material Cold rolled steel plate sheet (SPCC)	F548	• General petroleum hydraulic fluid oil		
	TCZ		① Lip material Nitrile rubber (A795) Fluoro rubber (F584)	A795	• General petroleum hydraulic fluid oil		
			② Metal case material Cold rolled steel plate sheet (SPCC) ③ Spring material Piano wires (SWP)	F548	• General petroleum hydraulic fluid oil		
	(Combination)						

(7) Seals for oscillating and rotating movement

Type	NOK type	Cross section	Standard material	Main applicable fluid	Feature	Dimension table (page)
Hinge pin dust seals	DLI		① Lip material Iron rubber (U801) (U593)	• Outer dust	• The product uses the iron rubber as the material, and is the standard type of hinge pin seal excellent in dust resistance.	206 ~ 207
	DLI2		① Lip material Iron rubber (U451)		• This is a dust seal for oscillating and rotating movement for hinge pin and bush. This can be used under severe dust conditions to improve the durability of the equipment.	208 ~ 209
	VAY		① Lip material Nitrile rubber (A104)		• Relief effect makes easy to drain used grease when filling up new grease.	—
	(Combination)		② Metal case material Cold rolled steel plate sheet (SPCC)		• Lip shape is specially designed to reduce the torque. • Lip wear is reduced because of metallic protection plate.	

Type	NOK type	Cross section	Standard material	Main applicable fluid	Feature	Dimension table (page)
Center swivel seals	CSII		Iron rubber (U801) (U652)	• General petroleum hydraulic fluid oil	<ul style="list-style-type: none"> This is a special seal for center swivel with excellent wear resistance and extrusion proof ability. Since perfect sealing cannot be expected, please provide a drain at end and use oil seals for rotating pressure with it. 	—

Remark) Items with a “—” mark in the dimension table column have unique specifications. Please consult NOK before ordering since there is no dimension description.

Resistivity														Heat resistance	Cold-temperature resistance	Wear resistance	特 徴	適用型式	
Hydraulic fluid oil							Water and others												
Turbine oil	Oil + water emulsion type	Water + glycol type	Water soluble hydraulic fluid oil	Refr. resistant type hydraulic fluid oil	Phosphate ester type	Silicon oil	Brake fluid	Torque converter oil	Water	Steam and hot water	Water soluble cutting oil	Chloric cutting oil	Sulfuric cutting oil						
○	○	○	○	○	×	○	△	○	△	△	○	×	○	○	○	○	○	Standard material of C shaped packings	CPH
○	○	○	○	○	×	○	△	○	△	△	○	×	○	○	○	○	○	Standard material of valve unit seals	CPH
○	○	○	○	○	×	○	△	○	△	△	○	×	○	○	○	○	○	Standard material of power steering seals	CPH・DKH・VAY
○	○	○	○	○	×	○	△	△	△	×	△	×	○	○	○	○	○	Standard material of O ring (JIS B 2401 1 type A)	SVY
○	○	○	○	○	×	○	△	△	○	×	△	×	○	○	○	○	○	Standard material of back ring for large diameter combination seals	SCJY
○	○	○	○	○	×	○	△	△	○	×	△	×	○	○	○	○	○	Standard material of nitrile rubber packings	SPGC・SPNC・SPNO・SPGO SPNS・DSPB
○	○	○	○	○	×	○	△	○	○	×	△	×	○	○	○	○	○	Material of cold resistant packing (for general petroleum hydraulic fluid oil ^{Remark 2)}	SPG
○	○	○	○	△	×	○	△	△	△	×	△	×	△	○	○	○	○	Material of cold resistant packing (mainly for Low temperature petroleum hydraulic fluid oil ^{Remark 3)}	IUH・UPH・OUHR・LBH・LBHK LBHK・V96H・USH・CPH
○	○	○	○	○	×	○	△	△	△	×	△	×	○	○	○	○	○	Standard material of back ring (O ring) for buffer rings	OUHR・IUH・USH・LBH・LBHK
○	○	○	○	○	×	○	△	△	△	×	△	×	○	○	○	○	△	Standard material of dust seals for reciprocal movement and oil seal for pressure resistance	HBTS
○	○	○	○	△	×	○	△	△	○	△	○	×	△	○	○	○	○	Standard material of back ring for combined seals	TCV・TCZ・DKB・DKH
○	△	△	○	○	○	○	△	△	△	△	○	○	○	△	○	△	○	Heat resistant material of back ring for combined seals	SPG・SPGW・SPN・DKB
○	△	△	○	○	○	○	△	△	△	△	○	○	○	△	○	△	○	Standard material for heat resistant packings	HBTS・SPG・SPGW・SPGC SPNC・SPNO・SPN・SPNS・DSPB
○	△	△	○	△	○	○	△	△	△	△	○	○	○	△	○	△	○	Heat resistant material of oil seals for pressure resistance	UPH・USH・LBH・V96H
○	△	△	○	○	○	○	×	○	△	×	△	○	○	○	△	○	△	Heat resistant material of dust seals for reciprocal movement	TCV・TCZ
○	○	○	-	-	○	×	○	○	△	△	-	-	○	○	△	○	△	Material of back ring for U packings	DKB・DKH
○	×	×	×	○	×	○	×	○	△	×	×	-	-	○	○	○	○	Material of hinge pin dust seals	UNI
○	×	×	×	○	×	○	×	○	△	×	×	-	-	○	○	○	○	Iron rubber improved for better cold resistance	DLI2
○	△	△	△	○	×	○	×	○	△	△	-	-	○	△	○	△	○	Iron rubber improved for better heat and water resistance	USI・LBI・DLI
○	△	△	△	○	×	○	×	○	△	△	-	-	○	△	○	△	○	Material for center swivel seals	ISI・OUIS・IUIS・HBY
○	×	×	×	○	×	○	×	○	△	×	×	-	-	○	○	○	○	Standard material of Iron rubber packings	CSI
○	△	△	△	○	×	○	×	○	△	△	-	-	○	△	○	△	○	Material for improving installation to the integrated groove	ODI・OSI・CPI・IDI・ISI・UNI・UPI・IUIS・DKI・DKBI・DWI・CSI・DSI・HBY・DWIR・DLI
○	△	△	△	○	×	○	×	○	△	△	-	-	○	○	○	○	○	Heat & cold resistant wide-range iron rubber	(Packings)
○	○	○	○	○	×	○	△	○	△	△	○	×	○	○	△	○	○	Standard material of fabric reinforced V packings (nitrile rubber)	(Buffer rings and packings)
○	○	○	○	○	×	○	△	○	○	○	○	×	○	○	○	○	○	Heat, water & water vapor resistant special nitrile rubber	V99F
○	○	○	○	○	×	○	△	○	○	×	△	×	○	○	○	○	○	Special nitrile rubber for better heat and wear resistance	(Packings)

Remark 1) The property value is the measured value, not the guaranteed value.
 Remark 2) A527 cannot be used for petroleum-derived work oil in low temperatures. (Rubber material may swell and soften, lowering the sealing performance.) When using petroleum-derived work oil in low temperatures, use A567.
 Remark 3) A567 can be used for both general petroleum-derived work oil and petroleum-derived operating oil in low temperatures, however, when using general petroleum-derived work oil, we recommend using A527 which has superior oil-resistant properties. (Material for improving the extension of A903)

<Table C-2> Types and characteristics of NOK resin material

Material	NOK material code	Material					Resistivity									
		Hardness	Tensile strength (MPa {kgf/cm ² })	Elongation (%)	Compression strength (MPa {kgf/cm ² })		Applicable temperature range (°C)	Lubricating oil (agent)								
					2.5% deformation	10% deformation		Engine oil	Gear oil	Machine oil	Spindle oil	Refrigerator oil	Cup grease	Lithium grease	Silicon grease	
Rareflon (polytetrafluoroethylene, PTFE, resin)	10FF (White)	60 (DurometerD)	33.0 {337}	380	8.8 {90}	16.0 {163}	-200 ~ 260	○	○	○	○	○	○	○	○	○
	34WF (White)	65 (DurometerD)	26.0 {265}	360	11.0 {112}	18.0 {184}		○	○	○	○	○	○	○	○	○
	19YF (Brown)	70 (DurometerD)	19.6 {200}	200	13.5 {138}	22.0 {224}		○	○	○	○	○	○	○	○	○
	49YF (Brown)	70 (DurometerD)	17.7 {181}	190	16.0 {163}	25.0 {255}		○	○	○	○	○	○	○	○	○
	55YF (Brown)	70 (DurometerD)	20.0 {204}	180	13.3 {136}	22.0 {224}		○	○	○	○	○	○	○	○	○
	11YF (Black)	66 (DurometerD)	21.0 {214}	320	12.0 {122}	20.0 {204}		○	○	○	○	○	○	○	○	○
	31BF (Black)	66 (DurometerD)	22.0 {224}	300	12.0 {122}	20.5 {209}		○	○	○	○	○	○	○	○	○
	05ZF (Brown)	66 (DurometerD)	22.0 {224}	260	11.2 {114}	20.0 {204}		○	○	○	○	○	○	○	○	○
	08GF (Black)	68 (DurometerD)	20.0 {204}	280	13.0 {133}	22.0 {224}		○	○	○	○	○	○	○	○	○
Polyamide resin	60NP (Milk white)	109 (Rockwell R)	42.0 {429}	300	19.6 {200}	49.1 {501}	-55 ~ 100	○	○	○	○	○	○	○	○	
	80NP (Black)	120 (Rockwell R)	78.5 {801}	15	39.2 {400}	72.6 {741}	-55 ~ 120	○	○	○	○	○	○	○	○	
	12NM (Navy blue)	123 (Rockwell R)	102.0 {1040}	8	38.0 {388}	100.0 {1020}	-55 ~ 140	○	○	○	○	○	○	○	○	
Fabric reinforced phenolic resin	12RS (Dark brown)	105 (Rockwell M)	105.0 {1071} *Flex strength	—	207 {2111} *Destruction	—	-55 ~ 120	○	○	○	○	○	○	○	○	
	15RS (Black)	105 (Rockwell M)	112.0 {1142} *Flex strength	—	234 {2386} *No destruction	—	○	○	○	○	○	○	○	○	○	

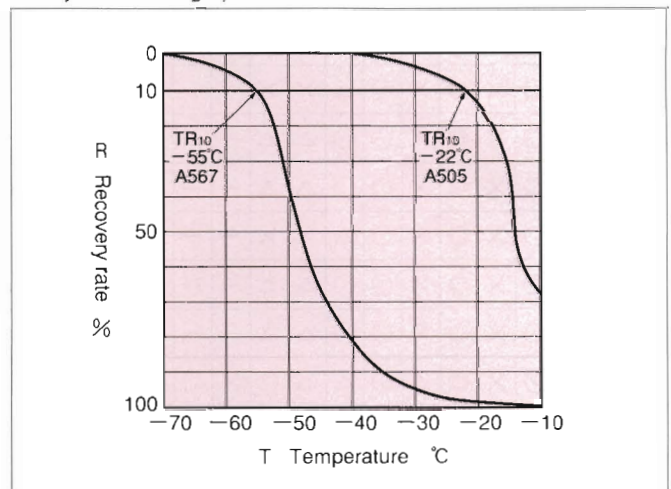
Resistivity standards ○ : Very good
 ○ : Good for most applications*
 △ : Fair, can be used if no other materials but otherwise not recommended*
 ※ Please consult NOK before using these materials.

Remark) The property value is the measured value, not the guaranteed value.

Low temperature retraction of rubber material

TR₁₀ value is used to judge low temperature capability of material. TR is an abbreviation for “Temperature-Retracton” as described by ASTM D 1329 and expresses the distortion recovery ability in low temperature. This is roughly the same as recovery of rubber-like elastomer. TR₁₀ value is the temperature where initial distortion has recovered by 10%. Graph D-1 shows an example of measuring this value.

<Graph D-1> TR graph



TR₁₀ values can indicate allowable low temperature service range of rubber material for packings. For allowable low temperature service range of specific types of packings, refer to page 14 to 16.

Resistivity														Features	Recommended NOK types	
Hydraulic fluid oil				Water and others				Heat resistance	Cold-temperature resistance	Wear resistance						
Turbine oil	Oil + water emulsion type	Water + glycol type	Water soluble hydraulic fluid oil	Phosphate ester type	Silicon oil	Brake fluid	Torque converter oil				Water	Steam and hot water	Water soluble cutting oil	Chloric cutting oil	Sulfuric cutting oil	
○	○	○	○	○	○	○	○	○	○	○	○	○	○	△	Pure PTFE. This material is the standard backup ring material for the O-ring.	(Backup ring)
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	This material is a rareflon material having better creep resistance than the pure PTFE.	(Backup ring)
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	Rareflon material with high extrusion and wear resistance.	BRT2,3•SPG•SPGW•SPGO•SPN•SPNO•HBTS
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	Special material improving extrusion resistance of 19YF.	(Combined seals, backup ring)
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	This material is a special material that can be used in low lubrication areas.	SPNS
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	This material is a special material that can be used for water.	DSPB
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	Rareflon material with better wear and creep resistance than with pure PTFE.	SPGC•SPNC•BRT2,3
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	Bearing material containing bronze for high speed and light load.	KZT•RYT
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	This material is a bearing material excellent in load resistance and abrasion resistance.	(Piston seal, wear ring)
○	○	○	○	○	○	○	○	△	△	△	○	○	○	○	Material of backup ring for special seals.	BRL•SCJY
○	○	○	○	○	○	○	○	△	△	△	○	○	○	○	Material of high pressure backup ring with high-wear resistance and mechanical strength. Its cutting manufacturing process makes large diameter seals available.	BRN2,3•SPGW•HBY
○	○	○	○	○	○	○	○	△	△	△	○	○	○	○	Material for injection molding having the same performance as 80NP with smaller dimension changes by water absorption	HBY•SPGW
○	△	○	△	○	○	△	○	△	△	△	○	○	○	○	Material for bearing with excellent wear resistance and mechanical strength	WR
○	△	○	△	○	○	△	○	△	△	△	○	○	○	○	This material is a bearing material for improving the load resistance and abrasion resistance of 12RS.	(wear ring)

■ Hardness of the material

Hardness of the material indicates pressure resistance and strength of a seal, including tensile strength. For example, the pressure resistance of rubber for a packing (extrusion resistance) is indicated by the hardness of the rubber (refer to Fig. B-7 on page 18).

The testing method for material hardness is expressed by the industrial standard for each material as shown in Table D-3.

Table D-3 details a new testing method for vulcanized rubber hardness, JIS K 6253, besides JIS K 6301 (physical testing method for vulcanized rubber).

<Table D-3> Testing method of material hardness

Vulcanized rubber	Rareflon (polytetrafluoroethylene resin)	Polyamide resin (thermoplastics resin)	Phenolic resin (thermosetting resin)
JIS K 6253	JIS K 7215	JIS K 7202	JIS K 6911

In this catalog, rubber hardness is expressed by spring-type hardness (JIS A) of JIS K 6301. Fig. D-2 shows the correlation of each material hardness.

<Fig. D-2> Correlation of each material hardness

