DATA FOR REFERENCE

OIL RESISTANCE AND CHEMICAL RESISTANCE OF NOK MATERIAL

This data is a summary of all the experimental data related to the materials and it gives a reference of material compatibility to each brand of oil or chemical. When selecting material, kindly check, referring to this collection of data, whether the material in question is compatible to the brand of oil or chemical which you are going to use. Please note, however, that they are representative values of actual measurement and not of guarantee.

This data includes nonstandard materials for each type of packing, due to the fact that the selection of material has been carried out in consideration of the sealing liquid in question.

When using materials other than standard, please consult with NOK.

[READING THE TABLES]

The test method is based on JIS K 6253, 6258 "Hardness method for vulcanized rubber and thermoplastic rubber, and dipping test method". The table shows the test temperature, time and change in hardness, tensile strength, volume after test, and compatibility.

+ symbol before figure means the increase to the value of before test, while - symbol means the decrease to the one of before test. In any case, if the absolute values of these figures are smaller, the better are oil and chemical resistances.

Compatibility is the result from judgement supposing the case where the product has been continuously operated for 500 hours at the temperature specified in the Table. If data exceeding 500 hours are available, compatibility for the said duration is also mentioned. Symbols used in the column of compatibility are as follows:

◎ : Resistant
○ : Resistant except special cases※
△ : Not resistant except special cases※
× : Not resistant
※ When using this, please consult with NOK

In most cases, judgement is made based upon the data of change in hardness and volume. In some cases, however, the judgements show △ or × in spite of the small value with hardness and volume. The "compatibility" is judged by taking other factors into account, so they are not contradictory to the principle mentioned above. The compatibility of IRON RUBBER is judged mainly by change in tensile strength.

On the other hand, the test conditions applicable to these data are defined to examine the compatibility of each rubber material with the sealing liquid and not to guarantee the life of the liquid in question. For nature of the liquid, refer to the handbook for brands of lubricants.

OIL RESISTANCE DATA

[NOK's material symbol] A : Nitrile rubber F : Fluoro rubber G : Hydrogenated-nitrile rubber
U : Iron rubber

(— : No data available)

	Brand name of sealing liquid (Manufacturer)	NOK's material symbol	Test temperature (℃)	Duration of test (H)	Change in hardness (points)	Change in tensile strength (%)	Change in volume (%)	Adaptable or not
Diesel engine oil	DELPACK SHC 5W-30 (MOBIL)	A105	80	70	− 5	− 17	+ 4.6	
				240	− 5	− 13	+ 5.4	◎
			120	70	− 4	− 25	+ 3.5	
				240	− 2	− 45	+ 2.9	△
		A305	80	70	− 5	− 14	+ 4.0	
				240	− 6	− 16	+ 5.2	◎
			120	70	− 5	− 27	+ 4.0	
				240	− 2	− 44	+ 3.2	△
		A505	80	70	− 4	− 6	+ 3.3	
				240	− 3	− 2	+ 4.0	◎
			120	70	− 3	− 15	+ 3.4	
				240	− 1	− 28	+ 3.3	△
		A980	80	70	− 9	− 10	+ 7.9	
				240	− 8	− 16	+ 7.7	○
			120	70	− 8	− 34	+ 9.0	
				240	− 6	− 58	+ 9.0	×
		U593	100	500	− 2	− 33	+ 5.5	◎
		U641	100	500	0	− 8	+ 5.2	◎
		U801	100	500	− 1	− 18	+ 4.8	◎
	DELPACK 1210 (MOBIL)	U801	120	500	+ 1	− 44	+ 0.3	○

OIL RESISTANCE DATA

	Brand name of sealing liquid (Manufacturer)	NOK's material symbol	Test temperature (℃)	Duration of test (H)	Change in hardness (points)	Change in tensile strength(%)	Change in volume (%)	Adaptable or not
Diesel engine oil	MOBIL PEGASUS 10W (MOBIL)	U641	100	1000	− 1	− 24	+ 3.7	◎
		U801	100	500	− 2	− 17	+ 1.3	◎
				1000	0	− 73	+ 0.9	×
	WHITE PARROT SUPER S-3 OIL 10W (SHOWA-SHELL)	A105	120	70	0	− 23	− 0.9	
				240	+ 1	− 35	− 1.5	
				500	+ 2	− 48	− 1.8	△
				1000	+ 5	− 73	− 2.6	×
		A305	120	70	− 3	− 16	− 0.1	
				240	− 2	− 38	− 0.9	
				500	0	− 49	− 1.4	△
				1000	+ 4	− 76	− 1.9	×
		A505	80	70	− 4	− 12	+ 2.3	
				240	− 4	0	+ 2.2	
				500	− 3	− 1	+ 2.3	◎
				1000	− 2	− 5	+ 2.5	◎
			100	70	− 3	− 3	+ 2.2	
				240	− 1	− 16	+ 1.4	
				500	0	− 27	+ 1.1	○
				1000	+ 2	− 41	+ 1.1	△
			120	70	+ 1	− 8	− 0.1	
				240	+ 1	− 7	− 0.3	
				500	+ 2	− 33	− 0.4	△
				1000	+ 5	− 67	− 0.9	×
		A980	120	100	− 4	− 1	+ 4.0	
				240	− 1	− 36	+ 4.0	
				500	+ 1	− 51	+ 3.6	×
				1000	+ 4	− 79	+ 3.1	×
		U641	120	500	+ 1	− 41	+ 2.3	○
		U801	120	500	0	− 45	+ 0.4	○
		G506	100	70	0	+ 1	+ 1.0	
				150	0	0	+ 1.3	
				300	+ 1	− 15	+ 1.6	
				500	+ 1	− 16	+ 1.6	◎
				1000	+ 3	− 18	+ 1.5	◎
			120	70	0	− 10	+ 1.2	
				150	0	− 10	+ 1.0	
				300	+ 2	− 14	+ 1.4	
				500	+ 2	− 18	+ 1.0	◎
				1000	+ 4	− 24	+ 0.7	○
	APPOLLOIL Diesel Motive S-310 (IDEMITSU)	A505	100	70	− 2	− 2	+ 1.6	
				150	− 1	− 8	+ 1.3	
				500	+ 1	− 5	+ 0.8	◎
				1000	+ 3	− 14	+ 0.7	◎
			120	70	− 2	0	+ 0.9	
				150	0	− 19	+ 0.7	
				500	+ 4	− 62	+ 0.5	×
				1000	+ 7	− 74	− 0.3	×
		A980	80	150	− 3	− 6	+ 2.7	
				500	− 2	− 13	+ 2.0	◎
				1000	− 1	− 19	+ 2.1	◎
			100	70	− 4	+ 3	+ 3.5	
				150	− 3	− 14	+ 3.2	
				500	0	− 29	+ 3.2	○
				1000	+ 4	− 31	+ 2.5	△
			120	70	− 4	− 4	+ 4.8	
				150	− 2	− 42	+ 4.5	
				500	+ 5	− 69	+ 2.9	×
				1000	+ 8	− 78	+ 1.5	×
		G869	100	70	+ 2	0	+ 1.8	
				150	+ 1	0	+ 2.3	
				500	+ 3	− 3	+ 2.5	◎
				1000	+ 4	− 4	+ 2.4	◎

OIL RESISTANCE DATA

	Brand name of sealing liquid (Manufacturer)	NOK's material symbol	Test temperature (℃)	Duration of test (H)	Change in hardness (points)	Change in tensile strength (%)	Change in volume (%)	Adaptable or not
Diesel engine oil	APPOLLOIL Diesel Motive S-310 (IDEMITSU)	G869	120	70	+ 2	− 3	+ 2.3	
				150	+ 3	− 5	+ 2.4	
				500	+ 5	− 10	+ 2.6	◎
				1000	+ 6	− 17	+ 2.0	○
		G928	100	70	− 3	0	+ 3.4	
				150	− 3	0	+ 3.5	
				500	− 2	+ 1	+ 3.6	◎
				1000	0	+ 2	+ 3.5	◎
			120	70	− 2	+ 1	+ 3.8	
				150	− 2	+ 3	+ 3.5	
				500	+ 1	+ 3	+ 3.4	◎
				1000	+ 2	− 9	+ 3.1	◎
Gear oil	APPOLLOIL GEAR-MISSION 80W-90 (IDEMITSU)	F201	100	70	− 1	− 4	+ 1.0	○
			120	70	0	− 25	+ 1.2	○
			150	70	+ 5	− 38	+ 1.7	△
	APPOLLOIL GEAR LSD 80W-90 (IDEMITSU)	F201	100	70	− 1	− 1	+ 0.8	○
			120	70	0	− 20	+ 1.1	○
			150	70	+ 4	− 30	+ 1.7	○
	GEARLUB SP90 (NISSEKI)	U652	100	336	0	− 33	+ 1.5	○
		U801	70	1000	− 1	+ 4	+ 1.3	○
			100	200	0	− 49	+ 1.7	×
	GELCO-OIL 6140 (SHOWA-SHELL)	F204	120	70	0	+ 4	+ 0.2	◎
	GELCO-OIL No 1 [GL-3] (SHOWA-SHELL)	F204	120	70	0	− 12	+ 0.6	○
	NISSAN GEAR OIL MP-G SPECIAL (NISSAN MOTOR GENUINE OIL)	F201	100	70	− 3	− 16	+ 2.0	○
			120	70	− 3	− 43	+ 3.5	△
			150	70	0	− 45	+ 4.2	△
		F357	100	70	− 1	− 5	+ 2.0	◎
			120	70	− 1	− 40	+ 3.6	△
			150	70	− 1	− 36	+ 4.5	△
	NISSAN GEAR OIL HYPOID SUPER 80W-90 (NISSAN MOTOR GENUINE OIL)	G506	120	70	− 1	− 4	+ 2.7	◎
	MOLUB-ALLOY GEAR OIL 170W (Castrol)	A505	100	70	− 2	+ 4	+ 2.3	
				500	− 3	+ 3	+ 3.0	◎
		A795	100	70	+ 3	− 3	− 2.7	
				500	+ 6	− 3	− 3.3	○
		U801	100	70	0	− 3	+ 0.2	
				500	0	− 70	+ 0.6	×
ATF	DEXIRON ii (SHOWA-SHELL)	A505	100	70	− 3	+ 5	+ 2.2	◎
		A903	100	70	0	+ 3	− 0.8	○
	PAN ATF AMENITI (NISSEKI)	F357	120	70	− 1	− 1	+ 0.5	
				240	− 1	− 5	+ 1.0	
				500	− 1	− 8	+ 1.2	◎
			150	70	− 1	− 20	+ 1.2	
				240	− 1	− 34	+ 1.7	
				500	− 1	− 53	+ 1.8	△
	MOBIL ATF220 (MOBILE)	A104	100	70	− 3	− 4	+ 1.0	
				168	− 3	− 6	+ 0.8	◎
		A105	100	70	− 4	− 8	+ 3.0	
				168	− 3	− 10	+ 2.3	◎
		A305	100	70	− 7	− 3	+ 4.2	
				168	− 5	− 9	+ 3.4	◎
		A980	100	70	− 5	+ 4	+ 5.1	
				168	− 5	+ 6	+ 5.0	◎
	CASTLE AUTOFLUID SPECIAL W (TOYOTA MOTORS GENUINE OIL)	A505	100	70	− 6	+ 7	+ 5.2	
				168	− 5	+ 8	+ 4.2	◎
		A903	80	70	− 5	+ 1	+ 4.7	
				168	− 5	− 1	+ 4.0	◎
			100	70	− 6	+ 7	+ 5.3	
				168	− 4	− 5	+ 4.9	○
	CASTLE HYDRAULIC OIL 32 (TOYOTA MOTOR GENUINE OIL)	A505	100	70	− 2	+ 7	+ 0.4	
				168	0	+ 10	− 0.3	◎
		A903	80	70	0	+ 10	− 1.6	
				168	+ 1	+ 10	− 2.3	◎
		U801	100	336	0	+ 6	0	◎

OIL RESISTANCE DATA

	Brand name of sealing liquid (Manufacturer)	NOK's material symbol	Test temperature (℃)	Duration of test (H)	Change in hardness (points)	Change in tensile strength(%)	Change in volume (%)	Adaptable or not
ATF	POWER FLUID (NISSEKI)	U593	80	72	0	+ 1.0	+ 0.5	
				140	0	+ 1.4	+ 0.7	
				280	0	+ 1.5	+ 0.9	○
Brake oil	TOYOTA GENUINE BRAKE FLUID 2500H (TOYOTA)	F357	150	70	− 28	− 76	+ 44.6	
				168	− 32	− 85	+ 45.9	×
		G506	150	70	− 13	− 16	+ 24.4	
				168	− 13	− 19	+ 24.3	△
		A305	120	70	− 21	− 44	+ 51.1	
				210	− 27	− 61	+ 56.4	×
Hydraulic oil	DAFFNEY HYDRAULIC FLUID 32 (IDEMITSU)	A795	100	200	+ 8	− 4	− 5.4	○
		F548	150	200	0	− 5	+ 0.9	◎
	DAFFNEY HYDRAULIC FLUID 44 (IDEMITSU)	A505	100	70	+ 1	+ 8	− 0.9	◎
	HIGH LAND 26 (NISSEKI)	A505	100	70	− 6	+ 4	+ 5.4	◎
		A903	100	70	− 3	− 5	+ 3.0	○
	HYDRAX 56 (KYOSEKI)	A104	120	70	+ 4	+ 4	− 3.9	○
		A105	120	70	0	− 13	− 0.7	○
		A305	120	70	0	− 2	− 0.7	○
		A505	120	70	0	− 12	− 0.9	○
		A626	120	70	+ 1	+ 1	− 1.4	○
		A980	120	70	− 2	− 14	+ 2.2	○
	DIAMOND LUB RO32 (MITSUBISHI PETROL)	A505	100	70	+ 1	+ 10	− 0.3	◎
		U641	100	1000	+ 1	+ 2	+ 0.2	◎
		U801	100	1000	0	− 33	+ 1.3	◎
	TERASSE OIL C10 (SHOWA-SHELL)	A795	100	200	+ 4	− 3	− 1.8	◎
		F548	150	200	− 1	− 15	+ 2.7	◎
		U801	100	200	− 1	+ 2	+ 2.6	○
	MITSUI HITEC 150 (MITSUI PETROL)	A505	100	240	− 1	+ 2	− 0.5	
				500	+ 1	+ 8	− 0.5	◎
				1000	+ 3	+ 8	− 0.4	◎
		A980	100	240	+ 1	+ 6	− 1.6	
				500	+ 3	+ 6	− 1.8	◎
				1000	+ 5	0	− 2.3	◎
		U593	100	1000	+ 1	+ 2	+ 0.8	◎
		U641	100	1000	0	− 15	+ 1.9	◎
		U801	100	1000	0	0	− 0.1	◎
Wear resistant hydraulic oil	DAFFNEY SUPER HYDRAULIC FLUID 32 (IDEMITSU)	U593	100	168	+ 1	+ 7	+ 0.8	○
		U801	100	168	+ 1	− 5	− 0.7	○
	DAFFNEY SUPER HYDRO 32 (IDEMITSU)	U801	100	600	0	+ 10	+ 0.5	◎
	DAFFNEY SUPER HYDRAULIC FLUID 46 (IDEMITSU)	G506	100	1000	+ 6	− 11	− 0.9	○
			120	500	+ 5	− 15	− 0.8	○
		A305	100	166	− 2	− 5	− 2.2	◎
		A626	100	166	+ 1	− 1	− 6.3	○
		A903	100	166	+ 6	− 10	− 6.5	○
		A980	100	166	+ 2	− 7	− 2.2	◎
	DAFFNEY SUPER HYDRO 46 (IDEMITSU)	A505	100	70	− 2	+ 3	+ 0.5	
				150	0	− 4	+ 0.3	
				500	+ 2	+ 3	+ 0.2	◎
				1000	+ 4	+ 11	+ 0.5	◎
			120	70	− 1	− 7	+ 0.2	
				150	+ 1	− 3	− 0.1	
				500	+ 6	− 15	+ 0.1	△
				1000	+ 9	− 22	− 0.6	△
		A567	80	70	+ 4	− 4	− 5.5	
				150	+ 4	− 3	− 5.5	
				300	+ 5	− 3	− 5.9	
				500	+ 5	− 7	− 6.4	◎
			100	70	+ 4	− 5	− 5.3	
				150	+ 5	− 7	− 5.3	
				300	+ 6	− 7	− 6.2	
				500	+ 8	− 7	− 6.8	△
		A980	100	70	− 1	− 7	− 1.2	
				150	+ 1	− 6	− 1.4	
				500	+ 4	− 9	− 2.2	◎
				1000	+ 7	− 6	− 2.4	○

OIL RESISTANCE DATA

	Brand name of sealing liquid (Manufacturer)	NOK's material symbol	Test temperature (℃)	Duration of test (H)	Change in hardness (points)	Change in tensile strength (%)	Change in volume (%)	Adaptable or not
Wear resistant hydraulic oil	DAFFNEY SUPER HYDRO 46 (IDEMITSU)	A980	120	70	0	− 7	− 0.2	
				150	+ 2	− 13	− 1.0	
				500	+ 9	− 7	− 2.6	△
				1000	+ 12	+ 12	− 1.6	×
		G869	100	70	+ 2	+ 2	+ 0.2	
				150	+ 2	+ 3	+ 0.8	
				500	+ 3	+ 2	+ 0.9	◎
				1000	+ 3	+ 3	+ 1.0	◎
			120	70	+ 2	+ 4	+ 0.7	
				150	+ 2	+ 6	+ 1.0	
				500	+ 4	+ 4	+ 1.2	◎
				1000	+ 5	− 1	+ 1.4	○
		G928	100	70	− 2	0	+ 2.6	
				150	− 2	0	+ 2.9	
				500	− 2	0	+ 2.8	◎
				1000	− 1	− 5	+ 3.2	◎
			120	70	− 2	− 3	+ 3.0	
				150	− 2	− 1	+ 3.2	
				500	0	− 2	+ 3.0	◎
				1000	+ 1	− 6	+ 2.8	◎
		U593	100	500	0	− 2	+ 1.0	◎
		U641	100	70	− 1	− 4	+ 1.7	
				300	− 1	+ 4	+ 1.6	
				560	− 1	+ 10	+ 1.7	◎
				1000	− 1	+ 9	+ 1.5	◎
				1500	− 1	+ 12	+ 1.9	◎
				2000	− 1	+ 11	+ 2.3	◎
		U801	100	70	− 1	− 4	+ 0.5	
				300	− 1	+ 18	− 0.2	
				560	− 1	+ 15	− 0.2	◎
				1000	− 1	+ 32	− 0.4	◎
				1500	− 1	+ 17	0.0	◎
				2000	− 1	+ 26	+ 0.4	◎
	DAFFNEY SUPER HYDRAULIC FLUID 56 (IDEMITSU)	A104	100	70	+ 1	+ 5	− 4.4	○
		A105	100	70	0	− 12	− 1.0	◎
		A305	100	70	− 2	− 3	− 1.7	◎
		A505	100	70	− 1	− 5	− 0.8	◎
		A626	100	70	0	+ 4	− 4.3	◎
		A980	100	70	+ 3	+ 3	− 2.2	
				168	+ 3	− 8	− 2.4	◎
	DAFFNEY SUPER HYDRAULIC FLUID 100 (IDEMITSU)	G506	100	1000	+ 7	− 4	− 2.8	○
			120	500	+ 5	− 8	− 2.8	○
	DAFFNEY SUPER HYDRO A32 (IDEMITSU)	A305	100	70	− 3	+ 1	+ 1.0	
				168	− 2	+ 2	+ 0.4	
				500	+ 2	− 8	− 0.6	◎
				1000	+ 3	− 2	− 0.6	◎
		G506	120	70	0	+ 7	+ 0.1	
				168	+ 1	+ 4	+ 0.1	
				500	+ 2	+ 2	+ 0.2	◎
				1000	+ 3	+ 3	+ 0.4	◎
		G869	120	70	+ 2	+ 10	− 1.0	
				168	+ 2	+ 8	− 0.9	
				500	+ 4	+ 4	− 1.0	◎
				1000	+ 5	+ 2	− 0.7	◎
		U801	80	70	0	+ 12	+ 0.5	
				240	− 1	+ 1	+ 0.6	
				500	− 2	0	+ 0.7	◎
				1000	− 2	− 3	+ 0.8	◎
				2000	− 2	− 7	+ 1.0	◎
				3000	− 2	− 19	+ 1.1	◎
				5000	− 3	− 47	+ 1.3	○
				7000	− 5	− 76	+ 1.6	×

OIL RESISTANCE DATA

	Brand name of sealing liquid (Manufacturer)	NOK's material symbol	Test temperature (℃)	Duration of test (H)	Change in hardness (points)	Change in tensile strength(%)	Change in volume (%)	Adap-table or not
Wear resistant hydraulic oil	DAFFNEY SUPER HYDRO A32 (IDEMITSU)	U801	100	70	− 1	+ 8	+ 0.6	
				240	− 1	+ 6	+ 0.7	
				500	− 2	− 3	+ 0.8	◎
				1000	− 3	− 4	+ 0.9	◎
				2000	− 3	− 54	+ 1.2	△
				3000	− 3	− 68	+ 1.2	×
			120	70	− 1	+ 2	+ 0.3	
				240	− 1	+ 1	+ 0.4	
				500	− 2	− 31	+ 0.6	○
				1000	− 3	− 75	+ 0.7	×
		U641	80	70	0	− 2	+ 1.8	
				240	− 1	− 9	+ 2.5	
				500	− 1	+ 2	+ 3.0	◎
				1000	− 2	− 14	+ 3.3	◎
				2000	− 2	− 16	+ 3.6	◎
				3000	− 3	− 16	+ 3.7	◎
				5000	− 4	− 16	+ 4.0	◎
				7000	− 6	− 17	+ 4.6	○
			100	70	− 1	− 14	+ 2.5	
				240	− 1	− 17	+ 3.0	
				500	− 2	− 19	+ 3.1	◎
				1000	− 3	− 23	+ 3.5	◎
				2000	− 3	− 29	+ 3.9	◎
				3000	− 4	− 36	+ 4.5	○
				5000	− 6	− 50	+ 5.0	△
				7000	− 8	− 62	+ 9.0	×
			120	70	− 1	− 14	+ 3.2	
				240	− 1	− 17	+ 3.4	
				500	− 2	− 34	+ 3.8	○
				1000	− 3	− 50	+ 4.5	○
				2000	− 4	− 65	+ 6.2	×
				3000	− 7	− 81	+ 11.0	×
	DAFFNEY SUPER HYDRO HF46 (IDEMITSU)	A305	100	70	− 2	+ 2	− 0.2	
				168	− 2	− 1	− 0.5	
				500	+ 3	− 11	− 1.4	◎
				1000	+ 4	− 8	− 1.4	◎
		G506	120	70	+ 1	+ 7	− 1.3	
				168	+ 1	+ 3	− 1.0	
				500	+ 3	+ 2	− 0.9	◎
				1000	+ 3	0	− 0.6	◎
		G869	120	70	+ 3	+ 11	− 2.4	
				168	+ 3	+ 5	− 2.2	
				500	+ 4	+ 3	− 2.2	◎
				1000	+ 6	+ 1	− 1.7	○
		U641	80	70	0	+ 2.8	+ 1.9	
				168	0	+ 3.6	+ 2.3	
				500	0	+ 1.9	+ 2.3	◎
				1000	0	+ 2.6	+ 2.2	◎
	DAFFNEY SUPER HYDRO LW46 (IDEMITSU)	A305	100	70	− 5	+ 3	− 0.1	
				240	− 4	+ 1	− 1.5	
				500	− 3	+ 1	− 2.5	◎
		A795	100	70	+ 6	−	− 5.4	○
		A980	100	70	− 1	+ 2	+ 0.2	
				240	0	0	+ 0.2	
				500	0	− 8	+ 0.6	◎
		U641	100	1000	− 1	− 7	+ 0.2	◎
		U801	100	1000	0	− 4	− 0.4	◎
	SUPER HIGH LAND 32 (NISSEKI)	A104	120	70	+ 3	− 3	− 2.5	○
		A105	120	70	− 1	− 10	+ 0.4	○
		A305	120	70	− 1	+ 1	+ 0.5	○
		A505	120	70	− 1	− 9	− 1.6	○
		A626	120	70	− 1	− 6	+ 0.9	○
		A980	120	70	− 3	− 11	+ 4.9	○
		U801	100	1800	0	+ 12	+ 0.8	◎

OIL RESISTANCE DATA

	Brand name of sealing liquid (Manufacturer)	NOK's material symbol	Test temperature (℃)	Duration of test (H)	Change in hardness (points)	Change in tensile strength (%)	Change in volume (%)	Adaptable or not
Wear resistant hydraulic oil	SUPER HIGH LAND 56 (NISSEKI)	A104	120	70	+ 4	+ 3	− 3.9	○
		A105	120	70	− 1	− 9	− 0.6	○
		A305	120	70	− 2	− 3	− 0.4	○
		A505	120	70	+ 3	− 4	− 2.3	○
		A626	120	70	0	− 15	− 1.0	○
		A980	120	70	− 2	− 16	+ 2.8	○
		U641	100	1000	− 1	+ 8	− 0.3	◎
		U801	100	1000	0	+ 2	+ 0.2	◎
	SUPER HIGH LAND Z46 (SHIN NISSEKI)	A505	100	70	0	+ 6	+ 0.2	
				280	0	+ 9	− 0.4	
				500	+ 2	+ 8	− 0.6	◎
		A980	100	70	− 1	+ 5	+ 2.5	
				280	0	− 1	+ 1.5	
				500	+ 2	− 4	+ 1.3	◎
		U641	100	70	− 1	− 1	+ 0.4	
				280	− 1	− 3	+ 0.4	
				500	− 1	− 7	+ 0.2	◎
		U801	100	70	0	− 2	− 1.2	
				280	0	+ 8	− 1.1	
				500	0	+ 14	− 1.4	◎
	COSMO HYDRO AW32 (COSMO)	A305	100	70	− 2	+ 1	− 0.3	
				168	− 1	+ 1	− 1.3	◎
		A980	100	70	+ 1	+ 4	+ 0.6	
				168	+ 2	− 4	+ 0.1	◎
		U593	100	168	0	− 13	+ 0.9	○
		U801	100	168	0	+ 14	− 0.9	○
	COSMO HYDRO AW46 (COSMO)	A305	100	70	− 3	− 1	− 0.7	
				168	− 2	− 4	− 1.8	◎
		A980	100	70	+ 1	+ 3	− 0.3	
				168	+ 2	− 1	− 0.7	◎
		U593	100	168	0	− 10	+ 0.8	○
		U801	100	168	0	+ 9	− 1.1	○
	COSMO HYDRO AW68 (COSMO)	A305	100	70	− 1	+ 1	− 1.5	
				168	0	− 1	− 2.3	◎
		A980	100	70	+ 1	+ 5	− 1.3	
				168	+ 3	0	− 1.7	◎
		U593	100	168	0	− 16	+ 0.4	○
		U801	100	168	0	+ 12	− 1.1	○
	COSMO HYDRO LF22 (COSMO)	A305	100	70	− 4	− 4	+ 3.4	
				168	− 4	− 7	+ 2.4	◎
		A980	100	70	− 6	− 1	+ 8.2	
				168	− 4	− 9	+ 7.9	◎
		U593	100	168	0	+ 4	+ 3.2	○
		U801	100	168	0	+ 1	+ 1.1	○
	COSMO HYDRO HV15 (COSMO)	A305	100	70	− 4	− 4	+ 2.5	
				168	− 3	+ 3	+ 1.5	◎
		A980	100	70	− 8	− 7	+ 6.9	
				168	− 7	− 9	+ 6.3	○
		U593	100	168	− 2	+ 1	+ 3.1	○
		U801	100	168	− 1	− 9	+ 0.7	○
	SEKI HYDRAX LT15 (KYOSEKI)	A903	80	70	− 6	0	+ 7.2	◎
			100	70	− 7	+ 1	+ 8.3	○
	KYOSEKI HYDRAX LT32 (KYOSEKI)	U593	100	500	− 6	− 56	+ 3.0	△
				1000	− 8	− 76	+ 3.1	×
		U801	100	500	− 1	− 34	+ 0.2	◎
				1000	− 1	− 71	+ 0.4	×
	DIAMOND HYDRO FLUID EP46 (MITSUBISHI PETROL)	A980	100	70	0	− 1	− 1.1	◎
	TERRASSE OIL 32 (SHOWA-SHELL)	G928	100	70	− 2	− 4	+ 3.1	
				250	− 2	− 5	+ 3.2	
				500	− 1	− 3	+ 3.7	◎
			120	70	− 2	− 3	+ 3.7	
				250	− 1	− 6	+ 3.5	
				500	− 1	− 6	+ 3.8	◎

OIL RESISTANCE DATA

	Brand name of sealing liquid (Manufacturer)	NOK's material symbol	Test temperature (℃)	Duration of test (H)	Change in hardness (points)	Change in tensile strength(%)	Change in volume (%)	Adaptable or not
Wear resistant hydraulic oil	TERRASSE OIL 32 (SHOWA-SHELL)	U641	100	70	0	− 4	+ 1.9	
				250	0	+ 5	+ 1.9	
				500	− 1	+ 6	+ 2.0	◎
			120	70	− 1	− 5	+ 2.5	
				250	− 1	− 16	+ 2.0	
				500	− 1	− 37	+ 2.7	○
		U801	100	70	0	+ 6	+ 0.1	
				250	0	+ 6	+ 0.2	
				500	0	+ 17	+ 0.1	◎
			120	70	0	0	+ 0.3	
				250	0	− 17	− 0.1	
				500	− 1	− 78	− 0.1	×
		UH05	100	70	− 3	− 2	+ 6.8	
				250	− 3	− 3	+ 6.9	
				500	− 4	− 3	+ 7.2	◎
			120	70	− 3	− 11	+ 7.4	
				250	− 4	− 17	+ 7.9	
				500	− 4	− 46	+ 8.5	○
	TERRASSE OIL K32 (SHOWA-SHELL)	U801	100	500	0	+ 5	+ 0.8	◎
	TERRASSE OIL 45 (SHOWA-SHELL)	U641	100	1000	− 1	− 49	+ 1.7	○
		U801	100	500	0	− 10	+ 0.1	◎
				1000	+ 1	− 77	− 1.5	×
	TERRASSE OIL 46 (SHOWA-SHELL)	A505	100	70	− 1	+ 7	− 0.3	
				150	0	+ 6	− 0.8	
				300	+ 1	+ 12	− 1.2	
				500	+ 3	+ 12	− 1.2	◎
			120	70	− 1	+ 7	− 0.2	
				150	+ 1	+ 6	− 0.8	
				300	+ 2	+ 7	− 1.3	
				500	+ 5	− 5	− 1.2	○
		A980	100	70	− 3	+ 5	+ 2.1	
				280	− 2	+ 8	+ 1.8	
				500	+ 1	+ 13	+ 1.1	◎
		G506	100	70	+ 1	− 2	− 1.3	
				150	+ 1	+ 3	− 0.9	
				300	+ 2	− 1	− 1.0	
				500	+ 2	0	− 1.1	◎
			120	70	+ 1	+ 2	− 1.1	
				150	+ 1	− 5	− 0.9	
				300	+ 2	− 2	− 1.1	
				500	+ 2	− 4	− 0.9	◎
		U641	100	70	− 1	0	+ 1.2	
				280	− 1	0	+ 1.3	
				500	− 2	− 6	+ 1.4	◎
		U801	100	70	− 1	+ 9	+ 0.2	
				280	− 1	+ 11	+ 0.6	
				500	− 1	+ 11	+ 1.2	◎
	TERRASSE OIL K46 (SHOWA-SHELL)	G506	100	168	0	− 3	− 2.0	◎
			120	168	− 1	− 2	− 0.2	◎
	TERRASSE OIL 56 (SHOWA-SHELL)	A104	120	70	+ 4	+ 1	− 3.8	○
		A105	120	70	0	− 21	− 0.5	○
		A305	120	70	− 1	− 1	− 0.5	○
		A505	120	70	+ 1	− 20	− 1.2	○
		A626	120	70	− 2	− 2	− 1.2	○
		A980	120	70	− 2	− 6	+ 2.4	○
		U641	100	1500	0	− 6	+ 1.4	◎
		U801	100	1500	0	− 42	− 0.5	○
	TERRASSE OIL K100 (SHOWA-SHELL)	G506	100	168	+ 1	+ 4	− 1.5	◎
			120	168	+ 2	− 3	− 1.4	◎

OIL RESISTANCE DATA

	Brand name of sealing liquid (Manufacturer)	NOK's material symbol	Test temperature (℃)	Duration of test (H)	Change in hardness (points)	Change in tensile strength(%)	Change in volume (%)	Adaptable or not
Wear resistant hydraulic oil	NUTOH H15 (ESSO)	A305	100	70	− 4	− 5	+ 2.9	
				168	− 3	− 1	+ 2.1	◎
		A980	100	70	− 5	− 4	+ 7.2	
				168	− 6	− 15	+ 6.6	◎
		U593	100	168	− 4	− 14	+ 3.0	△
		U801	100	168	− 1	− 8	+ 0.9	○
	NUTOH HP68 (ESSO)	A104	120	70	+ 4	+ 5	− 3.1	○
		A105	120	70	− 1	− 7	+ 0.7	○
		A305	120	70	− 2	+ 4	+ 0.4	◎
		A505	120	70	− 1	− 8	+ 0.3	○
		A626	120	70	0	+ 2	− 1.0	○
		A980	120	70	− 2	− 6	+ 1.8	○
	UNIPOWER SQ32 (ESSO)	U593	100	168	+ 1	− 4	+ 1.8	○
		U801	100	168	+ 1	− 3	− 0.1	○
	UNIPOWER SQ46 (ESSO)	U593	100	168	+ 1	− 1	+ 1.7	○
		U801	100	168	+ 1	0	− 0.1	○
	UNIPOWER SQ68 (ESSO)	U593	100	168	+ 1	− 3	+ 1.3	○
		U801	100	168	+ 1	− 6	− 0.3	○
	MOBIL DTE26 (MOBIL)	A104	120	70	+ 5	− 5	− 4.2	○
		A105	120	70	+ 1	− 15	− 0.9	○
		A305	120	70	0	− 4	− 1.1	○
		A505	120	70	+ 1	− 15	− 1.8	○
		A626	120	70	0	− 11	− 2.2	○
		A980	120	70	0	− 19	− 0.8	○
		U801	100	1000	+ 1	+ 20	+ 0.6	◎
	MITSUI HIDICK AW46 (MITSUI PETROL)	A505	100	240	+ 1	+ 3	− 0.7	
				500	+ 1	+ 3	− 0.8	◎
				1000	+ 3	+ 3	− 0.8	◎
		A980	100	240	+ 1	− 2	+ 0.6	
				500	+ 3	− 3	+ 0.4	◎
				1000	+ 5	− 8	+ 0.1	◎
		U801	100	1000	0	− 1	− 0.4	◎
		U593	100	1000	+ 1	+ 7	+ 0.2	◎
		U641	100	1000	0	− 11	+ 0.4	◎
Wear resistant hydraulic oil (with improved viscosity and temperature characteristic)	DAFFNEY SUPER HYDRO 22WR (IDEMITSU)	U593	100	168	+ 1	− 1	+ 3.1	○
		U801	100	168	+ 1	+ 6	+ 1.1	○
	DAFFNEY SUPER HYDRO 32WR (IDEMITSU)	A104	100	70	− 2	+ 10	− 2.6	◎
		A105	100	70	− 1	− 12	+ 0.5	◎
		A305	100	70	− 3	− 2	+ 0.3	◎
		A505	100	70	− 2	0	+ 0.9	◎
		A626	100	70	− 3	+ 3	− 1.3	◎
		A980	100	70	− 5	+ 6	+ 2.1	
				168	− 1	− 8	+ 2.4	◎
	DAFFNEY SUPER HYDRO 46WR (IDEMITSU)	A104	100	70	+ 2	+ 1	− 4.0	○
		A795	100	70	+ 2	− 4	− 4.3	○
		U593	100	1000	0	− 8	+ 0.1	◎
		U641	100	1000	0	+ 18	+ 0.1	◎
		U801	100	1000	+ 1	+ 7	− 1.2	◎
	HIGH LAND WIDE 15 (NISSEKI)	A305	100	70	− 6	− 6	+ 4.3	
				168	− 5	− 5	+ 3.3	◎
		A980	100	70	− 10	− 3	+ 10.1	
				168	− 9	− 1	+ 9.6	○
		U593	100	168	− 2	+ 5	+ 4.4	○
		U801	100	168	− 1	− 6	+ 1.8	○
	HIGH LAND AH15 (NISSEKI)	A505	100	70	− 4	− 2	+ 4.9	◎
		A903	100	70	− 1	− 5	+ 1.8	◎
	COSMO HYDRO HV32 (COSMO)	U593	120	1000	− 1	− 27	+ 0.2	○
		U801	120	1000	0	− 45	− 1.6	○
	COSMO HYDRO HV56 (COSMO)	U593	100	1000	− 4	− 41	+ 0.8	○
		U801	100	1000	0	− 43	− 0.9	○
	TERRASSE OIL KT32 (SHOWA-SHELL)	G506	120	168	0	+ 1	+ 0.6	◎
	TERRASSE OIL R32 (SHOWA-SHELL)	U641	120	300	0	+ 3	+ 1.2	○
		U801	120	300	0	− 2	− 0.1	○

OIL RESISTANCE DATA

		Brand name of sealing liquid (Manufacturer)	NOK's material symbol	Test temperature (℃)	Duration of test (H)	Change in hardness (points)	Change in tensile strength(%)	Change in volume (%)	Adaptable or not
Wear resistant hydraulic oil (with improved viscosity and temperature characteristic)		TERRASSE OIL ST32 (SHOWA-SHELL)	A505	100	70	− 2	+ 7	+ 0.9	
					280	− 1	+ 9	+ 0.2	
					500	+ 2	+ 15	+ 0.2	◎
			A980	100	70	− 2	+ 4	+ 0.8	
					280	− 1	+ 6	+ 0.8	
					500	+ 2	+ 2	+ 0.1	◎
			U641	100	70	− 1	0	+ 1.2	
					280	− 1	0	+ 1.3	
					500	− 1	− 5	+ 1.7	◎
			U801	100	70	− 1	+ 11	+ 0.3	
					280	− 1	+ 14	+ 0.7	
					500	− 1	+ 14	+ 1.3	◎
		DIAMOND HYDRO-FLUID W32 (MITSUBISHI PETROL)	U801	100	1130	0	+ 12	+ 0.6	◎
		MOBIL DTE11 (MOBIL)	A305	100	70	− 4	− 13	+ 2.1	
					168	− 4	− 10	+ 3.4	◎
			A980	100	70	− 5	− 4	+ 10.3	
					168	− 5	0	+ 10.6	◎
			U593	100	168	− 2	− 4	+ 4.0	○
			U801	100	168	− 1	− 1	+ 2.0	○
		MOBIL DTE13 (MOBIL)	A104	120	70	+ 2	− 9	− 1.0	○
			A105	120	70	− 1	− 19	+ 1.6	○
			A305	120	70	− 2	− 11	+ 2.1	○
			A505	120	70	0	− 17	+ 0.5	○
			A626	120	70	− 3	− 21	+ 2.8	△
			A980	120	70	− 5	− 16	+ 7.5	○
			U801	120	1000	0	+ 9	+ 2.0	○
Worm gear oil		OMARA OIL 150 (SHOWA-SHELL)	U801	100	168	0	0	0	○
Flame retardant hydraulic oil	〈Phosphate〉	HIGH LAND FRP46 (NISSEKI)	A795	100	200	− 30	−	+ 97.4	×
			F548	100	200	− 4	− 24	+ 12.1	○
			F975	100	200	− 9	− 15	+ 14.0	○
				150	200	− 11	− 18	+ 17.6	△
		SFR FLUID D46 (SHOWA-SHELL)	A505	100	70	− 19	− 67	+ 77.5	×
			F268	100	70	− 5	+ 3	+ 3.0	
					168	− 6	− 8	+ 4.1	◎
	〈Fatty acid ester base〉	COSMO LUBRIC HF130 (E.F. HORTON)	G506	100	70	− 4	+ 2	+ 3.1	
					240	− 3	+ 2	+ 3.9	
					500	− 3	+ 1	+ 4.5	◎
				120	70	− 3	+ 1	+ 3.8	
					240	− 3	+ 2	+ 4.1	
					500	− 2	+ 8	+ 5.4	◎
			U641	80	500	0	+ 12	+ 2.2	◎
				100	500	0	− 7	+ 2.4	◎
				120	500	0	− 37	+ 2.8	○
		QUINTLEPLIC 822-200 (JAPAN QUAKER CHEMICAL)	A795	80	70	0	+ 9	− 0.1	◎
		QUINTLEPLIC 822-300 (JAPAN QUAKER CHEMICAL)	A402	100	70	− 8	− 19	+ 9.1	○
			A980	100	70	− 13	− 11	+ 18.0	△
			F201	100	70	− 3	− 5	+ 0.4	◎
			A505	100	70	− 4	+ 9	+ 2.3	
					240	− 5	+ 11	+ 2.7	
					500	− 5	+ 8	+ 4.7	◎
			G869	100	70	+ 1	+ 6	− 1.9	
					240	+ 1	+ 4	− 1.1	
					500	+ 1	+ 7	− 0.7	◎
			U641	100	70	0	+ 33	+ 2.1	
					240	0	+ 15	+ 2.8	
					500	− 1	− 20	+ 3.3	◎
			U801	100	70	− 1	+ 37	+ 2.2	
					240	− 2	− 66	+ 1.6	
					500	− 2	− 78	− 0.3	×
		HORTSAFE HF130 (HORTON)	U801	100	72	− 1	0	+ 5.9	
					144	− 2	− 19	+ 6.5	
					300	− 2	− 37	+ 7.2	×

OIL RESISTANCE DATA

		Brand name of sealing liquid (Manufacturer)	NOK's material symbol	Test temperature (℃)	Duration of test (H)	Change in hardness (points)	Change in tensile strength (%)	Change in volume (%)	Adaptable or not
Flame retardant hydraulic oil	〈Fatty acid ester base〉	DAFFNEY FURTHEST ES (IDEMITSU)	A505	100	70	− 7	+ 7	+ 4.9	
					240	− 6	+ 1	+ 4.7	
					500	− 6	+ 14	+ 4.8	◎
			G869	100	70	− 2	+ 6	+ 1.8	
					240	− 2	+ 7	+ 2.5	
					500	− 1	+ 8	+ 2.4	◎
			U641	100	70	0	+ 6	+ 3.6	
					240	− 1	+ 13	+ 4.3	
					500	− 1	+ 5	+ 4.9	◎
			U801	100	70	− 1	+ 21	+ 3.8	
					240	− 1	+ 24	+ 4.4	
					500	− 2	− 36	+ 4.9	○
	〈Water, glycol base〉	HIGH LAND FRG46 (NISSEKI)	A104	100	70	− 8	− 1	+ 4.2	○
			A402	100	70	− 8	− 18	+ 8.4	○
			A505	100	70	− 3	0	+ 2.6	○
			A980	100	70	− 3	− 6	0	○
			A795	80	70	− 3	− 2	+ 3.5	○
		COSMO FLUID GS46 (COSMO)	A795	80	70	− 3	+ 3	+ 3.5	○
		COSMO FLUID HQ46 (COSMO)	A795	80	70	− 4	− 5	+ 3.4	○
		IRUS FLUID C (SHOWA-SHELL)	A104	100	70	− 6	− 7	+ 0.8	○
			A402	100	70	− 5	− 22	+ 1.9	○
			A505	100	70	0	+ 6	+ 0.8	○
			A980	100	70	− 1	− 7	− 1.1	○
		HI-DOLL HAW (MATSUMURA PETROL)	A104	100	70	− 8	− 2	+ 5.6	○
			A402	100	70	− 6	− 9	+ 10.0	○
			A505	70	70	− 3	+ 10	+ 4.4	○
				100	70	− 4	− 2	+ 5.7	○
			A980	70	70	− 2	0	+ 2.6	○
				100	70	− 2	− 8	+ 0.4	○
			A795	80	70	− 4	+ 5	+ 4.5	○
		HI-DOLL HAW(S) (MATSUMURA PETROL)	A505	80	70	− 6	+ 1	+ 4.4	
					240	− 4	+ 3	+ 4.1	
					500	− 3	+ 2	+ 2.7	◎
					1000	− 2	+ 7	+ 0.6	◎
				100	70	− 6	+ 3	+ 4.6	
					240	− 3	+ 2	+ 1.8	
					500	− 3	+ 4	+ 0.8	◎
					1000	− 2	+ 5	+ 0.1	◎
			A626	80	70	− 7	− 1	+ 2.4	
					240	− 3	+ 2	+ 1.5	
					500	− 3	+ 2	− 0.3	◎
					1000	− 2	+ 9	− 3.2	◎
				100	70	− 7	− 3	+ 1.7	
					240	− 3	+ 1	− 1.6	
					500	− 2	+ 1	− 4.8	◎
					1000	0	+ 1	− 6.4	○
			A980	80	70	− 4	+ 2	+ 0.9	
					240	− 3	− 1	+ 3.5	
					500	− 2	− 1	+ 2.0	◎
					1000	0	+ 1	+ 0.1	◎
				100	70	− 3	+ 3	+ 3.4	
					240	0	+ 4	+ 0.1	
					500	+ 3	− 3	− 4.7	◎
					1000	+ 6	− 2	− 8.0	○
			G869	80	70	0	− 1	− 2.6	
					240	+ 2	+ 2	− 2.4	
					500	+ 2	− 2	− 3.1	◎
					1000	+ 2	+ 3	− 3.6	◎
				100	70	+ 1	+ 1	− 1.7	
					240	+ 2	+ 4	− 2.5	
					500	+ 2	+ 2	− 2.7	◎
					1000	+ 2	+ 5	− 2.6	◎

OIL RESISTANCE DATA

		Brand name of sealing liquid (Manufacturer)	NOK's material symbol	Test temperature (℃)	Duration of test (H)	Change in hardness (points)	Change in tensile strength(%)	Change in volume (%)	Adaptable or not
Flame retardant hydraulic oil	〈Water, glycol base〉	HI-DOLL HAW(S) (MATSUMURA PETROL)	G928	80	70	− 3	− 6	+ 3.6	
					240	− 3	− 3	+ 3.6	
					500	− 2	− 5	+ 2.7	◎
					1000	− 1	− 6	+ 2.3	◎
				100	70	− 3	− 8	+ 4.5	
					240	− 2	− 4	+ 3.1	
					500	− 2	− 5	+ 2.1	◎
					1000	− 1	− 4	+ 2.2	◎
			U641	80	70	− 2	− 5	+ 4.0	
					240	− 3	− 52	+ 4.0	
					500	− 3	− 79	+ 4.7	×
					1000	− 3	− 84	+ 3.9	×
				100	70	− 3	− 62	+ 6.1	×
			U652	80	70	− 3	− 15	+ 3.8	
					240	− 4	− 59	+ 3.9	
					500	− 4	− 80	+ 4.5	×
					1000	− 4	− 85	+ 3.7	×
				100	70	− 4	− 68	+ 5.9	×
			U801	80	70	− 3	− 38	+ 6.1	
					240	− 4	− 88	+ 5.7	×
				100	70	− 4	− 88	+ 7.9	×
		HI-DOLL HAW-32 (MATSUMURA PETROL)	A795	80	70	− 4	+ 1	+ 4.4	○
		HI-DOLL H200 (MATSUMURA PETROL)	F268	175	70	− 14	− 27	+ 26.7	×
		HORTSAFE 72 (E.F.HORTON)	A105	70	70	− 1	− 3	+ 2.3	
					240	− 2	0	+ 3.4	
					500	− 2	− 2	+ 6.1	○
					1000	+ 3	− 10	+ 2.8	○
			A305	70	70	− 4	− 6	+ 2.8	
					240	− 6	− 3	+ 5.4	
					500	− 6	− 7	+ 9.3	◎
					1000	− 4	− 6	+ 3.7	◎
			A980	70	70	− 2	− 6	+ 1.9	
					240	− 3	− 1	+ 2.1	
					500	− 3	− 2	+ 2.1	◎
					1000	+ 2	− 10	− 2.9	◎
		SYNLUBE M-46 (NIPPON STEEL CHEMICAL)	F268	100	70	− 4	− 3	+ 2.3	○
				175	70	− 14	− 19	+ 22.3	△
			F975	100	70	− 1	− 22	+ 6.8	△
				175	70	− 5	− 80	+ 29.7	×
			G869	100	70	+ 2	+ 9	− 3.3	◎
				175	70	− 4	− 1	+ 4.9	△
	〈Emulsion type〉	HYDROLUBLIC 120B 5% SOLUTION (E.F. HORTON)	U641	60	420	0	− 7	+ 2.3	○
				80	420	− 1	− 25	+ 2.7	○
			U801	60	420	− 1	− 13	+ 3.2	○
				80	250	− 2	− 40	+ 4.0	×
	〈Water soluble oil〉	DAFFNEY FURTHEST WO46 (IDEMITSU)	A505	80	168	− 7	− 3	+ 13.4	
					500	− 8	− 4	+ 12.9	○
			A795	80	168	− 10	− 9	+ 11.7	
					500	− 12	− 15	+ 12.1	△
			A980	80	168	− 13	− 7	+ 26.3	
					500	− 19	− 5	+ 29.7	×
			G506	80	168	− 6	− 19	+ 9.7	
					500	− 13	− 21	+ 9.8	△
			U641	80	168	− 4	− 35	+ 9.7	
					500	− 4	− 51	+ 9.9	△
TURBINE OIL		140 TURBINE OIL (IDEMITSU)	A505	100	70	0	0	− 0.7	◎
		180 TURBINE OIL (IDEMITSU)	A505	100	70	+ 1	+ 3	− 0.9	◎
		FBK TURBINE 90 (NISSEKI)	A105	100	70	− 2	− 3	+ 1.7	◎
			A305	100	70	− 2	− 14	+ 0.5	◎
			A505	100	70	− 3	− 8	+ 0.9	◎
		TURBINE OIL 32 (NISSEKI)	U801	100	1000	+ 1	+ 2	+ 0.7	◎
Sliding face lubricant		UNIWAY 68 (NISSEKI)	U801	100	1000	+ 1	+ 17	+ 1.5	◎

OIL RESISTANCE DATA

	Brand name of sealing liquid (Manufacturer)	NOK's material symbol	Test temperature (℃)	Duration of test (H)	Change in hardness (points)	Change in tensile strength (%)	Change in volume (%)	Adaptable or not
Machine oil	No.2 SPINDLE OIL (NISSEKI)	A105	100	70	− 5	− 4	+ 9.4	◎
		A305	100	70	− 9	− 22	+ 10.8	○
		A505	100	70	− 6	− 10	+ 9.7	◎
		F548	120	200	0	−	+ 1.6	◎
GREASE FOR VEHICLES	APPOLOIL AUTOREX A (IDEMITSU)	A305	80	70	0	+ 3	+ 2.0	◎
		A795	100	200	+ 5	− 7	− 4.7	◎
		U695	100	750	− 1	− 43	+ 1.3	○
				1000	− 1	− 56	+ 1.2	△
		U801	80	500	0	− 48	+ 3.8	○
	APPOLOIL AUTOREX C (IDEMITSU)	U641	100	1000	− 2	0	0	◎
		U801	100	1000	− 1	+ 15	+ 0.2	◎
	DAFFNEY CORONEX GREASE No.2 (IDEMITSU)	U801	70	1000	− 1	+ 9	+ 2.3	◎
	DIAMOND MULTI-PURPOSE GREASE No.2 (IDEMITSU)	U801	70	1000	− 1	+ 10	+ 2.6	◎
	CHASSIS GREASE 2 (SHOWA-SHELL)	U801	100	168	0	+ 18	+ 3.4	○
	ALBANIA GREASE 2 (SHOWA-SHELL)	U801	100	500	0	− 57	+ 2.4	△
	ALBANIA GREASE RA (SHOWA-SHELL)	U801	100	500	0	− 70	+ 2.2	×
	ALBANIA EP GREASE 2 (SHOWA SHELL)	U641	100	500	− 3	− 10	+ 3.0	◎
		U801	100	500	− 2	− 75	+ 3.9	×
	CHASSIS GREASE No.2 (NISSEKI)	U695	100	1000	− 2	− 15	+ 4.7	◎
			120	1000	− 2	− 35	+ 5.3	○
	SEMI-COAT GREASE No.2 (GENERAL PETROL)	U801	80	168	0	− 13	+ 2.4	○
	CENTPLEX 2 (NOK KLUEBER)	A305	100	70	− 7	+ 1	+ 1.9	
				168	− 5	+ 1	+ 1.2	◎
		A980	100	70	− 5	+ 5	+ 5.0	
				168	− 4	0	+ 4.5	◎
		U593	100	168	0	− 1	+ 0.3	○
		U801	100	168	− 1	− 69	+ 1.0	×
	ONE LOOPER No. 2 (KYODO GREASE)	A305	80	70	− 7	+ 1	+ 4.9	◎
	MARUTEMP TA No.2 (KYODO GREASE)	U801	100	168	0	+ 1	+ 2.4	◎
	CASTLE MP GREASE (TOYOTA MOTORS GENUINE)	A305	80	70	− 6	− 4	+ 4.8	◎
	CASTLE CHASSIS GREASE SPECIAL (TOYOTA MOTORS GENUINE)	U695	100	1000	− 1	− 9	+ 3.0	◎
			120	1000	− 2	− 15	+ 3.5	○
	BLUE RIBBON BEARING GREASE (HINO MOTOR SALES GENUINE)	A305	80	70	− 6	+ 6	+ 2.9	◎
	SUNLIGHT GREASE (SHOWA SHELL)	U801	100	200	− 1	+ 4	+ 1	
				400	− 1	+ 7	+ 1	
				600	− 1	+ 8	+ 1	◎
				800	0	+ 11	+ 1	◎
				1000	0	+ 16	+ 1	◎
	DAFFNEY EPONEX GREASE SR2 (IDEMITSU)	A156	100	70	0	+ 7	− 1.7	
				166	+ 2	− 2	− 2.6	○
		A305	100	70	− 2	+ 1	− 1.1	
				166	− 2	0	− 2.2	◎
		A527	100	70	+ 1	0	− 0.6	
				166	+ 1	+ 4	− 1.2	○
		A567	100	70	+ 5	+ 5	− 7.7	
				166	+ 6	+ 4	− 8.2	△
		A727	100	70	0	+ 8	− 1.4	
				166	− 2	+ 1	− 1.2	◎
		A980	100	70	+ 2	+ 8	− 3.9	
				166	+ 2	+ 4	− 4.2	◎
		U652	100	70	0	+ 21	+ 0.5	
				166	0	+ 11	+ 0.3	○
	DAFFNEY EPONEX GREASE SR2 (IDEMITSU)	U801	100	70	0	+ 19	− 0.6	
				166	0	+ 9	− 0.5	○
	DAFFNEY MOLYBDENUM GREASE (IDEMITSU)	U801	100	70	0	− 14	+ 2.7	
				210	0	− 65	+ 3.1	
				300	0	− 58	+ 3.0	×
Industrial grease	MOBIL TAK 81 (MOBIL)	A505	100	1000	+ 4	− 20	+ 0.4	◎
	GOLD No.2 (JAPAN GREASE)	U801	100	168	0	+ 1	+ 2.7	○
	STABRUGGS NBU30G5 (NOK KLUEBER)	A505	100	1000	+ 6	+ 4	− 0.3	○
	SYNTHESSO PROBA270 (NOK KLUBER)	A168	100	70	− 2	+ 6	+ 2.1	◎

OIL RESISTANCE DATA

	Brand name of sealing liquid (Manufacturer)	NOK's material symbol	Test temperature (℃)	Duration of test (H)	Change in hardness (points)	Change in tensile strength(%)	Change in volume (%)	Adaptable or not
Other grease	No115 SPRAY GREASE (NICHIMORI)	A305	100	70	− 5	0	− 2.3	
				168	− 4	+ 3	− 3.2	◎
		A980	100	70	+ 2	+ 4	− 3.5	
				168	+ 3	+ 4	− 3.6	◎
	DAFFNEY SPRAY GREASE (IDEMITSU)	A305	100	70	− 5	+ 2	+ 1.4	
				168	− 5	+ 5	+ 0.6	◎
		A980	100	70	− 3	+ 1	+ 2.9	
				168	− 2	+ 2	+ 2.7	◎
PROCESSING OIL 〈Cutting oil〉	YUSHILOKEN EC50T3 50% SOLUTION (YUSHIRO KAGAKU)	U641	80	168	− 2	− 13	+ 2.4	○
		U801	80	168	− 2	− 13	+ 2.7	○
	YUSHILOKEN EC50T3 30 times dilution (YUSHIRO KAGAKU)	A105	70	70	− 13	− 11	+ 17.8	
				168	− 13	− 11	+ 18.6	
				336	− 13	− 12	+ 18.4	
				500	− 13	− 8	+ 18.7	△
				1000	− 14	− 9	+ 18.4	△
		A305	70	70	− 10	− 13	+ 16.3	
				168	− 11	− 15	+ 17.4	
				336	− 10	− 15	+ 17.2	
				500	− 10	− 13	+ 17.2	△
				1000	− 11	− 15	+ 17.1	△
		A505	70	70	− 5	− 1	+ 5.6	
				168	− 5	− 1	+ 6.3	
				336	− 5	− 1	+ 10.4	
				500	− 6	− 6	+ 10.3	○
				1000	− 5	+ 4	+ 9.9	○
		A795	70	70	− 10	− 6	+ 10.2	
				168	− 12	− 8	+ 13.2	
				336	− 14	− 13	+ 16.4	
				500	− 15	− 12	+ 18.5	×
				1000	− 16	− 9	+ 22.3	×
		A980	70	70	− 5	− 4	+ 6.0	
				168	− 6	− 5	+ 7.3	
				336	− 6	− 4	+ 9.0	
				500	− 6	+ 1	+ 10.4	○
				1000	− 8	+ 1	+ 12.7	○
		F201	70	70	− 6	+ 1	+ 13.7	
				168	− 4	− 27	+ 28.1	
				336	− 3	− 42	+ 42.5	
				500	− 3	− 50	+ 41.2	×
				1000	− 8	− 53	+ 62.7	×
		G506	70	70	− 2	+ 1	+ 2.5	
				168	− 2	− 1	+ 3.8	
				336	− 3	− 4	+ 3.5	
				500	− 3	− 5	+ 4.3	◎
				1000	− 3	0	+ 6.5	◎
		G869	70	70	0	− 3	+ 1.2	
				168	− 1	+ 1	+ 2.5	
				336	− 1	− 2	+ 2.6	
				500	− 2	− 8	+ 3.9	◎
				1000	− 2	− 2	+ 5.2	◎
		U593	70	70	− 2	− 19	+ 4	
				168	− 5	− 36	+ 6	
				336	− 6	− 43	+ 7	
				500	− 12	− 68	+ 8	×
		U641	70	70	− 3	− 13	+ 2	
				168	− 3	− 14	+ 5	
				336	− 3	− 18	+ 5	
				500	− 3	− 20	+ 5	○
				1000	− 3	− 29	+ 6	○
		U801	70	70	− 3	− 32	+ 4	
				168	− 3	− 34	+ 5	
				336	− 3	− 35	+ 5	
				500	− 3	− 56	+ 5	△
				1000	− 3	− 85	+ 5	×

OIL RESISTANCE DATA

Brand name of sealing liquid (Manufacturer)	NOK's material symbol	Test temperature (℃)	Duration of test (H)	Change in hardness (points)	Change in tensile strength (%)	Change in volume (%)	Adaptable or not
PROCESSING OIL 〈Cutting oil〉 MULTICOOL CSF2000 20 times dilution (KYODO GREASE)	A505	80	72	− 5	− 3	+ 5.7	
			240	− 5	0	+ 7.2	
			480	− 5	− 2	+ 7.8	
			720	− 4	− 2	+ 7.7	◎
	G506	80	72	− 4	− 6	+ 4.1	
			240	− 3	− 1	+ 4.1	
			480	− 3	− 8	+ 4.3	
			720	− 4	− 9	+ 4.4	◎
	G869	80	72	− 5	− 1	+ 4.5	
			240	− 4	+ 3	+ 4.2	
			480	− 5	− 11	+ 6.9	
			720	− 5	− 12	+ 7.3	◎
	U593	80	72	− 3	− 8	+ 4	
			240	− 13	− 88	+ 7	×
	U641	80	72	− 2	− 22	+ 3	
			240	− 3	− 27	+ 5	
			480	− 4	− 33	+ 5	○
			720	− 4	− 42	+ 7	○
	U801	80	72	− 2	− 18	+ 3	
			240	− 2	− 74	+ 4	×
MULTICOOL CSF5000 20 times dilution (KYODO GREASE)	A105	70	70	− 4	− 6	+ 2.1	
			168	− 4	− 10	+ 3.4	
			336	− 4	− 9	+ 5.0	
			500	− 5	− 11	+ 6.1	◎
			1000	− 3	− 8	+ 4.1	◎
	A305	70	70	− 2	− 4	+ 2.0	
			168	− 5	− 5	+ 3.3	
			336	− 5	− 4	+ 6.0	
			500	− 5	− 6	+ 7.2	◎
			1000	− 1	− 1	+ 5.4	◎
	A505	70	70	− 3	+ 6	+ 2.2	
			168	− 4	+ 7	+ 3.5	
			336	− 4	+ 9	+ 4.2	
			500	− 4	+ 10	+ 3.7	◎
			1000	− 3	+ 7	+ 3.9	◎
	A795	70	70	− 6	+ 12	+ 7.4	
			168	− 7	+ 11	+ 9.7	
			336	− 7	+ 12	+ 11.8	
			500	− 8	+ 12	+ 14.0	○
			1000	− 10	+ 6	+ 18.1	△
	A980	70	70	− 2	+ 4	+ 2.6	
			168	− 2	+ 2	+ 2.2	
			336	− 2	+ 1	+ 1.8	
			500	− 2	− 1	+ 1.6	◎
			1000	− 1	− 5	+ 1.2	◎
	F201	70	70	− 2	− 13	+ 2.8	
			168	− 3	− 11	+ 4.3	
			336	− 3	− 17	+ 5.8	
			500	− 3	− 24	+ 7.0	○
			1000	− 2	+ 2	+ 8.8	○
	G506	70	70	+ 1	+ 7	− 0.5	
			168	+ 1	+ 8	− 0.3	
			336	+ 1	+ 8	− 0.9	
			500	+ 1	+ 8	− 1.1	◎
			1000	+ 1	+ 8	− 1.0	◎
	G869	70	70	0	+ 7	− 0.4	
			168	+ 1	+ 12	− 1.0	
			336	+ 1	+ 10	− 1.7	
			500	+ 2	+ 14	− 2.0	◎
			1000	+ 2	+ 10	− 1.9	◎
	U593	70	70	− 3	− 12	+ 3	
			168	− 3	− 9	+ 3	
			336	− 7	− 37	+ 5	
			500	− 11	− 77	+ 6	×

OIL RESISTANCE DATA

		Brand name of sealing liquid (Manufacturer)	NOK's material symbol	Test temperature (℃)	Duration of test (H)	Change in hardness (points)	Change in tensile strength(%)	Change in volume (%)	Adaptable or not
PROCESSING OIL	〈Cutting oil〉	MULTICOOL CSF5000 20 times dilution (KYODO GREASE)	U641	70	70	− 1	− 8	+ 2	
					168	− 1	− 7	+ 1	
					336	− 2	− 19	+ 1	
					500	− 2	− 19	+ 2	○
					1000	− 2	− 30	+ 2	○
			U801	70	70	− 1	− 5	+ 2	
					168	− 1	+ 4	+ 2	
					336	− 2	− 14	+ 3	
					500	− 2	− 73	+ 3	×
					1000	− 2	− 83	+ 4	×
		SUGICUT CS68-JR 20 times dilution (SUGIMURA CHEMICAL)	A105	70	70	− 5	− 7	+ 4.2	
					168	− 6	− 14	+ 6.1	
					336	− 6	− 10	+ 7.6	
					500	− 6	− 7	+ 8.0	◎
					1000	− 7	− 11	+ 11.3	○
			A305	70	70	− 5	− 4	+ 4.4	
					168	− 5	− 5	+ 6.8	
					336	− 6	− 5	+ 8.8	
					500	− 6	− 2	+ 9.2	◎
					1000	− 7	− 7	+ 14.5	○
			A505	70	70	− 4	+ 6	+ 4.2	
					168	− 6	+ 9	+ 5.9	
					336	− 6	+ 4	+ 7.7	
					500	− 6	+ 8	+ 8.5	◎
					1000	− 6	+ 5	+ 9.6	◎
			A795	70	70	− 7	+ 13	+ 8.9	
					168	− 10	+ 14	+ 12.0	
					336	− 12	− 4	+ 16.7	
					500	− 12	− 10	+ 19.0	×
					1000	− 14	− 16	+ 23.9	×
			A980	70	70	− 4	+ 3	+ 4.0	
					168	− 5	+ 7	+ 5.4	
					336	− 6	+ 4	+ 7.0	
					500	− 6	+ 5	+ 7.9	◎
					1000	− 5	+ 3	+ 8.7	◎
			F201	70	70	− 3	− 8	+ 4.8	
					168	− 4	− 16	+ 7.6	
					336	− 5	− 17	+ 12.7	
					500	− 6	− 21	+ 14.7	○
					1000	− 6	− 30	+ 27.3	×
			G506	70	70	0	+ 6	+ 1.5	
					168	− 1	+ 7	+ 2.0	
					336	− 2	+ 5	+ 3.4	
					500	− 2	+ 6	+ 4.9	◎
					1000	− 2	0	+ 5.7	◎
			G869	70	70	+ 1	+ 12	+ 0.3	
					168	0	+ 10	+ 0.6	
					336	− 1	+ 10	+ 1.3	
					500	− 1	+ 10	+ 2.1	◎
					1000	− 1	+ 11	+ 2.9	◎
			U593	70	70	− 3	− 15	+ 4	
					168	− 3	− 16	+ 5	
					336	− 9	− 52	+ 6	×
			U641	70	70	− 2	− 10	+ 2	
					168	− 2	− 9	+ 2	
					336	− 3	− 19	+ 4	
					500	− 3	− 24	+ 4	○
					1000	− 3	− 40	+ 6	○
			U801	70	70	− 1	− 1	+ 3	
					168	− 1	+ 5	+ 4	
					336	− 1	− 29	+ 5	
					500	− 1	− 79	+ 6	×

OIL RESISTANCE DATA

		Brand name of sealing liquid (Manufacturer)	NOK's material symbol	Test temperature (℃)	Duration of test (H)	Change in hardness (points)	Change in tensile strength (%)	Change in volume (%)	Adaptable or not
PROCESSING OIL	〈Cutting oil〉	NORITAKE COOL NK88 50 times dilution (NORITAKE)	A305	80	200	+ 1	0	+ 3.5	○
			G607	80	200	+ 1	0	− 1.9	○
		SULKRAT X-350C (KYODO GREASE)	U801	70	72	− 3	− 20	+ 22.7	
					144	− 3	− 18	+ 26.7	
					300	− 3	− 23	+ 29.3	×
	〈Laminating oil〉	MOBIL MTJ-200C (MOBIL)	A505	100	70	− 12	− 2	+ 16.6	△
			U801	80	70	0	− 49	+ 2.4	×
		MOBIL MTJ-200C 6% SOLUTION (MOBIL)	A104	80	70	− 7	− 3	+ 14.6	○
			A505	80	70	− 6	+ 2	+ 13.3	○
	〈Anti-rust oil〉	ST BOUSEI K2171 (MOBIL)	A104	25	70	− 12	− 14	+ 11.0	△
			A505	25	70	− 5	− 10	+ 7.6	○
Metal detergent		ANTI-CORROSION	A305	25	70	− 3	− 3	+ 2.2	○
			A402	25	70	− 3	− 18	+ 2.5	○
Crude oil		KUWAIT Crude oil	A505	60	70	− 4	− 16	+ 8.8	○
FUEL OIL		FUEL A	A105	25	70	− 4	− 21	+ 7.8	○
			A795	25	70	0	− 9	+ 0.4	○
		FUEL B	A105	25	70	− 17	− 53	+ 33.0	×
			A305	25	70	− 14	− 48	+ 23.4	×
			A795	25	70	− 16	− 35	+ 22	×
			F975	25	70	− 4	− 12	+ 2.2	○
		FUEL C	A305	40	70	− 17	− 61	+ 56.0	
					240	− 17	− 62	+ 55.0	×
			A795	25	70	− 18	− 50	+ 32	×
			F201	40	70	− 8	− 30	+ 9.5	
					240	− 10	− 38	+ 15.1	
					480	− 11	− 41	+ 15.5	
					960	− 12	− 42	+ 15.7	△
				60	70	− 11	− 41	+ 18.1	
					200	− 11	− 42	+ 18.1	
					500	− 14	− 56	+ 19.0	×
			F975	23	22	− 3	− 10	+ 2.1	
					70	− 3	− 14	+ 3.7	
					166	− 5	− 20	+ 5.5	○
		FUEL C + METHANOL (85:15)	A305	40	70	− 18	− 69	+ 94.0	
					240	− 18	− 68	+ 94.0	×
Other hydraulic oil	〈Hydraulic oil for aircrafts〉	MIL H 5606	A980	120	70	− 21	− 19	+ 30.7	×
		MIL H 5606 C	U801	100	500	− 1	+ 5	+ 6.0	◎
		HYDRAULIC FLUID (SHOWA-SHELL)	A903	100	70	− 4	− 2	+ 6.2	○
		Caltex RPM Aviation Hydraulic Fluid G	A105	100	70	− 1	− 9	− 2.6	
					240	0	− 11	− 2.2	
					500	0	− 13	− 2.0	◎
					1000	0	− 15	− 1.8	◎
					2000	0	− 14	− 1.5	◎
					3000	+ 1	− 22	− 0.6	○
					5000	+ 1	− 24	+ 4.3	○
			A980	100	70	− 1	− 9	− 0.9	
					240	− 1	− 9	− 0.5	
					500	− 1	− 18	− 0.1	◎
					1000	− 1	− 19	+ 0.3	◎
					2000	− 3	− 17	+ 1.1	◎
					3000	− 4	− 23	+ 5.0	○
					5000	− 7	− 33	+ 9.3	△
		ROYAL LUBRICANTS: MIL oil (MIL H5606G)	A305	100	70	− 6	− 9	+ 13.6	
					500	− 8	− 7	+ 13.6	○
			A567	100	70	− 12	− 19	+ 21.6	
					500	− 13	− 32	+ 22.1	△
			A903	100	70	− 11	− 19	+ 19.6	
					500	− 12	− 25	+ 19.6	△
			A980	100	70	− 15	− 21	+ 27.2	
					500	− 18	− 22	+ 27.9	×

OIL RESISTANCE DATA

		Brand name of sealing liquid (Manufacturer)	NOK's material symbol	Test temperature (℃)	Duration of test (H)	Change in hardness (points)	Change in tensile strength(%)	Change in volume (%)	Adaptable or not
Other hydraulic oil	〈Hydraulic oil for aircrafts〉	Chevron Aviation Hydraulic Fluid G (MIL H5606G)	A105	100	70	− 10	− 8	+ 11.7	○
			A505	100	70	− 10	+ 3	+ 11.2	○
			A527	100	70	− 16	− 23	+ 38.5	×
			A567	100	70	− 11	− 11	+ 18.3	△
			A980	100	70	− 15	− 13	+ 26.0	×
			G928	100	70	− 4	− 1	+ 12.9	○
	〈Raw resolution hydraulic oil〉	NATUREL HF (SHELL)	A105	120	70	− 6	− 8	+ 9.0	○
			A305	100	70	− 7	− 2	+ 1.3	
					240	− 6	− 4	+ 1.4	
					500	− 6	− 1	+ 1.5	◎
			A505	120	70	− 4	+ 8	+ 8.8	○
			A903	120	70	− 5	− 7	+ 15.4	△
			A980	60	70	− 7	+ 4	+ 7.9	
					240	− 10	0	+ 12.5	
					500	− 12	+ 3	+ 13.5	△
				80	70	− 12	+ 5	+ 13.4	
					240	− 12	− 2	+ 13.8	
					500	− 13	− 10	+ 14.2	△
				100	70	− 13	− 4	+ 15.1	
					240	− 13	− 6	+ 15.2	
					500	− 14	− 7	+ 15.6	△
				120	70	− 14	− 6	+ 28.0	×
			G506	120	70	− 3	− 7	+ 4.9	◎
			U593	60	500	− 1	+ 14	+ 1.1	◎
				80	500	− 2	− 7	+ 1.4	◎
				100	500	− 4	− 50	+ 0.5	○
			U641	60	500	− 1	+ 28	+ 0.7	◎
				80	500	− 1	+ 8	+ 0.9	◎
				100	500	− 1	+ 7	+ 1.6	◎
			U801	80	500	0	+ 2	− 0.7	◎
				100	500	0	− 63	− 1.4	×
		PLANTO HYD-40	A104	100	50	− 1	+ 1	− 3.4	
					100	− 1	+ 1	− 3.4	
					200	− 1	+ 1	− 3.4	
					300	− 1	0	− 3.3	◎
			A105	100	72	− 1	− 9	+ 0.1	
					300	− 1	− 16	− 0.8	
					600	0	− 16	− 1.4	◎
					1000	+ 1	− 17	− 1.3	◎
				120	70	− 2	− 19	+ 0.2	○
			A305	100	72	− 5	0	+ 0.1	
					300	− 4	− 3	− 0.6	
					600	− 4	− 6	− 0.9	◎
					1000	− 4	− 5	− 0.9	◎
				120	70	− 4	− 3	+ 0.1	○
			A505	100	72	− 3	− 1	+ 1.1	
					300	− 3	+ 4	+ 1.0	
					600	− 4	− 4	+ 0.9	◎
					1000	− 3	− 3	+ 1.1	◎
				120	70	− 4	+ 6	+ 1.9	○
			A795	100	50	+ 2	− 7	− 3.4	
					100	+ 2	+ 1	− 4.0	
					200	+ 2	− 5	− 4.1	
					300	+ 2	− 8	− 4.1	◎
			A980	120	70	− 16	− 3	+ 19.1	×
			G506	120	72	0	+ 1	− 0.6	
					300	0	+ 3	− 0.6	
					600	+ 1	− 2	− 0.6	◎
					1000	+ 1	− 3	− 0.6	◎
			U593	100	1000	− 2	− 30	+ 0.4	◎
			U641	100	1000	− 1	− 2	+ 1.4	◎
			U801	100	1000	0	− 26	− 0.6	◎

OIL RESISTANCE DATA

Brand name of sealing liquid (Manufacturer)	NOK's material symbol	Test temperature (℃)	Duration of test (H)	Change in hardness (points)	Change in tensile strength (%)	Change in volume (%)	Adaptable or not
Other hydraulic oil 〈Raw resolution hydraulic oil〉 PANOLIN HLP SYNTH46	A105	80	70	− 9	− 4	+ 11.5	
			280	− 9	− 5	+ 11.1	
			500	− 9	− 10	+ 10.5	○
	A505	80	70	− 7	− 1	+ 8.4	
			280	− 7	− 1	+ 8.7	
			500	− 7	− 3	+ 8.1	○
		110	500	− 9	+ 3	+ 9.5	△
			750	− 10	+ 1	+ 9.6	△
			1000	− 10	− 2	+ 9.8	△
			1500	− 10	+ 5	+ 10.2	△
	A795	100	70	+ 1	+ 1	− 0.4	
			500	+ 5	− 20	− 0.7	○
	A980	80	70	− 14	− 6	+ 28.5	
			280	− 14	− 8	+ 28.8	
			500	− 15	− 10	+ 29.0	×
	G588	110	500	− 2	+ 4	+ 13.4	○
			750	− 1	+ 2	+ 15.0	○
			1000	− 1	+ 4	+ 14.8	○
			1500	− 1	− 2	+ 15.2	○
	G928	80	70	− 4	− 1	+ 7.1	
			280	− 5	0	+ 9.9	
			500	− 5	+ 1	+ 10.1	○
MOBIL EAL 224H	A505	80	240	− 1	+ 5	+ 1.3	◎
	A903	80	240	− 5	+ 3	+ 5.8	◎
	G361	80	240	− 1	− 6	+ 0.7	◎
	U593	100	72	0	− 2	+ 2.2	
			140	0	+ 2	+ 2.4	
			300	− 1	+ 3	+ 2.8	◎
	U641	100	72	0	+ 13	+ 0.8	
			140	0	+ 15	+ 1.0	
			300	0	+ 23	+ 1.2	◎
	U652	100	72	0	− 6	+ 0.6	
			140	0	0	+ 0.7	
			300	0	+ 4	+ 0.8	◎
	U801	100	72	0	+ 3	− 0.1	
			140	0	+ 20	− 0.2	
			300	0	+ 18	− 0.1	◎
HIGH LAND Z46 (SHIN NISSEKI)	A305	100	72	− 2	+ 2	− 0.1	
			140	− 2	− 2	− 0.4	◎
	A505	80	240	− 2	+ 4	+ 0.4	◎
	A903	80	240	− 2	− 4	+ 2.8	◎
	G361	80	240	− 1	0	+ 0.2	◎
	U593	100	72	0	+ 1	+ 2.3	
			140	0	+ 4	+ 2.4	
			300	− 1	+ 4	+ 2.9	◎
	U641	100	70	− 1	+ 9	+ 1.4	
			500	− 1	− 1	+ 1.5	◎
			1000	− 1	− 6	+ 1.7	◎
			2000	− 1	− 10	+ 2.6	◎
	U652	100	72	0	− 3	+ 0.8	
			140	0	− 4	+ 0.8	
			300	0	− 9	+ 1.0	◎
	U801	100	70	− 1	− 12	+ 0.2	
			500	− 3	− 17	+ 0.3	◎
			1000	− 3	− 24	+ 0.6	◎
			2000	− 3	− 27	+ 0.6	◎
	UH04	100	70	− 1	+ 12	+ 0.8	
			500	− 3	− 10	+ 1.7	◎
			1000	− 3	− 11	+ 2.1	◎
			2000	− 3	− 14	+ 2.8	◎

OIL RESISTANCE DATA

Brand name of sealing liquid (Manufacturer)			NOK's material symbol	Test temperature (℃)	Duration of test (H)	Change in hardness (points)	Change in tensile strength(%)	Change in volume (%)	Adaptable or not
Other hydraulic oil	〈Raw resolution hydraulic oil〉	DAFFNEY VIOS HYDRO 46SE (IDEMITSU)	A105	100	70	− 2	− 9	+ 2.4	
					280	− 2	− 9	+ 0.9	
					500	− 3	− 14	+ 1.2	◎
				120	70	− 3	− 17	+ 2.1	
					280	− 3	− 21	+ 1.9	
					500	− 3	− 33	+ 2.1	△
			A505	100	70	− 2	+ 5	+ 2.4	
					280	− 2	+ 5	+ 2.1	
					500	− 3	+ 6	+ 1.9	◎
				120	70	− 3	+ 1	+ 2.7	
					280	− 3	+ 4	+ 2.8	
					500	− 5	+ 5	+ 3.4	○
			A980	100	70	− 9	+ 3	+ 13.9	
					280	− 11	− 7	+ 14.3	
					500	− 11	− 8	+ 14.7	△
				120	70	− 13	− 16	+ 20.7	
					280	− 17	− 28	+ 25.6	
					500	− 17	− 23	+ 23.2	×
			G928	100	70	− 2	− 3	+ 3.1	
					280	− 3	− 2	+ 4.0	
					500	− 4	− 3	+ 4.5	◎
				120	70	− 3	− 3	+ 3.9	
					280	− 4	− 2	+ 4.3	
					500	− 4	− 4	+ 4.5	◎
			U641	100	70	0	− 1	+ 1.4	
					280	0	+ 1	+ 2.4	
					500	0	0	+ 2.4	◎
				120	70	− 2	− 4	+ 2.2	
					280	− 1	− 13	+ 2.8	
					500	− 1	− 25	+ 2.8	○
			U801	100	70	− 1	+ 5	+ 0.7	
					280	− 1	− 3	+ 1.0	
					500	0	− 1	+ 0.9	◎
				120	70	0	+ 1	+ 0.9	
					280	0	− 15	+ 1.2	
					500	− 1	− 38	+ 1.1	○
		NATUREL HF-E46 (SHELL)	A105	100	70	− 4	− 10	+ 4.0	
					280	− 5	− 10	+ 4.1	
					500	− 6	− 14	+ 4.8	◎
				120	70	− 6	− 14	+ 6.8	
					280	− 7	− 27	+ 5.7	
					500	− 8	− 22	+ 5.7	△
			A505	100	70	− 5	+ 6	+ 6.4	
					280	− 6	+ 7	+ 6.5	
					500	− 6	− 2	+ 6.7	◎
				120	70	− 6	+ 4	+ 7.8	
					280	− 8	− 5	+ 7.9	
					500	− 9	− 9	+ 8.3	△
			A980	100	70	− 12	− 6	+ 19.8	
					280	− 16	− 16	+ 21.3	
					500	− 16	− 18	+ 20.6	×
				120	70	− 13	− 16	+ 20.7	
					280	− 17	− 28	+ 25.6	
					500	− 17	− 23	+ 23.2	×
			G928	100	70	− 3	− 3	+ 4.5	
					280	− 4	− 2	+ 6.2	
					500	− 4	− 4	+ 7.2	◎
				120	70	− 4	− 3	+ 6.6	
					280	− 5	− 1	+ 7.5	
					500	− 6	− 3	+ 9.2	◎

OIL RESISTANCE DATA

	Brand name of sealing liquid (Manufacturer)	NOK's material symbol	Test temperature (℃)	Duration of test (H)	Change in hardness (points)	Change in tensile strength (%)	Change in volume (%)	Adaptable or not
Other hydraulic oil	NATUREL HF-E46 (SHELL) 〈Raw resolution hydraulic oil〉	U641	100	70	0	+ 9	+ 2.8	
				280	0	+ 6	+ 3.9	
				500	0	− 11	+ 4.0	◎
			120	70	− 1	− 4	+ 3.9	
				280	− 1	− 38	+ 5.1	
				500	− 2	− 56	+ 5.2	△
		U801	100	70	0	+ 21	+ 1.5	
				280	0	− 17	+ 1.9	
				500	0	− 54	+ 1.7	△
			120	70	0	− 14	+ 2.0	
				280	− 1	− 77	+ 0.6	
				500	− 1	− 77	− 5.7	×
Others	Water and Vapor	A105	100	70	+ 3	− 16	− 0.1	○
		A168	120	70	+ 5	− 41	− 0.8	△
		A305	100	70	− 4	− 3	+ 3.8	○
		A505	100	70	− 1	− 11	+ 3.8	○
		U641	25	35040	− 1	− 11	+ 0.5	◎
		U695	80	1000	0	− 7	+ 1.4	◎
			98	1000	− 2	− 43	+ 1.5	○
		U801	70	1000	− 1	− 28	+ 1.0	◎
			100	200	− 3	− 79	+ 1.5	×
	Muddy water	U641	25	35040	− 1	− 11	+ 0.3	◎
	COLA	A104	25	100	− 5	−	+ 1.4	○
		A168	25	100	− 1	−	+ 1.1	○
		A305	25	100	− 3	−	+ 1.4	○
	METHANOL	A305	40	70	− 12	− 41	+ 14.0	
				240	− 10	− 38	+ 12.0	×
		F201	40	70	− 20	−	+ 76.5	×

FITTING TOLERANCE FOR SHAFT (JIS B 0401)

Unit 0.001mm

Classification of nominal sizes (mm)	IT 5	m 5	k 5	j 5	h 5	IT 6	r 6	p 6	n 6	m 6	k 6	j 6	h 6	g 6	f 6	IT 7	s 7	r 7	p 7	n 7	m 7	k 7	j 7	h 7	g 7	f 7	e 7	IT 8	h 8	f 8	e 8	d 8	IT 9	h 9	e 9	d 9	c 9	b 9	IT 10	h 10	IT 11	h 11
		Upper tolerance / Lower tolerance					Upper tolerance / Lower tolerance										Upper tolerance / Lower tolerance												Upper tolerance / Lower tolerance					Upper tolerance / Lower tolerance						Upper tolerance / Lower tolerance		Upper tolerance / Lower tolerance
1 - 3	4	+6 / +2	+4 / 0	+4 / −1	0 / −4	6	+16 / +10	+12 / +6	+10 / +4	+8 / +2	+6 / 0	+6 / −1	0 / −6	−2 / −8	−6 / −12	10	+24 / +15	+21 / +12	+18 / +9	+15 / +6	— / —	— / —	+7 / −2	0 / −10	−3 / −12	−6 / −16	−14 / −24	14	0 / −14	−6 / −20	−14 / −28	−20 / −34	25	0 / −25	−14 / −39	−20 / −45	−60 / −85	−140 / −165	40	0 / −40	60	0 / −60
3 - 6	5	+9 / +4	+6 / +1	+4 / −1	0 / −5	8	+23 / +15	+20 / +12	+16 / +8	+12 / +4	+9 / +1	+7 / −1	0 / −8	−4 / −12	−10 / −18	12	+31 / +19	+27 / +15	+24 / +12	+20 / +8	— / —	— / —	+9 / −3	0 / −12	−4 / −16	−10 / −22	−20 / −32	18	0 / −18	−10 / −28	−20 / −38	−30 / −48	30	0 / −30	−20 / −50	−30 / −60	−70 / −100	−140 / −170	48	0 / −48	75	0 / −75
6 - 10	6	+12 / +6	+7 / +1	+4 / −2	0 / −6	9	+28 / +19	+24 / +15	+19 / +10	+15 / +6	+10 / +1	+7 / −2	0 / −9	−5 / −14	−13 / −22	15	+38 / +23	+34 / +19	+30 / +15	+25 / +10	+21 / +6	+16 / +1	+10 / −5	0 / −15	−5 / −20	−13 / −28	−25 / −40	22	0 / −22	−13 / −35	−25 / −47	−40 / −62	36	0 / −36	−25 / −61	−40 / −76	−80 / −116	−150 / −186	58	0 / −58	90	0 / −90
10 - 14 14 - 18	8	+15 / +7	+9 / +1	+5 / −3	0 / −8	11	+34 / +23	+29 / +18	+23 / +12	+18 / +7	+12 / +1	+8 / −3	0 / −11	−6 / −17	−16 / −27	18	+46 / +28	+41 / +23	+36 / +18	+30 / +12	+25 / +7	+19 / +1	+12 / −6	0 / −18	−6 / −24	−16 / −34	−32 / −50	27	0 / −27	−16 / −43	−32 / −59	−50 / −77	43	0 / −43	−32 / −75	−50 / −93	−95 / −138	−150 / −193	70	0 / −70	110	0 / −110
18 - 24 24 - 30	9	+17 / +8	+11 / +2	+5 / −4	0 / −9	13	+41 / +28	+35 / +22	+28 / +15	+21 / +8	+15 / +2	+9 / −4	0 / −13	−7 / −20	−20 / −33	21	+56 / +35	+49 / +28	+43 / +22	+36 / +15	+29 / +8	+23 / +2	+13 / −8	0 / −21	−7 / −28	−20 / −41	−40 / −61	33	0 / −33	−20 / −53	−40 / −73	−65 / −98	52	0 / −52	−40 / −92	−65 / −117	−110 / −162	−160 / −212	84	0 / −84	130	0 / −130
30 - 40 40 - 50	11	+20 / +9	+13 / +2	+6 / −5	0 / −11	16	+50 / +34	+42 / +26	+33 / +17	+25 / +9	+18 / +2	+11 / −5	0 / −16	−9 / −25	−25 / −41	25	+68 / +43	+59 / +34	+51 / +26	+42 / +17	+34 / +9	+27 / +2	+15 / −10	0 / −25	−9 / −34	−25 / −50	−50 / −75	39	0 / −39	−25 / −64	−50 / −89	−80 / −119	62	0 / −62	−50 / −112	−80 / −142	−120 / −182 −130 / −192	−170 / −232 −180 / −242	100	0 / −100	160	0 / −160
50 - 65 65 - 80	13	+24 / +11	+15 / +2	+6 / −7	0 / −13	19	+60 / +41 +62 / +43	+51 / +32	+39 / +20	+30 / +11	+21 / +2	+12 / −7	0 / −19	−10 / −29	−30 / −49	30	+83 / +53 +89 / +59	+71 / +41 +73 / +43	+62 / +32	+50 / +20	+41 / +11	+32 / +2	+18 / −12	0 / −30	−10 / −40	−30 / −60	−60 / −90	46	0 / −46	−30 / −76	−60 / −106	−100 / −146	74	0 / −74	−60 / −134	−100 / −174	−140 / −214 −150 / −224	−190 / −264 −200 / −274	120	0 / −120	190	0 / −190
80 - 100 100 - 120	15	+28 / +13	+18 / +3	+6 / −9	0 / −15	22	+73 / +51 +76 / +54	+59 / +37	+45 / +23	+35 / +13	+25 / +3	+13 / −9	0 / −22	−12 / −34	−36 / −58	35	+106 / +71 +114 / +79	+86 / +51 +89 / +54	+72 / +37	+58 / +23	+48 / +13	+38 / +3	+20 / −15	0 / −35	−12 / −47	−36 / −71	−72 / −107	54	0 / −54	−36 / −90	−72 / −126	−120 / −174	87	0 / −87	−72 / −159	−120 / −207	−170 / −257 −180 / −267	−220 / −307 −240 / −327	140	0 / −140	220	0 / −220
120 - 140 140 - 160 160 - 180	18	+33 / +15	+21 / +3	+7 / −11	0 / −18	25	+88 / +63 +90 / +65 +93 / +68	+68 / +43	+52 / +27	+40 / +15	+28 / +3	+14 / −11	0 / −25	−14 / −39	−43 / −68	40	+132 / +92 +140 / +100 +148 / +108	+103 / +63 +105 / +65 +108 / +68	+83 / +43	+67 / +27	+55 / +15	+43 / +3	+22 / −18	0 / −40	−14 / −54	−43 / −83	−85 / −125	63	0 / −63	−43 / −106	−85 / −148	−145 / −208	100	0 / −100	−85 / −185	−145 / −245	−200 / −300 −210 / −310 −230 / −330	−260 / −360 −280 / −380 −310 / −410	160	0 / −160	250	0 / −250
180 - 200 200 - 225 225 - 250	20	+37 / +17	+24 / +4	+7 / −13	0 / −20	29	+106 / +77 +109 / +80 +113 / +84	+79 / +50	+60 / +31	+46 / +17	+33 / +4	+16 / −13	0 / −29	−15 / −44	−50 / −79	46	+168 / +122 +176 / +130 +188 / +140	+123 / +77 +126 / +80 +130 / +84	+96 / +50	+77 / +31	+63 / +17	+50 / +4	+25 / −21	0 / −46	−15 / −61	−50 / −96	−100 / −146	72	0 / −72	−50 / −122	−100 / −172	−170 / −242	115	0 / −115	−100 / −215	−170 / −285	−240 / −355 −260 / −375 −280 / −395	−340 / −455 −380 / −495 −420 / −535	185	0 / −185	290	0 / −290
250 - 280 280 - 315	23	+43 / +20	+27 / +4	+7 / −16	0 / −23	32	+126 / +94 +130 / +98	+88 / +56	+66 / +34	+52 / +20	+36 / +4	+16 / −16	0 / −32	−17 / −49	−56 / −88	52	+210 / +158 +222 / +170	+146 / +94 +150 / +98	+108 / +56	+86 / +34	+72 / +20	+56 / +4	+26 / −26	0 / −52	−17 / −69	−56 / −108	−110 / −162	81	0 / −81	−56 / −137	−110 / −191	−190 / −271	130	0 / −130	−110 / −240	−190 / −320	−300 / −430 −330 / −460	−480 / −610 −540 / −670	210	0 / −210	320	0 / −320
315 - 355 355 - 400	25	+46 / +21	+29 / +4	+7 / −18	0 / −25	36	+144 / +108 +150 / +114	+98 / +62	+73 / +37	+57 / +21	+40 / +4	+18 / −18	0 / −36	−18 / −54	−62 / −98	57	+247 / +190 +265 / +208	+165 / +108 +171 / +114	+119 / +62	+94 / +37	+78 / +21	+61 / +4	+29 / −28	0 / −57	−18 / −75	−62 / −119	−125 / −182	89	0 / −89	−62 / −151	−125 / −214	−210 / −299	140	0 / −140	−125 / −265	−210 / −350	−360 / −500 −400 / −540	−600 / −740 −680 / −820	230	0 / −230	360	0 / −360
400 - 450 450 - 500	27	+50 / +23	+32 / +5	+7 / −20	0 / −27	40	+166 / +126 +172 / +132	+108 / +68	+80 / +40	+63 / +23	+45 / +4	+20 / −20	0 / −40	−20 / −60	−68 / −108	63	+295 / +232 +315 / +252	+189 / +126 +195 / +132	+131 / +68	+103 / +40	+86 / +23	+68 / +5	+31 / −32	0 / −63	−20 / −83	−68 / −131	−135 / −198	97	0 / −97	−68 / −165	−135 / −232	−230 / −327	155	0 / −155	−135 / −290	−230 / −385	−440 / −595 −480 / −635	−760 / −915 −840 / −995	250	0 / −250	400	0 / −400

Unit 0.001mm

FITTING TOLERANCE FOR BORE (JIS B 0401)

Unit 0.001mm

Classification of nominal sizes (mm)	IT 6	M6	K6	J6	H6	G6	F6	IT 7	U7	T7	S7	R7	P7	N7	M7	K7	J7	H7	G7	F7	E7	IT 8	H8	F8	E8	D8	IT 9	H9	E9	D9	C9	IT 10	H10	D10	C10	B10	IT 12	H12
		Upper tolerance / Lower tolerance							Upper tolerance / Lower tolerance														Upper tolerance / Lower tolerance					Upper tolerance / Lower tolerance					Upper tolerance / Lower tolerance					Upper tolerance / Lower tolerance
1 - 3	6	−2 −8	+0 −6	+2 −4	+6 0	+8 +2	+12 +6	10	−18 −28	—	−14 −24	−10 −20	−6 −16	−4 −14	−2 −12	0 −10	+3 −6	+10 0	+12 +2	+16 +6	+24 +14	14	+14 0	+20 +6	+28 +14	+34 +20	25	+25 0	+39 +14	+45 +20	+85 +60	40	+40 0	+60 +20	+100 +60	+180 +140	100	+100 0
3 - 6	8	−1 −9	+2 −6	+4 −4	+8 0	+12 +4	+18 +10	12	−19 −31	—	−15 −27	−11 −23	−8 −20	−4 −16	0 −12	+3 −9	+5 −7	+12 0	+16 +4	+22 +10	+32 +20	18	+18 0	+28 +10	+38 +20	+48 +30	30	+30 0	+50 +20	+60 +30	+100 +70	48	+48 0	+78 +30	+118 +70	+188 +140	120	+120 0
6 - 10	9	−3 −12	+2 −7	+5 −4	+9 0	+14 +5	+22 +13	15	−22 −37	—	−17 −32	−13 −28	−9 −24	−4 −19	0 −15	+5 −10	+8 −7	+15 0	+20 +5	+28 +13	+40 +25	22	+22 0	+35 +13	+47 +25	+62 +40	36	+36 0	+61 +25	+76 +40	+116 +80	58	+58 0	+98 +40	+138 +80	+208 +150	150	+150 0
10 - 14 14 - 18	11	−4 −15	+2 −9	+6 −5	+11 0	+17 +6	+27 +16	18	−26 −44	—	−21 −39	−16 −34	−11 −29	−5 −23	0 −18	+6 −12	+10 −8	+18 0	+24 +6	+34 +16	+50 +32	27	+27 0	+43 +16	+59 +32	+77 +50	43	+43 0	+75 +32	+93 +50	+138 +95	70	+70 0	+120 +50	+165 +95	+220 +150	180	+180 0
18 - 24	13	−4 −17	+2 −11	+8 −5	+13 0	+20 +7	+33 +20	21	−33 −54	—	−27	−20	−14	−7	0	+6	+12	+21	+28	+41	+61	33	+33 0	+53 +20	+73 +40	+98 +65	52	+52 0	+92 +40	+117 +65	+162 +110	84	+84 0	+149 +65	+194 +110	+244 +160	210	+210 0
24 - 30									−40 −61	−33 −54	−48	−41	−35	−28	−21	−15	−9	0	+7	+20	+40																	
30 - 40	16	−4 −20	+3 −13	+10 −6	+16 0	+25 +9	+41 +25	25	−51 −76	−39 −64	−34	−25	−17	−8	0	+7	+14	+25	+34	+50	+75	39	+39 0	+64 +25	+89 +50	+119 +80	62	+62 0	+112 +50	+142 +80	+182 +120	100	+100 0	+180 +80	+220 +120	+270 +170	250	+250 0
40 - 50									−61 −86	−45 −70	−59	−50	−42	−33	−25	−18	−11	0	+9	+25	+50									+192 +130				+230 +130	+280 +180		
50 - 65	19	−5 −24	+4 −15	+13 −6	+19 0	+29 +10	+49 +30	30	−76 −106	−55 −85	−42 −72	−30 −60	−21	−9	0	+9	+18	+30	+40	+60	+90	46	+46 0	+76 +30	+106 +60	+146 +100	74	+74 0	+134 +60	+174 +100	+214 +140	120	+120 0	+220 +146	+260 +140	+310 +190	300	+300 0
65 - 80									−91 −121	−64 −94	−48 −78	−32 −62	−51	−39	−30	−21	−12	0	+10	+30	+60									+224 +150				+270 +150	+320 +200		
80 - 100	22	−6 −28	+4 −18	+16 −6	+22 0	+34 +12	+58 +36	35	−111 −146	−78 −113	−58 −93	−38 −73	−24	−10	0	+10	+22	+35	+47	+71	+107	54	+54 0	+90 +36	+126 +72	+174 +120	87	+87 0	+159 +72	+207 +120	+257 +170	140	+140 0	+260 +120	+310 +170	+360 +220	350	+350 0
100 - 120									−131 −166	−91 −126	−66 −101	−41 −76	−59	−45	−35	−25	−13	0	+12	+36	+72									+267 +180				+320 +180	+380 +240		
120 - 140	25	−8 −33	+4 −21	+16 −7	+25 0	+39 +14	+68 +43	40	—	−107	−77	−48										63	+63 0	+106 +43	+148 +85	+208 +145	100	+100 0	+185 +85	+245 +145	+300 +200	160	+160 0	+305 +145	+360 +200	+420 +260	400	+400 0
140 - 160									—	−119	−85	−50	−28	−12	0	+12	+26	+40	+54	+83	+125									+310 +210				+370 +210	+440 +280		
160 - 180									—	−131	−93	−53																	+330 +230				+390 +230	+470 +310		
180 - 200	29	−8 −37	+5 −24	+22 −7	+29 0	+44 +15	+79 +50	46	—	—	−105	−60										72	+72 0	+122 +50	+172 +100	+242 +170	115	+115 0	+215 +100	+285 +170	+355 +240	185	+185 0	+355 +170	+425 +240	+525 +340	460	+460 0
200 - 225									—	—	−113	−63	−33	−14	0	+13	+30	+46	+61	+96	+146									+375 +260				+445 +260	+565 +380		
225 - 250									—	—	−123	−67																	+395 +280				+465 +280	+605 +420		
250 - 280	32	−9 −41	+5 −27	+25 −7	+32 0	+49 +17	+88 +56	52	—	—	—	−74										81	+81 0	+137 +56	+191 +110	+271 +190	130	+130 0	+240 +110	+320 +190	+430 +300	210	+210 0	+400 +190	+510 +300	+690 +480	520	+520 0
280 - 315									—	—	—	−126	−36	−14	0	+16	+36	+52	+69	+108	+162									+460 +330				+540 +330	+750 +540		
315 - 355	36	−10 −46	+7 −29	+29 −7	+36 0	+54 +18	+98 +62	57	—	—	—	−87										89	+89 0	+151 +62	+214 +125	+299 +210	140	+140 0	+265 +125	+350 +210	+500 +360	230	+230 0	+440 +210	+590 +360	+830 +600	570	+570 0
355 - 400									—	—	—	−144	−41	−16	0	+17	+39	+57	+75	+119	+182									+540 +400				+630 +400	+910 +680		
400 - 450	40	−10 −50	+8 −32	+33 −7	+40 0	+60 +20	+108 +68	63	—	—	—	−93	−98	−73	−57	−40	−18	0	+18	+62	+125	97	+97 0	+165 +68	+232 +135	+327 +230	155	+155 0	+290 +135	+385 +230	+595 +440	250	+250 0	+480 +230	+690 +440	+1010 +760	630	+630 0
450 - 500									—	—	—	−150																	+635 +480				+730 +480	+1090 +840		

Unit 0.001mm

DATA FOR REFERENCE

STANDARD FITTING TOLERANCE FOR LARGE DIAMETER (JIS B 0401)

Unit : 0.001mm

Classification of nominal sizes (mm)		Tolerance of shaft			Tolerance of hole			
		h9	h10	f8	H7	H8	H9	H10
Above	Below	Upper tolerance Lower tolerance			Upper tolerance Lower tolerance			
500	630	0 – 175	0 – 280	– 76 – 186	+ 70 0	+ 110 0	+ 175 0	+ 280 0
630	800	0 – 200	0 – 320	– 80 – 205	+ 80 0	+ 125 0	+ 200 0	+ 320 0
800	1000	0 – 230	0 – 360	– 86 – 226	+ 90 0	+ 140 0	+ 230 0	+ 360 0
1000	1250	0 – 260	0 – 420	– 98 – 263	+ 105 0	+ 165 0	+ 260 0	+ 420 0
1250	1600	0 – 310	0 – 500	– 110 – 305	+ 125 0	+ 195 0	+ 310 0	+ 500 0
1600	2000	0 – 370	0 – 600	– 120 – 350	+ 150 0	+ 230 0	+ 370 0	+ 600 0

TABLE OF MAJOR SI UNIT CONVERSION

Unit shown in bold line represents SI unit.

Force

N	dyn	kgf
1	1×10^{5}	$1.019\,72\times10^{-1}$
1×10^{-5}	1	$1.019\,72\times10^{-6}$
9.806 65	9.80665×10^{5}	1

Viscosity

Pa·s	cp	P
1	1×10^{3}	1×10
1×10^{-3}	1	1×10^{-2}
1×10^{-1}	1×10^{2}	1

Note : 1P = 1dyn·s/cm² = 1g/cm·s, 1Pa·s = 1N·s/m², 1cP = 1mPa·s

Pressure

Pa	kPa	MPa	bar	kgf/cm²	atm	mmH2O	mmHg or Torr
1	1×10^{-3}	1×10^{-6}	1×10^{-5}	$1.019\,72\times10^{-5}$	$9.869\,23\times10^{-6}$	$1.019\,72\times10^{-1}$	$7.500\,62\times10^{3}$
1×10^{3}	1	1×10^{-3}	1×10^{-2}	$1.019\,72\times10^{-2}$	$9.869\,23\times10^{-3}$	$1.019\,72\times10^{2}$	7.500 62
1×10^{6}	1×10^{3}	1	1×10	$1.019\,72\times10$	9.869 23	$1.019\,72\times10^{5}$	$7.500\,62\times10^{3}$
1×10^{5}	1×10^{2}	1×10^{-1}	1	1.019 72	$9.869\,23\times10^{-1}$	$1.019\,72\times10^{4}$	$7.500\,62\times10^{2}$
$9.806\,65\times10^{4}$	$9.806\,65\times10$	$9.806\,65\times10^{-2}$	$9.806\,65\times10^{-1}$	1	$9.678\,41\times10^{-1}$	1×10^{4}	7.35559×10^{2}
$1.013\,25\times10^{5}$	$1.013\,25\times10^{2}$	$1.013\,25\times10^{-1}$	1.013 25	1.033 23	1	$1.033\,23\times10^{4}$	$7.600\,00\times10^{2}$
9.806 65	$9.806\,65\times10^{-3}$	$9.806\,65\times10^{-6}$	$9.806\,65\times10^{-5}$	1×10^{-4}	$9.678\,41\times10^{-5}$	1	$7.355\,59\times10^{-2}$
$1.333\,22\times10^{2}$	$1.333\,22\times10^{-1}$	$1.333\,22\times10^{-4}$	$1.333\,22\times10^{-3}$	$1.359\,51\times10^{-3}$	$1.315\,79\times10^{-3}$	$1.359\,51\times10$	1

Note : 1Pa = 1N/m²

Stress

Pa or N/m²	MPa or N/mm²	kgf	kgf/cm²
1	1×10^{-6}	$1.019\,72\times10^{-7}$	$1.019\,72\times10^{-5}$
1×10^{6}	1	$1.019\,72\times10^{-1}$	$1.019\,72\times10$
$9.806\,65\times10^{6}$	9.806 65	1	1×10^{2}
$9.806\,65\times10^{4}$	$9.806\,65\times10^{-2}$	1×10^{-2}	1

Note : 1Pa = 1N/m², 1MPa = 1N/mm²

Dynamic viscosity

m²/s	cSt	St
1	1×10^{6}	1×10^{4}
1×10^{-6}	1	1×10^{2}
1×10^{-4}	1×10^{2}	1

Note : 1St = 1cm²/s, 1cSt = 1mm²/S

TABLE OF HARDNESS CONVERSION

Approximate conversion value for Rockwell ASTM hardness C of steel

Hardness by Rockwell C scale	Vickers hardness	Brinell hardness 300kg Standard ball	Rockwell hardness B scale Load 100kg Dia. of ball: 1/16 in.	Shore hardness	Hardness by Rockwell C scale
68	940	–	–	97	68
67	900	–	–	95	67
66	865	–	–	92	66
65	832	–	–	91	65
64	800	–	–	88	64
63	772	–	–	87	63
62	746	–	–	85	62
61	720	–	–	83	61
60	697	–	–	81	60
59	674	–	–	80	59
58	653	–	–	78	58
57	633	–	–	76	57
56	613	–	–	75	56
55	595	–	–	74	55
54	577	–	–	72	54
53	560	–	–	71	53
52	544	500	–	69	52
51	528	487	–	68	51
50	513	475	–	67	50
49	498	464	–	66	49
48	484	451	–	64	48
47	471	442	–	63	47
46	458	132	–	62	46
45	446	421	–	60	45
44	434	409	–	58	44
43	423	400	–	57	43
42	412	390	–	56	42
41	402	381	–	55	41
40	392	371	–	54	40
39	382	362	–	52	39
38	372	358	–	51	38
37	363	344	–	50	37
36	354	336	(109.0)	49	36
35	345	327	(108.5)	48	35
34	336	319	(108.0)	47	34
33	327	311	(107.5)	46	33
32	318	301	(107.0)	44	32
31	310	294	(106.0)	43	31
30	302	286	(105.5)	42	30
29	294	279	(104.5)	41	29
28	286	271	(104.0)	41	28
27	279	264	(103.0)	40	27
26	272	258	(102.5)	38	26
25	266	253	(101.5)	38	25
24	260	247	(101.0)	37	24
23	254	243	(100.0)	36	23
22	248	237	(99.0)	35	22
21	243	231	(98.5)	35	21
20	238	226	97.8	34	20
(18)	230	219	96.7	33	(18)
(16)	222	212	95.5	32	(16)
(14)	213	203	93.9	31	(14)
(12)	204	194	92.3	29	(12)
(10)	196	187	90.7	28	(10)
(8)	188	179	89.5	27	(8)
(6)	180	171	87.1	26	(6)
(4)	173	165	85.5	25	(4)
(2)	166	158	83.5	24	(2)
(0)	160	152	81.7	24	(0)

RANGE OF ROUGHNESS BY VARIOUS METHODS OF PROCESSING

Method of processing \ Range of roughness Rz μm	Symbols	0.1 Below	0.2 Below	0.4 Below	0.8 Below	1.5 Below	3 Below	6 Below	12 Below	25 Below	50 Below	100 Below	200 Below	400 Below
		No symbols or												
Forging	FG								←	→	←	→		
Casting	C								Precision					
Die casting	DC								←	→				
Hot rolling	HR								←	→		→		
Cold rolling	CR			←	→	→	→	→						
Drawing	DW						←	→	→	→	→			
Extrusion	EX						←	→	→	→	→			
Tumbling	TU		←	→	→	→								
Sand-blasting	SB								←	→	→			
Roll lining	RL				←	→	→							
Face milling	FM						Precision		←	→		→		
Planing	P								←	→		→		
Slotting	SL								←	→		→		
Milling	M						Precision		←	→		→		
Fine boring	FB				←	→	→	→						
Filing finish	FF						Precision		←	→	→			
Turning	T			Precision	←	→	Fine	→	Medium	→	Rough	→	→	→
Boring	B						Precision		←	→	→			
Drilling	D								←	→	→			
Reaming	DR					Precision	←	→	→	→				
Broaching	BR					Precision	←	→	→	→				
Shaving	SV						←	→	→	→				
Grinding	G			Precision	←	Fine	→	Medium	→	Rough	→			
Honing finish	GH			Precision	←	→	→	→						
Super finish	GSP	Precision	←	→	→									
Buffing finish	SPBF		←	Precision	→	→	→	→	→					
Paper finish	FCA			Precision	←	→	→	→						
Lapping finish	FL	Precision	←	→	→									
Liquid horning	SPLH			Precision	←	→	→	→						
Burnishing	RLB				←	→	→							
Roller finish	RF				←	→	→							
Chemical polishing	SPC					Precision	←	→	→	→				
Electrolytic polishing	SPE		Precision	←	→	←	→	→						

CHANGE OF SURFACE ROUGHNESS JIS STANDARD

Comparison and use \ Standard No.	JIS B 0601 : 1982 JIS B 0031 : 1982	JIS B 0601 : 1994 JIS B 0031 : 1994	JIS B 0601 : 2001
Profile curve	Without filter	Without filter	λc filter
Evaluation length	1 Reference length	–	Length of shape
Maximum height	R max	–	Pt
Average roughness of 10 points	Rz	–	–
Roughness curve	2 Rc λc filter	Phase compensation λc filter	Phase compensation λc filter +λs filter
Evaluation length	1 Reference length	5 Reference length	5 Reference length
Maximum height	–	Maximum height: Ry	Maximum height: Rz
Average roughness of 10 points	–	Rz	Rz JIS
Average roughness of center point	Ra	Ra 75	Ra 75
Arithmetic average roughness	–	Ra	Ra
Average interval between convexities and concavities	–	Average interval between concavities and convexities: Sm	Average length of roughness curve element: RSm
Local peak interval	–	Local peak average interval: S	–
Load length rate	–	tp (on per-reference-length basis)	Rmr (entire evaluation length)
Other height parameters	–	–	Rp, Rv, Rt, Rc, Rq
Height feature parameter	–	–	Rsk, Rku,
Composite parameter and others	–	–	RΔq, Rσc, Rmr

Table of viscosity conversion

Seyboldt SUS (sec)	Red wood R (sec)	Engler E (sec)	Centi-stokes cSt
35	32.2	1.18	2.7
40	36.2	1.32	4.3
45	40.6	1.46	5.9
50	44.9	1.60	7.4
55	49.1	1.75	8.9
60	53.5	1.88	10.4
65	57.9	2.02	11.8
70	62.3	2.15	13.1
75	67.6	2.31	14.5
80	71.0	2.42	15.8
85	75.1	2.55	17.0
90	79.6	2.68	18.2
95	84.2	2.81	19.4
100	88.4	2.95	20.6
110	97.1	3.21	23.0
120	105.9	3.49	25.0
130	114.8	3.77	27.5
140	123.6	4.04	29.8
150	132.4	4.32	32.1
160	141.1	4.59	34.3
170	150.0	4.88	36.5
180	158.8	5.15	38.8
190	167.5	5.44	41.0
200	176.4	5.72	43.2
220	194	6.28	47.5
240	212	6.85	51.9
260	229	7.38	56.5
280	247	7.95	60.5
300	265	8.51	64.9
325	287	9.24	70.3
350	309	9.95	75.8
375	331	10.7	81.2
400	353	11.4	86.8
425	375	12.1	92.0
450	397	12.8	97.4

Seyboldt SUS (sec)	Red wood R (sec)	Engler E (sec)	Centi-stokes cSt
475	419	13.5	103
500	441	14.2	108
550	485	15.6	119
600	529	17.0	130
650	573	18.5	141
700	617	19.9	152
750	661	21.3	163
800	705	22.7	173
850	749	24.2	184
900	793	25.6	195
950	837	27.0	206
1000	882	28.4	217
1200	1058	34.1	260
1400	1234	39.8	302
1600	1411	45.5	347
1800	1587	51	390
2000	1763	57	433
2500	2204	71	542
3000	2646	85	650
3500	3087	99	758
4000	3526	114	867
4500	3967	128	974
5000	4408	142	1082
5500	4849	156	1150
6000	5290	170	1300
6500	5730	185	1400
7000	6171	199	1510
7500	6612	213	1630
8000	7053	227	1740
8500	7494	242	1850
9000	7943	256	1960
9500	8375	270	2070
10000	8816	284	2200

Table of temperature conversion

How to read the Table :
For example, when converting 38℃ into °F, find out 38 from the 2nd row of the table (10th position from the top) at the center column and then read the figure in the column °F on the right side. You will thus find out 100,4 °F.
To the contrary, you can convert 38° F into ℃ by reading the figure in the column ℃ on the left side and then you can know that it correspond to 33℃.

$$C = \frac{5}{9}(F - 32) \qquad F = \frac{9}{5}C + 32$$

°C ←	°F	°C →	°F
− 73	− 100	− 148	
− 62	− 80	− 112	
− 51	− 60	− 76	
− 40	− 40	− 40	
− 29	− 20	− 4	
− 23.3	− 10	14	
− 17.7	0	32	
− 17.2	1	33.8	
− 16.6	2	35.6	
− 16.1	3	37.4	
− 15.5	4	39.2	
− 15.0	5	41.0	
− 14.4	6	42.8	
− 13.9	7	44.6	
− 13.3	8	46.4	
− 12.7	9	48.2	
− 12.2	10	50.0	
− 11.6	11	51.8	
− 11.1	12	53.6	
− 10.5	13	55.4	
− 10.0	14	57.2	
− 9.4	15	59.0	
− 8.8	16	61.8	
− 8.3	17	63.6	
− 7.7	18	65.4	
− 7.2	19	67.2	
− 6.6	20	68.0	
− 6.1	21	69.8	
− 5.5	22	71.6	
− 5.0	23	73.4	
− 4.4	24	75.2	
− 3.9	25	77.0	
− 3.3	26	78.8	
− 2.8	27	80.6	
− 2.2	28	82.4	

°C ←	°F	°C →	°F
− 1.6	29	84.2	
− 1.1	30	86.0	
− 0.6	31	87.8	
0	32	89.6	
0.5	33	91.4	
1.1	34	93.2	
1.6	35	95.0	
2.2	36	96.8	
2.7	37	98.6	
3.3	38	100.4	
3.8	39	102.2	
4.4	40	104.0	
4.9	41	105.8	
5.5	42	107.6	
6.0	43	109.4	
6.6	44	111.2	
7.1	45	113.0	
7.7	46	114.8	
8.2	47	116.6	
8.8	48	118.4	
9.3	49	120.2	
9.9	50	122.0	
10.4	51	123.8	
11.1	52	125.6	
11.5	53	127.4	
12.1	54	129.2	
12.6	55	131.0	
13.2	56	132.8	
13.7	57	134.6	
14.3	58	136.4	
14.8	59	138.2	
15.6	60	140.0	
16.1	61	141.8	
16.8	62	143.6	
17.1	63	145.4	

°C ←	°F	°C →	°F
17.7	64	147.2	
18.2	65	149.0	
18.8	66	150.8	
19.3	67	152.6	
19.9	68	154.4	
20.4	69	156.2	
21.0	70	158.0	
21.5	71	159.8	
22.2	72	161.8	
22.7	73	163.4	
23.3	74	165.2	
23.8	75	167.0	
24.4	76	168.8	
25.0	77	170.6	
25.5	78	172.4	
26.2	79	174.2	
26.8	80	176.0	
27.3	81	177.8	
27.7	82	179.6	
28.2	83	181.4	
28.8	84	183.2	
29.3	85	185.0	
29.9	86	186.8	
30.4	87	188.6	
31.0	88	190.4	
31.5	89	192.2	
32.1	90	194.0	
32.6	91	195.8	
33.3	92	197.6	
33.8	93	199.4	
34.4	94	201.2	
34.9	95	203.0	
35.5	96	204.8	
36.1	97	206.6	
36.6	98	208.4	

°C ←	°F	°C →	°F
37.1	99	210.2	
37.7	100	212.0	
38	100	212	
43	110	230	
49	120	248	
54	130	266	
60	140	284	
65	150	302	
71	160	320	
76	170	338	
83	180	356	
88	190	374	
93	200	392	
121	250	482	
149	300	572	
177	350	662	
204	400	752	
232	450	842	
260	500	932	
288	550	1022	
315	600	1112	
343	650	1202	
371	700	1292	
399	750	1382	
426	800	1472	
454	850	1562	
482	900	1652	
510	950	1742	
538	1000	1832	
538	1000	1832	
593	1100	2012	
648	1200	2192	
704	1300	2372	
760	1400	2552	
815	1500	2732	

KLUEBER LUBRICANT FOR SEALS

WHAT IS NOK KLUEBER

NOK established NOK KLÜBER Co. Ltd through a merger with Klüber Lubrication München SE & Co.KG of Germany, which has over a century of experience in the field of specialized lubricants, and also supplies KLUBER lubricants for oil seal use.

NOK KLUBER combines proven technologies from both companies, resolving various lubrication problems by utilizing our vast experience and extensive developmental activities.

NOK KLUBER has established a complete system to respond to user needs for extreme conditions, such as high or low temperatures, high speeds, or high loads, based on our unparalleled experience.

Types of NOK KLUEBER lubricants

- **General purpose**
  Roller bearings, sliding bearings, chains, gears, valves, etc.
- **Lubricants for special applications**
  For oxygen, vacuum, radioactivity, sliding faces food machinery, textile machinery, various conveyors and so on.
- **Other special lubricants**
  Fluorene base lubricants, silicone oil type lubricant, special release agent, anticorrosive agent, lubricant for seals.

For details, refer to the **Special Lubricants Catalog (Cat. 910)**.

NOK KLUEBER LUBRICANT FOR SEALS

Application	Grease Name	Effect on Rubber Note(1)					Working temperature range (℃)	Consistency (NLGI)	Examples of use	Features
		Nitrile rubber	Acrylic rubber	Silicone rubber	Fluoro-carbon rubber	Ethylene propylene rubber				
General	**SEALUB S-1**	○	○	○	○	×	−30〜120	2号	Automobiles, construction machinery, agricultural machinery	General-purpose lubricant for use with rubber
Water resistant	**SEALUB S-8**	○	○	×	○	○	−45〜160	3号	Automobiles, household appliances	Excellent resistance to water and steam
Low temperature/ high speed	**SEALUB S-14**	○	○	○	○	×	−50〜150	2号	Automobiles, household electrical appliances, industrial equipment	May be used in extremely low and high temperature conditions
For assembly	**SEALUB L101**	○	○	○	○	○ Note(2)	−30〜 90	—	Assembly/insertion of seal parts	Quick-drying assembly wax and spray products
To prevent adhesion	**Klüber L604**	○	○	○	○	○	−25〜260	Oil	For assembly and to prevent adhesion of seal parts Lubrication of electrical contacts and plastic parts, high-temperature sliding	High-temperature fluorine oil, anti-adhesive oil and spray products
Food processing machinery	**Klübersynth UH1 64-2403**	○	○	○	○	×	−10〜140	3号	Food/beverage manufacturing equipment	Excellent resistance to water and steam NSF H1 register※
	PARALIQ GTE 703	○	○	×	○	○	−50〜150	3号		
High temperature/ solvent resistant/ chemicals	**BARRIERTA L 55/2 H1**	○	○	○	○	○	−30〜260	2号	Automobiles, chemical plant equipment	Excellent resistance to heat, solvents, and chemicals NSF H1 register※

Note(1) Effects on rubber
○ : Resistance
× : No resistance

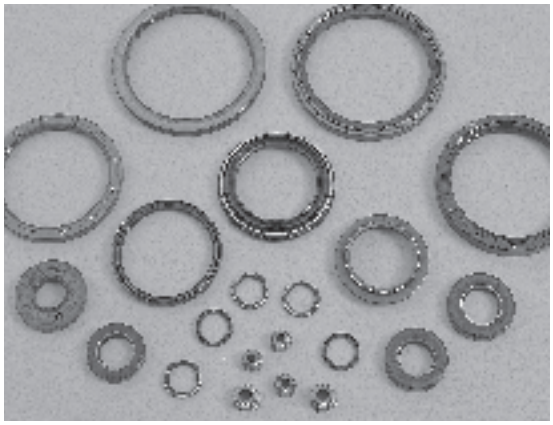
Effects on rubber being of average evaluation, check prior to usage, if the lubricant to be used is suitable for the required conditions.

Note(2) Figures supplied for effective ingredients only

※ **NSF H1 lubricant**
Lubricant can be used at locations that may touch the food incidentally or necessarily.

LINE-UP OF NOK PRODUCTS

Sealing products



Oil seals

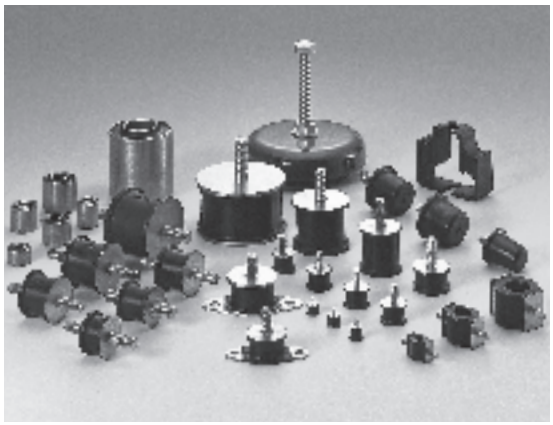
- Oil seals
- Packings
- O-rings
- Metal gaskets “SOFTMETAL”
- Seal washers
- Mechanical seals
- Lip seals
- Segment seals
- Brush seals
- Static metal packings actiseals
- Perfluoroelastomer “KALREZ”
- Magnetic fluid seals

Industrial rubber & resin products

Polyurethane rubber “IRON RUBBER” products

- Industrial rubber products
- Iron rubber products
- Iron rubber belts
- Traffic signs & Safety devices
- Engineering plastic products
- Synthetic rubber “NOXTITE”
- Industrial chemical products “CHEMINOX”
- Phenolic molding material

Vibration damping products Sound isolator products



Anti-vibration rubber

- Vibration damping products
- Sound isolator products

Fluid power equipment

Accumulators

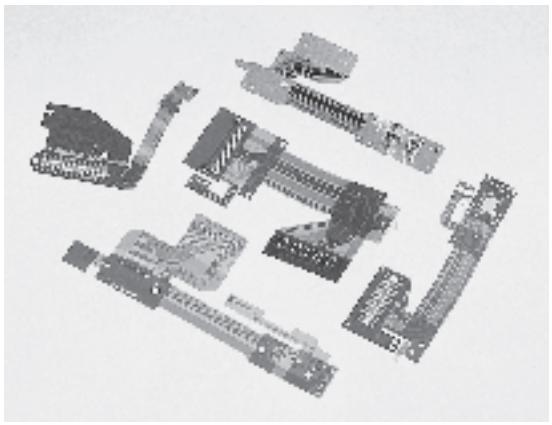
- Accumulators
- Housing and related equipments

Plant equipment

Metal bellows (Welding bellows)

- Metal bellows
- Couplings

Electronics products



Flexible circuits

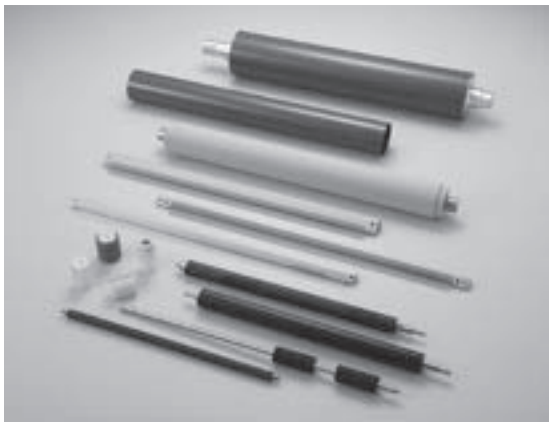
- Flexible printed circuit
- Precision rubber / resin parts

Industrial function parts & special parts

Special lubricant

- Polymer hollow fiber membrane modules
- Solenoids
- Actuators
- Oil-less bearing “LUBLESS”
- Adapters for cable breaking “SY JOINT”
- Special lubricant
- Fluorine base coating material “GLEITPAN”
- Fluorine base water repellent & oil repellent agents “NOXBARRIER”
- Compressor valves
- Recoil starters

OA equipment products



OA equipment products

- OA equipment products