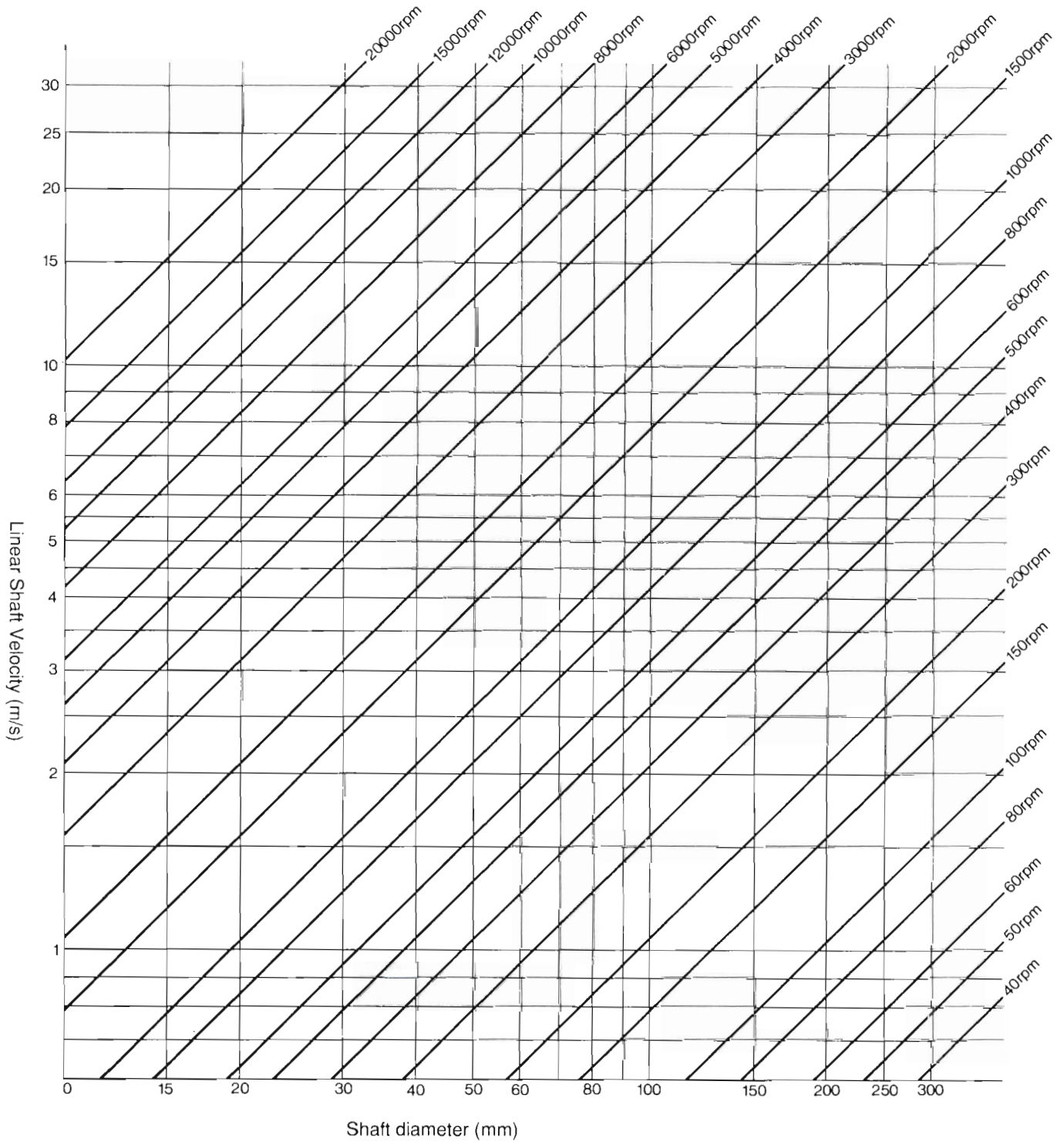


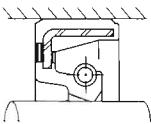
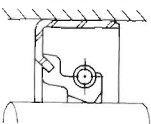
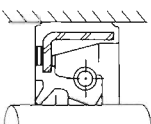
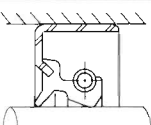
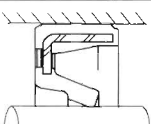
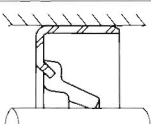
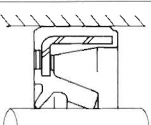
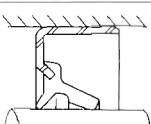
K. REFERENCE DATA

Linear Shaft Velocity Quick Reference Table



K

A Comparison of NOK Type and ISO, JIS, and JASO Type Oil Seals

Standard Profile/shape	NOK	ISO	JIS	JASO	Old JIS
	SC	TYPE 1	TYPE 1	S	AJ
	SB	TYPE 2	TYPE 2	SM	AK
	TC	TYPE 4	TYPE 4	D	PJ
	TB	TYPE 5	TYPE 5	DM	PK
	VC	—	—	G	BJ
	VB	—	—	GM	BK
	KC	—	—	P	—
	KB	—	—	PM	—

K

Corresponding list of NOK Part number (initial 2 figures) and NOK Type

Part number : A B 1 2 3 4 E 0

└─ Small classification

└─ Large classification

Large classification	Small classification	NOK type
A or B	A	SA type or TA type or VA type or KA type
	B	SB type
	C	SC type
	D	TB type
	E	TC type
	F	VB type or KB type
	G	VC type or KC type
	H	Helical Seal
	J	PTFE seal
	M	M type
	N	MO type (Morgoil Seal)
	O	OC type (Outer lip seal)
	P	Pressure Resistance Seal
	Q	Unitized Seal and Shaft Assembly
	R	Reciprocating Seal
	S	Stuntube Seal
U	Universal Joint Seal	
V	Valve Stem Seal	
W	D type	
Z	Others	

Hole Sizes and Tolerance (JIS B 0401)

Unit: 0.001 mm

Nominal Size Size Group (mm)	Unit: 0.001 mm																H12 Upper Lower tolerance																	
	I T 6		I T 7		I T 8		I T 9		I T 10		I T 12		B10 Upper tolerance Lower tolerance	C10 Upper tolerance Lower tolerance	D10 Upper tolerance Lower tolerance																			
	M6	K6	J6	H6	G6	F6	U7	T7	S7	R7	P7	N7				M7		K7	J7	H7	G7	F7	E7											
Over 1 up to 3	-2	+0	+2	+6	+8	+12	-18	-	-14	-10	-6	-4	-2	0	+3	+10	+12	+16	+24	14	+14	+20	+28	+34	+25	+39	+45	+85	+60	+100	+180	+100		
	-8	-6	-4	0	+2	+6	-28	-	-24	-20	-16	-14	-12	-10	-6	0	+2	+6	+14	10	0	+6	+14	+20	40	0	+14	+20	+60	+60	+140	100		
Over 3 up to 6	-1	+2	+4	+8	+12	+18	-19	-	-15	-11	-8	-4	0	+3	+5	+12	+16	+22	+32	12	+18	+28	+38	+48	30	+30	+50	+60	+100	+100	+188	+120		
	-9	-6	-4	0	+4	+10	-31	-	-27	-23	-20	-16	-12	-9	-7	0	+4	+10	+20	15	0	+10	+20	+30	48	0	+20	+30	+70	+70	+140	120		
Over 6 up to 10	-3	+2	+5	+9	+14	+22	-22	-	-17	-13	-9	-4	0	+5	+8	+15	+20	+28	+40	15	+22	+35	+47	+62	36	+36	+61	+76	+116	+138	+208	+150		
	-12	-7	-4	0	+5	+13	-37	-	-32	-28	-24	-19	-15	-10	-7	0	+5	+13	+25	22	0	+13	+25	+40	58	0	+25	+40	+80	+80	+150	150		
Over 10 up to 14	-4	+2	+6	+11	+17	+27	-26	-	-21	-16	-11	-5	0	+6	+10	+18	+24	+34	+50	18	+27	+43	+59	+77	43	+43	+75	+93	+138	+165	+220	+180		
	-15	-9	-5	0	+6	+16	-44	-	-39	-34	-29	-23	-18	-12	-8	0	+6	+16	+32	27	0	+16	+32	+50	70	0	+32	+50	+95	+95	+150	180		
Over 14 up to 18	-4	+2	+8	+13	+20	+33	-33	-	-27	-20	-14	-7	0	+6	+12	+21	+28	+41	+61	21	+33	+53	+73	+98	52	+52	+92	+117	+162	+194	+244	+210		
	-17	-11	-5	0	+7	+20	-40	-33	-48	-41	-35	-28	-21	-15	-9	0	+7	+20	+40	33	0	+20	+40	+65	84	0	+40	+65	+110	+110	+160	210		
Over 18 up to 24	-4	+3	+10	+16	+25	+41	-51	-39	-64	-54	-42	-30	0	+7	+14	+25	+34	+50	+75	25	-51	-39	-64	-54	62	+62	+112	+142	+192	+220	+270	+250		
	-20	-13	-6	0	+9	+25	-76	-64	-86	-70	-59	-50	-42	-33	-25	-18	-11	0	+9	+25	+50	39	+39	+64	+89	+119	100	0	+50	+80	+130	+130	+180	250
Over 30 up to 40	-5	+4	+13	+19	+29	+49	-106	-85	-111	-94	-78	-62	0	+9	+18	+30	+40	+60	+90	30	-106	-85	-111	-94	74	+74	+134	+174	+224	+260	+310	+300		
	-24	-15	-6	0	+10	+30	-91	-64	-91	-78	-62	0	+9	+18	+30	+40	+60	+90	46	+46	+76	+106	+146	120	0	+60	+100	+224	+260	+320	300			
Over 40 up to 50	-6	+4	+16	+22	+34	+58	-111	-78	-111	-94	-78	-62	0	+10	+22	+35	+47	+71	+107	35	-111	-78	-111	-94	87	+87	+159	+207	+257	+310	+360	+350		
	-28	-18	-6	0	+12	+36	-146	-113	-146	-113	-93	-73	-24	-10	0	+10	+22	+35	+47	+71	+107	54	+54	+90	+126	+174	140	0	+72	+120	+267	+320	+380	350
Over 50 up to 65	-8	+4	+16	+25	+39	+68	-131	-91	-131	-91	-66	-41	-59	-45	-35	-25	-13	0	+12	+36	+72	40	-131	-91	-131	-91	100	0	+85	+145	+210	+260	+320	+400
	-33	-21	-7	0	+14	+43	-166	-126	-166	-126	-101	-76	0	+12	+26	+40	+54	+83	+125	63	+63	+106	+148	+208	160	0	+100	+185	+245	+310	+370	400		
Over 65 up to 80	-8	+4	+16	+25	+39	+68	-107	-77	-107	-77	-58	-38	0	+12	+26	+40	+54	+83	+125	40	-107	-77	-107	-77	100	0	+85	+145	+210	+260	+320	+400		
	-33	-21	-7	0	+14	+43	-119	-85	-119	-85	-66	-46	-30	-21	-12	0	+10	+30	+60	63	+63	+106	+148	+208	160	0	+100	+185	+245	+310	+370	400		
Over 80 up to 100	-8	+5	+22	+29	+44	+79	-131	-93	-131	-93	-73	-53	0	+13	+30	+46	+61	+96	+146	46	-131	-93	-131	-93	100	0	+100	+170	+260	+330	+400	+460		
	-37	-24	-7	0	+15	+50	-159	-125	-159	-125	-99	-79	-60	-46	-33	-16	0	+15	+50	+100	72	+72	+122	+172	+242	185	0	+100	+170	+260	+330	+400	460	
Over 100 up to 120	-8	+5	+22	+29	+44	+79	-105	-60	-105	-60	-41	-21	0	+13	+30	+46	+61	+96	+146	46	-105	-60	-105	-60	100	0	+100	+170	+260	+330	+400	+460		
	-37	-24	-7	0	+15	+50	-113	-63	-113	-63	-41	-21	0	+13	+30	+46	+61	+96	+146	46	-113	-63	-113	-63	100	0	+100	+170	+260	+330	+400	+460		
Over 120 up to 140	-8	+5	+22	+29	+44	+79	-105	-60	-105	-60	-41	-21	0	+13	+30	+46	+61	+96	+146	46	-105	-60	-105	-60	100	0	+100	+170	+260	+330	+400	+460		
	-37	-24	-7	0	+15	+50	-113	-63	-113	-63	-41	-21	0	+13	+30	+46	+61	+96	+146	46	-113	-63	-113	-63	100	0	+100	+170	+260	+330	+400	+460		
Over 140 up to 150	-8	+5	+22	+29	+44	+79	-105	-60	-105	-60	-41	-21	0	+13	+30	+46	+61	+96	+146	46	-105	-60	-105	-60	100	0	+100	+170	+260	+330	+400	+460		
	-37	-24	-7	0	+15	+50	-113	-63	-113	-63	-41	-21	0	+13	+30	+46	+61	+96	+146	46	-113	-63	-113	-63	100	0	+100	+170	+260	+330	+400	+460		
Over 150 up to 160	-8	+5	+22	+29	+44	+79	-105	-60	-105	-60	-41	-21	0	+13	+30	+46	+61	+96	+146	46	-105	-60	-105	-60	100	0	+100	+170	+260	+330	+400	+460		
	-37	-24	-7	0	+15	+50	-113	-63	-113	-63	-41	-21	0	+13	+30	+46	+61	+96	+146	46	-113	-63	-113	-63	100	0	+100	+170	+260	+330	+400	+460		
Over 160 up to 180	-8	+5	+22	+29	+44	+79	-105	-60	-105	-60	-41	-21	0	+13	+30	+46	+61	+96	+146	46	-105	-60	-105	-60	100	0	+100	+170	+260	+330	+400	+460		
	-37	-24	-7	0	+15	+50	-113	-63	-113	-63	-41	-21	0	+13	+30	+46	+61	+96	+146	46	-113	-63	-113	-63	100	0	+100	+170	+260	+330	+400	+460		
Over 180 up to 200	-8	+5	+22	+29	+44	+79	-105	-60	-105	-60	-41	-21	0	+13	+30	+46	+61	+96	+146	46	-105	-60	-105	-60	100	0	+100	+170	+260	+330	+400	+460		
	-37	-24	-7	0	+15	+50	-113	-63	-113	-63	-41	-21	0	+13	+30	+46	+61	+96	+146	46	-113	-63	-113	-63	100	0	+100	+170	+260	+330	+400	+460		
Over 200 up to 225	-8	+5	+22	+29	+44	+79	-105	-60	-105	-60	-41	-21	0	+13	+30	+46	+61	+96	+146	46	-105	-60	-105	-60	100	0	+100	+170	+260	+330	+400	+460		
	-37	-24	-7	0	+15	+50	-113	-63	-113	-63	-41	-21	0	+13	+30	+46	+61	+96	+146	46	-113	-63	-113	-63	100	0	+100	+170	+260	+330	+400	+460		
Over 225 up to 250	-8	+5	+22	+29	+44	+79	-105	-60	-105	-60	-41	-21	0	+13	+30	+46	+61	+96	+146	46	-105	-60	-105	-60	100	0	+100	+170	+260	+330	+400	+460		
	-37	-24	-7	0	+15	+50	-113	-63	-113	-63	-41	-21	0	+13	+30	+46	+61	+96	+146	46	-113	-63	-113	-63	100	0	+100	+170	+260	+330	+400	+460		
Over 250 up to 280	-8	+5	+22	+29	+44	+79	-105	-60	-105	-60	-41	-21	0	+13	+30	+46	+61	+96	+146	46	-105	-60	-105	-60	100	0	+100	+170	+260	+330	+400	+460		
	-37	-24	-7	0	+15	+50	-113	-63	-113	-63	-41	-21	0	+13	+30	+46	+61	+96	+146	46	-113	-63	-113	-63	100	0	+100	+170	+260	+330	+400	+460		
Over 280 up to 315	-8	+5	+22	+29	+44	+79	-105	-60	-105	-60	-41	-21	0	+13	+30	+46	+61	+96	+146	46	-105	-60	-105	-60	100	0	+100	+170	+260	+330	+400	+460		
	-37	-24	-7	0	+15	+50	-113	-63	-113	-63	-41	-21	0	+13	+30	+46	+61	+96	+146	46	-113	-63	-113	-63	100	0	+100	+170	+260	+330	+400	+460		
Over 315 up to 355	-8	+5	+22	+29	+44	+79	-105	-60	-105	-60	-41	-21	0	+13	+30	+46	+61	+96	+146	46	-105	-60	-105	-60	100	0	+100	+170	+260	+330	+400	+460		
	-37	-24	-7	0	+15	+50	-113	-63	-113	-63	-41	-21	0	+13	+30	+46	+61	+96	+146	46	-113	-63	-113	-63	100	0	+100	+170	+260	+330	+400	+460		
Over 355 up to 400	-8	+5	+22	+29	+44	+79	-105	-60	-105	-60	-41	-21	0	+13	+30	+46	+61	+96	+146	46	-105	-60	-105	-60	100	0	+100	+170	+260	+330	+400	+460		
	-37	-24	-7	0	+15	+50	-113	-63	-113	-63	-41	-21	0	+13	+30	+46	+61	+96	+146	46	-113	-63	-113	-63	100	0	+100	+170	+260	+330	+400	+460		
Over 400 up to 450	-8	+5	+22	+29	+44	+79	-105	-60	-105	-60	-41	-21	0	+13	+30	+46	+61	+96	+146	46	-105	-60	-105	-60	100	0	+100	+170	+260	+330	+400	+460		

Basic Tolerances for Large Applications (JIS B 0401)

Unit: 0.001 mm

Nominal Size Size Group (mm)		Shaft Tolerances		Bore Tolerances	
		h9	H7	H8	H12
Over	Up to	Upper tolerance Lower tolerance			
500	630	0 -175	+ 70 0	+ 110 0	+ 700 0
630	800	0 -200	+ 80 0	+ 125 0	+ 800 0
800	1000	0 -230	+ 90 0	+ 140 0	+ 900 0
1000	1250	0 -260	+ 105 0	+ 165 0	+ 1050 0
1250	1600	0 -310	+ 125 0	+ 195 0	+ 1250 0
1600	2000	0 -370	+ 150 0	+ 230 0	+ 1500 0
2000	2500	0 -440	+ 175 0	+ 280 0	+ 1750 0
2500	3150	0 -540	+ 210 0	+ 330 0	+ 2100 0

Conversion Table for SI Units

The enclosed sections show the SI unit conversions.

Force	N	dyn	kgf
	1	1×10^5	$1.019\ 72 \times 10^{-1}$
	1×10^{-5}	1	$1.019\ 72 \times 10^{-6}$
	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: $1P = 1\text{dyn}\cdot\text{s}/\text{cm}^2 = 1\text{g}/\text{cm}\cdot\text{s}$, $1\text{Pa}\cdot\text{s} = 1\text{N}\cdot\text{s}/\text{m}^2$, $1\text{cP} = 1\text{mPa}\cdot\text{s}$

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

Note: $1\text{Pa} = 1\text{N}/\text{m}^2$

Stress	Pa or N/m ²	MPa or N/mm ²	kgf	kgf/cm ²
	1	1×10^{-6}	$1.019\ 72 \times 10^{-7}$	$1.019\ 72 \times 10^{-5}$
	1×10^6	1	$1.019\ 72 \times 10^{-1}$	$1.019\ 72 \times 10$
	$9.806\ 65 \times 10^6$	9.806 65	1	1×10^2
	$9.806\ 65 \times 10^4$	$9.806\ 65 \times 10^{-2}$	1×10^{-2}	1

Note: $1\text{Pa} = 1\text{N}/\text{m}^2$, $1\text{MPa} = 1\text{N}/\text{mm}^2$

Dynamic viscosity	m ² /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: $1\text{St} = 1\text{cm}^2/\text{s}$, $1\text{cSt} = 1\text{mm}^2/\text{s}$

Hardness Conversion Table

Approximate conversion value for Rockwell C hardness of steel ASTM					
Rockwell C Scale Hardness	Vickers Hardness	Brinell Hardness 10mm spherical load 300 kg	Rockwell Hardness B scale 100 kg load 1/16 in. diameter ball	Shore Hardness	Rockwell C Scale Hardness
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	432	—	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)

Surface Roughness vs Machining Methods

Method	Roughness Range Rz μm	Up to	Up to	Up to	Up to	Up to	Up to	Up to	Up to	Up to	Up to	Up to	Up to	Up to
		0.1	0.2	0.4	0.8	1.5	3	6	12	25	50	100	200	400
Symbols		No symbols or ~												
Forging	FG													
Casting	C													
Die casting	DC													
Hot rolling	HR													
Cold rolling	CR													
Drawing	DW													
Extruding	EX													
Tumbling	TU													
Sand blasting	SB													
Rolling	RL													
Face milling	FM													
Planing	P													
Slotting	SL													
Milling	M													
Fine Boring	FB													
File finishing	FF													
Rounding	T													
Boring	B													
Drilling	D													
Reaming	DR													
Broaching	BR													
Shaving	SV													
Grinding	G													
Honing	GH													
Super-finishing	GSP													
Buffing	SPBF													
Papering	FCA													
Lapping	FL													
Hydro-honing	SPLH													
Burnishing	RLB													
Roller finishing	RF													
Chemical polishing	SPC													
Electrolytic polishing	SPE													

The notation of surface roughness on the catalog comply with JIS B 0601:2001.

Viscosity Conversion Table

Saybolt SUS (second)	Redwood R (second)	Engler E (second)	Centistoke 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

Saybolt SUS (second)	Redwood R (second)	Engler E (second)	Centistoke 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

K

Temperature Conversion Table

How to read the table:

To convert 38°C to degrees Fahrenheit, first find “38” in the middle column (10th line from the top) of the second row, and then read across to the figure on the right in the °F column. 38°C is 100.4°F.

To convert 38°F to degrees Centigrade, find the column on the left to determine that 38°F is 3.3°C.

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

°C ← °F	°C	°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	°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	°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	°C → °F
37.1	99	210.2
37.7	100	212
38	100.4	212.7
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



■ KLUBER Lubricants for Oil Seal Use

NOK has created the NOK KLUBER Company through a merger with KLUBER LUBRICATION 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.

1. NOK KLUBER Lubricants

•General parts lubrication parts

Anti-friction bearings, Slide bearings, Chains, Toothed wheels, various kinds of valves.

•Lubricants for specialized applications

Oxygen systems, vacuums, slide members, food processing machinery, textile machinery, various conveyers.

•Other specialized lubricants

Silicone lubricants, solid lubricants, special mold lubricants, preservatives, and lubricants for oil seal use.

2. Features of NOK KLUBER Lubricants

•Extremely high or low temperatures

Liquid lubricants : -70 to 280°C

Dry lubricants : 1200°C

•High speeds

$\text{Dm} \cdot \text{N}$ value: 1,500,000

•High loads

The load capacity is two to four times that of general lithium grease.

•Long service life

Proven record of 12,000 hours at 200°C

•Resistance to severe application conditions

Excellent resistance to water, steam, seawater, acids, alkalis, and other chemicals

•Compatible with machinery

Does not degrade rubber, resins, plastics, and paint

3. Handling KLUBER Lubricants in Seal Use

•Coating

Apply a coating evenly to the lip contact face. (Refer to the photograph on page G-3.)

For details, refer to the **Special Lubricants Catalog (Cat. 906)**.

KLÜBER Lubricants Suitable for Oil Seal Use

Application	Name	Effect on Rubber ^{Note(1)}					Working temperature range (°C)	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	Automobiles, construction machinery, agricultural machinery	General-purpose lubricant for use with rubber
Water resistant	SEALUB S-8	○	○	×	○	○	-45 ~ 160	3	Automobiles, household appliances	Excellent resistance to water and steam
Low temperature/high speed	SEALUB S-14	○	○	○	○	×	-50 ~ 150	2	Automobiles, household electrical appliances	May be used in extremely low and high temperature conditions
Assembly	SEALUB L101	○	○	○	○	×	-30 ~ 90	—	Easy assembly of seals and shafts	Lubricating wax spray for assembly
Prevent adhesion	KLÜBER L604	○	○	○	○	○	-25 ~ 260	oil	Assembly of elastomers and plastics, prevent adhesion, electric contacts, High temperature friction point	High temperature perfluorinated oil, Prevent adhesion
Food processing machinery	Klübersynth UH1 64-2403	○	○	○	○	×	-10 ~ 140	3	Food/beverage producers	NSF H1 approved [*]
	PARALIQ GTE 703	○	○	×	○	○	-50 ~ 150	3		Excellent resistance to water and steam
High temperature/solvent resistant/chemicals	BARRIERTA L55/2 H1	○	○	○	○	○	-30 ~ 260	2	Automobiles, chemical plant equipment	Excellent resistance to heat, solvents, and chemicals

Note(1) Effects on rubber

- : Resistance
 × : No resistance

^{*} NSF H1 lubricant
 lubricant with incidental food contact

The indicated effects on rubber are based on a general evaluation. Before use, please check the relevant working conditions.