

SLIDE SHAFT

SPINDLE

SHAFT

SLIDE SHAFT

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SPINDLE SHAFT

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SHAFT

The NB shaft can be used in a wide range of applications as a mechanical component from straight shaft to spindle shaft. NB's expertise in machining and heat-treatment turns into manufacturing spindle shaft, roll shaft, and general machinery shaft for rotational motion. NB's high accuracy technology answers various shaft machining requirements.

ADVANTAGES

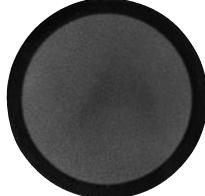
Advanced Machining Technology

NB performs a wide variety of highly accurate machining processes to provide custom shafting from relatively simple machining, such as tapping and shaft stepping to the more demanding high-speed rotating shafts and spindles. NB can also answer the special grinding and bore machining requirements.

Excellent Wear Resistance

Most commonly used materials are high-carbon chromium bearing steel (SUJ2) and martensite stainless steel (SUS440C or equivalent). NB's advanced heat-treatment technology gives these materials an excellent wear resistance by quenching and tempering to achieve a uniform hardened layer in the circumferential and axial directions. The cross-sectional picture below shows the hardened layer-depth of the NB shaft.

Hardened Layer
(cross section)



Surface Roughness

Precision grinding results in a surface roughness of less than Ra0.4.

Wide Selection of Shaft Types

SN type, SNS type, SNT type,
SNB, SNSB type (Center-lined tapped shaft)
Spindle shaft, roll shaft

Special Requirements

Based on the customer drawings and specifications
NB will answer the customer requirements in
material (SCM, SKS etc.), heat-treatment, surface
treatment, etc.

Shaft Supporter and Shaft Support Rail

These components ease the shaft installation and
help save the design/assembling time. (refer to page
F-10)

FIT Series

This series is a set of NB slide bush and NB shaft.
By precise shaft-grinding, FIT series achieves the
best-fit clearance adjustment for a smooth, high
accuracy linear motion. (refer to page F-33)

TYPES

SN/SNS/SNT type (NB Shaft)



SNB/SNSB type (NB Center-lined Tapped Shaft)



NB shaft is a high-precision shaft that can be used with slide bush or any other bearings. A wide range of machining is provided for customer drawings and requirements.

Table F-1 Specifications

type	SN type	SNS type	SNT type
material	SUJ2	equivalent to SUS440C	SUJ2 (hollow shaft)
outer diameter tolerance	g6 or to be specified		
hardness	60HRC or more	56HRC or more	60HRC or more
surface roughness	Ra0.4 or less		
page	page F-6	page F-7	page F-8

Center-lined tapped shafts are standardized series for easy selection that can be used with the SA shaft support rails. (refer to page F-14)

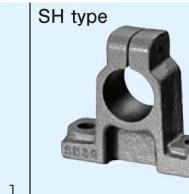
Table F-2 Specifications

type	SNB type	SNSB type
material	SUJ2	equivalent to SUS440C
outer diameter tolerance	g6 or to be specified	
hardness	60HRC or more	56HRC or more
surface roughness	Ra0.4 or less	
page	page F-9	

Shaft Supporter and Shaft Support Rail



P.F-11



P.F-12



P.F-13



P.F-14



P.F-18



P.F-19

Special Specifications



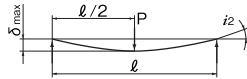
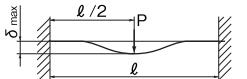
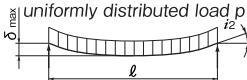
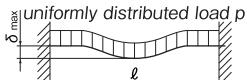
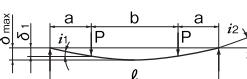
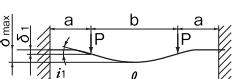
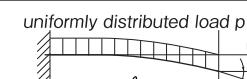
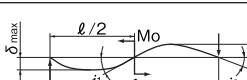
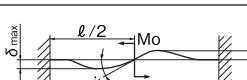
P.F-34

Based on drawings and specifications, NB manufactures spindle shafts, and roll shafts for the rotary motion application. Material, heat-treatment (hardening/tempering), surface treatment, etc, NB meets customer requirements. Please contact NB for details.

CALCULATION OF DEFLECTION AND DEFLECTION ANGLE

The following formulas are used to obtain the deflection and its angle of the shaft. Typical conditions are listed in Table F-3.

Table F-3 Formulas for Calculating Deflection and Deflection Angle

support method	specification	formula for deflection	formula for deflection angle
1 support support		$\delta_{\max} = \frac{P\ell^3}{48EI}$ $i_1 = 0$ $i_2 = \frac{P\ell^2}{16EI} = 3P\ell^2C$	
2 fixed fixed		$\delta_{\max} = \frac{P\ell^3}{192EI} = \frac{1}{4}P\ell^3C$ $i_1 = 0$ $i_2 = 0$	
3 support support		$\delta_{\max} = \frac{5p\ell^4}{384EI} = \frac{5}{8}p\ell^4C$ $i_1 = 0$ $i_2 = \frac{p\ell^3}{24EI} = 2p\ell^3C$	
4 fixed fixed		$\delta_{\max} = \frac{p\ell^4}{384EI} = \frac{1}{8}p\ell^4C$ $i_1 = 0$ $i_2 = 0$	
5 support support		$\delta_1 = \frac{Pa^3}{6EI} \left(2 + \frac{3b}{a}\right) = 8Pa^3 \left(2 + \frac{3b}{a}\right)C$ $\delta_{\max} = \frac{Pa^3}{24EI} \left(\frac{3\ell^2}{a^2} - 4\right) = 2Pa^3 \left(\frac{3\ell^2}{a^2} - 4\right)C$ $i_1 = \frac{Pab}{2EI} = 24PabC$ $i_2 = \frac{Pa(a+b)}{2EI} = 24Pa(a+b)C$	
6 fixed fixed		$\delta_1 = \frac{Pa^3}{6EI} \left(2 - \frac{3a}{\ell}\right) = 8Pa^3 \left(2 - \frac{3a}{\ell}\right)C$ $\delta_{\max} = \frac{Pa^3}{24EI} \left(2 + \frac{3b}{a}\right) = 2Pa^3 \left(2 + \frac{3b}{a}\right)C$ $i_1 = \frac{Pa^2b}{2EI\ell} = \frac{24Pa^2bC}{\ell}$ $i_2 = 0$	
7 fixed free		$\delta_{\max} = \frac{P\ell^3}{3EI} = 16P\ell^3C$ $i_1 = \frac{P\ell^2}{2EI} = 24P\ell^2C$ $i_2 = 0$	
8 fixed free		$\delta_{\max} = \frac{p\ell^4}{8EI} = 6p\ell^4C$ $i_1 = \frac{p\ell^3}{6EI} = 8p\ell^3C$ $i_2 = 0$	
9 support support		$\delta_{\max} = \frac{\sqrt{3}Mo\ell^2}{216EI} = \frac{2\sqrt{3}}{9}Mo\ell^2C$ $i_1 = \frac{Mo\ell}{12EI} = 4Mo\ell C$ $i_2 = \frac{Mo\ell}{24EI} = 2Mo\ell C$	
10 fixed fixed		$\delta_{\max} = \frac{Mo\ell^2}{216EI} = \frac{2}{9}Mo\ell^2C$ $i_1 = \frac{Mo\ell}{16EI} = 3Mo\ell C$ $i_2 = 0$	

δ_1 : deflection at the concentrated load point (mm) δ_{\max} : maximum deflection (mm) i_1 : deflection angle at the concentrated load point (rad)
 i_2 : deflection angle at the support point (rad) Mo : moment (N · mm) P : concentrated load (N)
 p : uniformly distributed load (N/mm) a, b : concentrated load point distance (mm) ℓ : span (mm) I : moment of inertia of area (mm⁴)
 E : modulus of longitudinal elasticity (SUJ2) 2.06×10^5 (N/mm²) (SUS) 2.0×10^5 (N/mm²) C : $1/48EI$ (1/N · mm²)

The moment of inertia of area (I) is obtained using the following formulas:

● For solid shaft

$$I = \frac{\pi D^4}{64}$$

● For hollow shaft

$$I = \frac{\pi}{64} (D^4 - d^4)$$

I : moment of inertia of area (mm⁴)
 D : outer diameter (mm) d : inner diameter (mm)

The values of the moment of inertia of area and $C (=1/48 EI)$ for NB shafts are listed in Table F-4 and F-5.

Calculation Examples

1. Calculating the maximum deflection of a 30mm shaft with a 500mm span when a concentrated load of 980 N is applied at the mid-point of the shaft ... (neglecting the shaft weight)

① In case the support method is support-support:

From the given conditions, $P = 980$ N, $\ell = 500$ mm
 From Table F-4, C for an outer diameter of 30 mm, $C = 2.54 \times 10^{-12}$ (N · mm²).

Substituting these values into the corresponding formula (No. 1) in Table F-3,
 $\delta_{\max} = P\ell^3C = 0.31$ (mm)

② In case the support method is fixed-fixed:

Substituting the values into the corresponding formula (No. 2) given in Table F-3,

$$\delta_{\max} = \frac{1}{4}P\ell^3C = 0.08 \text{ (mm)}$$

2. Calculating the maximum deflection of a 60mm shaft with an inner diameter of 32 mm and a 2,000 mm span by its own weight ...

From Table F-5, C for an outer diameter of 60 mm, $C = 1.73 \times 10^{-13}$ (N · mm²)

The mass per unit length of a shaft with an outer diameter of 60 mm and an inner diameter of 32 mm is 15.9kg/m. Therefore, a uniformly distributed load of 0.156 N/mm is applied. Substituting these values into the formula (No. 3) given in Table F-3.

$$\delta_{\max} = \frac{5}{8}p\ell^4C = 0.27 \text{ (mm)}$$

Table F-4 Solid Shaft

outer diameter D (mm)	moment of inertia of area I (mm ⁴)	$C=1/48EI$ (1/N · mm ²) SUJ2 equivalent to SUS440C
3	3.98	2.54×10^{-8} 2.62×10^{-8}
4	1.26×10	8.05×10^{-9} 8.29×10^{-9}
5	3.07×10	3.30×10^{-9} 3.40×10^{-9}
6	6.36×10	1.59×10^{-9} 1.64×10^{-9}
8	2.01×10^2	5.03×10^{-10} 5.18×10^{-10}
10	4.91×10^2	2.06×10^{-10} 2.12×10^{-10}
12	1.02×10^3	9.94×10^{-11} 1.02×10^{-10}
13	1.40×10^3	7.21×10^{-11} 7.43×10^{-11}
15	2.49×10^3	4.07×10^{-11} 4.19×10^{-11}
16	3.22×10^3	3.14×10^{-11} 3.24×10^{-11}
20	7.85×10^3	1.29×10^{-11} 1.33×10^{-11}
25	1.92×10^4	5.27×10^{-12} 5.43×10^{-12}
30	3.98×10^4	2.54×10^{-12} 2.62×10^{-12}
35	7.37×10^4	1.37×10^{-12} 1.41×10^{-12}
40	1.26×10^5	8.05×10^{-13} 8.29×10^{-13}
50	3.07×10^5	3.30×10^{-13} 3.40×10^{-13}
60	6.36×10^5	1.59×10^{-13} 1.64×10^{-13}
80	2.01×10^6	5.03×10^{-14} 5.18×10^{-14}
100	4.91×10^6	2.06×10^{-14} 2.12×10^{-14}
120	1.02×10^7	9.94×10^{-15} —
150	2.49×10^7	4.07×10^{-15} —

Table F-5 Hollow Shaft

outer diameter D (mm)	inner diameter d (mm)	moment of inertia of area I (mm ⁴)	$C=1/48EI$ (1/N · mm ²)
6	2	6.28×10	1.61×10^{-9}
8	3	1.97×10^2	5.13×10^{-10}
10	4	4.78×10^2	2.11×10^{-10}
12	5	9.87×10^2	1.02×10^{-10}
13	6	1.34×10^3	7.55×10^{-11}
16	8	3.02×10^3	3.36×10^{-11}
20	10	7.36×10^3	1.37×10^{-11}
25	15	1.67×10^4	6.06×10^{-12}
30	16	3.65×10^4	2.77×10^{-12}
35	19	6.73×10^4	1.50×10^{-12}
40	20	1.18×10^5	8.57×10^{-13}
50	26	2.84×10^5	3.56×10^{-13}
60	32	5.85×10^5	1.73×10^{-13}
80	48	1.75×10^6	5.78×10^{-14}
100	60	4.27×10^6	2.37×10^{-14}

SN TYPE

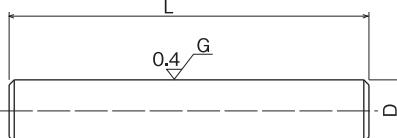
— NB Shaft —

part number structure

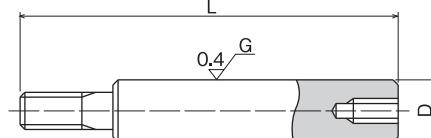
example	SN 25 h5 × 576		
SN type		length (L)	
outer diameter (D)		outer diameter tolerance	g6 when blank



straight



machined (example)



part number	outer diameter D mm	tolerance g6 μm	length L mm	mass Kg/m
SN 3	3	-2/-8	50 ← → 400	0.06
SN 4	4	- 4	100 ← → 500	0.10
SN 5	5	-12	100 ← → 700	0.16
SN 6	6		100 ← → 1000	0.23
SN 8	8	- 5	200 ← → 1500	0.40
SN 10	10	-14	200 ← → 2000	0.62
SN 12	12		200 ← → 3000	0.89
SN 13	13	- 6	200 ← → 3000	1.04
SN 15	15	-17	300 ← → 4000	1.39
SN 16	16		300 ← → 4000	1.58
SN 20	20		300 ← → 5000	2.47
SN 25	25	- 7	300 ← → 6000	3.85
SN 30	30	-20	300 ← → 6000	5.55
SN 35	35	- 9	400 ← → 6000	7.55
SN 40	40		400 ← → 6000	9.87
SN 50	50	-25	500 ← → 6000	15.4
SN 60	60	-10	600 ← → 6000	22.2
SN 80	80	-29	800 ← → 6000	39.5
SN100	100	-12	1000 ← → 6000	61.7
SN120	120	-34	1500 ← → 4500	88.8
SN150	150	-14/-39	1500 ← → 4500	139

material: high-carbon chromium bearing steel (SUJ2) hardness: 60HRC (HV697) or more

Tolerances other than g6 are available upon request.

SNS TYPE

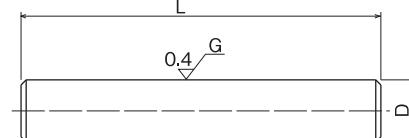
— NB Stainless Steel Shaft —

part number structure

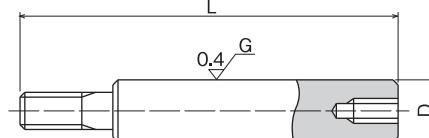
example	SNS 25 h5 × 576		
SNS type		length (L)	
outer diameter (D)		outer diameter tolerance	g6 when blank



straight



machined (example)



part number	outer diameter D mm	tolerance g6 μm	length L mm	mass Kg/m
SNS 3	3	-2/-8	50 ← → 300	0.06
SNS 4	4	- 4	100 ← → 400	0.10
SNS 5	5	-12	100 ← → 500	0.16
SNS 6	6		100 ← → 600	0.22
SNS 8	8	- 5	200 ← → 1000	0.39
SNS 10	10	-14	200 ← → 1500	0.61
SNS 12	12	- 6	200 ← → 2500	0.88
SNS 13	13	-17	200 ← → 3000	1.03
SNS 16	16		300 ← → 4000	1.56
SNS 20	20	- 7	300 ← → 5000	2.43
SNS 25	25		300 ← → 6000	3.80
SNS 30	30	-20	300 ← → 6000	5.48
SNS 35	35	- 9	400 ← → 6000	7.46
SNS 40	40		400 ← → 6000	9.75
SNS 50	50	-25	500 ← → 6000	15.2
SNS 60	60	-10	600 ← → 6000	21.9
SNS 80	80	-29	800 ← → 6000	39.0
SNS100	100	-12/-34	1000 ← → 6000	60.9

material: martensite stainless steel (equivalent to SUS440C)

hardness: 56HRC (HV613) or more

The maximum length of hardening is up to 4500mm for shafts with diameter over 80mm.

Tolerances other than g6 are available upon request.

SNT TYPE

- NB Hollow Shaft -

part number structure

example SNT **25** h5 **x 576**

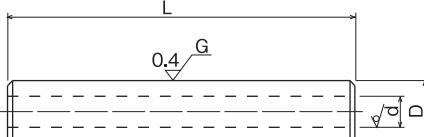
SNT type

outer diameter (D)

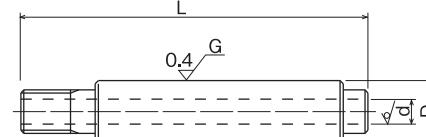
length (L)
outer diameter tolerance
g6 when blank



straight



machined (example)



part number	outer diameter D mm	tolerance g6 μm	inner diameter d mm	length L mm		mass Kg/m
				mm	mm	
SNT 6	6	-4/-12	2	100	400	0.20
SNT 8	8	-5	3	200	600	0.34
SNT 10	10	-14	4	200	1000	0.52
SNT 12	12	-6	5	200	1500	0.73
SNT 13	13	-6	6	200	1500	0.82
SNT 16	16	-17	8	300	2500	1.18
SNT 20	20	-7	10	300	4000	1.85
SNT 25	25	-20	15	300	4000	2.46
SNT 30	30	-20	16	300	4500	3.97
SNT 35	35	-9	19	400	4500	5.32
SNT 40	40	-25	20	400	4500	7.39
SNT 50	50	-25	26	500	4500	11.3
SNT 60	60	-10	32	600	4500	15.9
SNT 80	80	-29	48	800	4500	25.3

material: high-carbon chromium bearing steel (SUJ2)

hardness: 60HRC (HV697) or more

Tolerances other than g6 are available upon request.

NB CENTER-LINED TAPPED SHAFT

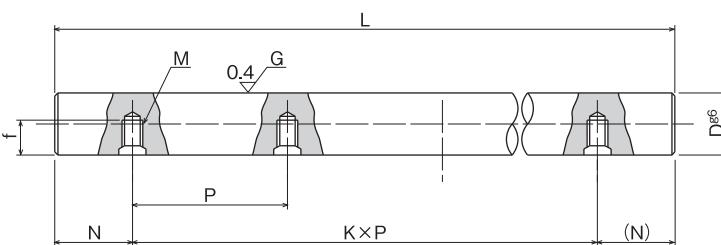
A larger diameter shaft can overcome problems in maintaining precision functionality when a high or unbalanced load is applied. A combination of the center-lined tapped shaft together with the SA type support rail is ideal in such cases. (see pages F-18,19) The center-lined tapped shaft is standardized to simplify shaft selection.

part number structure

example SNSB **25** **x 576**

material
SNB: SUJ2
SNSB: equivalent to
SUS440C

length (L)
outer diameter (D)
g6 when blank



$$N = \frac{L - K \times P}{2}$$

K: number of pitches

NB Center-Lined Tapped Shaft

part number	outer diameter D mm	tolerance g6* μm	pitch P mm			screw size M	tap depth f mm	maximum length L _{max} mm
			P mm	screw size M	tap depth f mm			
SNB10	10	-5/-14	100	M4	4.5	1,500		
SNB12	12	-6	100	M4	5.5	1,800		
SNB13	13	-17	100	M4	6	2,000		
SNB16	16	-	150	M5	7	4,000		
SNB20	20	-7	150	M6	9	4,000		
SNB25	25	-	200	M6	12	4,000		
SNB30	30	-20	200	M8	15	4,500		
SNB35	35	-9	200	M8	15	5,000		
SNB40	40	-25	300	M8	18	6,000		
SNB50	50	-	300	M10	22	6,000		

NB Center-Lined Tapped Stainless Steel Shaft

part number	outer diameter D mm	tolerance g6* μm	pitch P mm			screw size M	tap depth f mm	maximum length L _{max} mm
			P mm	screw size M	tap depth f mm			
SNSB16	16	-6/-17	150	M5	7	2,000		
SNSB20	20	-7	150	M6	9	3,000		
SNSB25	25	-20	200	M6	12	4,000		
SNSB30	30	-	200	M8	15	4,500		
SNSB35	35	-9	200	M8	15	5,000		
SNSB40	40	-25	300	M8	18	6,000		
SNSB50	50	-	300	M10	22	6,000		

material: martensite stainless steel (equivalent to SUS440C)

hardness: 56HRC (HV613) or more

*g6 is a standard tolerance of the outer diameter.

material: high-carbon chromium bearing steel (SUJ2)

hardness: 60HRC (HV697) or more

*g6 is a standard tolerance of the outer diameter.

SHAFT SUPPORTER AND SHAFT SUPPORT RAIL

These components save design/assembling time and ease shaft installation.

SH・SH-A・WH-A type

These are most commonly used compact shaft supporters. SH type is made of cast iron and SH-A/WH-A type is made of aluminum alloy.



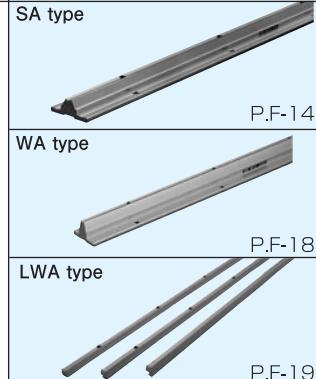
SHF・SHF-FC type

These are flanged type shaft supporters for a compact design. SHF is made of aluminum alloy and SHF-FC (shaft diameter 35 and over) is made of cast iron.



SA・WA・LWA type (shaft support rail)

These support rails support shafts from below to avoid shaft deflection for a long-stroke/high load application. This type is made of aluminum alloy.



ACCURACY OF SA TYPE SUPPORT RAIL

The accuracy of the SA support rails are measured as shown in Figure F-1.

Figure F-1 Measurement Method

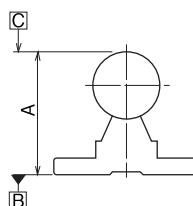
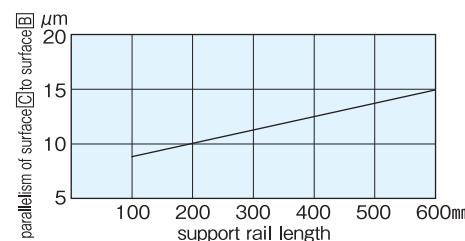
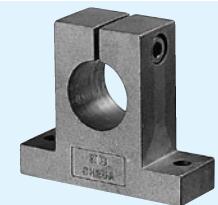


Figure F-2 Accuracy of SA type Support Rail



SH-A TYPE — Shaft Supporter —

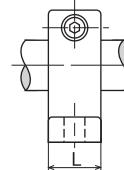
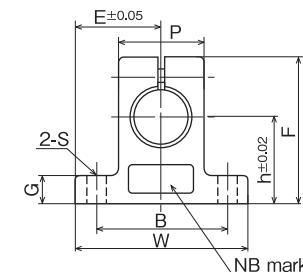


part number structure

example **SH|25|A**

SH-A type

shaft diameter



part number	shaft diameter mm	major dimensions									tightening screw size	recommended torque N·m	mass g
		h mm	E mm	W mm	L mm	F mm	G mm	P mm	B mm	S mm			
SH 8A	8	20	21	42	14	32.8	6	18	32	5.5 (M5)	M4	2	24
SH10A	10	20	21	42	14	32.8	6	18	32	5.5 (M5)	M4	2	24
SH12A	12	23	21	42	14	37.5	6	20	32	5.5 (M5)	M4	2	30
SH13A	13	23	21	42	14	37.5	6	20	32	5.5 (M5)	M4	2	30
SH16A	16	27	24	48	16	44	8	25	38	5.5 (M5)	M4	2	40
SH20A	20	31	30	60	20	51	10	30	45	6.6 (M6)	M5	3	70
SH25A	25	35	35	70	24	60	12	38	56	6.6 (M6)	M6	5.5	130
SH30A	30	42	42	84	28	70	12	44	64	9 (M8)	M6	5.5	180
SH35A	35	50	49	98	32	82	15	50	74	11 (M10)	M8	13.5	270
SH40A	40	60	57	114	36	96	15	60	90	11 (M10)	M8	13.5	420
SH50A	50	70	63	126	40	120	18	74	100	14 (M12)	M12	29	750
SH60A	60	80	74	148	45	136	18	90	120	14 (M12)	M12	29	1,100

SH TYPE

— Shaft Supporter —

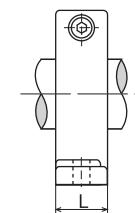
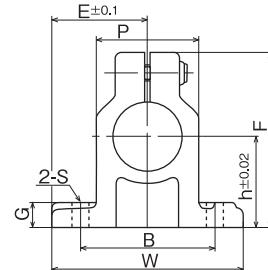


part number structure

example **SH 25**

SH type

shaft diameter



part number	shaft diameter mm	h mm	major dimensions								tightening screw size	recommended torque N·m	mass g
			E mm	W mm	L mm	F mm	G mm	P mm	B mm	S mm			
SH10	10	20	22	44	15	35	7	19	32	4.5 (M4)	M4	2	80
SH13	13	23	25	50	17	40	8	17	32	7 (M5)	M4	2	120
SH16	16	27	27.5	55	17	45	10	25	38	7 (M5)	M4	2	120
SH20	20	31	32.5	65	20	53	12	30	45	8 (M6)	M5	3	190
SH25	25	35	38	76	24	61	12	35	56	8 (M6)	M6	5.5	300
SH30	30	42	42.5	85	28	73	15	42	64	10 (M8)	M6	5.5	490
SH35	35	50	50	100	32	87	15	50	74	12 (M10)	M8	13.5	690
SH40	40	60	60	120	36	104	18	58	90	12 (M10)	M10	29	1,200
SH50	50	70	70	140	40	122	20	68	100	14 (M12)	M12	29	1,700
SH60	60	80	82.5	165	45	140	23	80	120	14 (M12)	M12	29	2,500

SHF TYPE

— Shaft Supporter Flange Type —

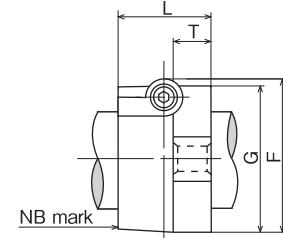
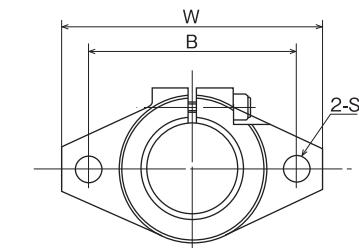


part number structure

example **SHF 35 FC**

SHF type

shaft diameter

blank: aluminum alloy
FC: cast iron

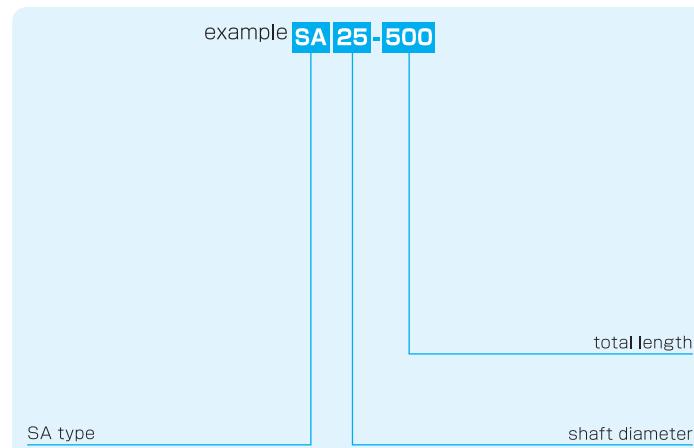
part number	shaft diameter mm	major dimensions								tightening screw size	recommended torque N·m	mass g
		W mm	L mm	T mm	F mm	G mm	B mm	S mm				
SHF10	—	10	43	10	5	24	20	32	5.5 (M5)	M4	2	13
SHF12	—	12	47	13	7	28	25	36	5.5 (M5)	M4	2	20
SHF13	—	13	47	13	7	28	25	36	5.5 (M5)	M4	2	20
SHF16	—	16	50	16	8	31	28	40	5.5 (M5)	M4	2	27
SHF20	—	20	60	20	8	37	34	48	7 (M6)	M5	3	40
SHF25	—	25	70	25	10	42	40	56	7 (M6)	M5	3	60
SHF30	—	30	80	30	12	50	46	64	9 (M8)	M6	5.5	110
SHF35	SHF35FC	35	92	35	14	58	50	72	12 (M10)	M8	13.5	380
SHF40	SHF40FC	40	102	40	16	67	56	80	12 (M10)	M10	29	205
SHF50	SHF50FC	50	122	50	19	83	70	96	14 (M12)	M12	29	360
SHF60	SHF60FC	60	140	60	23	95	82	112	14 (M12)	M12	29	530
												1,500

SA TYPE

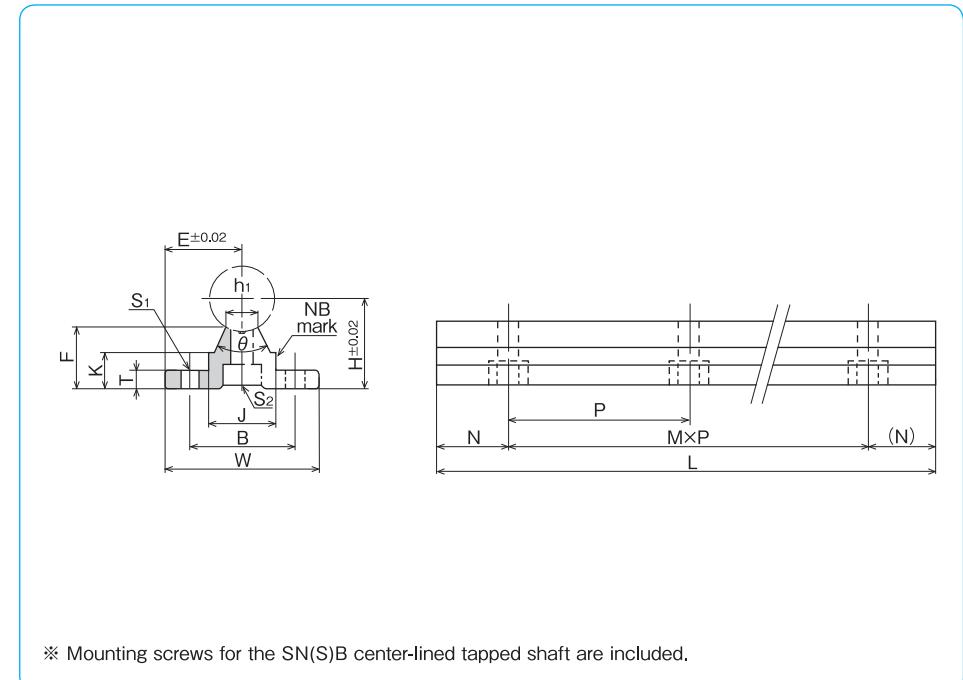
— Shaft Support Rail —



part number structure



part number	shaft diameter mm	major dimensions															mass g
		H mm	E mm	W mm	L mm	F mm	T mm	K mm	J mm	h ₁ mm	θ	B mm	N mm	M×P mm	S ₁ mm	S ₂ mm	
SA10-200					200							50	1×100				110
SA10-300					300							50	2×100				160
SA10-400	10	18	16	32	400	13.5	4	8.9	12.4	4.7	80°	22	50	3×100	4.5	M4	220
SA10-500					500							50	4×100				270
SA10-600					600							50	5×100				330
SA13-200					200							50	1×100				140
SA13-300					300							50	2×100				210
SA13-400	13	21	17	34	400	15	4.5	9.8	15	6	80°	25	50	3×100	4.5	M4	280
SA13-500					500							50	4×100				350
SA13-600					600							50	5×100				420
SA16-200					200							25	1×150				200
SA16-300					300							75	1×150				300
SA16-400	16	25	20	40	400	17.8	5	11.7	18.5	8	80°	30	50	2×150	5.5	M5	400
SA16-500					500							25	3×150				500
SA16-600					600							75	3×150				600
SA20-200					200							25	1×150				200
SA20-300					300							75	1×150				300
SA20-400	20	27	22.5	45	400	17.7	5	10	19	8	50°	30	50	2×150	5.5	M6	400
SA20-500					500							25	3×150				510
SA20-600					600							75	3×150				610
SA25-200					200							25	1×150				290
SA25-300					300							50	1×200				430
SA25-400	25	33	27.5	55	400	21	6	12	21.5	8	50°	35	100	1×200	6.5	M6	580
SA25-500					500							50	2×200				730
SA25-600					600							100	2×200				880



part number	shaft diameter mm	major dimensions															mass g	
		H mm	E mm	W mm	L mm	F mm	T mm	K mm	J mm	h ₁ mm	θ	B mm	N mm	M×P mm	S ₁ mm	S ₂ mm		
SA30-200								200				25	1×150				360	
SA30-300								300				50	1×200				550	
SA30-400	30	37	30	60			22.8	7	13	26.5	10.3	50°	40	100	1×200	6.5	M8	730
SA30-500								500				50	2×200				920	
SA30-600								600				100	2×200				1,100	
SA35-200								200				25	1×150				460	
SA35-300								300				50	1×200				700	
SA35-400	35	43	32.5	65			26.5	8	15.5	28	13	50°	45	100	1×200	9	M8	950
SA35-500								500				50	2×200				1,190	
SA35-600								600				100	2×200				1,420	
SA40-200								200				25	1×150				630	
SA40-300								300				75	1×150				960	
SA40-400	40	48	37.5	75			29.4	9	17	38	16	50°	55	100	1×300	9	M8	1,290
SA40-500								500				50	1×300				1,610	
SA40-600								600				150	1×300				1,950	
SA50-200								200				25	1×150				1,000	
SA50-300								300				75	1×150				1,500	
SA50-400	50	62	47.5	95			38.8	11	21	45	20	50°	70	50	1×300	11	M10	2,000
SA50-500								500				100	1×300				2,500	
SA50-600								600				150	1×300				3,000	

WH-A TYPE

— Shaft Supporter —
(Inch Standard)



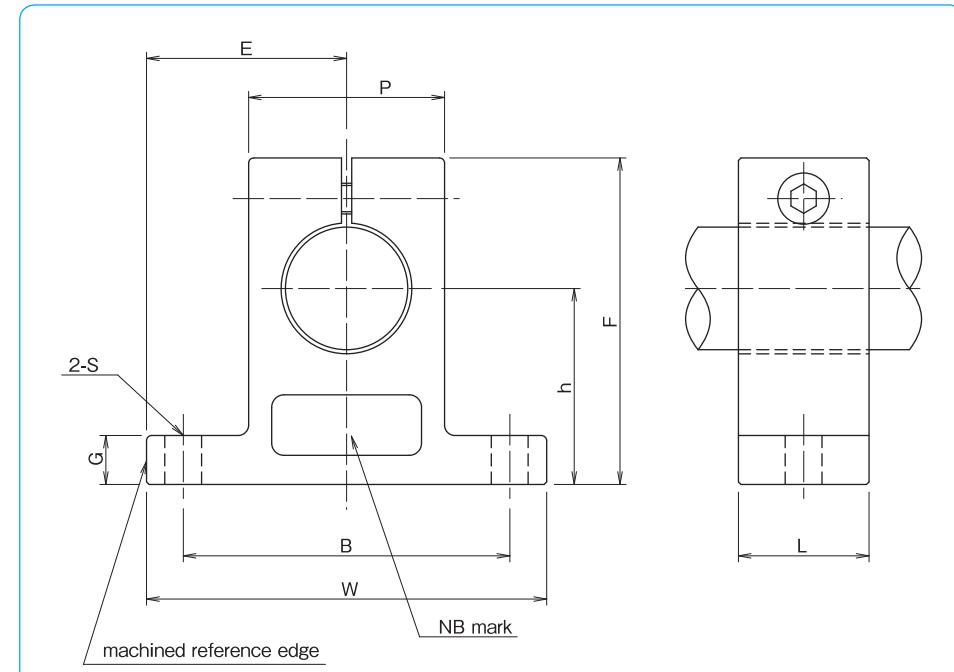
part number structure

example **WH 24 A**

WH-A type

size

part number	shaft diameter inch	h $\pm .001$ inch	major dimensions			
			E $\pm .005$ inch	W inch	L inch	F inch
WH 4A	.2500	.6875	.7500	1.500	.500	1.063
WH 6A	.3750	.7500	.8125	1.625	.563	1.187
WH 8A	.5000	1.0000	1.0000	2.000	.625	1.625
WH 10A	.6250	1.0000	1.2500	2.500	.688	1.750
WH 12A	.7500	1.2500	1.2500	2.500	.750	2.063
WH 16A	1.0000	1.5000	1.5315	3.063	1.000	2.500
WH 20A	1.2500	1.7500	1.8750	3.750	1.125	3.000
WH 24A	1.5000	2.0000	2.1875	4.375	1.250	3.437
WH 32A	2.0000	2.5000	2.7500	5.500	1.500	4.375

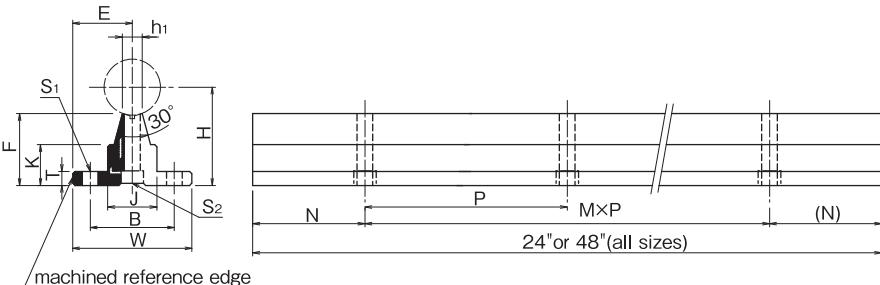
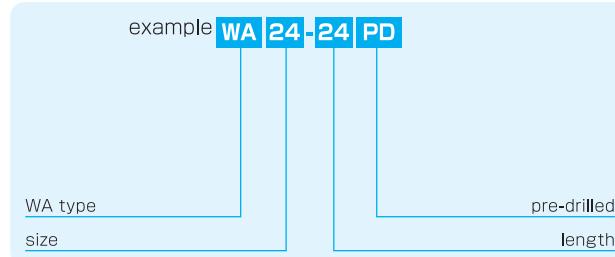


G inch	P inch	major dimensions			bolt#	mass lbs	part number
		B $\pm .01$ inch	S inch	inch			
.250	.500	1.125	.156	# 6	.033		WH 4A
.250	.688	1.250	.156	# 6	.044		WH 6A
.250	.875	1.500	.188	# 8	.075		WH 8A
.313	1.000	1.875	.218	# 10	.106		WH 10A
.313	1.250	2.000	.218	# 10	.156		WH 12A
.375	1.500	2.500	.281	1/4	.294		WH 16A
.438	2.000	3.000	.346	5/16	.531		WH 20A
.500	2.250	3.500	.346	5/16	.725		WH 24A
.625	3.000	4.500	.406	3/8	1.400		WH 32A

1kg ≈ 2.205lbs
1lb ≈ 0.454kg

WA TYPE

— Shaft Support Rail —
(Inch Standard)

**part number structure**

part number	shaft diameter inch	major dimensions		mounting dimensions											mass lbs		
		H ±.001 inch	E ±.005 inch	W inch	F inch	T inch	K inch	J inch	h1 inch	B ±.01 inch	N inch	MxP inch	S1 hole inch	bolt #	S2 hole inch	bolt #	
WA 8- 48PD	.5000	1.125	.7500	1.500	.903	.188	.466	.500	.255	1.000	2	5x4 11x4	.169	#6	.169	#6	1.326 2.652
WA10- 48PD	.6250	1.125	.8125	1.625	.841	.250	.423	.500	.276	1.125	2	5x4 11x4	.193	#8	.193	#8	1.488 2.976
WA12- 48PD	.7500	1.500	.8750	1.750	1.158	.250	.592	.625	.322	1.250	3	3x6 7x6	.221	#10	.221	#10	2.100 4.200
WA16- 48PD	1.0000	1.750	1.0625	2.125	1.280	.250	.727	.875	.359	1.500	3	3x6 7x6	.281	1/4	.281	1/4	2.776 5.552
WA20- 48PD	1.2500	2.125	1.2500	2.500	1.537	.313	.799	1.100	.437	1.875	3	3x6 7x6	.343	5/16	.343	5/16	4.060 8.120
WA24- 48PD	1.5000	2.500	1.5000	3.000	1.798	.375	.922	1.375	.558	2.250	4	2x8 5x8	.343	5/16	.406	3/8	5.840 11.680
WA32- 48PD	2.0000	3.250	1.8750	3.750	2.322	.500	1.450	1.500	.800	2.750	4	2x8 5x8	.406	3/8	.531	1/2	9.500 19.000

All sizes are also available without pre-drilled mounting holes.

Complete shaft-rail assemblies are also available as well as custom drilling and lengths.

Please send drawings with customer specifications.

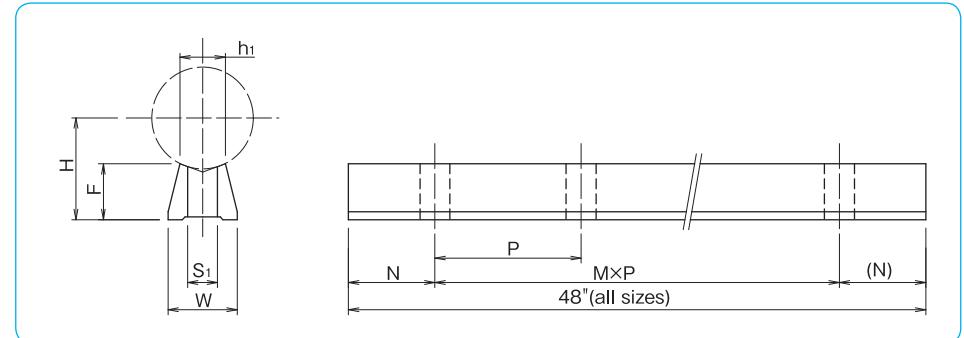
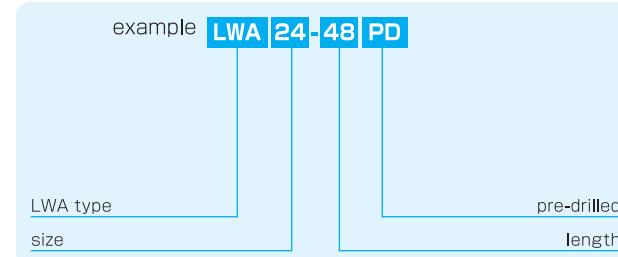
Product of NB Corporation of America

1kg≈2.205lbs

1lb≈.454kg

LWA TYPE

— Low Shaft Support Rail —
(Inch Standard)

**part number structure**

part number	shaft diameter inch	major dimensions			N inch	mounting dimensions			S1 inch	mass lb
		H ±.002 inch	W inch	F inch		MxP inch	h1 inch	S1 inch		
LWA 8-48 PD	.5000	.5625	.37	.342	2	11x4	0.25	.169	0.11	
LWA 10-48 PD	.6250	.6875	.45	.405	2	11x4	0.276	.193	0.17	
LWA 12-48 PD	.7500	.7500	.51	.409	3	7x6	0.317	.220	0.20	
LWA 16-48 PD	1.0000	1.0000	.69	.545	3	7x6	0.422	.283	0.35	
LWA 20-48 PD	1.2500	1.1875	.78	.617	3	7x6	0.520	.343	0.44	
LWA 24-48 PD	1.5000	1.3750	.93	.691	4	5x8	0.630	.406	0.58	
LWA 32-48 PD	2.0000	1.7500	1.18	.836	4	5x8	0.824	.531	0.89	

Product of NB Corporation of America

1kg≈2.205lbs

1lb≈.454kg

WSS TYPE

— Shaft Support Assembly —
(Standard Type)

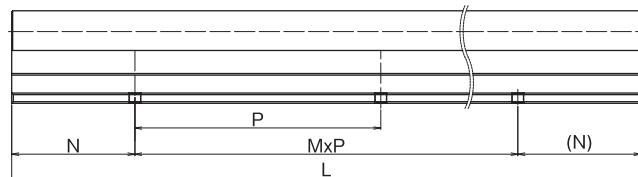
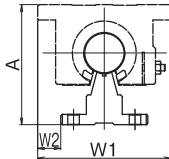


part number structure

example **WSS | 16 × 36**

outer diameter

length



Part Number	Outer Diameter inch/mm	Outer Assembly Dimensions		Base Mounting Holes N inch/mm	P inch/mm	Maximum Length	Weight lbs/ft kg/m
WSS 8	1/2	1.812	2.000	0.2500	2.000	4.000	168 1.26
	12.700	46.02	50.80	6.35	50.80	101.60	4267.2 1.88
WSS 10	5/8	2.000	2.500	0.4375	2.000	4.000	180 1.83
	15.875	50.80	63.50	11.11	50.80	101.60	4572.0 2.72
WSS 12	3/4	2.437	2.750	0.5000	3.000	6.000	204 2.50
	19.050	61.90	69.85	12.70	76.20	152.40	5181.6 3.72
WSS 16	1	2.937	3.250	0.5625	3.000	6.000	204 4.06
	25.400	74.60	82.55	14.29	76.20	152.40	5181.6 6.04
WSS 20	1-1/4	3.625	4.000	0.7500	3.000	6.000	204 6.28
	31.750	92.08	101.60	19.05	76.20	152.40	5181.6 9.35
WSS 24	1-1/2	4.250	4.750	0.8750	4.000	8.000	204 8.60
	38.100	107.95	120.65	22.23	101.60	203.20	5181.6 12.8
WSS 32	2	5.375	6.000	1.1250	4.000	8.000	204 14.88
	50.800	136.53	152.40	28.58	101.60	203.20	5181.6 22.14

Product of NB Corporation of America

WSS-SS TYPE

— Shaft Support Assembly —
(Stainless Steel Type)

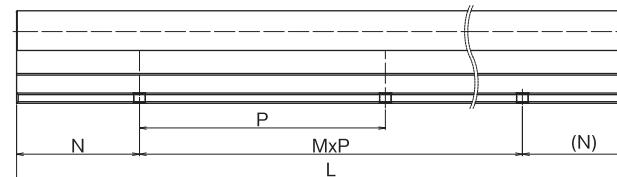
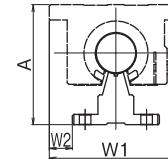


part number structure

example **WSS | 8 × 36 - SS**

outer diameter

length



Part Number	Outer Diameter inch/mm	Outer Assembly Dimensions		Base Mounting Holes N inch/mm	P inch/mm	Maximum Length	Weight lbs/ft kg/m
WSS 8-SS	1/2	1.812	2.000	0.2500	2.000	4.000	158 1.26
	12.700	46.02	50.80	6.35	50.80	101.60	4013.2 1.88
WSS 10-SS	5/8	2.000	2.500	0.4375	2.000	4.000	158 1.83
	15.875	50.80	63.50	11.11	50.80	101.60	4013.2 2.72
WSS 12-SS	3/4	2.437	2.750	0.5000	3.000	6.000	158 2.50
	19.050	61.90	69.85	12.70	76.20	152.40	4013.2 3.72
WSS 16-SS	1	2.937	3.250	0.5625	3.000	6.000	158 4.06
	25.400	74.60	82.55	14.29	76.20	152.40	4013.2 6.04
WSS 20-SS	1-1/4	3.625	4.000	0.7500	3.000	6.000	158 6.28
	31.750	92.08	101.60	19.05	76.20	152.40	4013.2 9.35
WSS 24-SS	1-1/2	4.250	4.750	0.8750	4.000	8.000	158 8.60
	38.100	107.95	120.65	22.23	101.60	203.20	4013.2 12.8
WSS 32-SS	2	5.375	6.000	1.1250	4.000	8.000	204 14.88
	50.800	136.53	152.40	28.58	101.60	203.20	5181.6 22.14

Product of NB Corporation of America

SF TYPE

— NBCA Shaft —

part number structure

example **SF | 25 × 576**

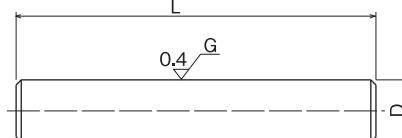
SF type

outer diameter (D)

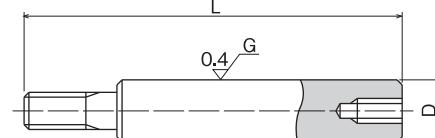
length (L)



straight



machined (example)



part number	outer diameter D mm	tolerance g6 μm	length L mm	mass Kg/m
SF 6	6	-4/-12	100 ← → 3000	0.23
SF 8	8	- 5	100 ← → 3000	0.40
SF 10	10	-14	100 ← → 3000	0.62
SF 12	12		100 ← → 3000	0.89
SF 13	13	- 6	100 ← → 3000	1.04
SF 15	15	-17	100 ← → 3000	1.39
SF 16	16		100 ← → 3000	1.58
SF 20	20	- 7	100 ← → 3000	2.47
SF 25	25	-20	100 ← → 3000	3.85
SF 30	30		100 ← → 3000	5.55
SF 35	35		100 ← → 3000	7.55
SF 40	40	- 9	100 ← → 3000	9.87
SF 50	50	-25	100 ← → 3000	15.4

material: CF53 or Equivalent hardness: 60HRC (HV697) or more

Product of NB Corporation of America

SFS TYPE

— NBCA Stainless Steel Shaft —

part number structure

example **SFS | 25 × 576**

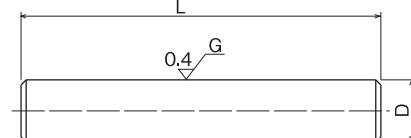
SFS type

outer diameter (D)

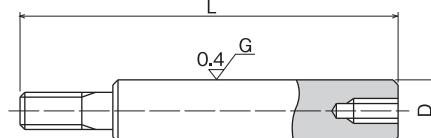
length (L)



straight



machined (example)



part number	outer diameter D mm	tolerance g6 μm	length L mm	mass Kg/m
SFS 6	6	-4/-12	100 ← → 3000	0.22
SFS 8	8	- 5	100 ← → 3000	0.39
SFS 10	10	-14	100 ← → 3000	0.61
SFS 12	12		100 ← → 3000	0.88
SFS 13	13	- 6	100 ← → 3000	1.03
SFS 16	16	-17	100 ← → 3000	1.56
SFS 20	20		100 ← → 3000	2.43
SFS 25	25	- 7	100 ← → 3000	3.80
SFS 30	30	-20	100 ← → 3000	5.48
SFS 35	35		100 ← → 3000	7.46
SFS 40	40	- 9	100 ← → 3000	9.75
SFS 50	50	-25	100 ← → 3000	15.2

material: X46Cr13 or Equivalent

hardness: 52HRC (HV544) or more

Product of NB Corporation of America

SFW TYPE

— NBCA Inch Shaft —

part number structure

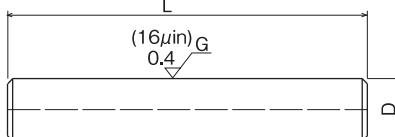
example **SFW 24 × 3000**

SFW type

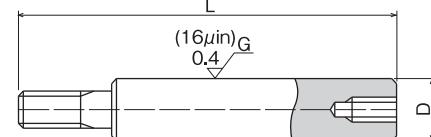
size



straight



machined (example)



Part Number	Outer Diameter D inch/mm	Length L inch/mm	Mass lbs/inch kg/m
SFW 4 6.350	1/4 6.350	2 50.8 ← → 3048	0.014 0.25
SFW 6 9.525	3/8 9.525	2 50.8 ← → 3048	0.031 0.56
SFW 8 12.700	1/2 12.700	2 50.8 ← → 3048	0.056 0.99
SFW 10 15.875	5/8 15.875	2 50.8 ← → 3048	0.086 1.55
SFW 12 19.050	3/4 19.050	2 50.8 ← → 3048	0.125 2.24
SFW 16 25.400	1 25.400	2 50.8 ← → 3048	0.222 3.98
SFW 20 31.750	1-1/4 31.750	2 50.8 ← → 3048	0.348 6.22
SFW 24 38.100	1-1/2 38.100	2 50.8 ← → 3048	0.500 8.95
SFW 32 50.800	2 50.800	2 50.8 ← → 3048	0.890 15.91

material: CF53 or Equivalent

hardness: 60 HRC or more

Product of NB Corporation of America

1kg ≈ 2.205lbs

SFWS TYPE

— NBCA Inch Stainless Steel Shaft —

part number structure

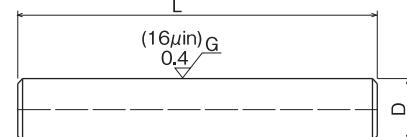
example **SFWS 24 × 3000**

SFWS type

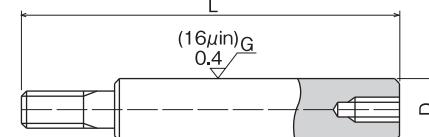
size



straight



machined (example)



Part Number	Outer Diameter D inch/mm	Length L inch/mm	Mass lbs/inch kg/m
SFWS 2 3.175	1/8 3.175	2 50.8 ← → 406.4	0.004 0.10
SFWS 3 4.763	3/16 4.763	2 50.8 ← → 406.4	0.008 0.20
SFWS 4 6.350	1/4 6.350	2 50.8 ← → 3048	0.014 0.25
SFWS 6 9.525	3/8 9.525	2 50.8 ← → 3048	0.031 0.56
SFWS 8 12.700	1/2 12.700	2 50.8 ← → 3048	0.056 0.99
SFWS 10 15.875	5/8 15.875	2 50.8 ← → 3048	0.086 1.55
SFWS 12 19.050	3/4 19.050	2 50.8 ← → 3048	0.125 2.24
SFWS 16 25.400	1 25.400	2 50.8 ← → 3048	0.222 3.98
SFWS 20 31.750	1-1/4 31.750	2 50.8 ← → 3048	0.348 6.22
SFWS 24 38.100	1-1/2 38.100	2 50.8 ← → 3048	0.500 8.95
SFWS 32 50.800	2 50.800	2 50.8 ← → 3048	0.890 15.91

material: X46Cr13 or Equivalent

hardness: 52 HRC or more

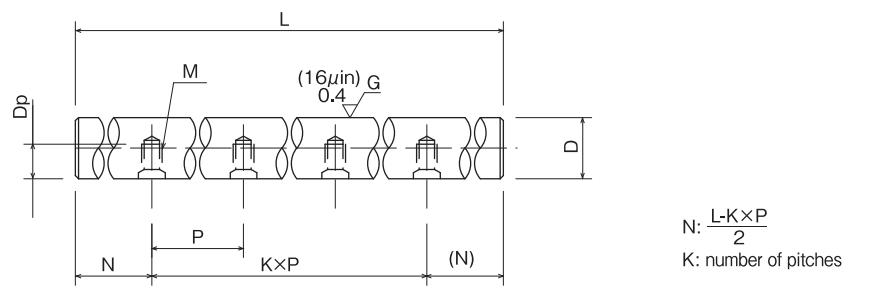
Product of NB Corporation of America

1kg ≈ 2.205lbs

SFW-PD

— NBCA Inch Pre-Drilled Shaft —

part number structure

example **SFW | 24 × 72 - PD**SFW type
sizepre-drilled shaft
length (L in inches)

Part Number	Outer Diameter D inch/mm	Pitch P inch/mm	Bolt Size M	Tapped Hole Depth Dp inch/mm	Maximum Length L inch/mm
SFW 8-PD	1/2	-0.0005	4	0.280	168
	12.700	-0.0010		7.1	4267.2
SFW 10-PD	5/8	-13	101.6	0.350	180
	15.875	-25		8.9	4572
SFW 12-PD	3/4	-0.0005	# 10-32	0.400	204
	19.050	-0.0010		10.2	5181.6
SFW 16-PD	1	-0.0010	6 152.4	0.500	204
	25.400	-13		12.7	5181.6
SFW 20-PD	1-1/4	-0.0010	5/16-18	0.650	204
	31.750	-25		16.5	5181.6
SFW 24-PD	1-1/2	-0.0006	8 203.2	0.700	204
	38.100	-0.0011		17.8	5181.6
SFW 32-PD	2	-0.0006		0.850	204
	50.800	-0.0013		21.6	5181.6

material: CF53 or Equivalent

hardness: 60 HRC or more

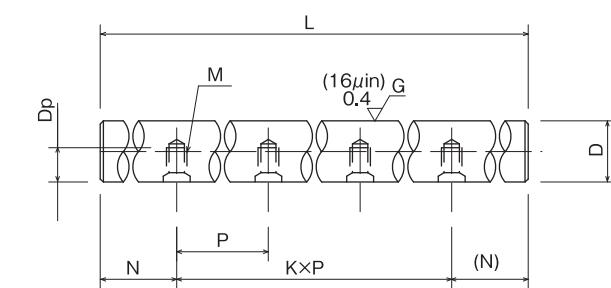
Product of NB Corporation of America

1kg≈2.205lbs

SFWS-PD

— NBCA Inch Pre-Drilled Stainless Steel Shaft —

part number structure

example **SFWS | 24 × 72 - PD**SFWS type
sizepre-drilled shaft
length (L in inches)

Part Number	Outer Diameter D inch/mm	Pitch P inch/mm	Bolt Size M	Tapped Hole Depth Dp inch/mm	Maximum Length L inch/mm
SFWS 8-PD	1/2	-0.0005	4	0.280	158
	12.700	-0.0010		7.1	4013.2
SFWS 10-PD	5/8	-13	101.6	0.350	158
	15.875	-25		8.9	4013.2
SFWS 12-PD	3/4	-0.0005	# 10-32	0.400	158
	19.050	-0.0010		10.2	4013.2
SFWS 16-PD	1	-0.0010	6 152.4	0.500	158
	25.400	-13		12.7	4013.2
SFWS 20-PD	1-1/4	-0.0010	5/16-18	0.650	158
	31.750	-25		16.5	4013.2
SFWS 24-PD	1-1/2	-0.0006	8 203.2	0.700	158
	38.100	-0.0011		17.8	4013.2
SFWS 32-PD	2	-0.0006		0.850	158
	50.800	-0.0013		21.6	4013.2

material: X46Cr13 or Equivalent

hardness: 52 HRC or more

Product of NB Corporation of America

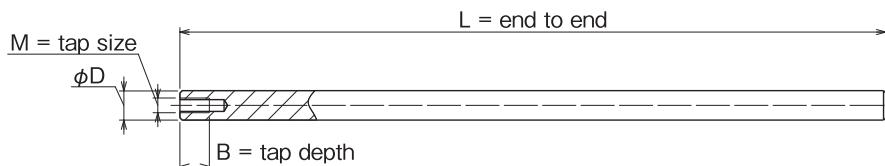
1kg≈2.205lbs

SFW-FS102/SFWS-FS102 TYPE

— Format Single End Tapped Inch Shaft —

**part number structure**example **SFW | 16 × 18 - FS102**

material
SFW: CF53 or
Equivalent
SFWS: X46Cr13 or
Equivalent
size

FS102-Single End Tapped
length(L in inches)

Part Number SFW	SFWS	Outer Diameter D inch/mm	Tap Size M	Tap Depth B	Length in mm							
					6	8		12	18	24		
SFW 4-FS102		1/4 6.350	# 5-40	0.250"	152.4	203.2		304.8	457.2	609.6		
SFW 6-FS102	SFWS 6-FS102	3/8 9.525	# 8-32	0.330"	6	8*	9*	10*	12	18	24	36
SFW 8-FS102	SFWS 8-FS102	1/2 12.700	1/4-20	0.500"	152.4	203.2	228.6	254	304.8	457.2	609.6	914.4
SFW 10-FS102	SFWS 10-FS102	5/8 15.875	1/4-20	0.500"	152.4	203.2	228.6	254	304.8	457.2	609.6	914.4
SFW 12-FS102	SFWS 12-FS102	3/4 19.050	5/16-18	0.625"	6	8*	9*	10*	12	18	24	36
SFW 16-FS102	SFWS 16-FS102	1 25.400	3/8-16	0.750"	152.4	203.2	228.6	254	304.8	457.2	609.6	914.4
SFW 20-FS102	SFWS 20-FS102	1-1/4 31.750	1/2-13	1.000"	6	8*	9*	10*	12	18	24	36
SFW 24-FS102	SFWS 24-FS102	1-1/2 38.100	-0.006 -0.011 -15 -27	5/8-11	1.250"	6			12	18	24	36
								304.8	457.2	609.6		914.4

hardness of SFW: 60 HRC or more

hardness of SFWS: 52 HRC or more

Product of NB Corporation of America

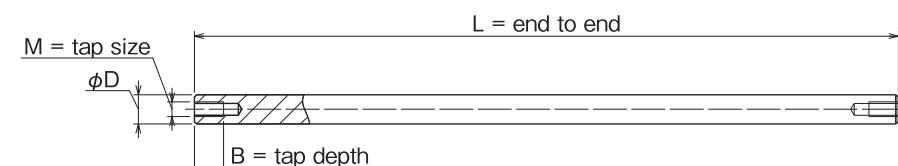
* SFWS is not available

SFW-FS103/SFWS-FS103 TYPE

— Format Both Ends Tapped Inch Shaft —

**part number structure**example **SFWS | 16 × 18 - FS103**

material
SFW: CF53 or
Equivalent
SFWS: X46Cr13 or
Equivalent
size

FS103-Both Ends Tapped
length(L in inches)

Part Number SFW	SFWS	Outer Diameter D inch/mm	Tap Size M	Tap Depth B	Length in mm							
					6	8		12	18	24		
SFW 4-FS103		1/4 6.350	# 5-40	0.250"	152.4	203.2		304.8	457.2	609.6		
SFW 6-FS103	SFWS 6-FS103	3/8 9.525	# 8-32	0.330"	6	8*	9*	10*	12	18	24	36
SFW 8-FS103	SFWS 8-FS103	1/2 12.700	1/4-20	0.500"	152.4	203.2	228.6	254	304.8	457.2	609.6	914.4
SFW 10-FS103	SFWS 10-FS103	5/8 15.875	1/4-20	0.500"	152.4	203.2	228.6	254	304.8	457.2	609.6	914.4
SFW 12-FS103	SFWS 12-FS103	3/4 19.050	5/16-18	0.625"	6	8*	9*	10*	12	18	24	36
SFW 16-FS103	SFWS 16-FS103	1 25.400	3/8-16	0.750"	152.4	203.2	228.6	254	304.8	457.2	609.6	914.4
SFW 20-FS103	SFWS 20-FS103	1-1/4 31.750	1/2-13	1.000"	6	8*	9*	10*	12	18	24	36
SFW 24-FS103	SFWS 24-FS103	1-1/2 38.100	-0.006 -0.011 -15 -27	5/8-11	1.250"	6			12	18	24	36
								304.8	457.2	609.6		914.4

hardness of SFW: 60 HRC or more

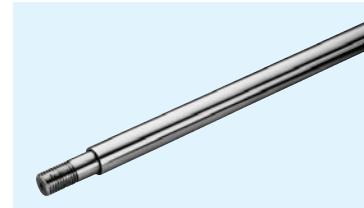
hardness of SFWS: 52 HRC or more

Product of NB Corporation of America

* SFWS is not available

SFW-FS115 TYPE

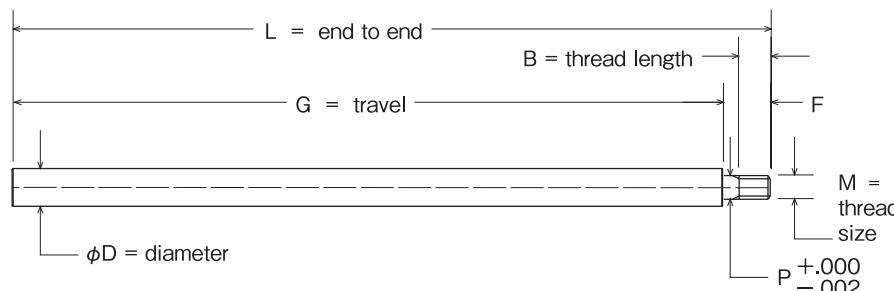
— Format Single End Threaded Inch Shafts —



part number structure

example **SFW | 16 × 18 - FS115**

size

FS115-
Single End Threaded
length(L in inches)

Part Number	Outer Diameter	Thread Size	Thread Length	Journal Length	Journal DIA	4" Travel G	6" Travel G	8" Travel G	12" Travel G	24" Travel G	36" Travel G	48" Travel G
	D inch/mm	M	B inch/mm	F inch/mm	P inch/mm	Length L inch/mm	Length L inch/mm	Length L inch/mm	Length L inch/mm	Length L inch/mm	Length L inch/mm	Length L inch/mm
SFW 6-FS115	3/8 9.525		1/4-20	0.31 7.87	0.50 12.70	0.250 6.35	4.500 114.3	6.500 165.1	8.500 215.9	12,500 317.5	24,500 622.3	
SFW 8-FS115	1/2 12.700		5/16-18	0.39 9.91	0.63 15.88	0.313 7.95	4.625 117.5	6.625 168.3	8.625 219.1	12,625 320.7	24,625 625.5	
SFW 10-FS115	5/8 15.875	-0.0005 -.0010	3/8-16	0.47 11.94	0.75 19.05	0.375 9.53	4.750 120.7	6.750 171.5	8.750 222.3	12,750 323.9	24,750 628.7	
SFW 12-FS115	3/4 19.050	-13 -25	1/2-13	0.63 16.00	1.00 25.40	0.500 12.70	5,000 127.0	7,000 177.8	9,000 228.6	13,000 330.2	25,000 635.0	
SFW 16-FS115	1 25.400		5/8-11	0.78 19.81	1.25 31.75	0.625 15.88		7,250 184.2	9,250 235.0	13,250 336.6	25,250 641.4	37,250 946.2
SFW 20-FS115	1-1/4 31.750		3/4-10	0.94 23.88	1.50 38.10	0.750 19.05		7,500 190.5	9,500 241.3	13,500 342.9	25,500 647.7	37,500 952.5
SFW 24-FS115	1-1/2 38.100	-.0006~-.0011 -15~-27	1-8	1.25 31.75	2.00 50.80	1.000 25.40		10,000 254.0	14,000 355.6	26,000 660.4	38,000 965.2	50,000 1270.0

material: CF53 or Equivalent

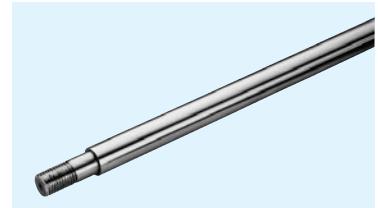
hardness: 60 HRC or more

stainless steel sizes are available on this series by quote only

Product of NB Corporation of America

SFW-FS116 TYPE

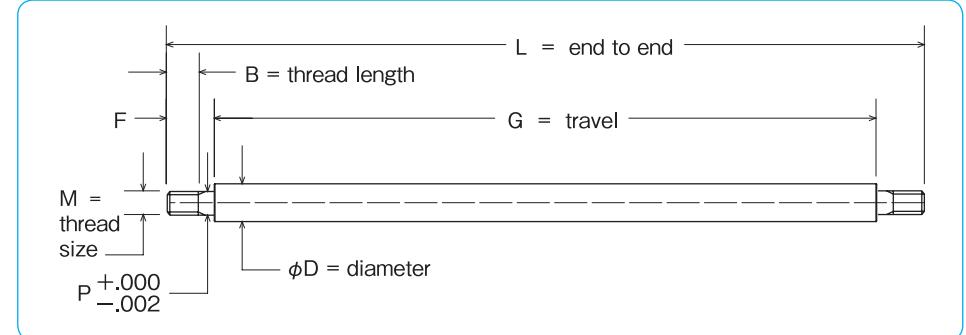
— Format Both Ends Threaded Inch Shafts —



part number structure

example **SFW | 16 × 18 - FS116**

size

FS116-
Both End Threaded
length(L in inches)

Part Number	Outer Diameter	Thread Size	Thread Length	Journal Length	Journal DIA	4" Travel G	6" Travel G	8" Travel G	12" Travel G	24" Travel G	36" Travel G	48" Travel G
	D inch/mm	M	B inch/mm	F inch/mm	P inch/mm	Length L inch/mm	Length L inch/mm	Length L inch/mm	Length L inch/mm	Length L inch/mm	Length L inch/mm	Length L inch/mm
SFW 6-FS116	3/8 9.525		1/4-20	0.31 7.87	0.50 12.70	0.250 6.35	4.500 114.3	6.500 165.1	8.500 215.9	12,500 317.5	24,500 622.3	
SFW 8-FS116	1/2 12.700		5/16-18	0.39 9.91	0.63 15.88	0.313 7.95	4.625 117.5	6.625 168.3	8.625 219.1	12,625 320.7	24,625 625.5	
SFW 10-FS116	5/8 15.875	-0.0005 -.0010	3/8-16	0.47 11.94	0.75 19.05	0.375 9.53	4.750 120.7	6.750 171.5	8.750 222.3	12,750 323.9	24,750 628.7	
SFW 12-FS116	3/4 19.050	-13 -25	1/2-13	0.63 16.00	1.00 25.40	0.500 12.70	5,000 127.0	7,000 177.8	9,000 228.6	13,000 330.2	25,000 635.0	
SFW 16-FS116	1 25.400		5/8-11	0.78 19.81	1.25 31.75	0.625 15.88		7,250 184.2	9,250 235.0	13,250 336.6	25,250 641.4	37,250 946.2
SFW 20-FS116	1-1/4 31.750		3/4-10	0.94 23.88	1.50 38.10	0.750 19.05		7,500 190.5	9,500 241.3	13,500 342.9	25,500 647.7	37,500 952.5
SFW 24-FS116	1-1/2 38.100	-.0006~-.0011 -15~-27	1-8	1.25 31.75	2.00 50.80	1.000 25.40		10,000 254.0	14,000 355.6	26,000 660.4	38,000 965.2	50,000 1270.0

material: CF53 or Equivalent

hardness: 60 HRC or more

stainless steel sizes are available on this series by quote only

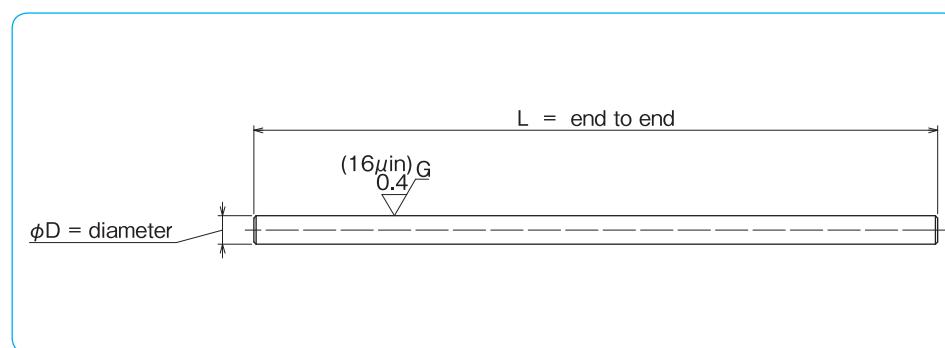
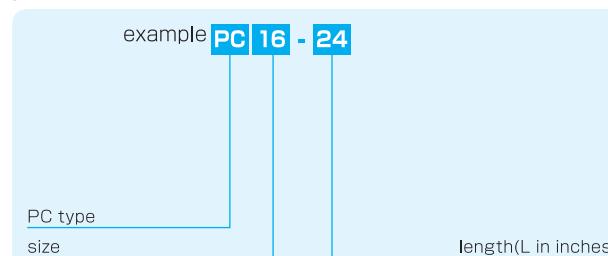
Product of NB Corporation of America

PC TYPE

— Pre-Cut Slide Shafts —



part number structure



Part Number	Outer Diameter D inch/mm	inch/μm	Length L inch mm						Mass lbs/inch kg/m
			6 152.4	12 304.8	18 457.2	24 609.6			
PC 4	1/4 6.350								0.014 0.25
PC 6			6 152.4	12 304.8	18 457.2	24 609.6			0.031 0.56
PC 8	1/2 12.700	-.0005		12 304.8	18 457.2	24 609.6	30 762	36 914.4	0.056 0.99
PC 10				12 304.8	18 457.2	24 609.6	30 762	36 914.4	0.086 1.55
PC 12	3/4 19.050	-.0010 -13			18 457.2	24 609.6	30 762	36 914.4	0.125 2.24
PC 16					18 457.2	24 609.6	30 762	36 914.4	0.222 3.98
PC 20	1-1/4 31.750	-.0006~-.0011 -15~-27			18 457.2	24 609.6	30 762	36 914.4	0.348 6.22
PC 24					18 457.2	24 609.6		36 914.4	0.500 8.95

material: CF53 or Equivalent

hardness: 60 HRC or more

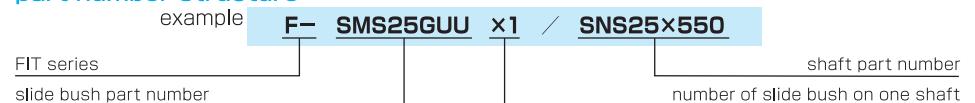
Product of NB Corporation of America

FIT SERIES

Due to the combined tolerances of the bush's bore and the shaft's diameter, accuracy can be affected by clearance or increased dynamic friction caused by preloading.

NB's FIT Series takes advantages of the lower cost slide bush and the precision ground shaft to achieve a target clearance in order for the linear system to produce a smooth, high-accuracy performance.

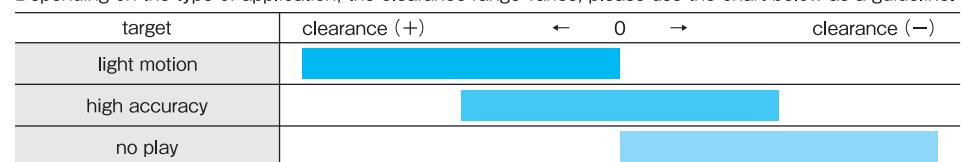
part number structure



- Please refer to corresponding catalog pages for details.
- Please specify on the drawing about the shaft machining, radial clearance, match-marking, etc.

Recommended Radial Clearance

Depending on the type of application, the clearance range varies, please use the chart below as a guideline.



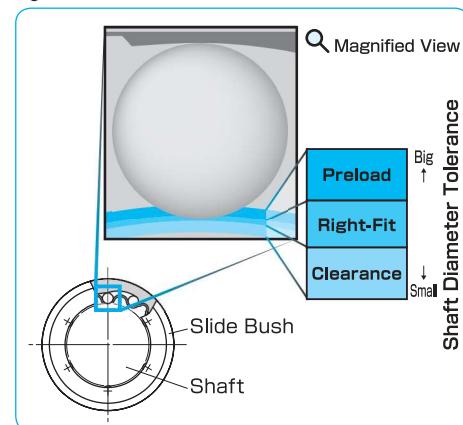
Slide Bush, Radial Clearance (-), Negative Limit

Negative clearance is opted to reduce backlash. Please refer to the chart below for the negative clearance limits.

size	3~8	10~13	16~25	30~35	40	50~60
radial clearance limit	-3 μm	-4 μm	-6 μm	-8 μm	-10 μm	-13 μm

- The off-center of the housing causes uneven loading on the slide bush, please pay special attention to the centering of the housing especially when negative clearance is a requirement.
- Please contact NB for details on the extra preloading requirement or on other part numbers like SRE, SR, etc.

Figure F-3 Radial Clearance between Slide Bush and Shaft



SPINDLE SHAFT

NB Spindle Shaft is backed by decades of precision manufacturing experience as well as up to date manufacturing facility to meet demands. NB is capable of handling all your spindle needs such as manufacturing of bearing case and spindle base, design and manufacturing of spindle unit, and overhauling of spindles.

ADVANTAGES

Ultra Precision Machining

Spindle manufacturing facility is controlled to a constant temperature throughout the year for precision manufacturing of spindles.

Various Machining Solution Available

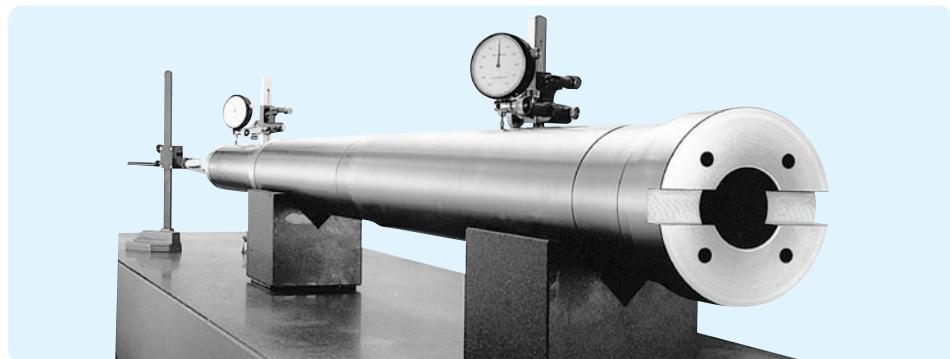
BT, BBT, HSK inner tapers, gauge and bearing matching, thread grinding, and many other spindle related machining are available.

Surface Treatments

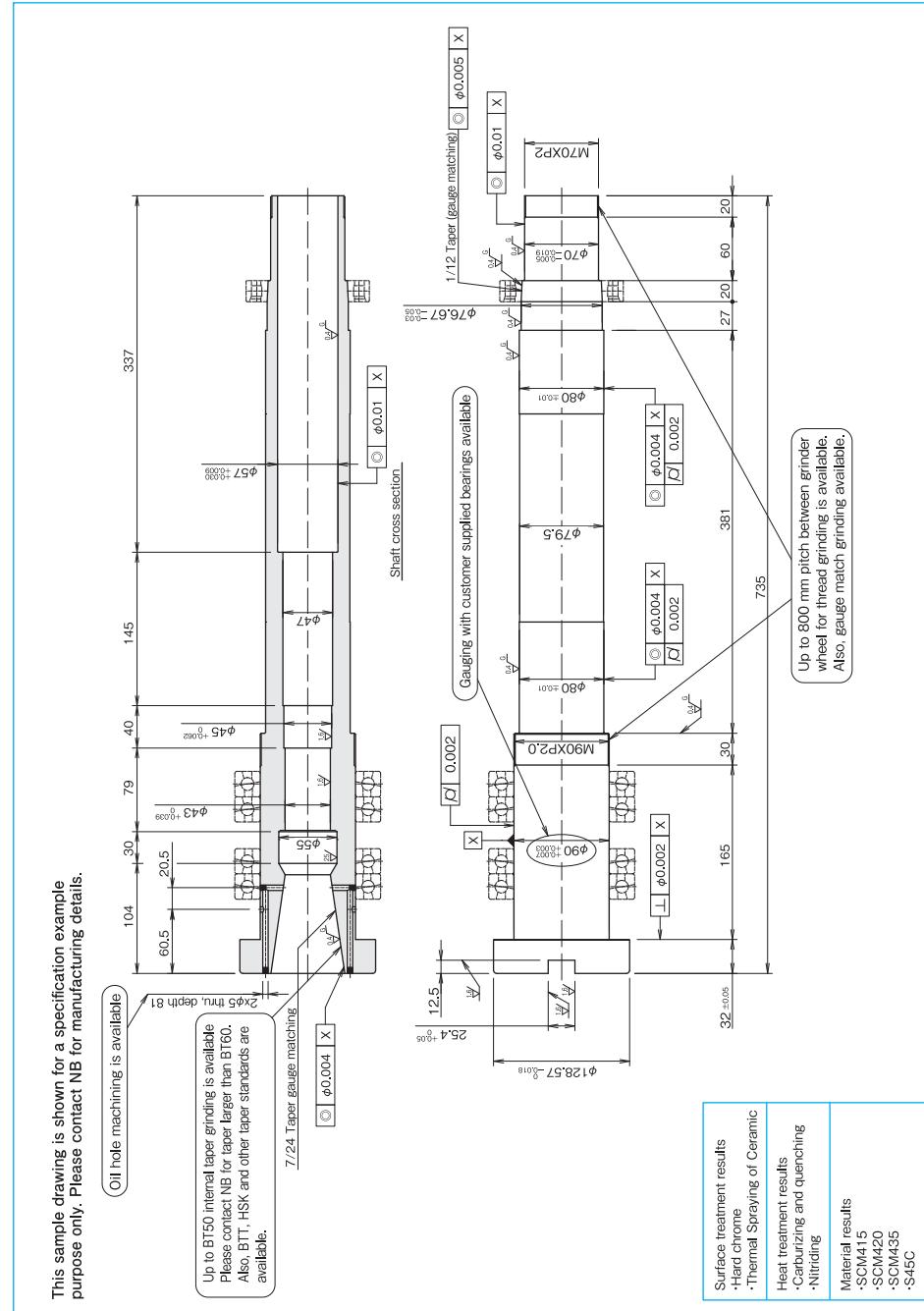
Various surface treatments are available such as hard chrome and ceramic coating. Repairing a damaged spindle with replating and grinding is also available.

EXAMPLES OF MACHINING

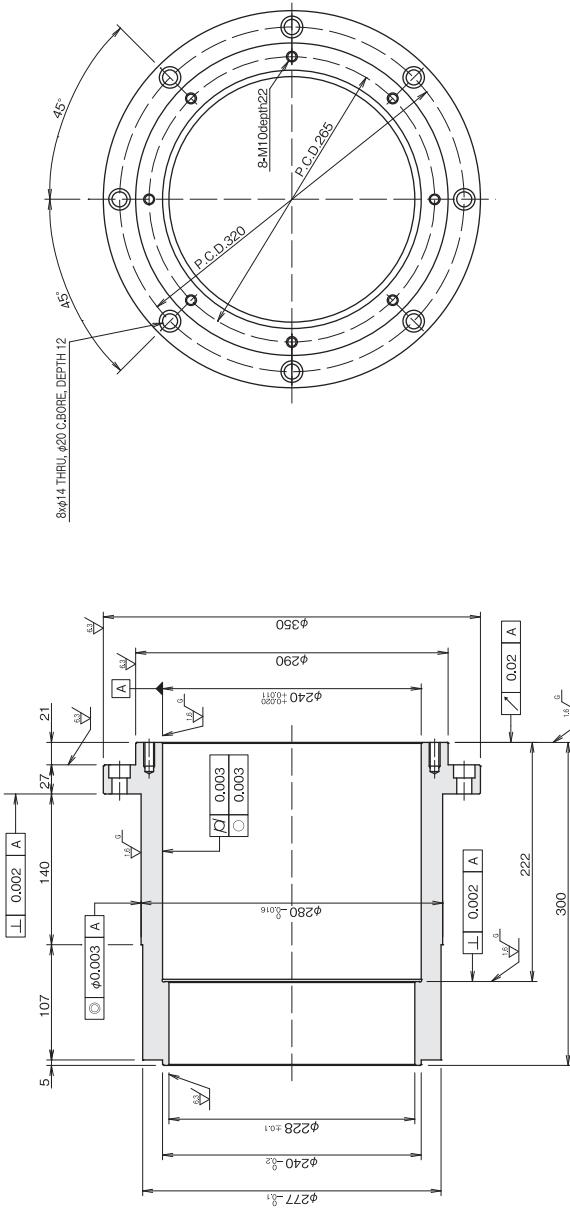
Spindle



EXAMPLE OF DRAWING ①

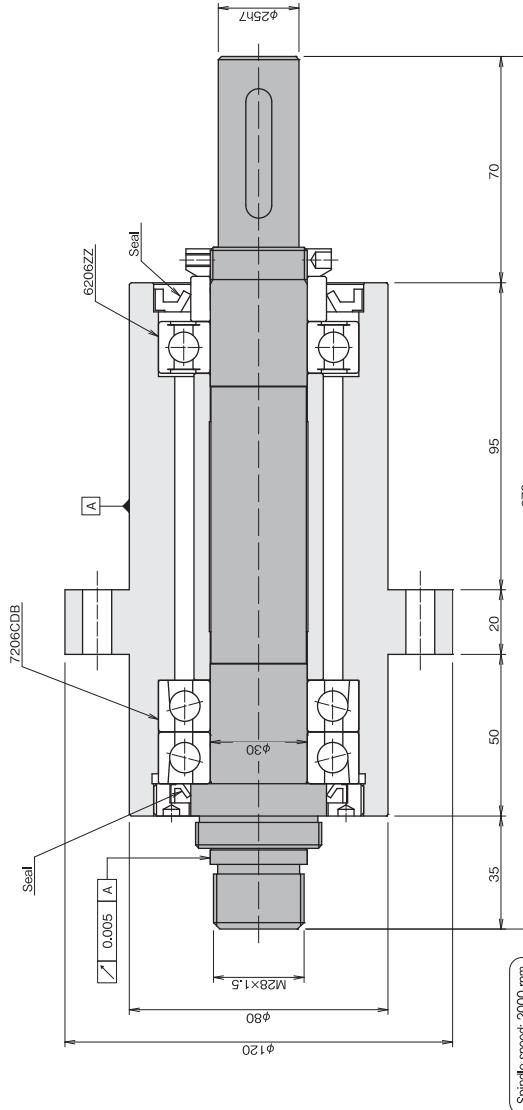


EXAMPLE OF DRAWING ②



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EXAMPLE OF DRAWING ③



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Custom design and manufacturing service for various spindle units is available. Please contact NB for details.

SPINDLE UNIT M-BT TYPE/G-MA TYPE

NB Spindle Shaft is backed by decades of precision manufacturing experience as well as up to date manufacturing facility to meet demands. NB is capable of handling all your spindle needs such as manufacturing of bearing case and spindle base, design and manufacturing of spindle unit, and overhauling of spindles, other than standard spindle unit M-BT and G-MA type.

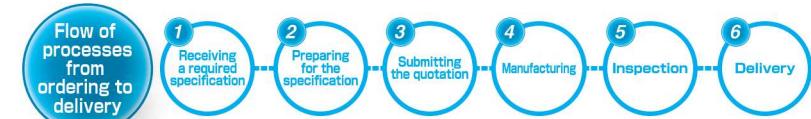
ADVANTAGES

- M-BT type is used in various cut processing machines and machining centers. It can be successfully operated having high rigidity and stability by utilizing angular ball bearings (the four-line combined) and double row cylindrical roller bearing.
- G-MA type is used in external grinding and flat surface grinding machines. It can be successfully rotated having high speed and stability by utilizing preloaded high accuracy angular ball bearings.
- Customised spindle units are available based on M-BT and G-MA type.
- M-BT and G-MA type can be used for long time coped with NB's overhaul.



SPECIAL REQUIREMENTS

Other than spindle units for machine tool, designing spindle units for various industrial machineries is available. Please feel free to contact NB when you take orders of spindle units.



[Examples of special requirements]

M-BT: Modifying outer dimensions / Adding a pulley / Adding an unclamping cylinder / etc.

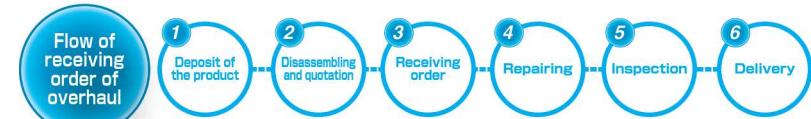
G-MA: Modifying shaft end machining / Adding a pulley / Adding a grindstone flange / etc.

EXAMPLES OF SPINDLE UNIT

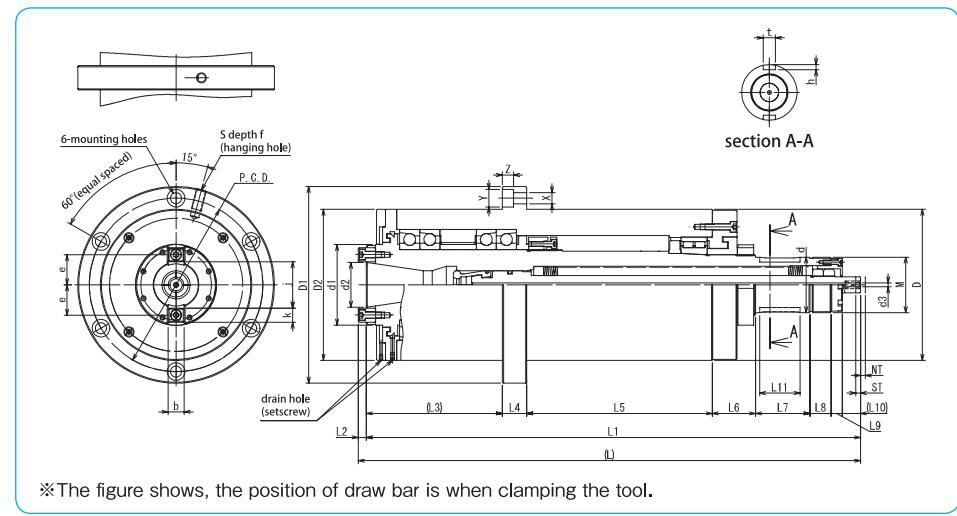


OVERHAUL

Also, other than NB's designed spindle unit can be overhauled. Please feel free to contact NB.



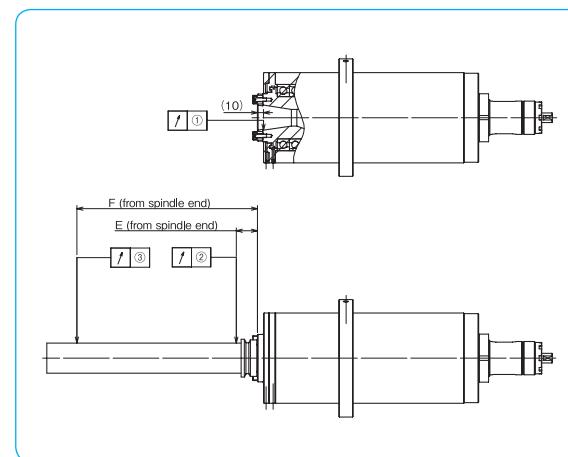
M-BT TYPE



part number	major dimensions																		
	D tolerance mm	D1 mm	D2 mm	d tolerance mm	d1 mm	d2 mm	d3 mm	L mm	L1 mm	L2 mm	L3 mm	L4 mm	L5 mm	L6 mm	L7 mm	L8 mm	L9 mm	L10 mm	L11 tolerance mm
M-BT30-01	130 0 -0.018	170 130 45	45 0 -0.016	68 31.75 4	413 405 8	405 20 137	43 39 26	8 17 30											+0.2 0
M-BT40-01	150 -0.018	195 150 55	55 0 -0.019	80 44.45 4	498 490 8	490 24 184	43 54 21	11 18 40											
M-BT50-01	230 0 -0.020	290 230 85	85 0 -0.022	130 69.85 4	717 704.5 12.5	704.5 197 35	12.5 270 59	59 79 30	11 11 11	23.5 60 60									

- When mounting this model or mounting mounted object, please handle with the utmost care and avoid shock.
- This model doesn't come with lubrication mechanism. Amount of pre-applied grease is enough for use.
- When using this model for the first time or not using for a long time, perform the running-in operation properly.
- The figure shows, the position of draw bar is when clamping the tool.
- Only when unclamping, air blow from d3 through hole is possible. Please use dried and clean air for air blow.
- Do not rotate at a high speed without clamping the tool.
- The drain hole is plugged when shipping. Please open the drain hole by unplugged the setscrew as needed.
- This is horizontal mounting model. Please contact NB for vertical mounting model.

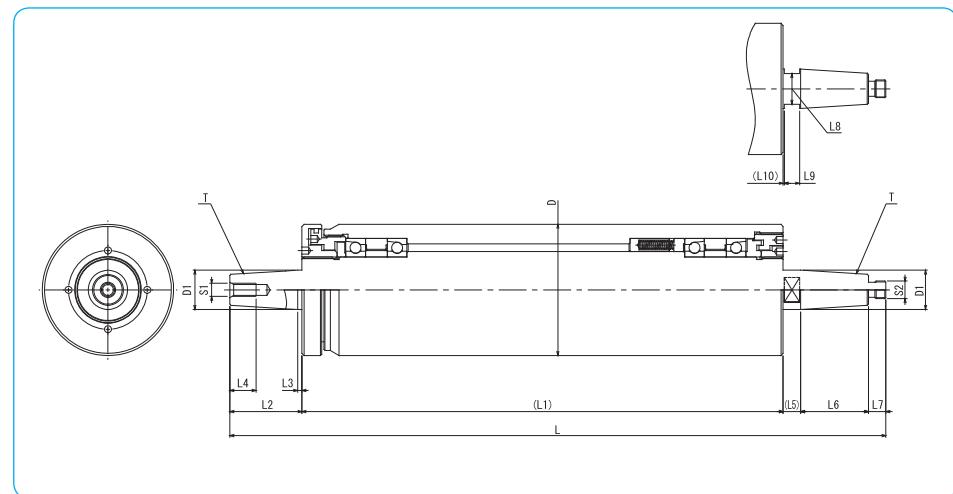
P.C.D. mm	XxYxZ mm	S	f mm	e mm	major dimensions					b tolerance mm	j mm	k mm	M	t tolerance mm	h tolerance mm	unclamping stroke		without tool NT mm	tool clamping power (torque side) N kg	estimated maximum revolutions rpm	bearings	
					b tolerance mm	j mm	k mm	M	t tolerance mm							ST mm	NT mm				front	rear
152	9x14 x8.6	M10	20	24	15.9	34	14	M45 x1.5	8	0 -0.036	4				4.5		3 ~ 4.5	3920	29	8000	7012C	NN3010
172	11x17.5 x11	M10	20	30	15.9	46	14	M55 x2.0	12	0 -0.043	5				4.5	+0.5 0	2.5 ~ 5	7840	47	7000	7014C	NN3012
260	16x23 x15.2	M16	30	49	25.4	72	26	M85 x2.0	14	5.5					6.5		3 ~ 8	15680	161	4500	7022C	NN3019



■ Rotational accuracy (max.)

part number	runout of the taper part (μm) ①	runout of the test bar (μm)			distance from spindle end (mm)
		②	③	E	
M-BT30-01	2	3	8	30	230
M-BT40-01	2	3	8	35	300
M-BT50-01	2	3	8	45	300

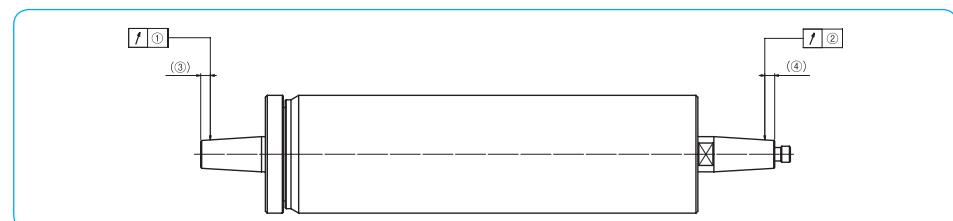
G-MA TYPE



part number	D mm	D tolerance mm	major dimensions						
			D ¹ mm	L mm	L ¹ mm	L ² mm	L ³ mm	L ⁴ mm	L ⁵ mm
G-MA060-01	60	0 -0.030	18	300	220	33	2	12	8
G-MA080-01			28	382	250	55	3	24	12
G-MA100-01	100	0 -0.035	38	460	300	65	8	32	16

- When mounting this model or mounting mounted object, please handle with the utmost care and avoid shock.
- This model doesn't come with lubrication mechanism. Amount of pre-applied grease is enough for use.
- When using this model for the first time or not using for a long time, perform the running-in operation properly.
- When holding the spindle unit, do not deform the outer cylinder.
- Maximum revolutions are based on the spindle unit single-body. Maximum revolutions are decreased by the external factors such as grindstone, belt tension, etc..
- Please contact NB for grindstone flange and pulley.

L ⁶ mm	L ⁷ mm	L ⁸ mm	L ⁹ mm	L ¹⁰ mm	S ¹ mm	S ² mm	T taper	estimated weight kg		maximum revolutions rpm		bearings
								major dimensions	estimated weight kg	maximum revolutions rpm	bearings	
31	8	14	7	0.5	M6	M8x0.75 (left-hand thread)	1/8	4.5	15000	7906C		
52	13	24	11	0.5	M12	M12x1 (left-hand thread)	1/8	9	12000	7007C		
57	22	32	15	0.5	M16	M20x1 (left-hand thread)	1/5	17.5	9500	7009C		



■Rotational accuracy (max.)

part number	runout of the taper part (μm) ①	runout of the taper part (μm) ②	measuring point dimension (mm) ③	measuring point dimension (mm) ④
G-MA060-01	2	2	4	3
G-MA080-01	2	2	6	7
G-MA100-01	3	3	8	3

GENERAL MACHINE SHAFTING

NB general machine shafts are made to customer drawings. Integrated production from material sourcing, machining, heat treatments, surface treatments and final inspection, NB does it all.

ADVANTAGES

Small Lot Production Accepted

One piece custom accepted.

Variety of Machining Capabilities

From small to large, various shaft and spindle machining is available.

Surface Treatment

Various surface treatments are available such as hard chrome, electroless nickel plating, and low temperature black chrome.

Heat Treatment

Various heat treatments are available such as carburizing and induction hardening.

THERMAL-SPRAYING CERAMIC-COATING SPECIFICATIONS

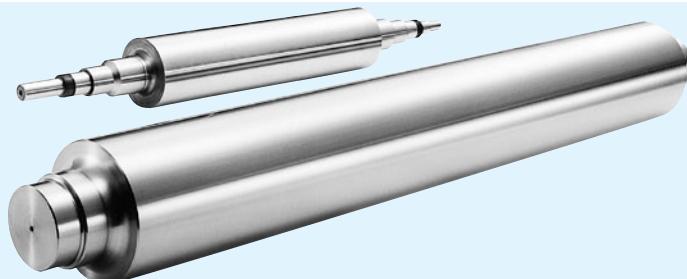
Parts that require wear and corrosion resistance can be thermal-sprayed with a ceramic material per NB's ceramic-coating specifications. Ceramic-coating can be applied to a wide variety of materials. The pores in the coated layer result in good lubrication characteristics and can be sealed to achieve high corrosion resistance.

Materials	High Carbon Chromium Bearing Steel (SUJ2)	Surface Treatment	Hard Chrome
	Chrome Molybdenum Steel (JIS SCM415, 420, 435)		Low Temperature Black Chrome
	Structural Carbon Steel (JIS S45C)		Electroless Nickel Plating
	Martensite Stainless Steel (SUS440)		Thermal Spray Ceramic Coating
	Austenite Stainless Steel (SUS303, 304)		Gauging with customer supplied nuts and bearings
	Tool Steel (JIS SK4)		Triangular and trapezoidal thread grinding available
	Tool Steel (JIS SKS3)	Others	
Heat Treatment	Induction Hardening		
	Induction Hardening (deep)		
	Carburizing and quenching		

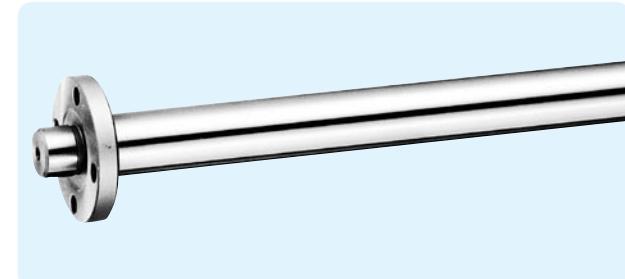
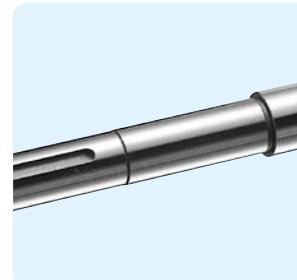
Machining Ability	Process Details / Manufacturing Contents	Maximum Machinable Diameter	Maximum Machinable Length	Remarks / Notes
	Centerless Grinding	φ60 mm outer diameter	4000mm	
	External Grinder	φ640 mm outer diameter	6000mm	
	Internal Grinder	φ200 mm inner diameter	300mm	Allowable work length: up to 1100 mm
	Vertical Grinder	φ350 mm inner diameter	300mm	
		φ630 mm outer diameter	300mm	
	Lathe	φ400	3800mm	
	Horizontal Machining Center	φ350	2000mm	Up to 3000 kg
	Vertical Machining Center	φ300	3000mm	Up to 3000 kg
	BT / Gun Drilling	φ80	2000mm	Up to 4000 mm long with both end machining for less than φ120 Up to 2000 mm long for φ120 and over

EXAMPLES OF MACHINING ①

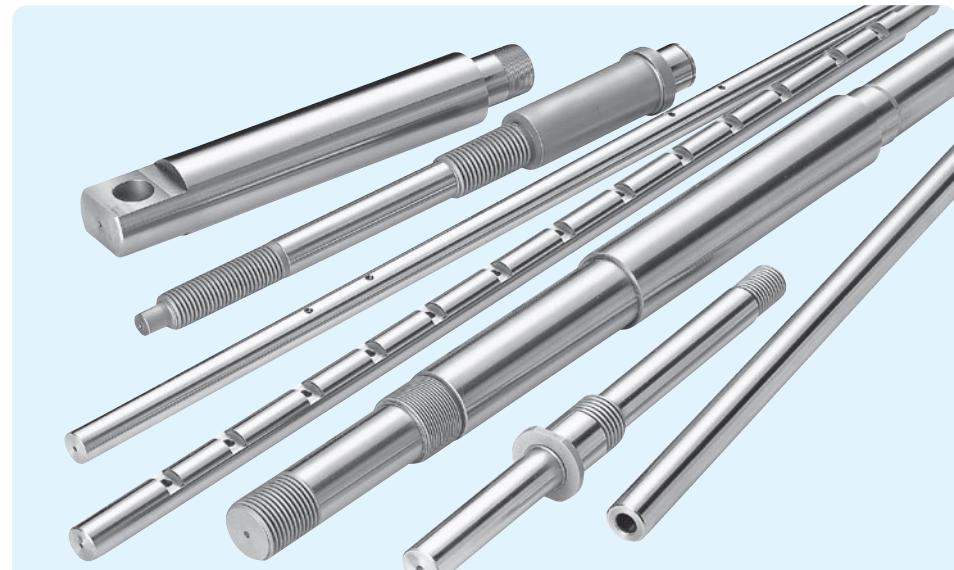
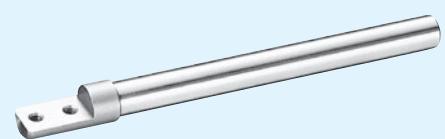
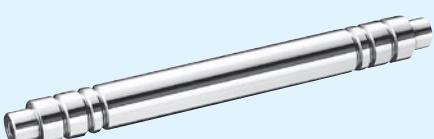
Roll Shaft



Quill Shaft



EXAMPLES OF MACHINING ②



Please visit at NB Website for more examples of machining.

SLIDE WAY SLIDE TABLE MINIATURE SLIDE GONIO WAY

SLIDE WAY

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