

# SLIDE 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

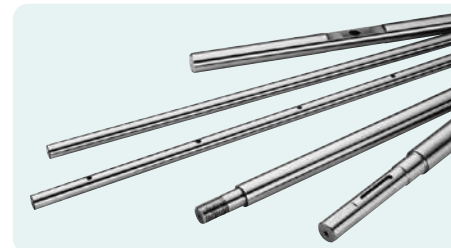
These components ease the shaft installation and help save the design/assembling time. (refer to page F-10)

### FIT Series

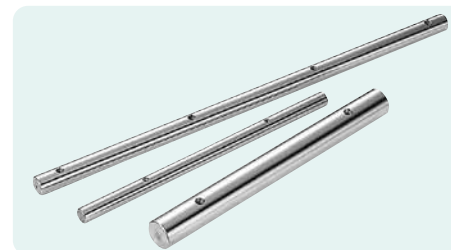
This series is a set of NB slide bush and NB shaft. By precise shaft-grinding, FIT series achieves the best-fit clearance adjustment for a smooth, high accuracy linear motion. (refer to page F-33)

## TYPES

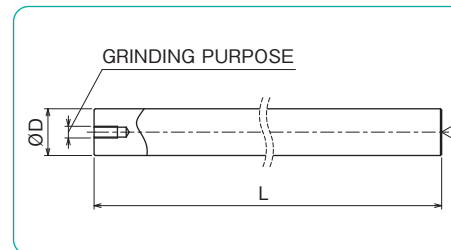
### SN/SNS/SNT type (NB Shaft)



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



### Machining tap hole for grinding



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	

For large diameter straight shafts, a tap hole is machined on one end for cylindrical grinding. Refer to Table F-3 for details.

Table F-3 Grinding Purpose

outer diameter φD (mm)	shaft length L (mm)	tap for grinding purpose on one side only
φ30 or less	—	not required
over φ30 and φ40 or less	over 2,000mm	M8 × 16
over φ40 and φ50 or less	over 1,300mm	M10 × 20
over φ50 and φ70 or less	over 650mm	M10 × 20
over φ70 and φ100 or less	all lengths	M12 × 24
over φ100	all lengths	M16 × 32

### 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-4.

Table F-4 Formulas for Calculating Deflection and Deflection Angle

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

$\delta_1$ : deflection at the concentrated load point (mm)  $\delta_{max}$ : 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)  $\ell$ : span (mm) I: moment of inertia of area (mm<sup>4</sup>)  
 E: modulus of longitudinal elasticity (SUJ2)  $2.06 \times 10^5$  (N/mm<sup>2</sup>) (SUS)  $2.0 \times 10^5$  (N/mm<sup>2</sup>) C:  $1/48EI$  ( $1/N \cdot mm^2$ )

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

● For solid shaft

● For hollow shaft

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

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

I: moment of inertia of area (mm<sup>4</sup>)

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-5 and F-6.

### 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-5, C for an outer diameter of 30 mm,  
 C =  $2.54 \times 10^{-8}$  (N·mm<sup>2</sup>).

Substituting these values into the corresponding formula (No. 1) in Table F-4,  
 $\delta_{max} = P\ell^3C = 0.31$  (mm)

② In case the support method is fixed-fixed:

Substituting the values into the corresponding formula (No. 2) given in Table F-4,

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

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-6, C for an outer diameter of 60 mm,  
 C =  $1.73 \times 10^{-13}$  (N·mm<sup>2</sup>)

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-4.

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

Table F-5 Solid Shaft

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

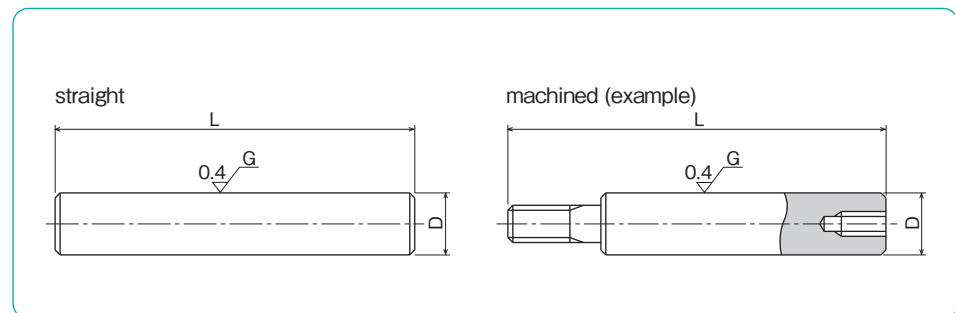
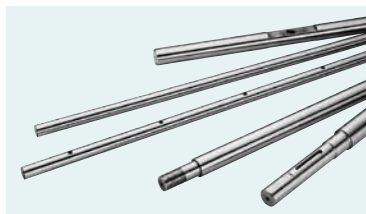
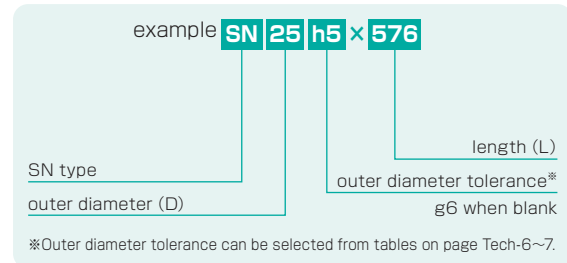
Table F-6 Hollow Shaft

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

# SN TYPE

- NB Shaft -

## part number structure



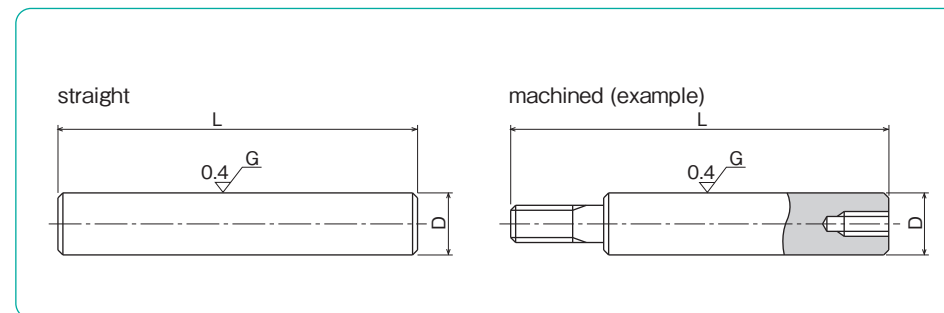
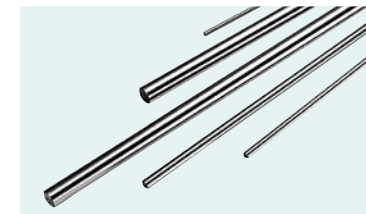
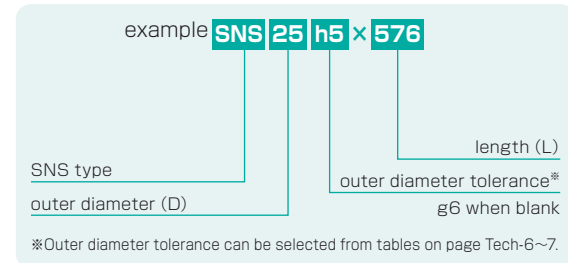
part number	outer diameter D	tolerance	length L	mass
	mm	g6 μm	mm	kg/m
SN 3	3	-2/-8	50 ↔ 400	0.06
SN 4	4	-4	100 ↔ 500	0.10
SN 5	5	-12	100 ↔ 700	0.16
SN 6	6	-12	100 ↔ 1,000	0.23
SN 8	8	-5	200 ↔ 1,500	0.40
SN 10	10	-14	200 ↔ 2,000	0.62
SN 12	12	-6	200 ↔ 3,000	0.89
SN 13	13	-6	200 ↔ 3,000	1.04
SN 15	15	-17	300 ↔ 3,000	1.39
SN 16	16	-17	300 ↔ 3,000	1.58
SN 20	20	-7	300 ↔ 4,000	2.47
SN 25	25	-20	300 ↔ 4,000	3.85
SN 30	30	-20	300 ↔ 4,000	5.55
SN 35	35	-9	400 ↔ 4,000	7.55
SN 40	40	-9	400 ↔ 4,000	9.87
SN 50	50	-25	500 ↔ 4,000	15.4
SN 60	60	-10	600 ↔ 4,000	22.2
SN 80	80	-29	800 ↔ 4,000	39.5
SN100	100	-12	1,000 ↔ 4,000	61.7
SN120	120	-34	1,500 ↔ 4,000	88.8
SN150	150	-14/-39	1,500 ↔ 4,000	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



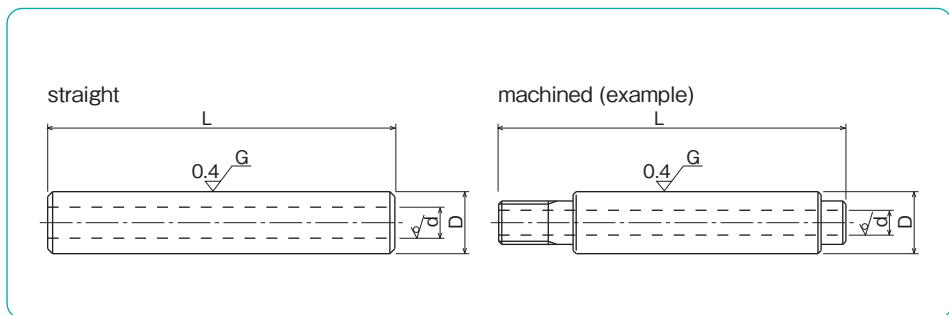
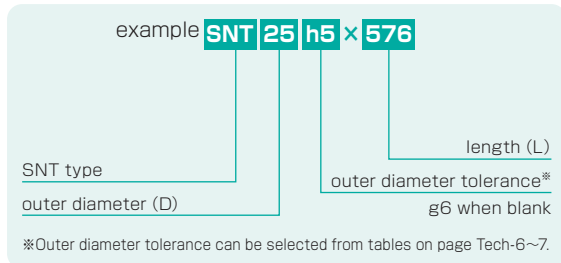
part number	outer diameter D	tolerance	length L	mass
	mm	g6 μm	mm	kg/m
SNS 3	3	-2/-8	50 ↔ 300	0.06
SNS 4	4	-4	100 ↔ 400	0.10
SNS 5	5	-12	100 ↔ 500	0.16
SNS 6	6	-12	100 ↔ 600	0.22
SNS 8	8	-5	200 ↔ 1,000	0.39
SNS 10	10	-14	200 ↔ 1,500	0.61
SNS 12	12	-6	200 ↔ 2,500	0.88
SNS 13	13	-17	200 ↔ 3,000	1.03
SNS 16	16	-17	300 ↔ 3,000	1.56
SNS 20	20	-7	300 ↔ 4,000	2.43
SNS 25	25	-20	300 ↔ 4,000	3.80
SNS 30	30	-20	300 ↔ 4,000	5.48
SNS 35	35	-9	400 ↔ 4,000	7.46
SNS 40	40	-25	400 ↔ 4,000	9.75
SNS 50	50	-25	500 ↔ 4,000	15.2
SNS 60	60	-10	600 ↔ 4,000	21.9
SNS 80	80	-29	800 ↔ 4,000	39.0
SNS100	100	-12/-34	1,000 ↔ 4,000	60.9

material: martensite stainless steel (equivalent to SUS440C)  
hardness: 56HRC (HV613) or more  
Tolerances other than g6 are available upon request.

# SNT TYPE

— NB Hollow Shaft —

## part number structure



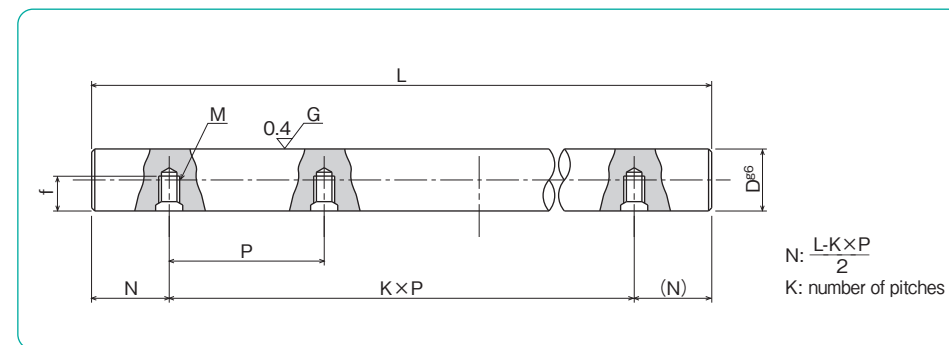
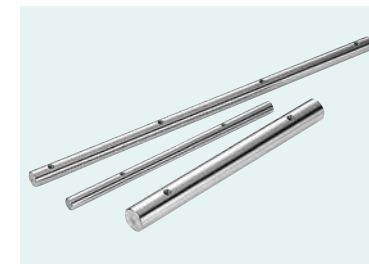
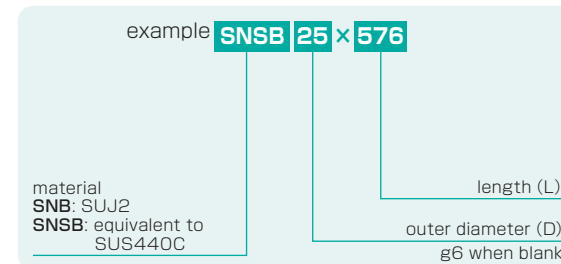
part number	outer diameter D mm	tolerance g6 μm	inner diameter d mm	length L mm	mass kg/m
SNT 6	6	-4/-12	2	100 ↔ 400	0.20
SNT 8	8	-5	3	200 ↔ 600	0.34
SNT 10	10	-14	4	200 ↔ 1,000	0.52
SNT 12	12	-6	5	200 ↔ 1,500	0.73
SNT 13	13	-17	6	200 ↔ 1,500	0.82
SNT 16	16	-	8	300 ↔ 2,500	1.18
SNT 20	20	-7	10	300 ↔ 4,000	1.85
SNT 25	25	-20	15	300 ↔ 4,000	2.46
SNT 30	30	-	16	300 ↔ 4,000	3.97
SNT 35	35	-9	19	400 ↔ 4,000	5.32
SNT 40	40	-25	20	400 ↔ 4,000	7.39
SNT 50	50	-	26	500 ↔ 4,000	11.3
SNT 60	60	-10	32	600 ↔ 4,000	15.9
SNT 80	80	-29	48	800 ↔ 4,000	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-14,15) The center-lined tapped shaft is standardized to simplify shaft selection.

## part number structure



## 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 <sub>max</sub> 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	3,000
SNB20	20	-7	150	M6	9	4,000
SNB25	25	-20	200	M6	12	4,000
SNB30	30	-	200	M8	15	4,000
SNB35	35	-9	200	M8	15	4,000
SNB40	40	-25	300	M8	18	4,000
SNB50	50	-	300	M10	22	4,000

material: high-carbon chromium bearing steel (SUJ2)  
hardness: 60HRC (HV697) or more  
\*g6 is a standard tolerance of the outer diameter.








## 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 <sub>max</sub> 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	4,000
SNSB35	35	-9	200	M8	15	4,000
SNSB40	40	-25	300	M8	18	4,000
SNSB50	50	-	300	M10	22	4,000

material: martensite stainless steel (equivalent to SUS440C)  
hardness: 56HRC (HV613) 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.

<p><b>SH·SH-A·WH-A type</b></p> <p>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 casting.</p>	<p>SH-A type</p>  <p>P.F-11</p>
	<p>SH type</p>  <p>P.F-12</p>
	<p>WH-A type</p>  <p>P.F-16</p>
<p><b>SHF·SHF-FC type</b></p> <p>These are flanged type shaft supporters for a compact design. SHF is made of aluminum casting and SHF-FC (shaft diameter 35 and over) is made of cast iron.</p>	<p>SHF type SHF-FC type</p>  <p>P.F-13</p>
	<p>SA type</p>  <p>P.F-14</p>
<p><b>SA·WA·LWA type (shaft support rail)</b></p> <p>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.</p>	<p>WA type</p>  <p>P.F-18</p>
	<p>LWA type</p>  <p>P.F-19</p>

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

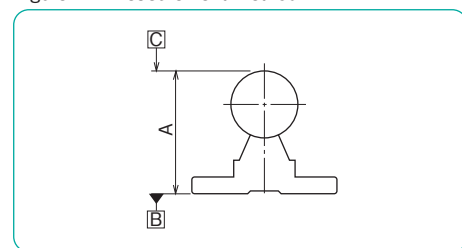
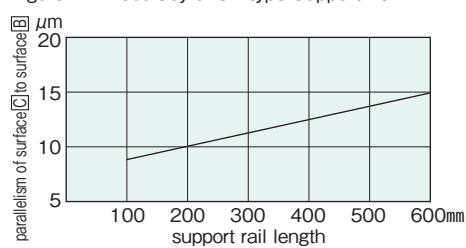
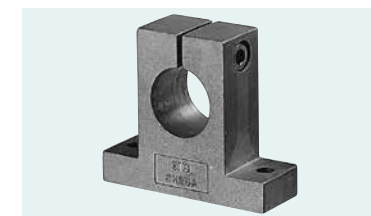


Figure F-2 Accuracy of SA type Support Rail

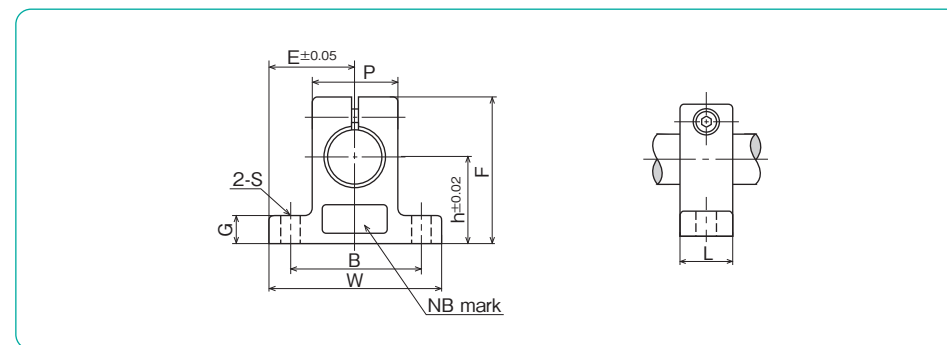
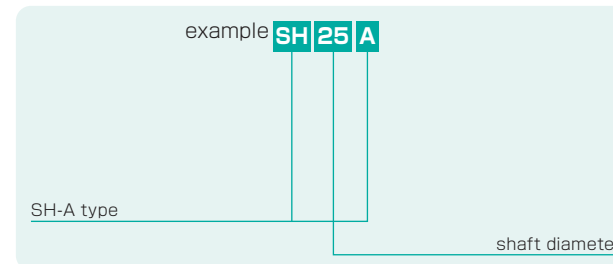


SH-A TYPE

– Shaft Supporter –



part number structure



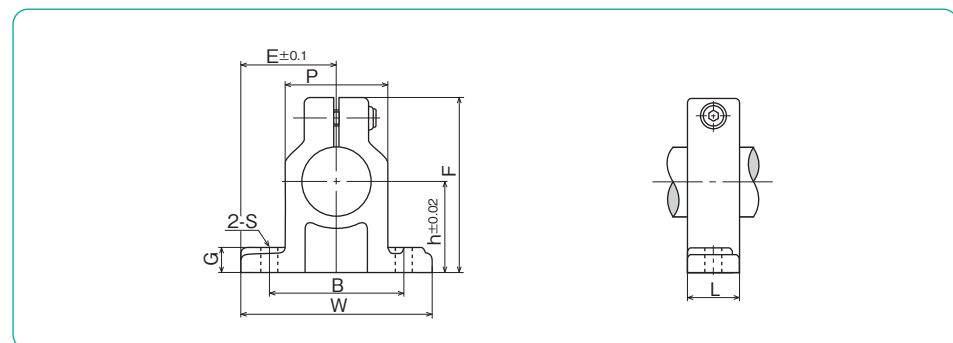
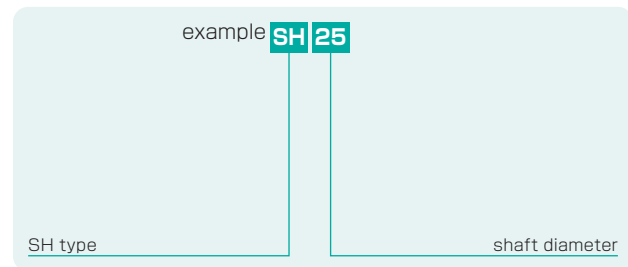
part number	shaft diameter mm	major dimensions									tightening screw size	recommended torque N·m	mass g
		h mm	E mm	W mm	L mm	F mm	G mm	P mm	B mm	S mm			
SH 8A	8	20	21	42	14	32.8	6	18	32	5.5 (M5)	M4	2	24
SH10A	10	20	21	42	14	32.8	6	18	32	5.5 (M5)	M4	2	24
SH12A	12	23	21	42	14	37.5	6	20	32	5.5 (M5)	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



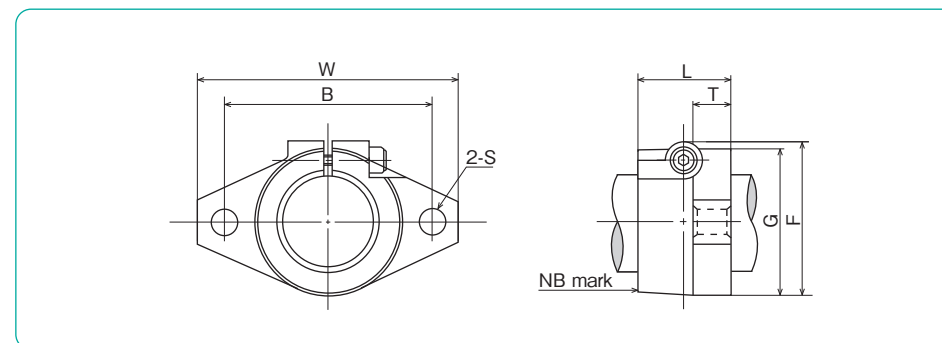
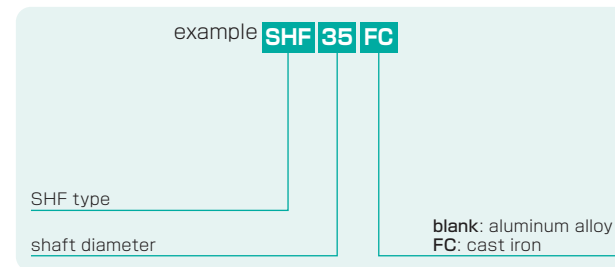
part number	shaft diameter mm	major dimensions									tightening screw size	recommended torque N · m	mass g
		h mm	E mm	W mm	L mm	F mm	G mm	P mm	B mm	S mm			
SH10	10	20	22	44	15	35	7	19.5	32	4.5 (M4)	M4	2	80
SH13	13	23	25	50	17	40	8	18	32	7 (M5)	M4	2	120
SH16	16	27	27.5	55	17	45	10	25	38	7 (M5)	M4	2	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 –



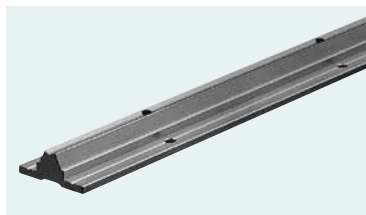
### part number structure



part number		shaft diameter mm	major dimensions						tightening screw size	recommended torque N · m	mass g		
aluminum alloy	cast iron		W mm	L mm	T mm	F mm	G mm	B mm			S mm	aluminum alloy	cast iron
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	140	380
SHF40	SHF40FC	40	102	40	16	67	56	80	12 (M10)	M10	29	205	510
SHF50	SHF50FC	50	122	50	19	83	70	96	14 (M12)	M12	29	360	890
SHF60	SHF60FC	60	140	60	23	95	82	112	14 (M12)	M12	29	530	1,500

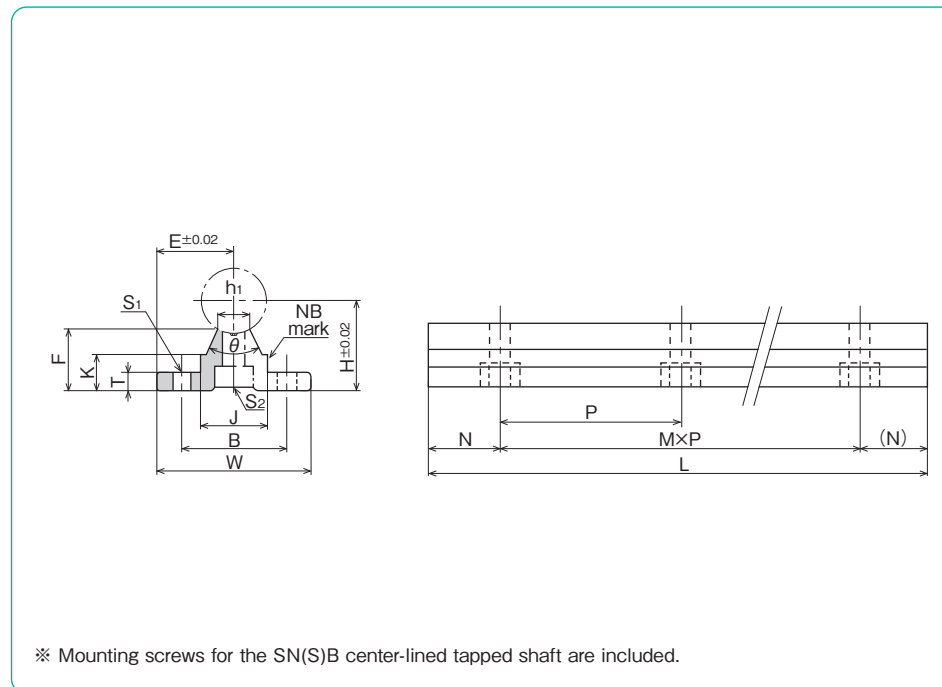
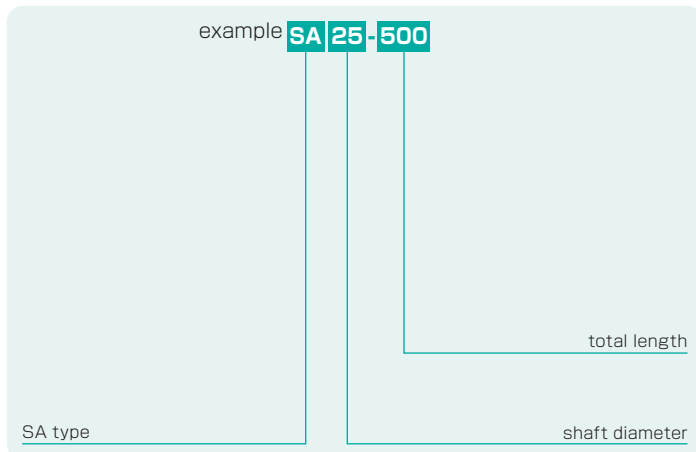
# SA TYPE

– Shaft Support Rail –



## part number structure

example SA 25 - 500



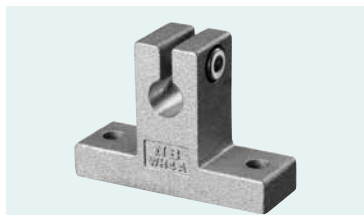
※ Mounting screws for the SN(S)B center-lined tapped shaft are included.

part number	shaft diameter mm	major dimensions											mass g					
		H	E	W	L	F	T	K	J	h <sub>1</sub>	θ	B		N	M×P	S <sub>1</sub>	S <sub>2</sub>	
SA10-200	10	18	16	32	200	13.5	4	8.9	12.4	4.7	80°	22	50	1×100	4.5	M4	110	
SA10-300					300								50	2×100				160
SA10-400					400								50	3×100				220
SA10-500					500								50	4×100				270
SA10-600					600								50	5×100				330
SA13-200	13	21	17	34	200	15	4.5	9.8	15	6	80°	25	50	1×100	4.5	M4	140	
SA13-300					300								50	2×100				210
SA13-400					400								50	3×100				280
SA13-500					500								50	4×100				350
SA13-600					600								50	5×100				420
SA16-200	16	25	20	40	200	17.8	5	11.7	18.5	8	80°	30	25	1×150	5.5	M5	200	
SA16-300					300								75	1×150				300
SA16-400					400								50	2×150				400
SA16-500					500								25	3×150				500
SA16-600					600								75	3×150				600
SA20-200	20	27	22.5	45	200	17.7	5	10	19	8	50°	30	25	1×150	5.5	M6	200	
SA20-300					300								75	1×150				300
SA20-400					400								50	2×150				400
SA20-500					500								25	3×150				510
SA20-600					600								75	3×150				610
SA25-200	25	33	27.5	55	200	21	6	12	21.5	8	50°	35	25	1×150	6.5	M6	290	
SA25-300					300								50	1×200				430
SA25-400					400								100	1×200				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	E	W	L	F	T	K	J	h <sub>1</sub>	θ	B		N	M×P	S <sub>1</sub>	S <sub>2</sub>	
SA30-200	30	37	30	60	200	22.8	7	13	26.5	10.3	50°	40	25	1×150	6.5	M8	360	
SA30-300					300								50	1×200				550
SA30-400					400								100	1×200				730
SA30-500					500								50	2×200				920
SA30-600					600								100	2×200				1,100
SA35-200	35	43	32.5	65	200	26.5	8	15.5	28	13	50°	45	25	1×150	9	M8	460	
SA35-300					300								50	1×200				700
SA35-400					400								100	1×200				950
SA35-500					500								50	2×200				1,190
SA35-600					600								100	2×200				1,420
SA40-200	40	48	37.5	75	200	29.4	9	17	38	16	50°	55	25	1×150	9	M8	630	
SA40-300					300								75	1×150				960
SA40-400					400								50	1×300				1,290
SA40-500					500								100	1×300				1,610
SA40-600					600								150	1×300				1,950
SA50-200	50	62	47.5	95	200	38.8	11	21	45	20	50°	70	25	1×150	11	M10	1,000	
SA50-300					300								75	1×150				1,500
SA50-400					400								50	1×300				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)



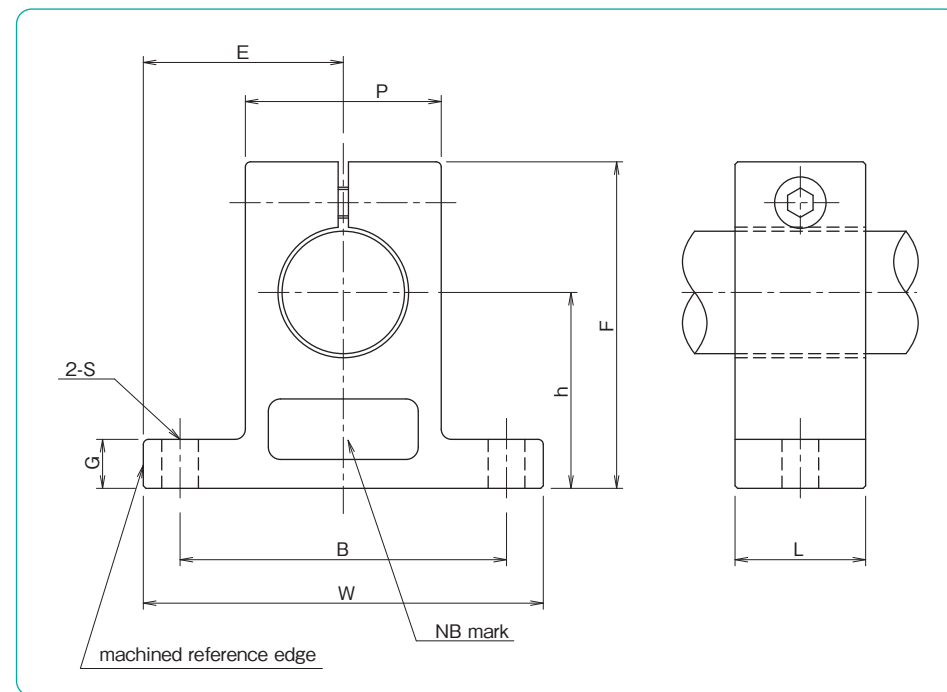
### part number structure

example **WH 24 A**

WH-A type

size

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



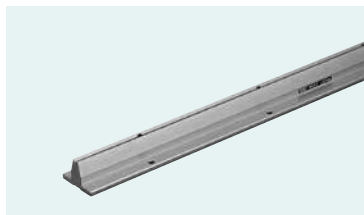
major dimensions					mass lbs	part number
G inch	P inch	B ±.01 inch	S inch	bolt# inch		
.250	.500	1.125	.156	# 6	.033	<b>WH 4A</b>
.250	.688	1.250	.156	# 6	.044	<b>WH 6A</b>
.250	.875	1.500	.188	# 8	.075	<b>WH 8A</b>
.313	1.000	1.875	.218	# 10	.106	<b>WH 10A</b>
.313	1.250	2.000	.218	# 10	.156	<b>WH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

1kg≒2.205lbs  
1lb≒0.454kg

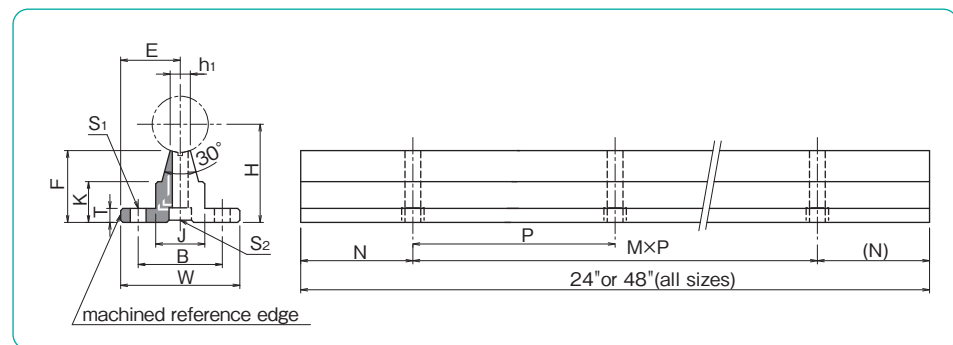
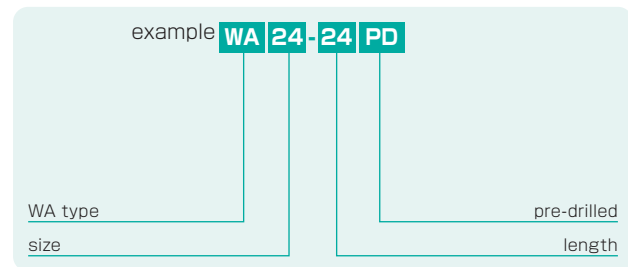


# WA TYPE

– Shaft Support Rail –  
(Inch Standard)



## part number structure

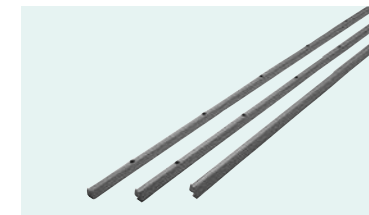


part number	shaft diameter inch	major dimensions								mounting dimensions						mass lbs		
		H ±.001 inch	E ±.005 inch	W inch	F inch	T inch	K inch	J inch	h <sub>1</sub> inch	B ±.01 inch	N inch	M×P inch	S <sub>1</sub> hole inch	S <sub>2</sub> hole inch	S <sub>1</sub> bolt#		S <sub>2</sub> bolt#	
WA 8-	24PD	.5000	1.125	.7500	1.500	.903	.188	.466	.500	.255	1.000	2	5×4	.169	#6	.169	#6	1.326
	48PD	.5000	1.125	.7500	1.500	.903	.188	.466	.500	.255	1.000	2	11×4	.169	#6	.169	#6	2.652
WA10-	24PD	.6250	1.125	.8125	1.625	.841	.250	.423	.500	.276	1.125	2	5×4	.193	#8	.193	#8	1.488
	48PD	.6250	1.125	.8125	1.625	.841	.250	.423	.500	.276	1.125	2	11×4	.193	#8	.193	#8	2.976
WA12-	24PD	.7500	1.500	.8750	1.750	1.158	.250	.592	.625	.322	1.250	3	3×6	.221	#10	.221	#10	2.100
	48PD	.7500	1.500	.8750	1.750	1.158	.250	.592	.625	.322	1.250	3	7×6	.221	#10	.221	#10	4.200
WA16-	24PD	1.0000	1.750	1.0625	2.125	1.280	.250	.727	.875	.359	1.500	3	3×6	.281	1/4	.281	1/4	2.776
	48PD	1.0000	1.750	1.0625	2.125	1.280	.250	.727	.875	.359	1.500	3	7×6	.281	1/4	.281	1/4	5.552
WA20-	24PD	1.2500	2.125	1.2500	2.500	1.537	.313	.799	1.100	.437	1.875	3	3×6	.343	5/16	.343	5/16	4.060
	48PD	1.2500	2.125	1.2500	2.500	1.537	.313	.799	1.100	.437	1.875	3	7×6	.343	5/16	.343	5/16	8.120
WA24-	24PD	1.5000	2.500	1.5000	3.000	1.798	.375	.922	1.375	.558	2.250	4	2×8	.343	5/16	.406	3/8	5.840
	48PD	1.5000	2.500	1.5000	3.000	1.798	.375	.922	1.375	.558	2.250	4	5×8	.343	5/16	.406	3/8	11.680
WA32-	24PD	2.0000	3.250	1.8750	3.750	2.322	.500	1.450	1.500	.800	2.750	4	2×8	.406	3/8	.531	1/2	9.500
	48PD	2.0000	3.250	1.8750	3.750	2.322	.500	1.450	1.500	.800	2.750	4	5×8	.406	3/8	.531	1/2	19.000

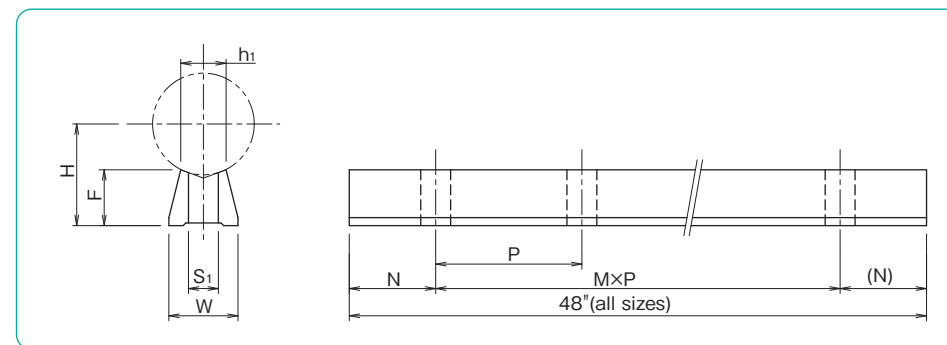
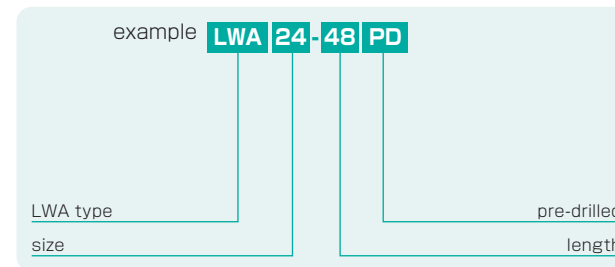
All sizes are also available without pre-drilled mounting holes.  
Complete shaft-rail assemblies are also available as well as custom drilling and lengths.  
Please send drawings with customer specifications.  
Product of NB Corporation of America

# LWA TYPE

– Low Shaft Support Rail –  
(Inch Standard)



## part number structure

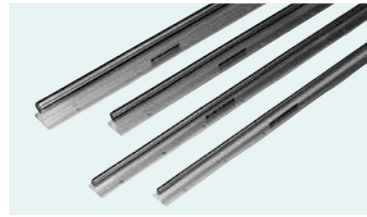


part number	shaft diameter inch	major dimensions			mounting dimensions				mass lb
		H ±.002 inch	W inch	F inch	N inch	M×P inch	h <sub>1</sub> inch	S <sub>1</sub> inch	
LWA 8-48 PD	.5000	.5625	.37	.342	2	11×4	0.25	.169	0.11
LWA 10-48 PD	.6250	.6875	.45	.405	2	11×4	0.276	.193	0.17
LWA 12-48 PD	.7500	.7500	.51	.409	3	7×6	0.317	.220	0.20
LWA 16-48 PD	1.0000	1.0000	.69	.545	3	7×6	0.422	.283	0.35
LWA 20-48 PD	1.2500	1.1875	.78	.617	3	7×6	0.520	.343	0.44
LWA 24-48 PD	1.5000	1.3750	.93	.691	4	5×8	0.630	.406	0.58
LWA 32-48 PD	2.0000	1.7500	1.18	.836	4	5×8	0.824	.531	0.89

Product of NB Corporation of America  
1kg≅2.205lbs  
1lb≅0.454kg

### WSS TYPE

– Shaft Support Assembly –  
(Standard Type)

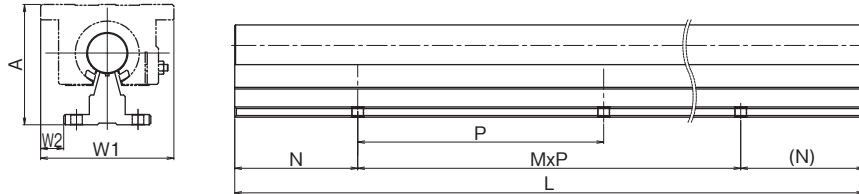


part number structure

example **WSS 16 x 36**

outer diameter

length

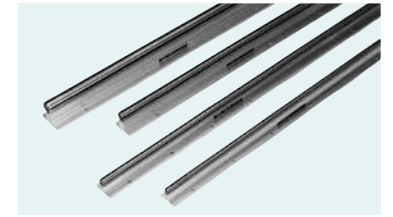


Part Number	Outer Diameter inch/mm	Outer Assembly Dimensions			Base Mounting Holes		Maximum Length	Weight lbs/ft kg/m
		A inch/mm	W1 inch/mm	W2 inch/mm	N inch/mm	P inch/mm		
<b>WSS 8</b>	1/2	1.812	2.000	0.2500	2.000	4.000	168	1.26
	12.700	46.02	50.80	6.35	50.80	101.60	4267.2	1.88
<b>WSS 10</b>	5/8	2.000	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
<b>WSS 12</b>	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
<b>WSS 16</b>	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
<b>WSS 20</b>	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
<b>WSS 24</b>	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
<b>WSS 32</b>	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)

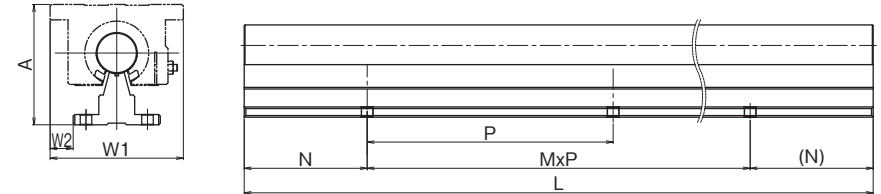


part number structure

example **WSS 8 x 36 -SS**

outer diameter

length



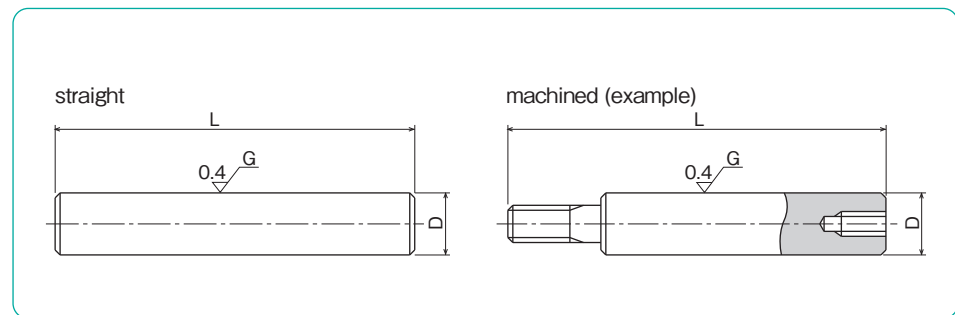
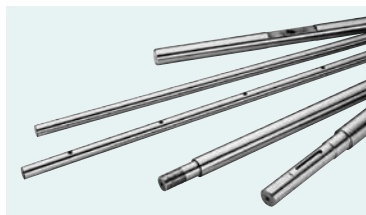
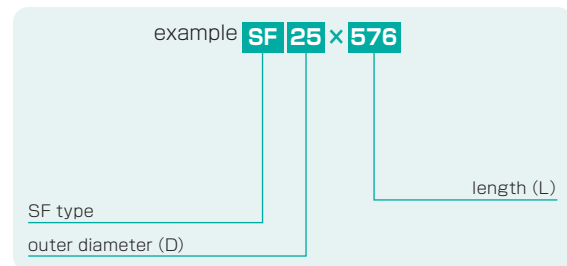
Part Number	Outer Diameter inch/mm	Outer Assembly Dimensions			Base Mounting Holes		Maximum Length	Weight lbs/ft kg/m
		A inch/mm	W1 inch/mm	W2 inch/mm	N inch/mm	P inch/mm		
<b>WSS 8-SS</b>	1/2	1.812	2.000	0.2500	2.000	4.000	158	1.26
	12.700	46.02	50.80	6.35	50.80	101.60	4013.2	1.88
<b>WSS 10-SS</b>	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
<b>WSS 12-SS</b>	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
<b>WSS 16-SS</b>	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
<b>WSS 20-SS</b>	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
<b>WSS 24-SS</b>	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
<b>WSS 32-SS</b>	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



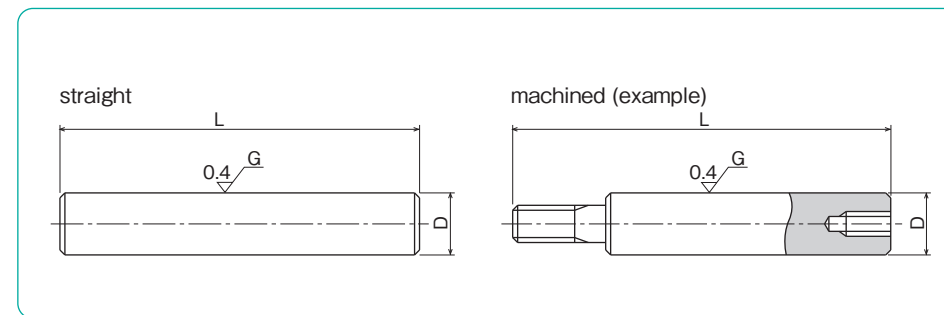
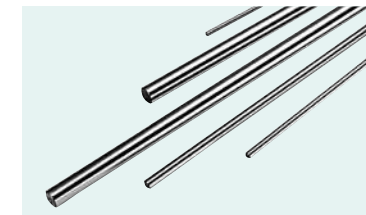
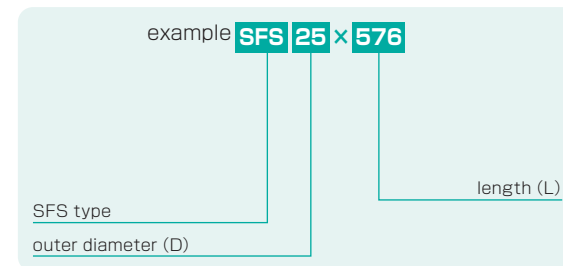
part number	outer diameter		length L	mass
	D	tolerance		
	mm	g6 μm	mm	Kg/m
SF 6	6	-4/-12	100 ← 3000	0.23
SF 8	8	- 5	100 ← 3000	0.40
SF 10	10	-14	100 ← 3000	0.62
SF 12	12		100 ← 3000	0.89
SF 13	13	- 6	100 ← 3000	1.04
SF 15	15	-17	100 ← 3000	1.39
SF 16	16		100 ← 3000	1.58
SF 20	20	- 7	100 ← 3000	2.47
SF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

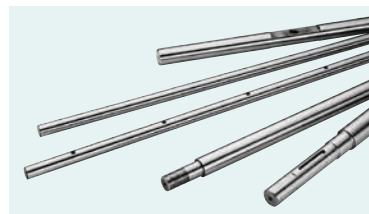


part number	outer diameter		length L	mass
	D	tolerance		
	mm	g6 μm	mm	Kg/m
SFS 6	6	-4/-12	100 ← 3000	0.22
SFS 8	8	- 5	100 ← 3000	0.39
SFS 10	10	-14	100 ← 3000	0.61
SFS 12	12		100 ← 3000	0.88
SFS 13	13	- 6	100 ← 3000	1.03
SFS 16	16	-17	100 ← 3000	1.56
SFS 20	20		100 ← 3000	2.43
SFS 25	25	- 7	100 ← 3000	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

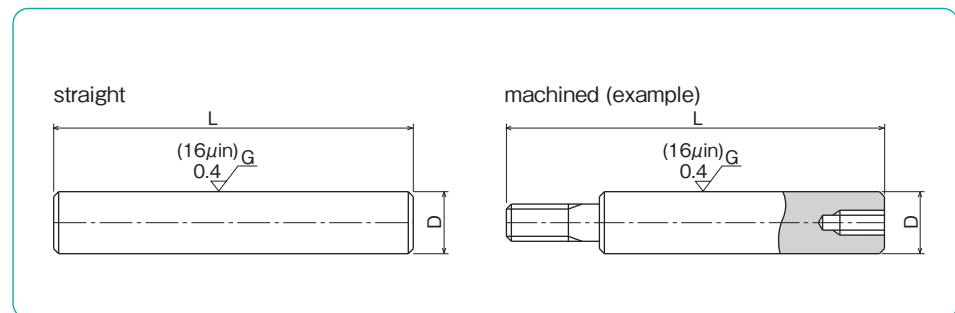
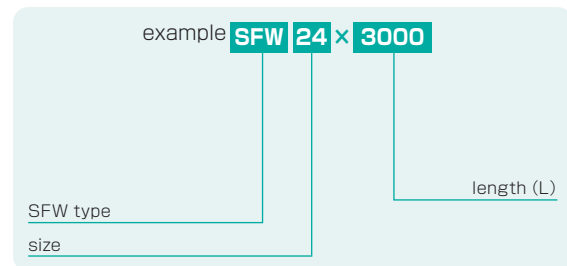
material: X46Cr13 or Equivalent  
hardness: 52HRC (HV544) or more  
Product of NB Corporation of America

# SFW TYPE

– NBCA Inch Shaft –



## part number structure



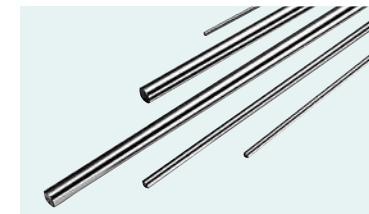
Part Number	Outer Diameter		Length L inch/mm	Mass lbs/inch kg/m
	inch/mm	inch/µm		
SFW 4	1/4	2	120	0.014
	6.350		3048	0.25
SFW 6	3/8	2	120	0.031
	9.525		3048	0.56
SFW 8	1/2	2	120	0.056
	12.700		3048	0.99
SFW 10	5/8	2	120	0.086
	15.875		3048	1.55
SFW 12	3/4	2	120	0.125
	19.050		3048	2.24
SFW 16	1	2	120	0.222
	25.400		3048	3.98
SFW 20	1-1/4	2	120	0.348
	31.750		3048	6.22
SFW 24	1-1/2	2	120	0.500
	38.100		3048	8.95
SFW 32	2	2	120	0.890
	50.800		3048	15.91

material: CF53 or Equivalent  
hardness: 60 HRC or more  
Product of NB Corporation of America

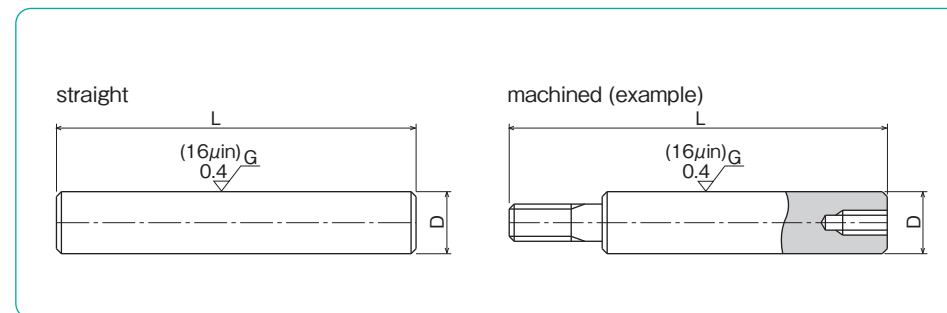
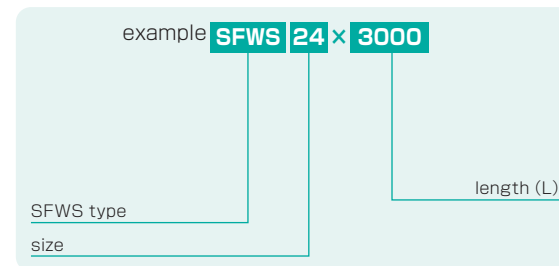
1kg ≒ 2.205lbs

# SFWS TYPE

– NBCA Inch Stainless Steel Shaft –



## part number structure



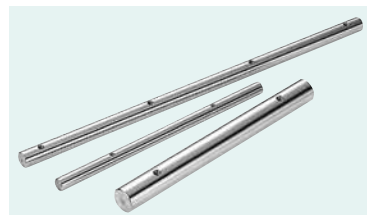
Part Number	Outer Diameter		Length L inch/mm	Mass lbs/inch kg/m
	inch/mm	inch/µm		
SFWS 2	1/8	2	16	0.004
	3.175		406.4	0.10
SFWS 3	3/16	2	16	0.008
	4.763		406.4	0.20
SFWS 4	1/4	2	120	0.014
	6.350		3048	0.25
SFWS 6	3/8	2	120	0.031
	9.525		3048	0.56
SFWS 8	1/2	2	120	0.056
	12.700		3048	0.99
SFWS 10	5/8	2	120	0.086
	15.875		3048	1.55
SFWS 12	3/4	2	120	0.125
	19.050		3048	2.24
SFWS 16	1	2	120	0.222
	25.400		3048	3.98
SFWS 20	1-1/4	2	120	0.348
	31.750		3048	6.22
SFWS 24	1-1/2	2	120	0.500
	38.100		3048	8.95
SFWS 32	2	2	120	0.890
	50.800		3048	15.91

material: X46Cr13 or Equivalent  
hardness: 52 HRC or more  
Product of NB Corporation of America

1kg ≒ 2.205lbs

# SFW-PD

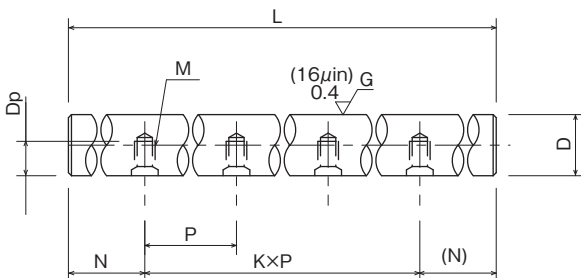
– NBCA Inch Pre-Drilled Shaft –



## part number structure

example **SFW 24 x 72 - PD**

SFW type size      pre-drilled shaft length (L in inches)



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

K: number of pitches

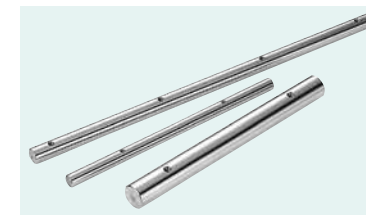
Part Number	Outer Diameter		Pitch P inch/mm	Bolt Size M	Tapped Hole Depth Dp inch/mm	Maximum Length L inch/mm
	D inch/mm	inch/µm				
<b>SFW 8-PD</b>	1/2	-.0005	4	# 6-32	0.280	168
	12.700	-.0010			7.1	4267.2
<b>SFW 10-PD</b>	5/8	-13	101.6	# 8-32	0.350	180
	15.875	-25			8.9	4572
<b>SFW 12-PD</b>	3/4	-.0005	6	# 10-32	0.400	204
	19.050				10.2	5181.6
<b>SFW 16-PD</b>	1	-.0010	152.4	1/4-20	0.500	204
	25.400	-13			12.7	5181.6
<b>SFW 20-PD</b>	1-1/4	-25	203.2	5/16-18	0.650	204
	31.750	-25			16.5	5181.6
<b>SFW 24-PD</b>	1-1/2	-.0006	8	3/8-16	0.700	204
	38.100	-.0011			17.8	5181.6
		-15				
<b>SFW 32-PD</b>	2	-.0006	203.2	1/2-13	0.850	204
	50.800	-.0013			21.6	5181.6
		-15				
		-33				

material: CF53 or Equivalent  
hardness: 60 HRC or more  
Product of NB Corporation of America

1kg≒2.205lbs

# SFWS-PD

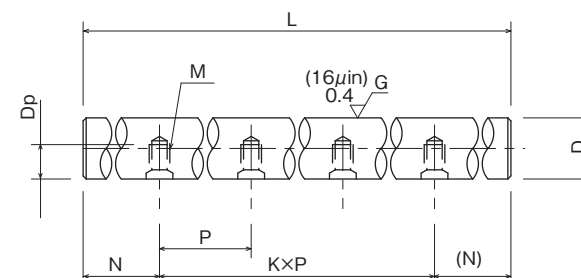
– NBCA Inch Pre-Drilled Stainless Steel Shaft –



## part number structure

example **SFWS 24 x 72 - PD**

SFWS type size      pre-drilled shaft length (L in inches)



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

K: number of pitches

Part Number	Outer Diameter		Pitch P inch/mm	Bolt Size M	Tapped Hole Depth Dp inch/mm	Maximum Length L inch/mm
	D inch/mm	inch/µm				
<b>SFWS 8-PD</b>	1/2	-.0005	4	# 6-32	0.280	158
	12.700	-.0010			7.1	4013.2
<b>SFWS 10-PD</b>	5/8	-13	101.6	# 8-32	0.350	158
	15.875	-25			8.9	4013.2
<b>SFWS 12-PD</b>	3/4	-.0005	6	# 10-32	0.400	158
	19.050				10.2	4013.2
<b>SFWS 16-PD</b>	1	-.0010	152.4	1/4-20	0.500	158
	25.400	-13			12.7	4013.2
<b>SFWS 20-PD</b>	1-1/4	-25	203.2	5/16-18	0.650	158
	31.750	-25			16.5	4013.2
<b>SFWS 24-PD</b>	1-1/2	-.0006	8	3/8-16	0.700	158
	38.100	-.0011			17.8	4013.2
		-15				
<b>SFWS 32-PD</b>	2	-.0006	203.2	1/2-13	0.850	158
	50.800	-.0013			21.6	4013.2
		-15				
		-33				

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 –



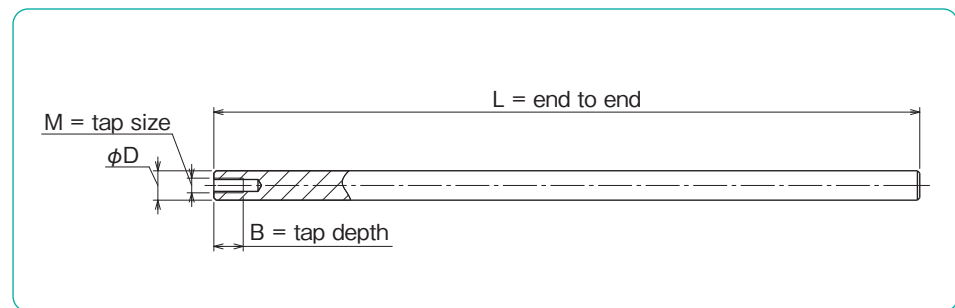
#### part number structure

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		Outer Diameter		Tap Size M	Tap Depth B	Length in mm							
SFW	SFWS	D inch/mm	inch/μm			6	8	9*	10*	12	18	24	36
SFW 4-FS102		1/4	6.350	# 5-40	0.250"	6	8		12	18	24	36	
		3/8				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
		9.525				152.4	203.2	228.6	254	304.8	457.2	609.6	914.4
SFW 8-FS102	SFWS 8-FS102	1/2	12.700	1/4-20	0.500"	6	8*	9*	10*	12	18	24	36
		12.700				152.4	203.2	228.6	254	304.8	457.2	609.6	914.4
SFW 10-FS102	SFWS10-FS102	5/8	15.875	1/4-20	0.500"	6	8*	9*	10*	12	18	24	36
		15.875				152.4	203.2	228.6	254	304.8	457.2	609.6	914.4
SFW 12-FS102	SFWS12-FS102	3/4	19.050	5/16-18	0.625"	6	8*	9*	10*	12	18	24	36
		19.050				152.4	203.2	228.6	254	304.8	457.2	609.6	914.4
SFW 16-FS102	SFWS16-FS102	1	25.400	3/8-16	0.750"	6	8*	9*	10*	12	18	24	36
		25.400				152.4	203.2	228.6	254	304.8	457.2	609.6	914.4
SFW 20-FS102	SFWS20-FS102	1-1/4	31.750	1/2-13	1.000"	6	8*	9*	10*	12	18	24	36
		31.750				152.4	203.2	228.6	254	304.8	457.2	609.6	914.4
SFW 24-FS102	SFWS24-FS102	1-1/2	38.100	5/8-11	1.250"	6			12	18	24	36	
		38.100				152.4	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 –



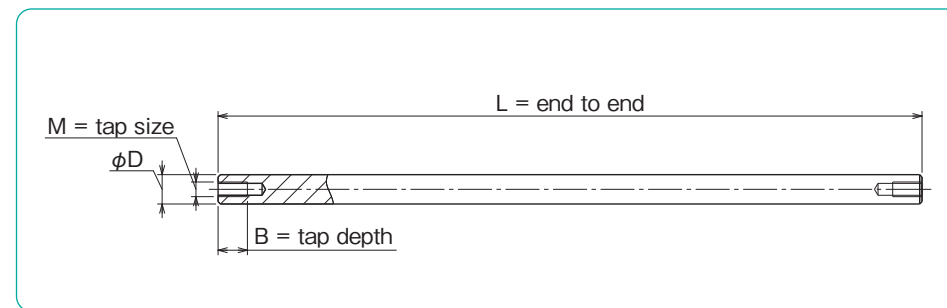
#### part number structure

example **SFWS 16 × 18 - FS103**

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

size

FS103-Both Ends Tapped length(L in inches)

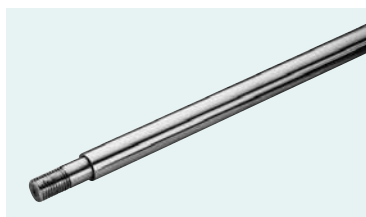


Part Number		Outer Diameter		Tap Size M	Tap Depth B	Length in mm							
SFW	SFWS	D inch/mm	inch/μm			6	8	9*	10*	12	18	24	36
SFW 4-FS103		1/4	6.350	# 5-40	0.250"	6	8		12	18	24	36	
		3/8				152.4	203.2	304.8	457.2	609.6			
SFW 6-FS103	SFWS 6-FS103	3/8	9.525	# 8-32	0.330"	6	8*	9*	10*	12	18	24	36
		9.525				152.4	203.2	228.6	254	304.8	457.2	609.6	914.4
SFW 8-FS103	SFWS 8-FS103	1/2	12.700	1/4-20	0.500"	6	8*	9*	10*	12	18	24	36
		12.700				152.4	203.2	228.6	254	304.8	457.2	609.6	914.4
SFW 10-FS103	SFWS10-FS103	5/8	15.875	1/4-20	0.500"	6	8*	9*	10*	12	18	24	36
		15.875				152.4	203.2	228.6	254	304.8	457.2	609.6	914.4
SFW 12-FS103	SFWS12-FS103	3/4	19.050	5/16-18	0.625"	6	8*	9*	10*	12	18	24	36
		19.050				152.4	203.2	228.6	254	304.8	457.2	609.6	914.4
SFW 16-FS103	SFWS16-FS103	1	25.400	3/8-16	0.750"	6	8*	9*	10*	12	18	24	36
		25.400				152.4	203.2	228.6	254	304.8	457.2	609.6	914.4
SFW 20-FS103	SFWS20-FS103	1-1/4	31.750	1/2-13	1.000"	6	8*	9*	10*	12	18	24	36
		31.750				152.4	203.2	228.6	254	304.8	457.2	609.6	914.4
SFW 24-FS103	SFWS24-FS103	1-1/2	38.100	5/8-11	1.250"	6			12	18	24	36	
		38.100				152.4	304.8	457.2	609.6	914.4			

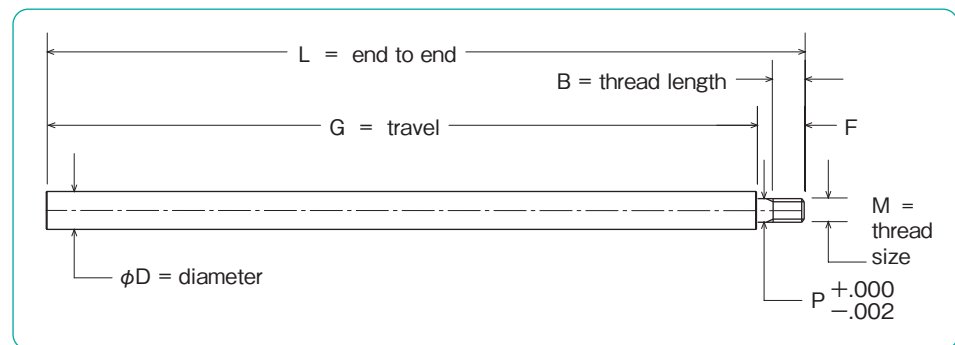
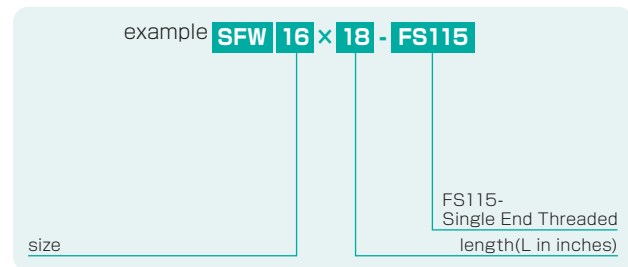
hardness of SFW: 60 HRC or more  
 hardness of SFWS: 52 HRC or more  
 Product of NB Corporation of America  
 \* SFWS is not available

# SFW-FS115 TYPE

– Format Single End Threaded Inch Shafts –



## part number structure

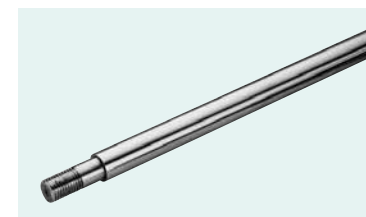


Part Number	Outer Diameter		Thread Size M	Thread Length B	Journal Length F	Journal DIA P	4" Travel	6" Travel	8" Travel	12" Travel	24" Travel	36" Travel	48" Travel
	D	inch/μm					G Length L	G Length L	G Length L	G Length L	G Length L	G Length L	
SFW 6-FS115	3/8	-0.0005 -0.0010	1/4-20	0.31 7.87	0.50 12.70	0.250 6.35	4.500	6.500	8.500	12.500	24.500		
	9.525						114.3	165.1	215.9	317.5	622.3		
SFW 8-FS115	1/2	-0.0005 -0.0010	5/16-18	0.39 9.91	0.63 15.88	0.313 7.95	4.625	6.625	8.625	12.625	24.625		
	12.700						117.5	168.3	219.1	320.7	625.5		
SFW 10-FS115	5/8	-0.0005 -0.0010	3/8-16	0.47 11.94	0.75 19.05	0.375 9.53	4.750	6.750	8.750	12.750	24.750		
	15.875						120.7	171.5	222.3	323.9	628.7		
SFW 12-FS115	3/4	-13 -25	1/2-13	0.63 16.00	1.00 25.40	0.500 12.70	5.000	7.000	9.000	13.000	25.000		
	19.050						127.0	177.8	228.6	330.2	635.0		
SFW 16-FS115	1	-0.0005 -0.0010	5/8-11	0.78 19.81	1.25 31.75	0.625 15.88	7.250	9.250	13.250	25.250	37.250		
	25.400						184.2	235.0	336.6	641.4	946.2		
SFW 20-FS115	1-1/4	-0.0005 -0.0010	3/4-10	0.94 23.88	1.50 38.10	0.750 19.05	7.500	9.500	13.500	25.500	37.500		
	31.750						190.5	241.3	342.9	647.7	952.5		
SFW 24-FS115	1-1/2	-0.0005 -0.0011 -15~-27	1-8	1.25 31.75	2.00 50.80	1.000 25.40	10.000	14.000	26.000	38.000	50.000		
	38.100						254.0	355.6	660.4	965.2	1270.0		

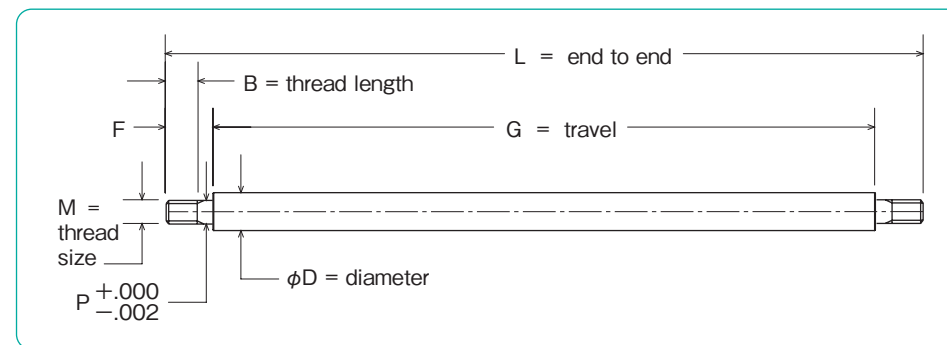
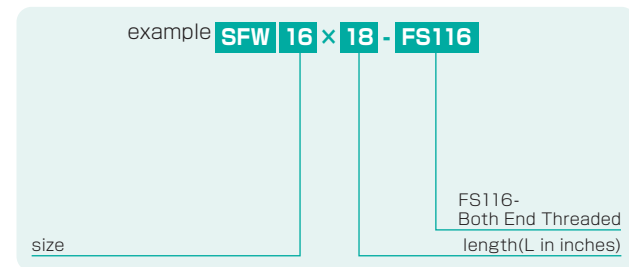
material: CF53 or Equivalent  
hardness: 60 HRC or more  
stainless steel sizes are available on this series by quote only  
Product of NB Corporation of America

# SFW-FS116 TYPE

– Format Both Ends Threaded Inch Shafts –



## part number structure

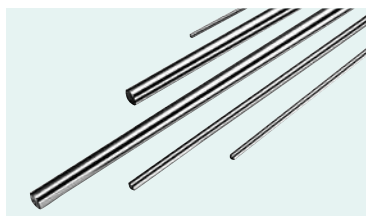


Part Number	Outer Diameter		Thread Size M	Thread Length B	Journal Length F	Journal DIA P	4" Travel	6" Travel	8" Travel	12" Travel	24" Travel	36" Travel	48" Travel
	D	inch/μm					G Length L	G Length L	G Length L	G Length L	G Length L	G Length L	
SFW 6-FS116	3/8	-0.0005 -0.0010	1/4-20	0.31 7.87	0.50 12.70	0.250 6.35	5.000	7.000	9.000	13.000	25.000		
	9.525						127.0	177.8	228.6	330.2	635.0		
SFW 8-FS116	1/2	-0.0005 -0.0010	5/16-18	0.39 9.91	0.63 15.88	0.313 7.95	5.250	7.250	9.250	13.250	25.250		
	12.700						133.4	184.2	235.0	336.6	641.4		
SFW 10-FS116	5/8	-0.0005 -0.0010	3/8-16	0.47 11.94	0.75 19.05	0.375 9.53	5.500	7.500	9.500	13.500	25.500		
	15.875						139.7	190.5	241.3	336.6	647.7		
SFW 12-FS116	3/4	-13 -25	1/2-13	0.63 16.00	1.00 25.40	0.500 12.70	6.000	8.000	10.000	14.000	26.000		
	19.050						152.4	203.2	254.0	355.6	660.4		
SFW 16-FS116	1	-0.0005 -0.0010	5/8-11	0.78 19.81	1.25 31.75	0.625 15.88	8.500	10.500	14.500	26.500	38.500		
	25.400						215.9	266.7	368.3	673.1	977.9		
SFW 20-FS116	1-1/4	-0.0005 -0.0011 -15~-27	3/4-10	0.94 23.88	1.50 38.10	0.750 19.05	9.000	11.000	15.000	27.000	39.000		
	31.750						228.6	279.4	381.0	685.8	990.6		
SFW 24-FS116	1-1/2	-0.0005 -0.0011 -15~-27	1-8	1.25 31.75	2.00 50.80	1.000 25.40	12.000	16.000	28.000	40.000	52.000		
	38.100						304.8	406.4	711.2	1016.0	1320.8		

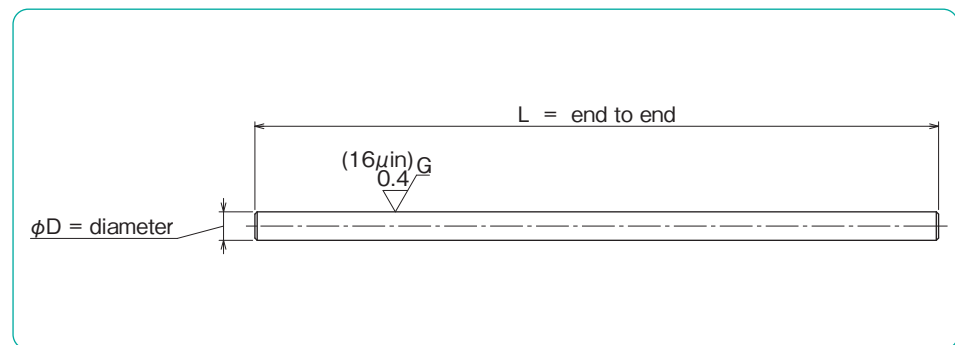
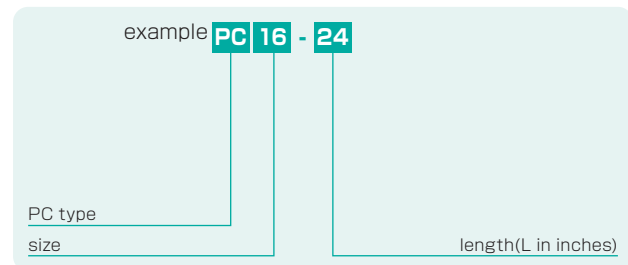
material: CF53 or Equivalent  
hardness: 60 HRC or more  
stainless steel sizes are available on this series by quote only  
Product of NB Corporation of America

# PC TYPE

– Pre-Cut Slide Shafts –



## part number structure



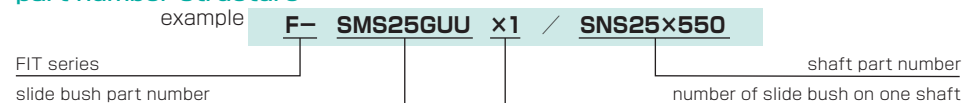
Part Number	Outer Diameter		Length L							Mass	
	D inch/mm	inch/μm	inch/mm								
PC 4	1/4	-0.0005	6	12	18	24				0.014 0.25	
	6.350		152.4	304.8	457.2	609.6					
PC 6	3/8	-0.0010	6	12	18	24				0.031 0.56	
	9.525		152.4	304.8	457.2	609.6					
PC 8	1/2	-0.0010		12	18	24	30	36		0.056 0.99	
	12.700			304.8	457.2	609.6	762	914.4			
PC 10	5/8	-0.0010		12	18	24	30	36		0.086 1.55	
	15.875			304.8	457.2	609.6	762	914.4			
PC 12	3/4	-0.0010			18	24	30	36	42	48	0.125 2.24
	19.050				457.2	609.6	762	914.4	1066.8	1219.2	
PC 16	1	-0.0010			18	24	30	36	42	48	0.222 3.98
	25.400				457.2	609.6	762	914.4	1066.8	1219.2	
PC 20	1-1/4	-0.0010			18	24	30	36	42	48	0.348 6.22
	31.750				457.2	609.6	762	914.4	1066.8	1219.2	
PC 24	1-1/2	-0.0010			18	24		36		48	0.500 8.95
	38.100				457.2	609.6		914.4		1219.2	

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.

target	clearance (+)	← 0 →	clearance (-)
light motion	[Bar chart showing positive clearance range]		
high accuracy	[Bar chart showing zero clearance range]		
no play	[Bar chart showing negative clearance range]		

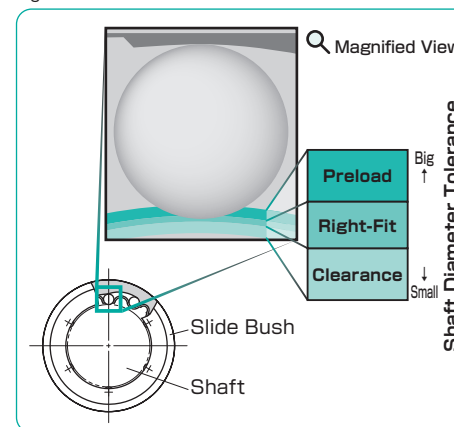
## Slide Bush, Radial Clearance (-), Negative Limit

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	±0μm	-4μm	-6μm	-8μm	-10μm	-13μm

- 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





# 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

### Variety of Machining Capabilities

From small to large, various shaft 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.

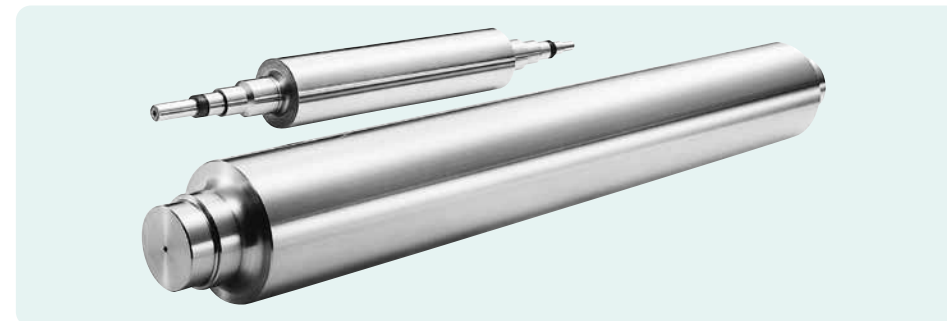
## MACHINING SPECIFICATIONS

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)		Others	Gauging with customer supplied nuts and bearings
	Tool Steel (JIS SK4)			Triangular and trapezoidal thread grinding available
Tool Steel (JIS SKS3)				
Heat Treatment	Induction Hardening			
	Induction Hardening (deep)			
	Carburizing and quenching			

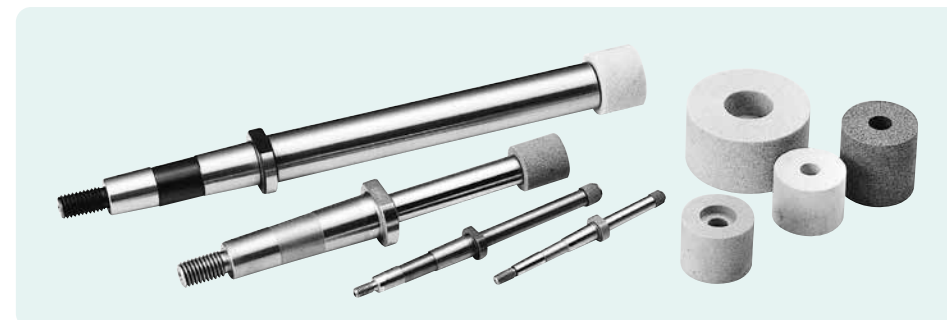
Machining Ability	Process Details / Manufacturing Contents	Maximum Machinable Diameter	Maximum Machinable Length	Remarks / Notes
	Centerless Grinding	φ60 mm outer diameter	4,000mm	
	External Grinder	φ400 mm outer diameter	4,000mm	
	Internal Grinder	φ200 mm inner diameter	300mm	Allowable work length: up to 1,100 mm
		φ350 mm inner diameter	300mm	
	Vertical Grinder	φ630 mm outer diameter	300mm	
	Lathe	φ400	3,800mm	
	Horizontal Machining Center	φ350	2,000mm	Up to 3,000 kg
Vertical Machining Center	φ300	3,000mm	Up to 3,000 kg	
BT / Gun Drilling	φ80	2,000mm	Up to 4,000 mm long with both end machining for less than φ120 Up to 2,000 mm long for φ120 and over	

## EXAMPLES OF MACHINING ①

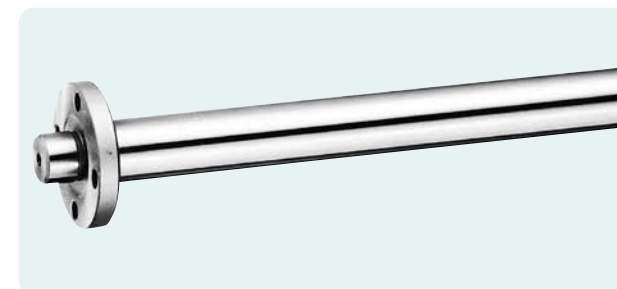
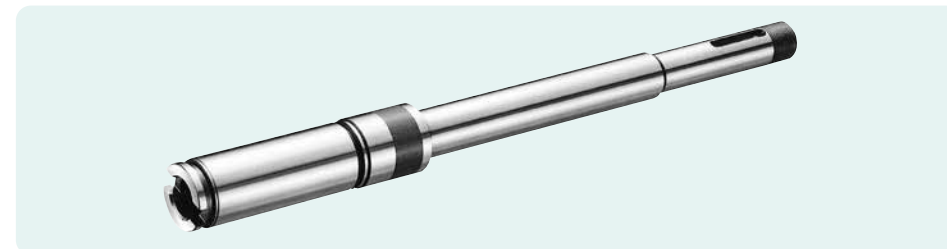
Roll Shaft



Quill Shaft



Ceramic-Coating



EXAMPLES OF MACHINING ②

