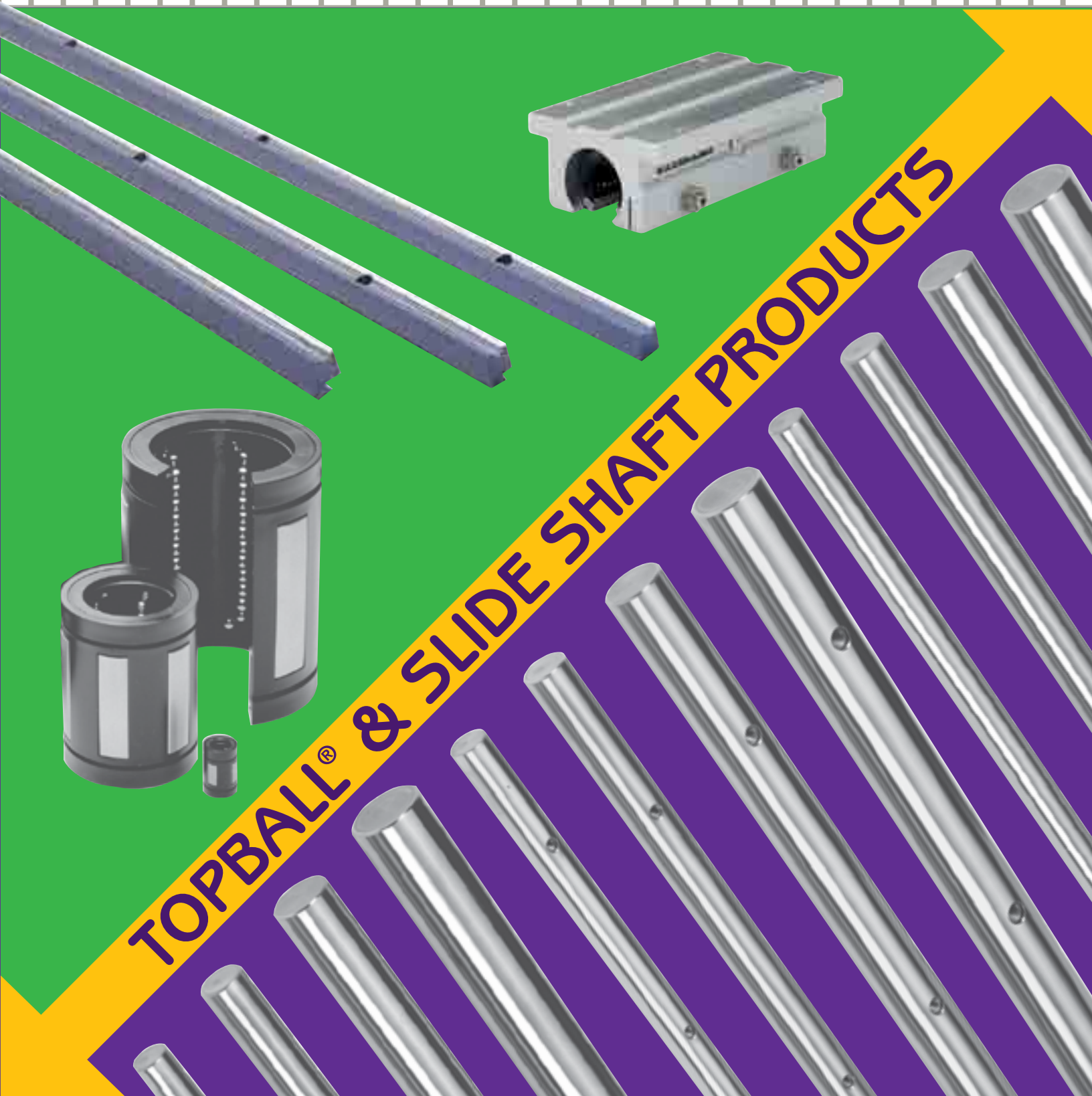




Winning Solutions For Precise Movement



TOPBALL® & SLIDE SHAFT PRODUCTS

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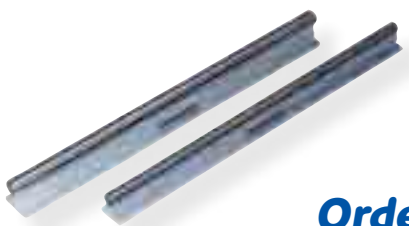
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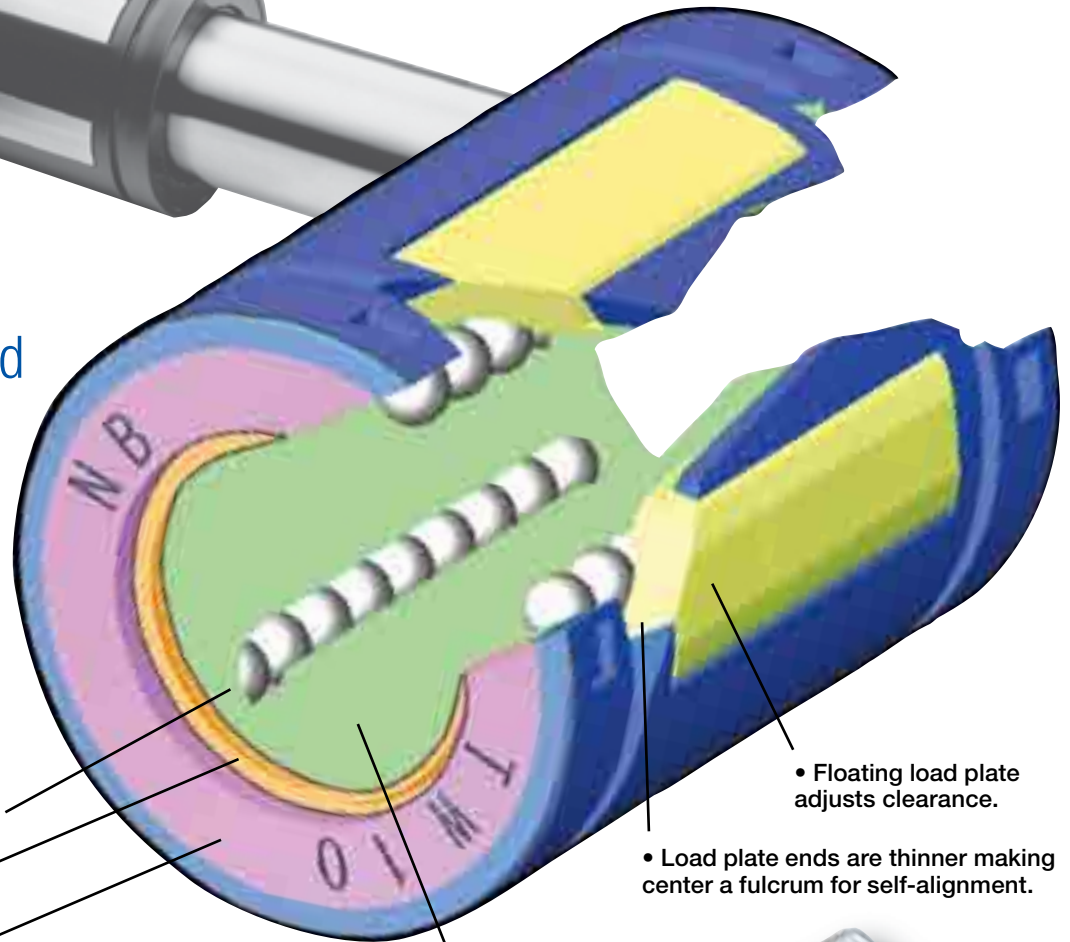
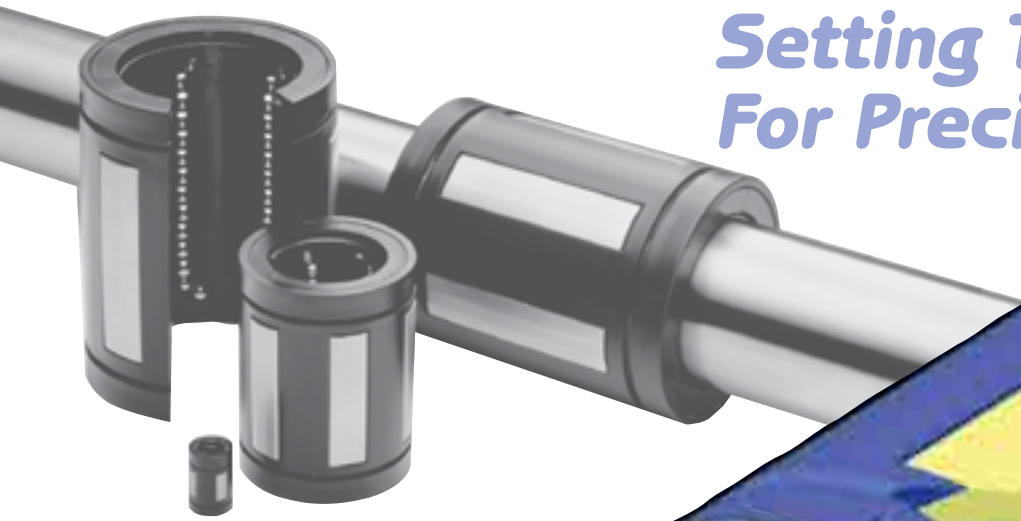


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TOPBALL®

Setting The Standard
For Precise Alignment



- Self-aligns to speed manufacturing and assembly.
- 3X The Load Capacity*
- 27X The Travel Life*

- Each load plate is precision-ground and checked for consistency - unlike competitors' stamped plates.
- Floating wiper seal allows unrestricted self-alignment.
- Light weight components for energy reduction.

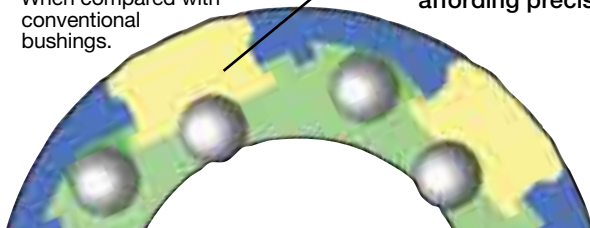
- Greater ball contact in ground circular arch triples load capacity.
- Our raceways are ground - not stamped - affording precision tolerances.

- Unibody construction for quieter operation.

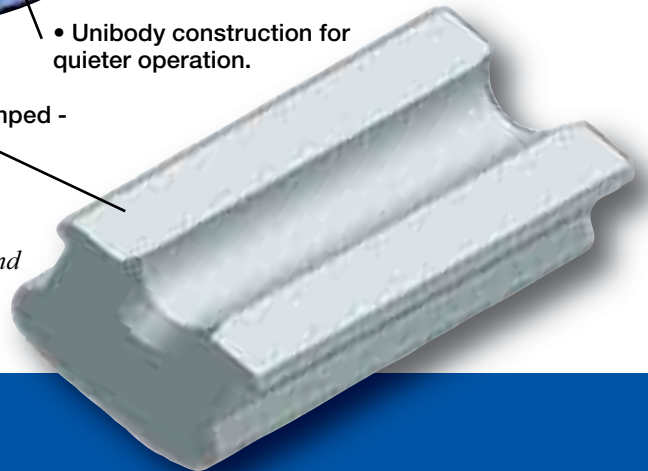
- Floating load plate adjusts clearance.

- Load plate ends are thinner making center a fulcrum for self-alignment.

*When compared with conventional bushings.



Comes in both inch and Euro metric standard series sizes..



Headquarters
1-800-521-2045

West Coast
1-888-562-4175

East Coast
1-800-981-8190

www.nbcorporation.com

Products

TOPBALL® Types

TW: Clearance Adjustable Standard

Floating load plate design is self aligning. It has a light weight outer ring and retainer for low noise operation.

TW-OP: Clearance Adjustable Open

One ball circuit is removed from the outer cylinder enabling it to be used with bottom supported shaft to eliminate shaft deflection.

Anti-Corrosive Type

A special TOPBALL is also available for corrosive applications. Contact your nearest distributor for application information, price and delivery.

TOPBALL® Features

• **Increased Load Capacity**

NB's uniquely designed ground load plate provides circular arch contact to the ball resulting in a greater dispersion of the load, enabling TOPBALL to provide three times the load capacity of conventional slide bushings. (See Fig. 1)

• **Longer Travel Life**

Dispersed stress on the load plate provides TOPBALL up to 27 times the travel life of conventional slide bushings. (See Fig. 1)

• **Self-Aligning Capability**

Load plates are thinner at the ends to provide a pivot point at the center of the plate. The center acts as a fulcrum to compensate for any slight misalignment between the shaft and the housing bore that might be caused by inaccurate machining, mounting errors or shaft deflection. (See Fig. 2)

• **Floating Integral Wiper Seal**

Seals are made of oil resistant industrial grade rubber for long life and durability. NB's unique floating seal design allows for self-alignment while maintaining equal and constant contact to the shaft. Seals do not add to the overall length of the bushing allowing for more compact designs. (See Fig. 2)

• **Interchangeability**

NB has designed TOPBALL to be fully interchangeable with conventional slide bushings.

• **Clearance Adjustable**

TOPBALL load plates are designed to "float" in the outer sleeve which allows for clearance between the balls and

Fig. 1 Illustrating circular arch design and ground surface raceway

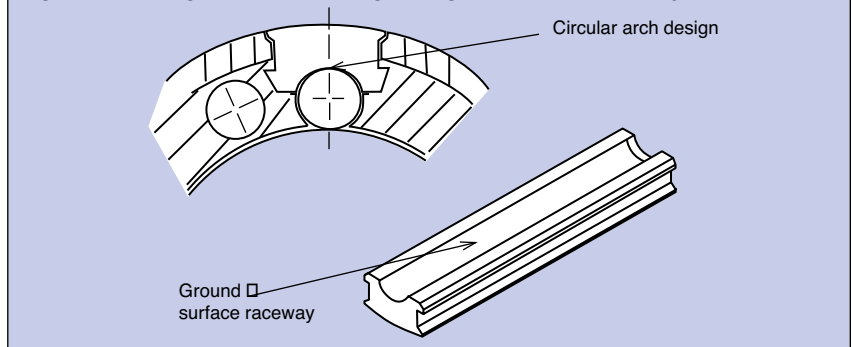
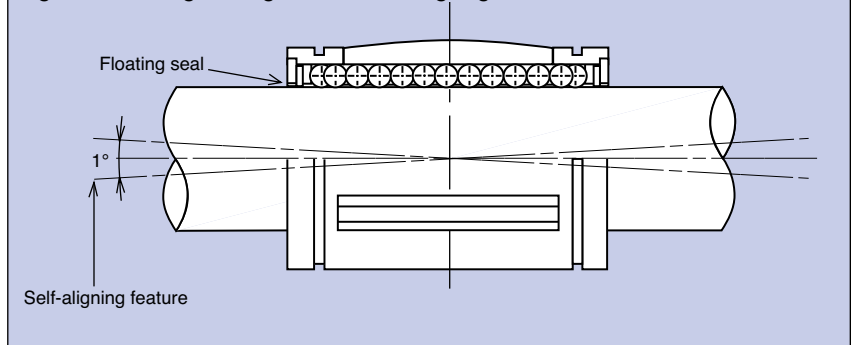


Fig. 2 Illustrating floating seal and self-aligning feature



shaft to best suit application requirements. TOPBALL is also available in NB's "adjustable" slide unit housing.

• **Cost Effectiveness**

TOPBALL's higher load capacity and longer travel life enables the use of smaller components such as bushings, housings and shafts, reducing material cost and the overall cost of the system. Longer travel life also extends replacement periods and reduces maintenance cost.

• **Smooth Running Low Friction**

TOPBALL is extremely smooth running due to the finely ground surface of the load plate. Self-alignment creates a smoother-running surface from shaft to load plate raceway. (See Fig. 1)

• **Low Noise**

Sound absorbing resin retainers and outer-sleeves enable TOPBALL to operate quietly. TOPBALL is excellent for low noise applications.

• **Light Weight**

TOPBALL's outer sleeve and retainer are made of high performance resin that is light weight and exceptionally rigid. TOPBALL's light weight allows users the advantages of higher operating speeds and greater acceleration compared to conventional slide bushings.

TOPBALL

Slide Bush Life

The life of a slide bush can be easily calculated with the load rating of the bush, shaft hardness and applicable load. However, in many cases, slide bushing failure may be caused by improper design of bush peripherals, including the shaft and housing, inappropriate mounting or improper operation. Serious consideration of these peripheral factors, in addition to load rating, are highly recommended when designing a slide bush application.

Basic Dynamic Load Rating and Life Expectancy

The basic dynamic load rating is the load which allows a rating life of 2-million inches (50 km), without changing its magnitude and direction. The rating life can be obtained from the following equation.

$$L = \left(\frac{C}{P}\right)^3 \cdot 2 \times 10^6 \quad \text{Equation (1)}$$

L: Rating life (inches)
C: Basic dynamic load rating (lbs.)
P: Load (lbs.)

Chart 1 shows the relationship between Life (L) and load ratio (C/P). In the practical use of a bushing, other factors that affect the life, such as shaft hardness and load condition should be considered. The equation for calculating bushing life considering these additional factors is:

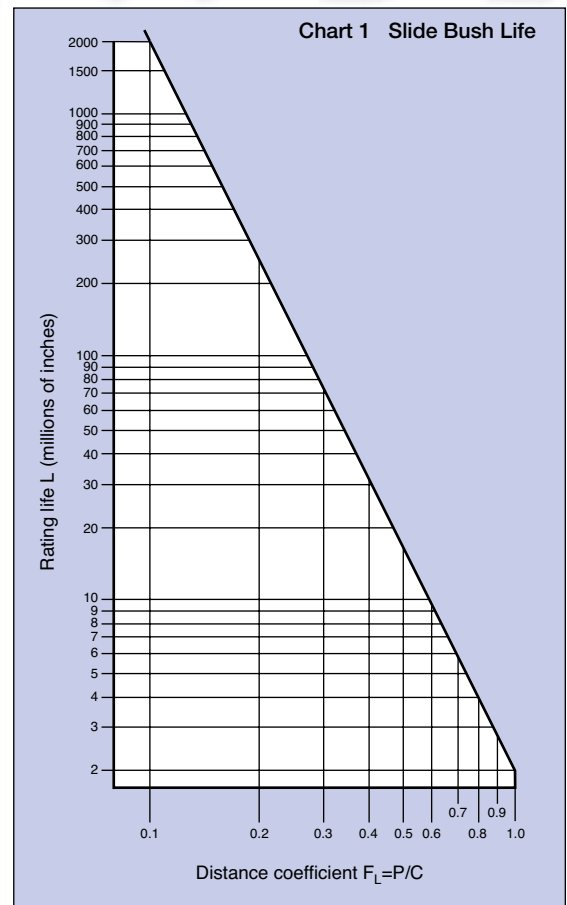
$$L = \left(\frac{f_h \cdot C}{f_w \cdot P}\right)^3 \cdot 2 \times 10^6 \quad \text{Equation (2)}$$

f_h : Hardness factor (See Chart 2)
 f_w : Load coefficient (See Table 1)

Rating life in hours can be calculated by obtaining the travelling distance per unit of time as follows:

$$L_h = \frac{L}{2 \cdot L_s \cdot N1 \cdot 60} \quad \text{Equation (3)}$$

Lh: Rating life in hours (hr.)
Ls: Stroke length (in.)
N1: Rate of cycles per minute
L: Rating life (in.)



Products

Load Coefficient (f_w)

When calculating the bush load, it is necessary to accurately obtain weight, inertial force based on speed, moment load and each transition as time passes. However, it is difficult to calculate those values accurately because reciprocating motion involves the repetition of starts and stops as well as vibration and impact. A more practical approach is to obtain the load coefficient by taking the actual operating conditions into account.

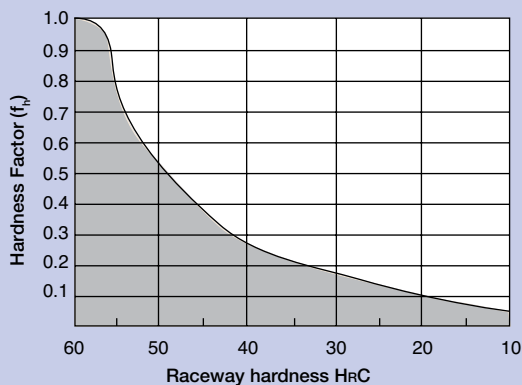
Table 1 LOAD COEFFICIENT

| OPERATING CONDITIONS | f_w |
|--|-----------|
| Operation at low speed (600 in./min. or less) without impulsive shock from outside | 1 - 1.5 |
| Operation at intermediate speed (2400 in./min. or less) without impulsive shock | 1.5 - 2.0 |
| Operation at high speed (over 2400 in./min.) with impulsive shock | 2.0 - 3.5 |

Hardness Factor (f_h)

The shaft must be hardened to 60-65 HRC when a slide bush is used. If not properly hardened, permissible load is lowered and the life of the bushing will be shortened.

Chart 2 Hardness factor (f_h)



Examples of Calculations:

(1) Life expectancy when NB's TOPBALL TW 16 (1") is used under the following conditions:

Load per bush: 150 lbs.
 Stroke distance: 8 inches
 Rate of cycles/min: 35
 Shaft hardness: 60 HRC

From Table 4 (Page 10) the basic dynamic load of TW 16 is 850 lbs. Hardness factor (f_h) is 1.0, and the operating speed can be calculated as 560"/min. Therefore, the load coefficient (f_w) is considered as 1.0.

Using equation (2)

$$L = \left(\frac{850}{1 \cdot 150} \right)^3 \cdot 2 \times 10^6 = 3.64 \times 10^8 \text{ inches}$$

Using equation (3)

$$Lh = \frac{3.63 \times 10^8}{2 \cdot 8 \cdot 35 \cdot 60} = 10,800 \text{ hours}$$

(2) Selection of size for the application as follows:

Expected life: 15,000 hours
 Number of bushings in the carriage: 4
 Gross weight on the carriage: 150 lbs.
 Stroke distance: 36 inches
 Traveling speed: 1200 inches/min.
 Shaft hardness: 60-64 HRC

From equation (3), the life expected in traveling distance is:

$$L = 15,000 \cdot 2 \cdot 36 \cdot \frac{1200}{2 \cdot 36} \cdot 60 = 1.08 \times 10^9 \text{ Inches}$$

$$C = \sqrt[3]{\frac{1.08 \times 10^9}{2 \times 10^6}} \cdot \left(\frac{f_w}{f_h} \right) \cdot P = 458 \text{ lbs.}$$

From the equation (2),

Note that: $f_h = 1.0$, $f_w = 1.5$, $P = 150/4 = 37.5$ lbs.

As a result, the TOPBALL that is able to handle this load is: TW 12 (3/4").

TOPBALL

Basic Static Load Rating

If a slide bush is loaded when it is in a stationary condition or working at low speed, a permanent elastic deformation is formed on the rolling element. The deformation prevents smooth movement of the bushing. To eliminate this possibility, the basic static load rating must not be exceeded.

Clearance and Fit

An appropriate clearance between the slide bush and shaft is required in TOPBALL® operation. Inadequate clearance may cause early failure and/or poor, rough movement. Proper clearance is determined by shaft diameter and housing bore. Table 3 shows NB's recommended tolerances of the shaft diameter and housing bore in order to maintain the appropriate clearance.

Relation Between Ball Circuits and Load Rating

The load rating of a slide bush varies according to the loaded position on the circumference. The value in the dimensional table indicates the lowest load rating with the load placed on top of one ball circuit. If the slide bush is used with two ball circuits loaded uniformly, the value will be greater. The table below (Table 2) shows the load ratio for the number of ball circuits in each case.

Table 2 OPTIONAL LOAD POSITIONS

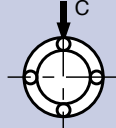
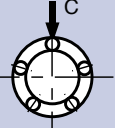
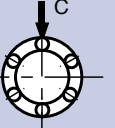
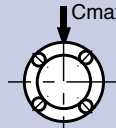
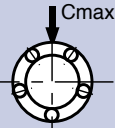
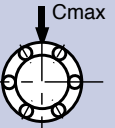
| NUMBER OF ROWS | 4 | 5 | 6 |
|---|---|--|--|
| C (LOAD RATING SPECIFIED ON THE TABLE) |  |  |  |
| C _{max} (MAXIMUM LOAD RATING) |  |  |  |
| LOAD RATIO C _{max} /C | 1.414 | 1.463 | 1.280 |

Table 3 RECOMMENDED TOLERANCE FOR SHAFT O.D. AND HOUSING BORE (INCH)

| SIZE | SHAFT DIAMETER | | HOUSING BORE | |
|--------------|------------------|------------------|--------------|----------------|
| | NOMINAL DIAMETER | TOLERANCE (g6) | NOMINAL BORE | TOLERANCE (H7) |
| TW 3 | .1875 | -.0002 to -.0006 | .3750 | 0 to + .0006 |
| TW 4 | .2500 | -.0002 to -.0006 | .5000 | 0 to + .0007 |
| TW 6 | .3750 | -.0002 to -.0006 | .6250 | 0 to + .0007 |
| TW 8 | .5000 | -.0002 to -.0007 | .8750 | 0 to + .0008 |
| TW 10 | .6250 | -.0002 to -.0007 | 1.1250 | 0 to + .0008 |
| TW 12 | .7500 | -.0003 to -.0008 | 1.2500 | 0 to + .0010 |
| TW 16 | 1.0000 | -.0003 to -.0008 | 1.5625 | 0 to + .0010 |
| TW 20 | 1.2500 | -.0004 to -.0010 | 2.0000 | 0 to + .0012 |
| TW 24 | 1.5000 | -.0004 to -.0010 | 2.3750 | 0 to + .0012 |
| TW 32 | 2.0000 | -.0004 to -.0012 | 3.0000 | 0 to + .0012 |

Products

Shaft and Housing

To optimize NB TOPBALL performance, high precision shafts and housings are required.

1. Shaft: Dimensional tolerance, surface finish and hardness greatly affect the traveling performance of the TOPBALL. The shaft must be manufactured to the following tolerances.
 - A. A surface finish of 16 micro-inch rms or less.
 - B. Hardness of HRC 60 to 64. Hardness less than HRC 60 decreases the life considerably and reduces the permissible load. Hardness over HRC 64 accelerates steel ball wear.
 - C. Case-hardened depth should be a minimum of .04 inches.
 - D. The correct tolerance of the shaft diameter is recommended on Table 3 (Page 8).

The NB Slide Shaft is an ideal component manufactured to these specifications. For details, please refer to the NB Slide Shaft catalog.

2. Housing: There are a wide range of designs and manufacturing techniques for mounted housings. NB pre-engineered slide units are also available. For proper fit, refer to Table 3 (Page 8).

Mounting

TOPBALL is designed to be slip fitted. Do not use extreme force when inserting bushing. Any shock load to the bushing may cause permanent damage.

Examples of Mounting

The following examples (Figs. 3 to 6) illustrate assembly of the inserted bush as they should be designed and mounted.

Explanation Of TOPBALL P/N (Part Number) Symbols

| T | W | # | UU | OP |
|------------|------------------|----------------------------------|--|-------------------|
| Series | Measurement Type | Inscribed Circle Diameter (inch) | Seal Symbol | Modification |
| T=TOPBALL® | W=Inch | 4=0.250 | UU=Seals on Both Ends | OP=Open Type |
| | | 6=0.375 | No Entry=Not Open (Standard) | No Entry=No Seals |
| | | 8=0.500 | Example: You need a slide bush that has a 1/2" interior diameter, that's not open, with seals on both ends. Order TW8UU | |
| | | 10=0.625 | | |
| | | 12=0.750 | | |
| | | 16=1.000 | | |
| | | 20=1.250 | | |
| | | 24=1.500 | | |
| | | 32=2.000 | | |

For Ordering Assistance
Call 1-800-521-2045.
 See page 26-27 for ordering information.

Fig. 3 use of holding plates

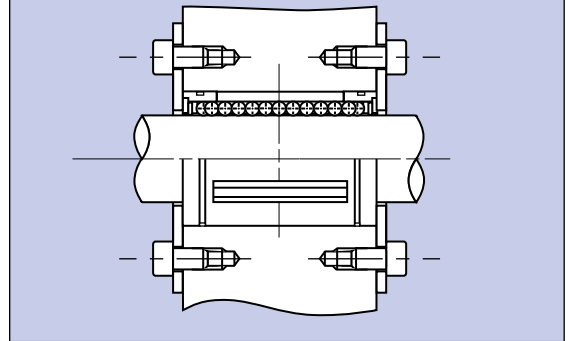


Fig. 4 Adjustable type housing

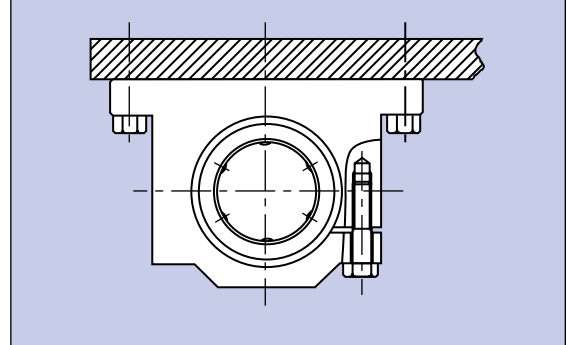


Fig. 5 Use of external retaining rings

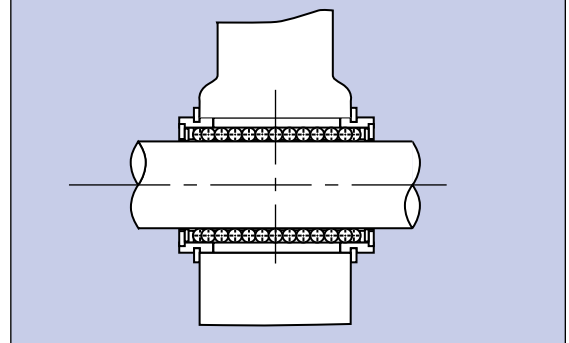
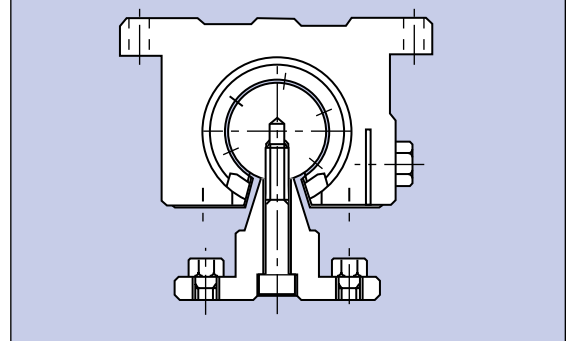


Fig. 6 Open type housing



TOPBALL

Dimensions and Load Ratings TOPBALL® Standard Type TW Type



Fig. 7 Standard Type TOPBALL Slide Bush

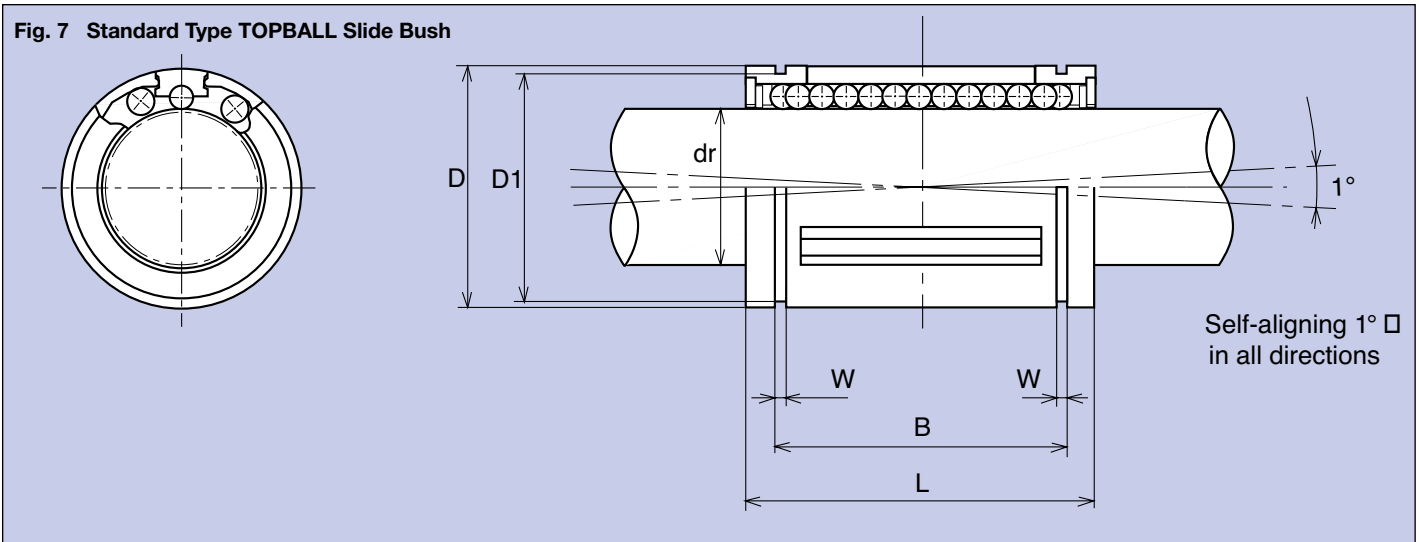


Table 4 STANDARD TYPE DIMENSIONS AND LOAD RATINGS

| NOM. SHAFT DIA. (inch) | P/N STANDARD & W/SEALS | WORKING DIAMETER (1) | | NOM. O.D. (3) | LENGTH | | RETAINING RINGS | | | | BALL DIA. (inch) | NO. OF ROWS | LOAD RATINGS (2) | | Wt. (lbs.) |
|------------------------|------------------------|----------------------|-------------------|---------------|----------|-----------------|-----------------|-----------------|----------|-----------|--------------------|-------------|------------------|-----------------------|----------------|
| | | dr (inch) | TOL (inch) | | L (inch) | TOL (inch) | DISTANCE | | WIDTH | DIA. | | | C (lbs.) | C ₀ (lbs.) | |
| | | | | | | | B (inch) | TOL (inch) | W (inch) | D1 (inch) | | | | | |
| 3/16 | TW 3 | 0.1875 | 0.0000 -0.0005 | 0.3750 | 0.562 | ±0.008 | ... | ... | ... | ... | 0.04724 (1.2mm) | 4 | 35 | 47 | 0.0013 |
| 1/4 | TW 4 TW 4UU | 0.2500 | 0.0000 -0.0005 | 0.5000 | 0.750 | 0.000 -0.015 | 0.515 | 0.000 -0.015 | 0.0390 | 0.4687 | 1/16 | 4 | 60 | 80 | 0.008 0.009 |
| 3/8 | TW 6 TW 6UU | 0.3750 | 0.0000 -0.0005 | 0.6250 | 0.875 | 0.000 -0.015 | 0.703 | 0.000 -0.015 | 0.0390 | 0.5880 | 1/16 | 4 | 95 | 120 | 0.013 0.014 |
| 1/2 | TW 8 TW 8UU | 0.5000 | 0.0000 -0.0005 | 0.8750 | 1.250 | 0.000 -0.020 | 1.032 | 0.000 -0.020 | 0.0459 | 0.8209 | 3/32 | 4 | 230 | 290 | 0.042 0.043 |
| 5/8 | TW 10 TW 10UU | 0.6250 | 0.0000 -0.0005 | 1.1250 | 1.500 | 0.000 -0.020 | 1.112 | 0.000 -0.020 | 0.0559 | 1.0590 | 1/8 | 5 | 400 | 500 | 0.101 0.103 |
| 3/4 | TW 12 TW 12UU | 0.7500 | 0.0000 -0.0005 | 1.2500 | 1.625 | 0.000 -0.020 | 1.272 | 0.000 -0.020 | 0.0559 | 1.1760 | 1/8 | 6 | 470 | 590 | 0.123 0.123 |
| 1 | TW 16 TW 16UU | 1.0000 | 0.0000 -0.0005 | 1.5625 | 2.250 | 0.000 -0.020 | 1.886 | 0.000 -0.020 | 0.0679 | 1.4687 | 5/32 | 6 | 850 | 1060 | 0.265 0.265 |
| 1-1/4 | TW 20 TW 20UU | 1.2500 | 0.0000 -0.0006 | 2.0000 | 2.625 | 0.000 -0.025 | 2.011 | 0.000 -0.025 | 0.0679 | 1.8859 | 3/16 | 6 | 1230 | 1530 | 0.485 0.485 |
| 1-1/2 | TW 24 TW 24UU | 1.5000 | 0.0000 -0.0006 | 2.3750 | 3.000 | 0.000 -0.030 | 2.422 | 0.000 -0.030 | 0.0859 | 2.2389 | 7/32 | 6 | 1480 | 1850 | 0.750 0.750 |
| 2 | TW 32 TW 32UU | 2.0000 | 0.0000 -0.0008 | 3.0000 | 4.000 | 0.000 -0.040 | 3.206 | 0.000 -0.040 | 0.1029 | 2.8379 | 1/4 | 6 | 2430 | 3040 | 1.389 1.411 |

(1) Based on nominal housing bore.

(2) See Table 2 for maximum load rating.

(3) See Table 3 for recommended tolerances.

Products

Dimensions and Load Ratings TOPBALL® Open Type TW Open Type

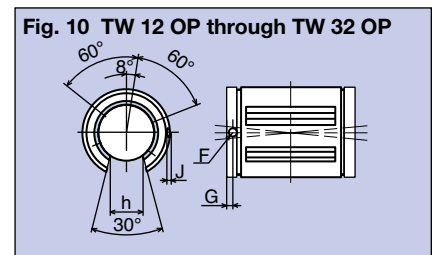
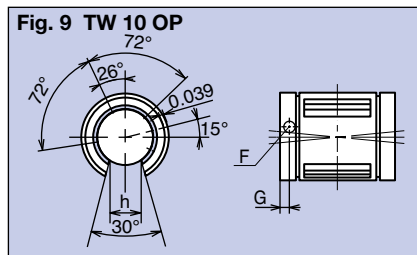
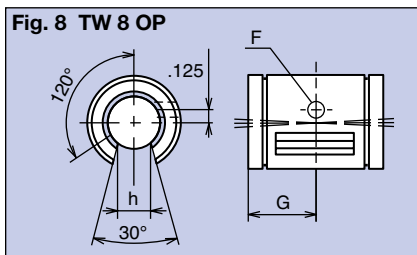


Table 5 OPEN TYPE DIMENSIONS AND LOAD RATINGS

| NOM. SHAFT DIA. (inch) | P/N OPEN & W/SEALS | WORKING DIAMETER (1) | | NOM. O.D. (3) | LENGTH | | RETAINING RINGS | | | | |
|------------------------|-------------------------|----------------------|-------------------|---------------|----------|-----------------|-----------------|-----------------|------------|----------|----------------|
| | | dr (inch) | TOL (inch) | | D (inch) | L (inch) | TOL (inch) | DISTANCE | | W (inch) | DIA. D1 (inch) |
| | | | | | | | | B (inch) | TOL (inch) | | |
| 1/2 | TW 8-OP TW 8 UU-OP | 0.5000 | 0.0000 -0.0005 | 0.8750 | 1.250 | 0.000 -0.020 | 1.032 | 0.000 -0.020 | 0.0459 | 0.8209 | |
| 5/8 | TW 10-OP TW 10 UU-OP | 0.6250 | 0.0000 -0.0005 | 1.1250 | 1.500 | 0.000 -0.020 | 1.112 | 0.000 -0.020 | 0.0559 | 1.0590 | |
| 3/4 | TW 12-OP TW 12 UU-OP | 0.7500 | 0.0000 -0.0005 | 1.2500 | 1.625 | 0.000 -0.020 | 1.272 | 0.000 -0.020 | 0.0559 | 1.1760 | |
| 1 | TW 16-OP TW 16 UU-OP | 1.0000 | 0.0000 -0.0005 | 1.5625 | 2.250 | 0.000 -0.020 | 1.886 | 0.000 -0.020 | 0.0679 | 1.4687 | |
| 1-1/4 | TW 20-OP TW 20 UU-OP | 1.2500 | 0.0000 0.0006 | 2.0000 | 2.625 | 0.000 -0.025 | 2.011 | 0.000 -0.025 | 0.0679 | 1.8859 | |
| 1-1/2 | TW 24-OP TW 24 UU-OP | 1.5000 | 0.0000 -0.0006 | 2.3750 | 3.000 | 0.000 -0.030 | 2.422 | 0.000 -0.030 | 0.0859 | 2.2389 | |
| 2 | TW 32-OP TW 32 UU-OP | 2.0000 | 0.0000 -0.0008 | 3.0000 | 4.000 | 0.000 -0.040 | 3.206 | 0.000 -0.040 | 0.1029 | 2.8379 | |

Table 5 CONTINUED

| NOM. SHAFT DIA. (inch) | P/N OPEN & W/SEALS | SLOT WIDTH h (inch) | RETENTION HOLE | | | BALL DIA. (inch) | NO. OF ROWS | LOAD RATINGS (2) | | Wt. (lbs.) |
|------------------------|-------------------------|---------------------|----------------|---------------|----------------|------------------|-------------|------------------|------------------------------|----------------|
| | | | DIA. F (inch) | LOC. G (inch) | DEPTH J (inch) | | | DYNAMIC C (lbs.) | STATIC C ₀ (lbs.) | |
| | | | | | | | | | | |
| 1/2 | TW 8-OP TW 8 UU-OP | 0.313 | 0.136 | 0.6250 | Thru hole | 3/32 | 3 | 230 | 290 | 0.033 0.033 |
| 5/8 | TW 10-OP TW 10 UU-OP | 0.375 | 0.105 | 0.1250 | 0.0390 | 1/8 | 4 | 400 | 500 | 0.082 0.083 |
| 3/4 | TW 12-OP TW 12 UU-OP | 0.438 | 0.136 | 0.1250 | 0.0590 | 1/8 | 5 | 470 | 590 | 0.101 0.102 |
| 1 | TW 16-OP TW 16 UU-OP | 0.563 | 0.136 | 0.1250 | 0.0470 | 5/32 | 5 | 850 | 1060 | 0.220 0.220 |
| 1-1/4 | TW 20-OP TW 20 UU-OP | 0.625 | 0.201 | 0.1875 | 0.0900 | 3/16 | 5 | 1230 | 1530 | 0.397 0.419 |
| 1-1/2 | TW 24-OP TW 24 UU-OP | 0.750 | 0.201 | 0.1875 | 0.0900 | 7/32 | 5 | 1480 | 1850 | 0.617 0.639 |
| 2 | TW 32-OP TW 32 UU-OP | 1.000 | 0.265 | 0.3125 | Thru hole | 1/4 | 5 | 2430 | 3040 | 1.146 1.168 |

(1) Based on nominal housing bore.







(2) See Table 2 for maximum load rating.

(3) See Table 3 for recommended tolerances.

TOPBALL

Slide Unit Introduction/Design Features

NB TOPBALL Slide Units include a clear anodized corrosion resistant aluminum block and either one or two TOPBALL self-aligning slide bushings. Closed and adjustable clearance styles incorporate machined snap ring grooves in combination with standard retaining rings for slide bush retention. The open style incorporates bottom plates and mounting screws to retain bushing in proper position. All styles are provided with standard machined reference edges for proper alignment and installation.

| WIDE / SPECIFICATION | | HOUSING TYPE | | |
|----------------------|---|---|--|---|
| | | BLOCK | ADJUSTABLE | OPEN |
| SINGLE | SINGLE; <ul style="list-style-type: none"> • Conventional Type • Self-Aligning Capability • High Load Capacity compared with SW type units | TWA  | TWJ  | TWD  |
| | | TWA-W  | TWJ-W  | TWD-W  |
| DOUBLE | DOUBLE; <ul style="list-style-type: none"> • Compact Tandem Design • Oiling feature available • Double Capacity compared with single type units | | | |

Explanation Of TOPBALL SLIDE UNIT P/N (Part Number) Symbols

| TW | # | W | UU |
|-------------------------|----------------------------------|--|-------------------------------|
| Series | Inscribed Circle Diameter (inch) | Width Symbol | Seal Symbol |
| TWA =Block | 4 =0.250 | W =Double Width | UU =Seals on Both Ends |
| TWJ = Adjustable | 6 =0.375 | No Entry= Single Width | No Entry=No Seals |
| TWD = Open | 8 =0.500 | Example: You need a slide bush in a block that is adjustable, has a 3/4" interior diameter, with seals, and is double wide. Order TWJ12UU. For Ordering Assistance Call 1-800-521-2045. See page 26-27 for ordering information. | |
| | 10 =0.625 | | |
| | 12 =0.750 | | |
| | 16 =1.000 | | |
| | 20 =1.250 | | |
| | 24 =1.500 | | |
| | 32 =2.000 | | |

Slide Units

TWA Block Type

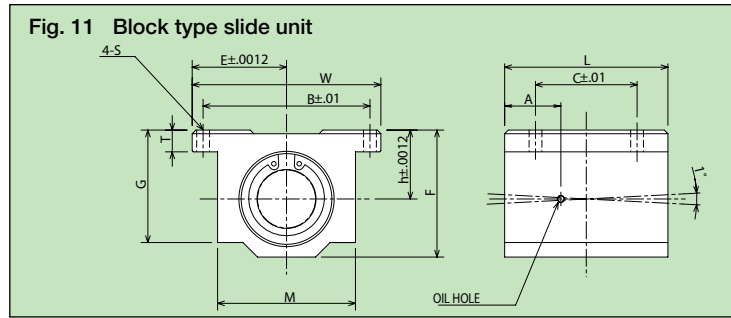


Table 6 BLOCK TYPE DIMENSIONS AND LOAD RATINGS

| NB PART NUMBER | NOM. SHAFT DIA. (inch) | MAIN DIMENSIONS (inch) | | | | | | | | MOUNTING DIMENSIONS (inch) | | | LOAD RATING | | Wt. (lbs.) |
|----------------|------------------------|------------------------|-----------|-------|-------|-------|------|-------|-------|----------------------------|---------|------|-------------|-----------|------------|
| | | h ± .0012 | E ± .0012 | W | L | F | T | G | M | B ± .01 | C ± .01 | S | C (lbs.) | C0 (lbs.) | |
| TWA 4UU | 1/4 | .4370 | .8125 | 1.625 | 1.188 | .813 | .188 | .750 | 1.000 | 1.312 | .750 | .156 | 60 | 80 | .090 |
| TWA 6UU | 3/8 | .5000 | .8750 | 1.750 | 1.313 | .938 | .188 | .875 | 1.125 | 1.437 | .875 | .156 | 95 | 120 | .120 |
| TWA 8UU | 1/2 | .6870 | 1.0000 | 2.000 | 1.688 | 1.250 | .250 | 1.125 | 1.375 | 1.688 | 1.000 | .156 | 230 | 290 | .248 |
| TWA 10UU | 5/8 | .8750 | 1.2500 | 2.500 | 1.938 | 1.625 | .281 | 1.437 | 1.750 | 2.125 | 1.125 | .188 | 400 | 500 | .465 |
| TWA 12UU | 3/4 | .9370 | 1.3750 | 2.750 | 2.063 | 1.750 | .313 | 1.563 | 1.875 | 2.375 | 1.250 | .188 | 470 | 590 | .553 |
| TWA 16UU | 1 | 1.1870 | 1.6250 | 3.250 | 2.813 | 2.188 | .375 | 1.938 | 2.375 | 2.875 | 1.750 | .219 | 850 | 1060 | 1.200 |
| TWA 20UU | 1-1/4 | 1.5000 | 2.0000 | 4.000 | 3.625 | 2.813 | .438 | 2.500 | 3.000 | 3.500 | 2.000 | .219 | 1230 | 1530 | 2.380 |
| TWA 24UU | 1-1/2 | 1.7500 | 2.3750 | 4.750 | 4.000 | 3.250 | .500 | 2.875 | 3.500 | 4.125 | 2.500 | .281 | 1480 | 1850 | 3.460 |
| TWA 32UU | 2 | 2.1250 | 3.0000 | 6.000 | 5.000 | 4.063 | .625 | 3.625 | 4.500 | 5.250 | 3.250 | .406 | 2430 | 3040 | 6.830 |

TWA-W Block Type Double Wide

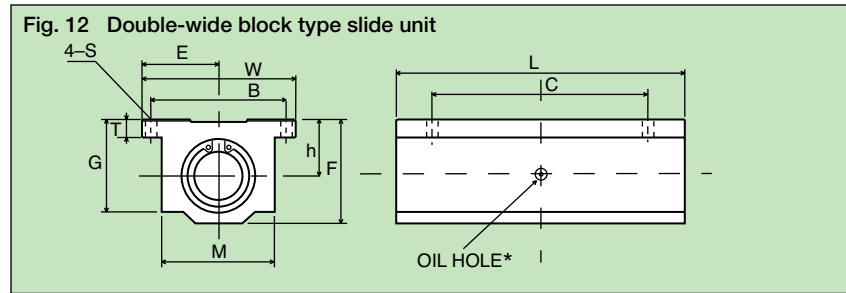


Table 7 DOUBLE-WIDE BLOCK TYPE DIMENSIONS AND LOAD RATINGS

| NB PART NUMBER | NOM. SHAFT DIA. (inch) | MAIN DIMENSIONS (inch) | | | | | | | | MOUNTING DIMENSIONS (inch) | | | LOAD RATING | | Wt. (lbs.) |
|----------------|------------------------|------------------------|-----------|-------|-------|-------|------|-------|-------|----------------------------|---------|------|-------------|-----------|------------|
| | | h ± .0012 | E ± .0012 | W | L | F | T | G | M | B ± .01 | C ± .01 | S | C (lbs.) | C0 (lbs.) | |
| TWA 4WUU | 1/4 | .4370 | .8125 | 1.625 | 2.500 | .813 | .188 | .750 | 1.000 | 1.312 | 2.000 | .156 | 96 | 160 | .190 |
| TWA 6WUU | 3/8 | .5000 | .8750 | 1.750 | 2.750 | .938 | .188 | .875 | 1.125 | 1.437 | 2.250 | .156 | 150 | 240 | .250 |
| TWA 8WUU | 1/2 | .6870 | 1.0000 | 2.000 | 3.500 | 1.250 | .250 | 1.125 | 1.375 | 1.688 | 2.500 | .156 | 370 | 580 | .510 |
| TWA 10WUU | 5/8 | .8750 | 1.2500 | 2.500 | 4.000 | 1.625 | .281 | 1.437 | 1.750 | 2.125 | 3.000 | .188 | 640 | 1000 | 1.000 |
| TWA 12WUU | 3/4 | .9370 | 1.3750 | 2.750 | 4.500 | 1.750 | .313 | 1.563 | 1.875 | 2.375 | 3.500 | .188 | 750 | 1180 | 1.200 |
| TWA 16WUU | 1 | 1.1870 | 1.6250 | 3.250 | 6.000 | 2.188 | .375 | 1.938 | 2.375 | 2.875 | 4.500 | .219 | 1360 | 2120 | 2.400 |
| TWA 20WUU | 1-1/4 | 1.5000 | 2.0000 | 4.000 | 7.500 | 2.813 | .438 | 2.500 | 3.000 | 3.500 | 5.500 | .219 | 1970 | 3060 | 5.000 |
| TWA 24WUU | 1-1/2 | 1.7500 | 2.3750 | 4.750 | 9.000 | 3.250 | .500 | 2.875 | 3.500 | 4.125 | 6.500 | .281 | 2370 | 3700 | 7.800 |

*Provided with push-in oil fitting for 1/4" to 1/2" sizes. Sizes from 5/8" to 2" offer a 1/4-28 tapped hole with a plug for adding a fitting if desired.

TOPBALL

TWJ Adjustable Type

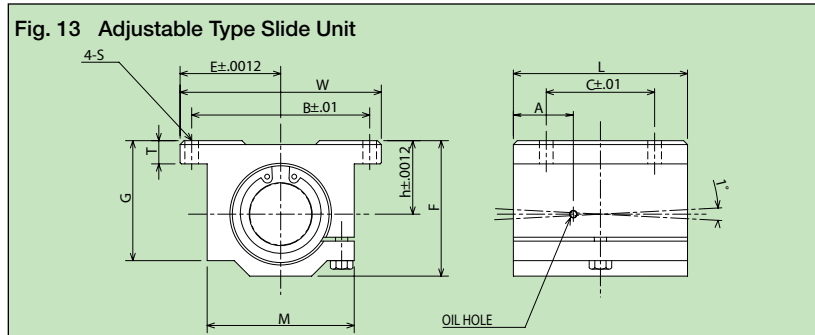


Table 8 ADJUSTABLE TYPE DIMENSIONS AND LOAD RATINGS

| NB PART NUMBER | NOM. SHAFT DIA. (inch) | MAIN DIMENSIONS (inch) | | | | | | | | MOUNTING DIMENSIONS (inch) | | | LOAD RATING | | Wt. (lbs.) |
|----------------|------------------------|------------------------|-----------|-------|-------|-------|------|-------|-------|----------------------------|---------|------|------------------|------------------|------------|
| | | h ± .0012 | E ± .0012 | W | L | F | T | G | M | B ± .01 | C ± .01 | S | DYNAMIC C (lbs.) | STATIC C0 (lbs.) | |
| TWJ 4 UU | 1/4 | .4370 | .8125 | 1.625 | 1.188 | .813 | .188 | .750 | 1.000 | 1.312 | .750 | .156 | 60 | 80 | .090 |
| TWJ 6 UU | 3/8 | .5000 | .8750 | 1.750 | 1.313 | .938 | .188 | .875 | 1.125 | 1.437 | .875 | .156 | 95 | 120 | .120 |
| TWJ 8 UU | 1/2 | .6870 | 1.0000 | 2.000 | 1.688 | 1.250 | .250 | 1.125 | 1.375 | 1.688 | 1.000 | .156 | 230 | 290 | .248 |
| TWJ 10 UU | 5/8 | .8750 | 1.2500 | 2.500 | 1.938 | 1.625 | .281 | 1.437 | 1.750 | 2.125 | 1.125 | .188 | 400 | 500 | .465 |
| TWJ 12 UU | 3/4 | .9370 | 1.3750 | 2.750 | 2.063 | 1.750 | .313 | 1.563 | 1.875 | 2.375 | 1.250 | .188 | 470 | 590 | .553 |
| TWJ 16 UU | 1 | 1.1870 | 1.6250 | 3.250 | 2.813 | 2.188 | .375 | 1.938 | 2.375 | 2.875 | 1.750 | .219 | 850 | 1060 | 1.200 |
| TWJ 20 UU | 1-1/4 | 1.5000 | 2.0000 | 4.000 | 3.625 | 2.813 | .438 | 2.500 | 3.000 | 3.500 | 2.000 | .219 | 1230 | 1530 | 2.380 |
| TWJ 24 UU | 1-1/2 | 1.7500 | 2.3750 | 4.750 | 4.000 | 3.250 | .500 | 2.875 | 3.500 | 4.125 | 2.500 | .281 | 1480 | 1850 | 3.460 |
| TWJ 32 UU | 2 | 2.1250 | 3.0000 | 6.000 | 5.000 | 4.063 | .625 | 3.625 | 4.500 | 5.250 | 3.250 | .406 | 2430 | 3040 | 6.830 |

TWJ-W Adjustable Type Double Wide

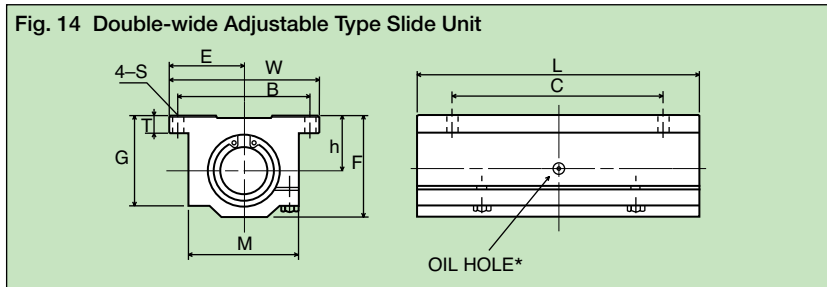


Table 9 DOUBLE-WIDE ADJUSTABLE TYPE DIMENSIONS AND LOAD RATINGS

| NB PART NUMBER | NOM. SHAFT DIA. (inch) | MAIN DIMENSIONS (inch) | | | | | | | | MOUNTING DIMENSIONS (inch) | | | LOAD RATING | | Wt. (lbs.) |
|----------------|------------------------|------------------------|-----------|-------|-------|-------|------|-------|-------|----------------------------|---------|------|------------------|------------------|------------|
| | | h ± .0012 | E ± .0012 | W | L | F | T | G | M | B ± .01 | C ± .01 | S | DYNAMIC C (lbs.) | STATIC C0 (lbs.) | |
| TWJ 4WUU | 1/4 | .4370 | .8125 | 1.625 | 2.500 | .813 | .188 | .750 | 1.000 | 1.312 | 2.000 | .156 | 96 | 160 | .190 |
| TWJ 6WUU | 3/8 | .5000 | .8750 | 1.750 | 2.750 | .938 | .188 | .875 | 1.125 | 1.437 | 2.250 | .156 | 150 | 240 | .250 |
| TWJ 8WUU | 1/2 | .6870 | 1.0000 | 2.000 | 3.500 | 1.250 | .250 | 1.125 | 1.375 | 1.688 | 2.500 | .156 | 370 | 580 | .510 |
| TWJ 10WUU | 5/8 | .8750 | 1.2500 | 2.500 | 4.000 | 1.625 | .281 | 1.437 | 1.750 | 2.125 | 3.000 | .188 | 640 | 1000 | 1.000 |
| TWJ 12WUU | 3/4 | .9370 | 1.3750 | 2.750 | 4.500 | 1.750 | .313 | 1.563 | 1.875 | 2.375 | 3.500 | .188 | 750 | 1180 | 1.200 |
| TWJ 16WUU | 1 | 1.1870 | 1.6250 | 3.250 | 6.000 | 2.188 | .375 | 1.938 | 2.375 | 2.875 | 4.500 | .219 | 1360 | 2120 | 2.400 |
| TWJ 20WUU | 1-1/4 | 1.5000 | 2.0000 | 4.000 | 7.500 | 2.813 | .438 | 2.500 | 3.000 | 3.500 | 5.500 | .219 | 1970 | 3060 | 5.000 |
| TWJ 24WUU | 1-1/2 | 1.7500 | 2.3750 | 4.750 | 9.000 | 3.250 | .500 | 2.875 | 3.500 | 4.125 | 6.500 | .281 | 2370 | 3700 | 7.800 |

*Provided with push-in oil fitting for 1/4" to 1/2" sizes. Sizes from 5/8" to 2" offer a 1/4-28 tapped hole with a plug for adding a fitting if desired.

Slide Units

TWD Open Type

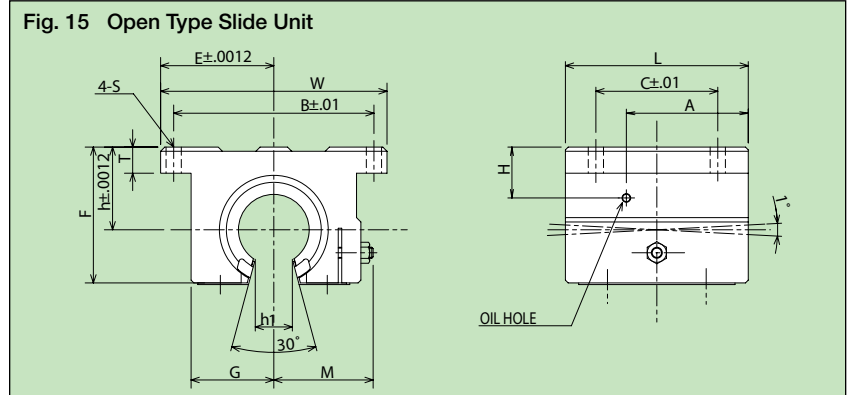


Table 10 OPEN TYPE DIMENSIONS AND LOAD RATINGS

| NB PART NUMBER | NOM. SHAFT DIA. (inch) | MAIN DIMENSIONS (inch) | | | | | | | | | MOUNTING DIMENSIONS (inch) | | | LOAD RATING | | Wt. (lbs.) |
|----------------|------------------------|------------------------|-----------|-------|-------|-------|------|-------|------|----------------|----------------------------|---------|------|-------------|-----------|------------|
| | | h ± .0012 | E ± .0012 | W | L | F | T | G | M | h ₁ | B ± .01 | C ± .01 | S | C (lbs.) | C0 (lbs.) | |
| TWD 8UU | 1/2 | .6870 | 1.000 | 2.000 | 1.500 | 1.100 | .250 | .688 | .86 | .260 | 1.688 | 1.000 | .156 | 230 | 290 | .188 |
| TWD 10UU | 5/8 | .8750 | 1.2500 | 2.500 | 1.750 | 1.405 | .281 | .875 | 1.06 | .319 | 2.125 | 1.125 | .188 | 400 | 500 | .365 |
| TWD 12UU | 3/4 | .9370 | 1.3750 | 2.750 | 1.875 | 1.535 | .315 | .937 | 1.12 | .386 | 2.375 | 1.250 | .188 | 470 | 590 | .452 |
| TWD 16UU | 1 | 1.1870 | 1.6250 | 3.250 | 2.625 | 1.975 | .375 | 1.188 | 1.40 | .512 | 2.875 | 1.750 | .218 | 850 | 1060 | 1.010 |
| TWD 20UU | 1-1/4 | 1.5000 | 2.0000 | 4.000 | 3.375 | 2.485 | .437 | 1.500 | 1.88 | .569 | 3.500 | 2.000 | .218 | 1230 | 1530 | 1.980 |
| TWD 24UU | 1-1/2 | 1.7500 | 2.3750 | 4.750 | 3.750 | 2.910 | .500 | 1.750 | 2.12 | .681 | 4.125 | 2.500 | .281 | 1480 | 1850 | 2.950 |
| TWD 32UU | 2 | 2.1250 | 3.0000 | 6.000 | 4.750 | 3.660 | .625 | 2.250 | 2.70 | .933 | 5.250 | 3.250 | .406 | 2430 | 3040 | 5.840 |

TWD Open Type Double Wide

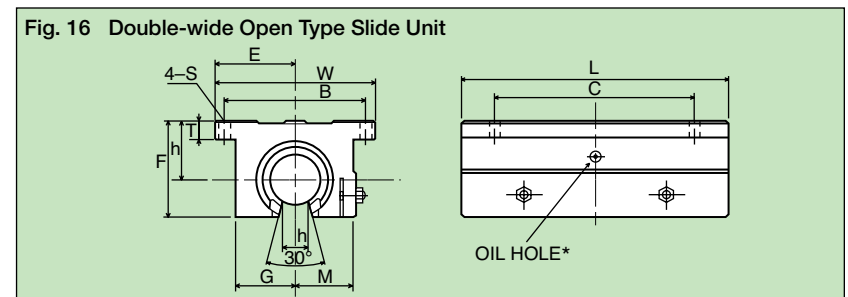


Table 11 DOUBLE-WIDE OPEN TYPE DIMENSIONS AND LOAD RATINGS

| NB PART NUMBER | NOM. SHAFT DIA. (inch) | MAIN DIMENSIONS (inch) | | | | | | | | | MOUNTING DIMENSIONS (inch) | | | LOAD RATING | | Wt. (lbs.) |
|----------------|------------------------|------------------------|-----------|-------|-------|-------|------|-------|------|----------------|----------------------------|---------|------|-------------|-----------|------------|
| | | h ± .0012 | E ± .0012 | W | L | F | T | G | M | h ₁ | B ± .01 | C ± .01 | S | C (lbs.) | C0 (lbs.) | |
| TWD 8WUU | 1/2 | .6870 | 1.000 | 2.000 | 3.500 | 1.100 | .250 | .688 | .86 | .260 | 1.688 | 2.500 | .156 | 370 | 580 | .400 |
| TWD 10WUU | 5/8 | .8750 | 1.2500 | 2.500 | 4.000 | 1.405 | .281 | .875 | 1.06 | .319 | 2.125 | 3.000 | .188 | 640 | 1000 | .800 |
| TWD 12WUU | 3/4 | .9370 | 1.3750 | 2.750 | 4.500 | 1.535 | .315 | .937 | 1.12 | .386 | 2.375 | 3.500 | .188 | 750 | 1180 | 1.000 |
| TWD 16WUU | 1 | 1.1870 | 1.6250 | 3.250 | 6.000 | 1.975 | .375 | 1.188 | 1.40 | .512 | 2.875 | 4.500 | .218 | 1360 | 2120 | 2.000 |
| TWD 20WUU | 1-1/4 | 1.5000 | 2.0000 | 4.000 | 7.500 | 2.485 | .437 | 1.500 | 1.88 | .569 | 3.500 | 5.500 | .218 | 1970 | 3060 | 4.200 |
| TWD 24WUU | 1-1/2 | 1.7500 | 2.3750 | 4.750 | 9.000 | 2.910 | .500 | 1.750 | 2.12 | .681 | 4.125 | 6.500 | .281 | 2370 | 3700 | 6.700 |

*Provided with push-in oil fitting for 1/2" size only. Sizes from 5/8" to 2" offer a 1/4-28 tapped hole with a plug for adding a fitting if desired.

Slide Shaft

Specification of NB Slide Shafts

Materials

Materials of NB slide shafts are selected AISI 52100, 1060, and 440C (or equivalent) on the basis of hardenability, fatigue strength, wear resistance, and toughness.

| | |
|------------|---|
| AISI 52100 | High carbon chromium bearing steel Most-used steel for bearings |
| AISI 1060 | High carbon alloy steel The most popular steel in linear motion shafts |
| AISI 440C | Martensite stainless steel A hardenable stainless steel |

Other materials may also be available, please contact NB

Heat Treatment

NB slide shafts are case hardened with controlled surface hardness and consistent adequate hardness depth. If the hardness depth is not great enough it will cause early failure to both the shaft and bushing.

NB controls the surface hardness by using high frequency induction hardening techniques. The surface hardness for SFW type (AISI 52100, 1060, or equivalent) is 60-64 Rc, SFWS Stainless type (AISI 440C or equivalent) is 52-56 Rc.

Surface Roughness & Straightness

NB slide shafts are finished to a surface roughness of 10-16 micro inches RMS. Straightness of shafts is maintained at 0.001" - 0.002" per foot.

Surface finish of shafting must be kept consistent to maintain proper operation of bushing and to maintain the proper life of the bearing system.

Diameter Tolerance and Length Tolerance

NB recommends (g6) ISO tolerance shafting for standard high grade linear motion bearings and (h5) ISO tolerance for precision grade linear motion bearings. Both (g6) & (h5) tolerance shafting are available from stock in particular standard lengths or can be cut to special lengths with a tolerance of $\pm 1/32"$ for less than 2" diameter shafts, and $\pm 1/16"$ for over 2" diameter. The maximum standard length of (g6) tolerance shafting is available in continuous usable length but with rough ends. The maximum standard length of (h5) tolerance are available in continuous usable length with finished ends. NB's maximum standard stock lengths are shown in the table provided. Special diameter tolerance and special length tolerance are also available. Please contact your NB sales representative for details.

Explanation Slide Shaft (Part Number) Symbols

| SFW | # | h5 | x | 72 | - | PD |
|---|-------------------------------|------------------|---|--------------------------|---|--------------------------|
| Series | Nominal Shaft Diameter (Inch) | Tolerance | | Overall Length In Inches | | Shaft Modifications |
| SFW = Carbon Steel | 2=0.125 | h5=ISO h5 | | | | PD=Pre-Drilled |
| SFWS = Anti-Corrosive | 3=0.1875 | No Entry= ISO g6 | | | | M=Custom Shaft |
| Example: You need an anti-corrosive slide shaft that has a 2" diameter, is ISO g6, is 72" long with no holes. Order SFWS32x72. | 4=0.250 | | | | | No Entry= Straight Shaft |
| | 6=0.375 | | | | | |
| | 8=0.500 | | | | | |
| | 10=0.625 | | | | | |
| | 12=0.750 | | | | | |
| | 16=1.000 | | | | | |
| | 20=1.250 | | | | | |
| | 24=1.500 | | | | | |
| | 32=2.000 | | | | | |



Features

- Case hardened
- Ground steel shafting
- Improves bearing life:
Better surface hardness
Better depth of hardness
Better surface roughness
Better cylindricity
Better straightness
- Stock for high grade bearings (g6) ISO tolerance
- Stock for precision grade bearings h5 tolerance
- Corrosion resistant Shafts 1/8" - 2" Stainless Steel (g6)
- Standard pre-drilled shafts for open bushings 1/2" - 2"

**For Ordering Assistance
Call 1-800-521-2045.**

See page 26-27 for ordering information.

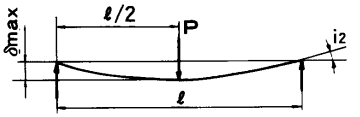
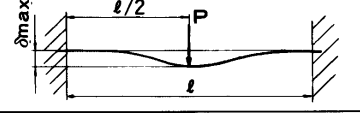
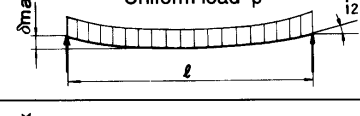
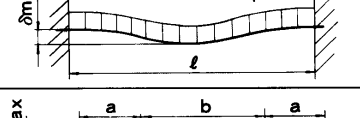
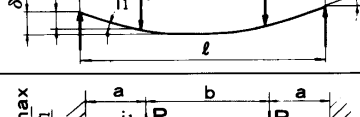
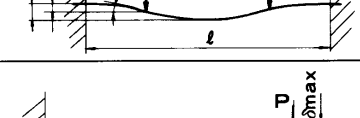
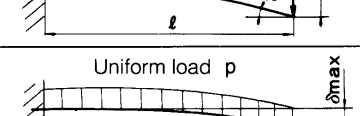
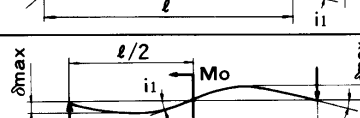
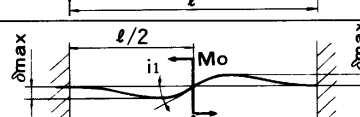
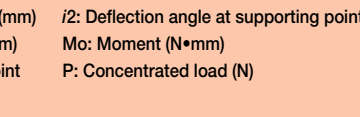
Products

Shaft Deflection and Angle

As Shafts are used for guideways it becomes important that shaft deflection constraints be maintained within certain limits under load. Deflection under load must be maintained otherwise the functioning and service life of the linear bearing assembly could be reduced and cause premature failures.

To aid in the determination of the shaft deflection and its angle, we have established a list of the most common loading conditions and the appropriate calculations for the selected condition. The table below shows the conditions and calculations for the deflection and its angle.

Chart 3

| | Supporting method | Specified conditions | Deflection equation | Deflection angle equation |
|----|--------------------|---|--|--|
| 1 | Free at both ends |  | $\delta_{\max} = \frac{Pl^3}{48EI} = Pl^3C$ | $i_1 = 0$ $i_2 = \frac{Pl^2}{16EI} = Pl^2C$ |
| 2 | Fixed at both ends |  | $\delta_{\max} = \frac{Pl^3}{192EI} = \frac{1}{4}Pl^3C$ | $i_1 = 0$ $i_2 = 0$ |
| 3 | Free at both ends |  | $\delta_{\max} = \frac{5pl^4}{384EI} = \frac{5}{8}pl^4C$ | $i_2 = \frac{pl^3}{24EI} = 2pl^3C$ |
| 4 | Fixed at both ends |  | $\delta_{\max} = \frac{pl^4}{384EI} = \frac{1}{8}pl^4C$ | $i_2 = 0$ |
| 5 | Free at both ends |  | $\delta_1 = \frac{Pa^3}{6EI} \left(2 + \frac{3b}{a}\right) = 8Pa^3 \left(2 + \frac{3b}{a}\right)C$ $\delta_{\max} = \frac{Pa^3}{24EI} \left(\frac{3l^2}{a^2} - 4\right) = 2Pa^3 \left(\frac{3l^2}{a^2} - 4\right)C$ | $i_1 = \frac{Pab}{2EI} = 24PabC$ $i_2 = \frac{Pa(a+b)}{2EI} = 24Pa(a+b)C$ |
| 6 | Fixed at both ends |  | $\delta_1 = \frac{Pa^3}{6EI} \left(2 - \frac{3a}{l}\right) = 8Pa^3 \left(2 - \frac{3a}{l}\right)C$ $\delta_{\max} = \frac{5}{8}pl^4C = 0.27(\text{mm})$ | $i_1 = \frac{Pa^2b}{2EI \cdot l} = \frac{24Pa^2bC}{l}$ $i_2 = 0$ |
| 7 | Fixed at one end |  | $\delta_{\max} = \frac{Pl^3}{3EI} = 16Pl^3C$ | $i_1 = \frac{Pl^2}{2EI} = 24Pl^2C$ $i_2 = 0$ |
| 8 | Fixed at one end |  | $\delta_{\max} = \frac{pl^4}{8EI} = 6pl^4C$ | $i_1 = \frac{pl^3}{6EI} = 8pl^3C$ $i_2 = 0$ |
| 9 | Free at both ends |  | $\delta_{\max} = \frac{\sqrt{3}Mo\ell^2}{216EI} = \frac{2\sqrt{3}}{9}Mo\ell^2C$ | $i_1 = \frac{Mo\ell}{12EI} = 4Mo\ell C$ $i_2 = \frac{Mo\ell}{24EI} = 2Mo\ell C$ |
| 10 | Fixed at both ends |  | $\delta_{\max} = \frac{Mo\ell^2}{216EI} = \frac{2}{9}Mo\ell^2C$ | $i_1 = \frac{Mo\ell}{16EI} = 3Mo\ell C$ $i_2 = 0$ |

Σf_1 : Deflection at loaded point (mm)

Σf_{i_max} : Maximum deflection (mm)

i_1 : Deflection angle at loading point

i_2 : Deflection angle at supporting point

Mo: Moment (N•mm)

P: Concentrated load (N)

p: Uniform load (N/mm)

a,b: Loading point distance (mm)

l: Span (mm)

I: Geometrical moment of inertia (mm⁴)

E: Modulus of direct elasticity 2.1×10^5 (N/mm²)

C: $1/48EI$ (1/N•mm³)

Slide Shaft

Standard Material & Stainless Steel Slide Shafts

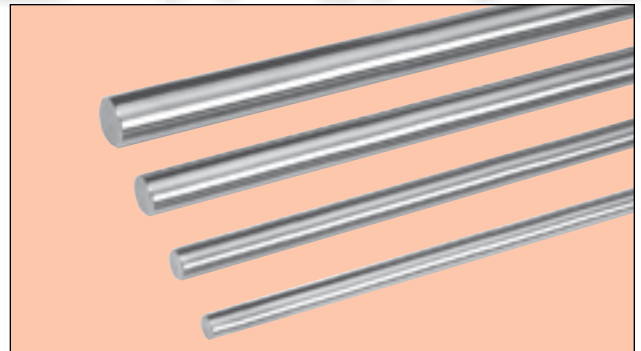
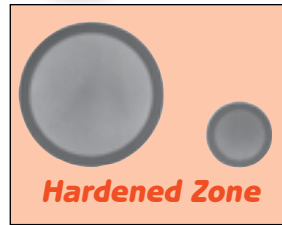


Table 12 STANDARD MATERIAL SLIDE SHAFTS

| NOM. SHAFT DIA. (inch) | STANDARD GRADE | | | PRECISION GRADE | | | MINIMUM HARDNESS DEPTH (inch) | WEIGHT PER INCH (lb) |
|------------------------|----------------|--------------------|--------------------------|-----------------|--------------------|--------------------------|-------------------------------|----------------------|
| | NB PART NUMBER | TOL. ISO g6 (inch) | STOCKED MAX* LGTH (inch) | NB PART NUMBER | TOL. ISO h5 (inch) | STOCKED MAX* LGTH (inch) | | |
| 1/4 | SFW 4xL | -0.0002 -0.0006 | 158 | SFW 4(h5)xL | 0 -0.00025 | 39 | 0.03 | 0.014 |
| 3/8 | SFW 6xL | -0.0002 -0.0006 | 168 | SFW 6(h5)xL | 0 -0.00025 | 78 | 0.03 | 0.031 |
| 1/2 | SFW 8xL | -0.0002 -0.0007 | 186 | SFW 8(h5)xL | 0 -0.00030 | 78 | 0.03 | 0.056 |
| 5/8 | SFW 10xL | -0.0002 -0.0007 | 185 | SFW 10(h5)xL | 0 -0.00030 | 78 | 0.05 | 0.087 |
| 3/4 | SFW 12xL | -0.0003 -0.0008 | 185 | SFW 12(h5)xL | 0 -0.00035 | 78 | 0.06 | 0.125 |
| 1 | SFW 16xL | -0.0003 -0.0008 | 204 | SFW 16(h5)xL | 0 -0.00035 | 78 | 0.06 | 0.222 |
| 1-1/4 | SFW 20xL | -0.0004 -0.0010 | 204 | SFW 20(h5)xL | 0 -0.00045 | 78 | 0.08 | 0.347 |
| 1-1/2 | SFW 24xL | -0.0004 -0.0010 | 208 | SFW 24(h5)xL | 0 -0.00045 | 78 | 0.08 | 0.500 |
| 2 | SFW 32xL | -0.0004 -0.0011 | 204 | SFW 32(h5)xL | 0 -0.00050 | 78 | 0.08 | 0.889 |

*CONTACT NB FOR CURRENT MAXIMUM LENGTH.

Surface Hardness: RC 60-64
Material: AISI 52100, 1060 (or equivalent)

Table 13 STAINLESS STEEL SLIDE SHAFTS

| NOM. SHAFT DIA. (inch) | NB PART NUMBER | TOL. ISO g6 (inch) | STOCKED MAX* LGTH (inch) | MINIMUM HARDNESS DEPTH (inch) | WEIGHT PER INCH (lb) |
|------------------------|----------------|--------------------|--------------------------|-------------------------------|----------------------|
| 1/8 | SFWS 2xL | -0.0002 -0.0005 | 16 | 0.03 | 0.004 |
| 3/16 | SFWS 3xL | -0.0002 -0.0005 | 16 | 0.03 | 0.008 |
| 1/4 | SFWS 4xL | -0.0002 -0.0006 | 158 | 0.03 | 0.014 |
| 3/8 | SFWS 6xL | -0.0002 -0.0006 | 158 | 0.03 | 0.031 |
| 1/2 | SFWS 8xL | -0.0002 -0.0007 | 158 | 0.03 | 0.056 |
| 5/8 | SFWS 10xL | -0.0002 -0.0007 | 158 | 0.05 | 0.087 |
| 3/4 | SFWS 12xL | -0.0003 -0.0008 | 158 | 0.06 | 0.125 |
| 1 | SFWS 16xL | -0.0003 -0.0008 | 222 | 0.06 | 0.222 |
| 1-1/4 | SFWS 20xL | -0.0004 -0.0010 | 204 | 0.08 | 0.347 |
| 1-1/2 | SFWS 24xL | -0.0004 -0.0010 | 158 | 0.08 | 0.500 |
| 2 | SFWS 32xL | -0.0004 -0.0010 | 158 | 0.08 | 0.889 |



Surface Hardness: RC 52-56
Material: AISI 440C (or equivalent)

*CONTACT NB FOR CURRENT MAXIMUM LENGTH.

Products

Pre-Drilled Shafts

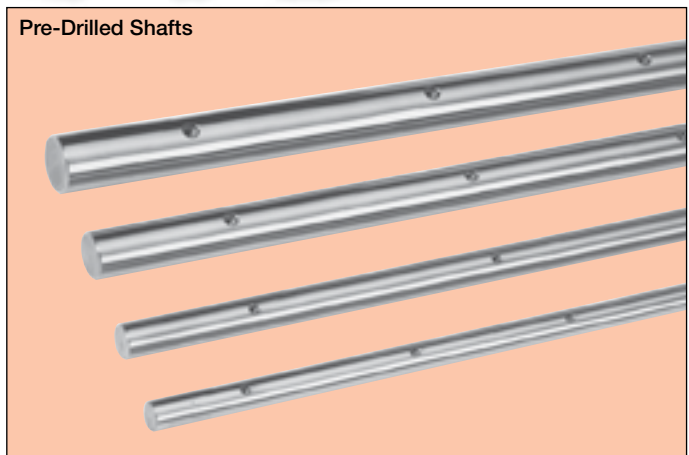
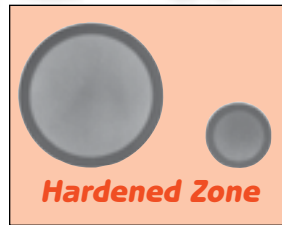


Fig. 17

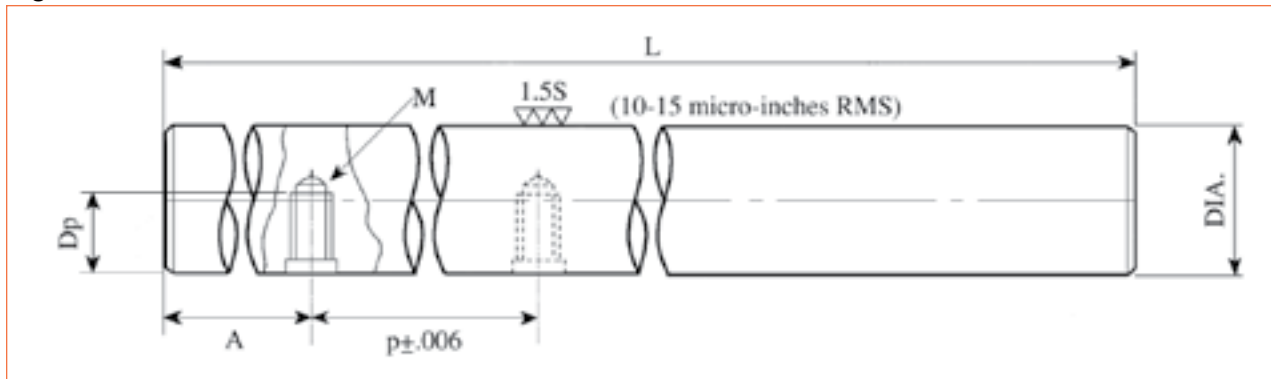


Table 14 PRE-DRILLED SHAFTS

| NOM. SHAFT DIA. (inch) | NB PART NUMBER | TOL. ISO g6 (inch) | STOCKED MAX* LGTH (inch) | HOLE SPACING | | STANDARD THREAD | | MINIMUM HARDNESS DEPTH (inch) | WEIGHT PER INCH (lb) |
|------------------------|----------------|--------------------|--------------------------|--------------|----------|-----------------|-----------|-------------------------------|----------------------|
| | | | | A (inch) | P (inch) | M | Dp (inch) | | |
| 1/2 | SFW 8xL-PD | -0.0002 -0.0007 | 168 | 2 | 4 | 6-32 UNC | 0.28 | 0.03 | 0.056 |
| 5/8 | SFW 10xL-PD | -0.0002 -0.0007 | 180 | 2 | 4 | 8-32 UNC | 0.35 | 0.05 | 0.087 |
| 3/4 | SFW 12xL-PD | -0.0003 -0.0008 | 204 | 3 | 6 | 10-32 UNC | 0.40 | 0.06 | 0.125 |
| 1 | SFW 16xL-PD | -0.0003 -0.0008 | 204 | 3 | 6 | 1/4-20 UNC | 0.50 | 0.06 | 0.222 |
| 1-1/4 | SFW 20xL-PD | -0.0004 -0.0010 | 204 | 3 | 6 | 5/16-18 UNC | 0.65 | 0.08 | 0.347 |
| 1-1/2 | SFW 24xL-PD | -0.0004 -0.0010 | 204 | 4 | 8 | 3/8-16 UNC | 0.70 | 0.08 | 0.500 |
| 2 | SFW 32xL-PD | -0.0004 -0.0011 | 158 | 4 | 8 | 1/2-13 UNC | 0.85 | 0.09 | 0.889 |

*CONTACT NB FOR CURRENT MAXIMUM LENGTH.

Surface Hardness: RC 60-64
Material: AISI 52100, 1060 (or equivalent)

Slide Shaft

For Ordering Assistance

Call 1-800-521-2045

see page 25-26 for ordering information



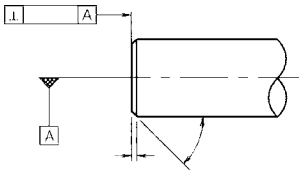
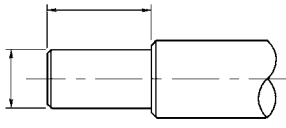
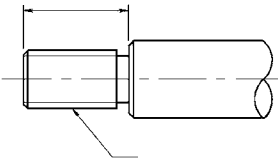
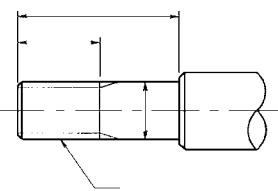
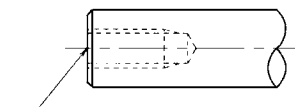
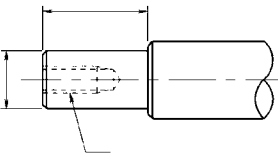
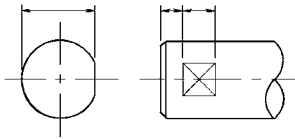
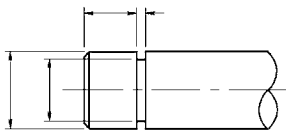
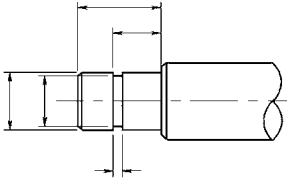
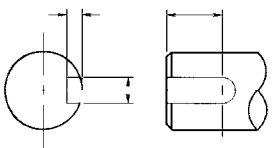
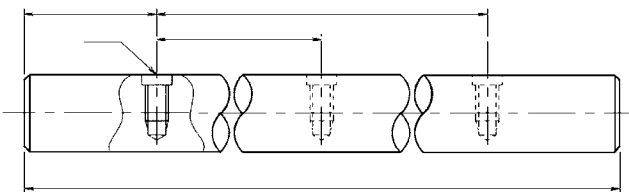
Pre-Cut Slide Shafts

Table 15 PRE-CUT SLIDE SHAFTS

| NB Part Number Prefix | Length (inch) (L) | Nominal Diameter (inch) | Diameter Tolerances (inch) | | Standard Lengths (inch) (L) | | | | | | | | |
|-----------------------|-------------------|-------------------------|----------------------------|--------|-----------------------------|----|----|----|----|----|----|----|---|
| | | | From | To | 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | |
| PC | 4 - ## | .250 | .2498 | .2494 | ◆ | ◆ | ◆ | ◆ | | | | | |
| PC | 6 - ## | .375 | .3748 | .3744 | ◆ | ◆ | ◆ | ◆ | | | | | |
| PC | 8 - ## | .500 | .4998 | .4993 | | ◆ | ◆ | ◆ | ◆ | ◆ | | | |
| PC | 10 - ## | .625 | .6248 | .6243 | | ◆ | ◆ | ◆ | ◆ | ◆ | | | |
| PC | 12 - ## | .750 | .7497 | .7492 | | | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ | |
| PC | 16 - ## | 1.000 | .9997 | .9992 | | | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ |
| PC | 20 - ## | 1.250 | 1.2496 | 1.2490 | | | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ |
| PC | 24 - ## | 1.500 | 1.4996 | 1.4990 | | | ◆ | ◆ | | ◆ | | ◆ | ◆ |

Products

Custom Shafts

| | | |
|---|--|---|
| <p>Example 1</p>  | <p>Example 2</p>  | <p>Example 3</p>  |
| <p>Example 4</p>  | <p>Example 5</p>  | <p>Example 6</p>  |
| <p>Example 7</p>  | <p>Example 8</p>  | <p>Example 9</p>  |
| <p>Example 10</p>  | <p>Example 11</p>  | |

Example 1.
Special Chamfer & Length

Example 2.
Reduced Diameter

Example 3-4.
External Thread

Example 5.
Tapped Hole

Example 6.
Reduced Diameter & Tapped Hole

Example 7.
Flats

Example 8.
External Ring Groove

Example 9.
Reduced Diameter & External Ring Groove

Example 10.
Key Way

Example 11.
Tapped Holes (radial)

NB can offer many custom machined shafts, such as spindles, guide rods, control rods, mandrels, quills, rollers, etc. Please contact our sales representative for details.

Note 1: Recommended maximum tap diameter in example 5 is half of the nominal shaft diameter or slightly larger.

Note 2: In the case of small diameter stainless shafts, the hardness depth may be too deep for additional machining.

All machined shaft requests for quotation must be accompanied by a drawing.

Shaft Support

End Shaft Support: WH-A Type

Precision machined aluminum die cast support blocks provide end support for shafts in applications where slight deflection is not critical.

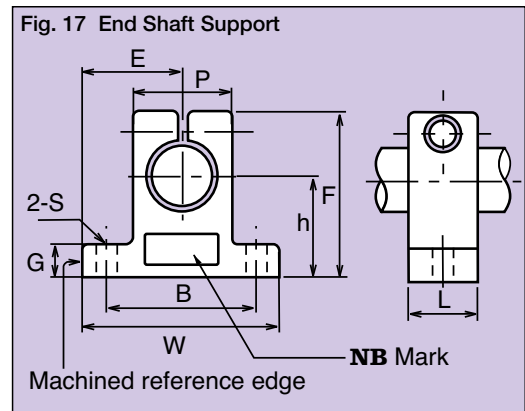


Table 16 END SHAFT SUPPORT DIMENSIONS AND MOUNTING DIMENSIONS

| NB PART NUMBER | NOMINAL SHAFT DIA. (inch) | MAIN DIMENSIONS (inch) | | | | | | | | MOUNTING HOLE(S) | | Wt. (LBS.) |
|----------------|---------------------------|------------------------|----------|-------|-------|-------|------|-------|----------|------------------|--------|------------|
| | | h ± .0010 | E ± .005 | W | L | F | G | P | B + 0.01 | S | BOLT # | |
| WH 4A | 1/4 | .6875 | .7500 | 1.500 | .500 | 1.063 | .250 | .500 | 1.125 | .156 | #6 | .033 |
| WH 6A | 3/8 | .7500 | .8125 | 1.625 | .563 | 1.187 | .250 | .688 | 1.250 | .156 | #6 | .044 |
| WH 8A | 1/2 | 1.0000 | 1.0000 | 2.000 | .625 | 1.625 | .250 | .875 | 1.500 | .188 | #8 | .075 |
| WH 10A | 5/8 | 1.0000 | 1.2500 | 2.500 | .688 | 1.750 | .313 | 1.000 | 1.875 | .218 | #10 | .106 |
| WH 12A | 3/4 | 1.2500 | 1.2500 | 2.500 | .750 | 2.063 | .313 | 1.250 | 2.000 | .218 | #10 | .156 |
| WH 16A | 1 | 1.5000 | 1.5315 | 3.063 | 1.000 | 2.500 | .375 | 1.500 | 2.500 | .281 | 1/4 | .294 |
| WH 20A | 1-1/4 | 1.7500 | 1.8750 | 3.750 | 1.125 | 3.000 | .438 | 2.000 | 3.000 | .346 | 5/16 | .531 |
| WH 24A | 1-1/2 | 2.0000 | 2.1875 | 4.375 | 1.250 | 3.437 | .500 | 2.250 | 3.500 | .346 | 5/16 | .725 |
| WH 32A | 2 | 2.5000 | 2.7500 | 5.500 | 1.500 | 4.375 | .625 | 3.000 | 4.500 | .406 | 3/8 | 1.400 |

Explanation Of END SHAFT SUPPORT P/N (Part Number) Symbols

| WH | # |
|---|-------------------------------|
| Series | Nominal Shaft Diameter (inch) |
| WH=Machined Aluminum, Die Cast, Block | 4A=0.250 |
| | 6A=0.375 |
| | 8A=0.500 |
| Example: You need an end support to support a 3/8" shaft. Order WH6A. | 10A=0.625 |
| | 12A=0.750 |
| | 16A=1.000 |
| | 20A=1.250 |
| | 24A=1.500 |
| | 32A=2.000 |

Explanation Of SHAFT SUPPORT RAIL P/N (Part Number) Symbols

| WA | # | x | 24 | - | PD |
|----------------------------|-------------------------------|---|---|---|---------------------|
| Series | Nominal Shaft Diameter (inch) | | Overall Length In Inches | | Shaft Modifications |
| WA=Inch Aluminum Extrusion | 8=0.500 | | Example: You need a shaft support that is 1½" by 24" with pre-drilled mounting holes. Order WA24x24-PD. | | PD=Pre-Drilled |
| | 10=0.625 | | | | |
| | 12=0.750 | | | | |
| | 16=1.000 | | | | |
| | 20=1.250 | | | | |
| | 24=1.500 | | | | |
| 32=2.000 | | | | | |

For Ordering Assistance
Call 1-800-521-2045.

See page 26-27 for ordering information.

Products

Shaft Support Rail: WA and WA-PD Types

Precision machined aluminum extrusion available with or without pre-drilled mounting holes. Offers continuous shaft support and consistent shaft centerline.

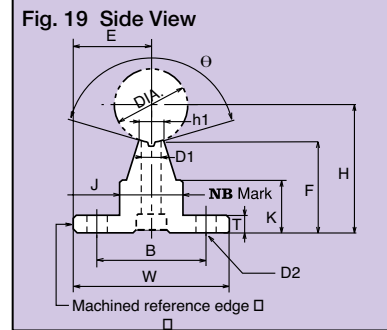
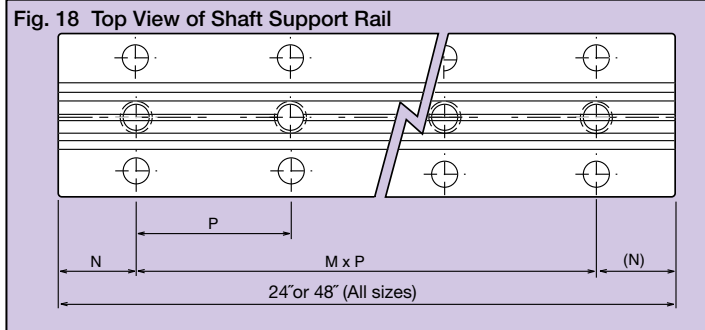


Table 17 SHAFT SUPPORT RAIL DIMENSIONS AND MOUNTING DIMENSIONS

| NB PART NUMBER | NOMINAL SHAFT DIA. (inch) | MAIN DIMENSIONS (inch) | | | | | | | | | | MOUNTING DIMENSIONS (inch) | | | | Wt. (lbs.) | | | |
|----------------|---------------------------|------------------------|-----------|--------|-------|-------|------|-------|-------|----------|---------|----------------------------|-------|-----------|-----------|------------|------|------|-------|
| | | H ± .0010 | E ± .0050 | W | F | T | K | J | h1 | U (Deg.) | B ± .01 | N | M x P | D1 HOLE # | D2 HOLE # | | | | |
| WA 08- | 24 PD | 1/2 | 1.1250 | .7500 | 1-1/2 | .903 | 3/16 | .466 | .500 | .255 | 145° | 1 | 2 | (5) x 4 | .169 | #6 | .169 | #6 | 1.326 |
| | (11) x 4 | | | | | | | | | | | | | 2.652 | | | | | |
| WA 10- | 24 PD | 5/8 | 1.1250 | .8125 | 1-5/8 | .841 | 1/4 | .423 | .500 | .276 | 145° | 1-1/8 | 2 | (5) x 4 | .193 | #8 | .193 | #8 | 1.488 |
| | (11) x 4 | | | | | | | | | | | | | 2.976 | | | | | |
| WA 12- | 24 PD | 3/4 | 1.5000 | .8750 | 1-3/4 | 1.158 | 1/4 | .592 | .625 | .322 | 145° | 1-1/4 | 3 | (3) x 6 | .221 | #10 | .221 | #10 | 2.100 |
| | (7) x 6 | | | | | | | | | | | | | 4.200 | | | | | |
| WA 16- | 24 PD | 1 | 1.7500 | 1.0625 | 2-1/8 | 1.280 | 1/4 | .727 | .875 | .359 | 150° | 1-1/2 | 3 | (3) x 6 | .281 | 1/4 | .281 | 1/4 | 2.776 |
| | (7) x 6 | | | | | | | | | | | | | 5.552 | | | | | |
| WA 20- | 24 PD | 1-1/4 | 2.1250 | 1.2500 | 2-1/2 | 1.537 | 5/16 | .799 | 1.100 | .437 | 150° | 1-7/8 | 3 | (3) x 6 | .343 | 5/16 | .343 | 5/16 | 4.060 |
| | (7) x 6 | | | | | | | | | | | | | 8.120 | | | | | |
| WA 24- | 24 PD | 1-1/2 | 2.5000 | 1.5000 | 3 | 1.798 | 3/8 | .922 | 1.375 | .558 | 150° | 2-1/4 | 4 | (2) x 8 | .406 | 3/8 | .343 | 5/16 | 5.840 |
| | (5) x 8 | | | | | | | | | | | | | 11.680 | | | | | |
| WA 32- | 24 PD | 2 | 3.2500 | 1.8750 | 3-3/4 | 2.322 | 1/2 | 1.450 | 1.500 | .800 | 150° | 2-3/4 | 4 | (2) x 8 | .531 | 1/2 | .406 | 3/8 | 9.500 |
| | (5) x 8 | | | | | | | | | | | | | 19.000 | | | | | |

All sizes are also available without pre-drilled mounting holes. Specify Part Number as WA##-## when ordering. Complete shaft-rail assemblies are also available as well as custom drilling and lengths. Please send drawing for quotation on custom configurations.

Low Shaft Support Rail: LWA (Solid) and LWA-PD (Pre-Drilled) Types

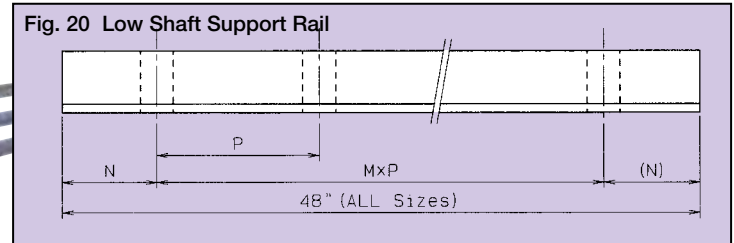
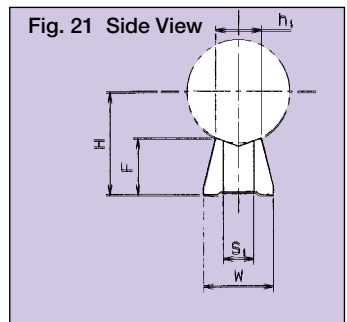


Table 18 LOW SHAFT SUPPORT RAIL DIMENSIONS AND MOUNTING DIMENSIONS

| NB PART NUMBER | NOMINAL SHAFT DIA. (inch) | MAIN DIMENSIONS (inch) | | | MOUNTING DIMENSIONS (inch) | | | | WEIGHT lbs / foot |
|----------------|---------------------------|------------------------|------|----------|----------------------------|-------|---|-------|-------------------|
| | | F | W | H ± .002 | h 1 | S 1 | P | N (3) | |
| LWA 08-48 PD | 1/2 | 0.341 | 0.37 | 0.5625 | 0.216 | 0.169 | 4 | 2 | 0.11 |
| LWA 10-48 PD | 5/8 | 0.405 | 0.45 | 0.6875 | 0.269 | 0.193 | 4 | 2 | 0.17 |
| LWA 12-48 PD | 3/4 | 0.409 | 0.51 | 0.7500 | 0.317 | 0.224 | 6 | 3 | 0.20 |
| LWA 16-48 PD | 1 | 0.545 | 0.69 | 1.0000 | 0.422 | 0.281 | 6 | 3 | 0.35 |
| LWA 20-48 PD | 1-1/4 | 0.617 | 0.78 | 1.1875 | 0.523 | 0.343 | 6 | 3 | 0.44 |
| LWA 24-48 PD | 1-1/2 | 0.691 | 0.93 | 1.3750 | 0.623 | 0.406 | 8 | 4 | 0.58 |
| LWA 32-48 PD | 2 | 0.836 | 1.18 | 1.7500 | 0.824 | 0.531 | 8 | 4 | 0.89 |



Shaft Rail

Slide Units and Shaft Rail Accessories

NB's Slide Units and Shaft Rail accessories are produced to tightly controlled tolerances to provide reliably high performance.

The WSS Shaft Rail Assembly comes to you pre-assembled and ready for use.

For corrosive environments, Stainless Steel Slide Shaft is mated with Aluminum Rail Supports which are clear anodized. Slide Units are also made available with corrosion resistance components.

Longer than Maximum Length Rail supports are available making use of Butt Joint or Dowel Pin Joint - quoted by factory.

NB's Slide Units and Shaft Rail accessories contain referenced edges to provide quick and accurate installation.



Explanation Of SHAFT RAIL ASSEMBLIES P/N (Part Number) Symbols

| WSS | # | x | 144 |
|-------------|-------------------------------|---|---|
| Series | Nominal Shaft Diameter (inch) | | Overall Length In Inches |
| WSS=Inch | 8=0.500 | | Example: You need a slide shaft that has a 1½" diameter and is affixed onto a support that is 48" long. Order WSS24x48". |
| Measurement | 10=0.625 | | |
| Shaft Rail | 12=0.750 | | |
| Assembly | 16=1.000 | | |
| | 20=1.250 | | |
| | 24=1.500 | | |
| | 32=2.000 | | |

**For Ordering Assistance
Call 1-800-521-2045.**

See page 26-27 for ordering information.

Assemblies

Shaft Rail Assemblies: WSS Type

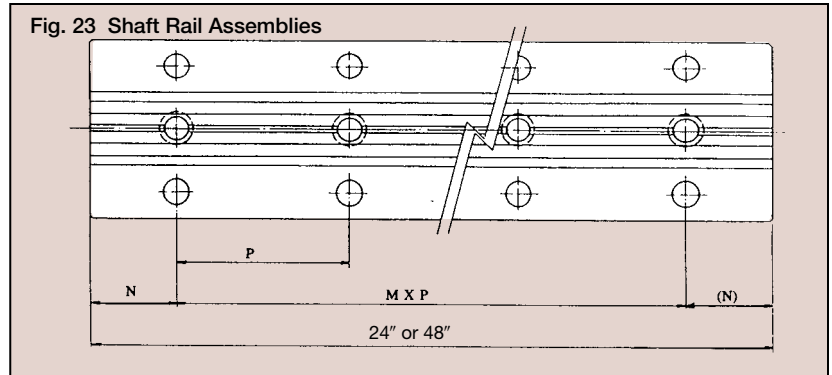
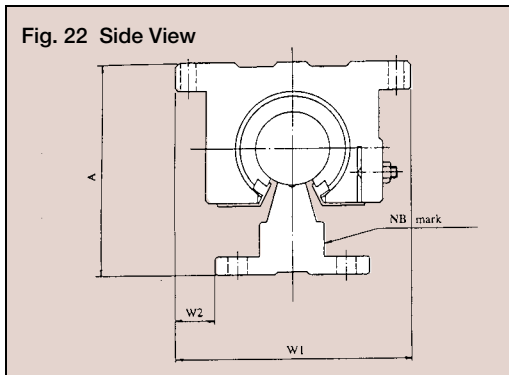


Table 19 Shaft Rail Assembly Dimensions and Mounting Dimensions

| NB Part Number | Nominal Shaft Dia. (inch) | Outer Assembly Dimensions (Inch) | | | Maximum Length 1 - Piece | Base Mounting Holes | | WT / FT Lbs. |
|-------------------|---------------------------|------------------------------------|-------|--------|--------------------------|---------------------|------------|--------------|
| | | A | W 1 | W 2 | | N (Inch) | P (Inch) | |
| WSS 8 x L | 1/2 | 1.812 | 2.000 | .2500 | 144" | 2 | 4 | 1.26 |
| WSS 10 x L | 5/8 | 2.000 | 2.500 | .4375 | 144" | 2 | 4 | 1.83 |
| WSS 12 x L | 3/4 | 2.437 | 2.750 | .5000 | 144" | 3 | 6 | 2.50 |
| WSS 16 x L | 1 | 2.937 | 3.250 | .5625 | 144" | 3 | 6 | 4.06 |
| WSS 20 x L | 1-1/4 | 3.625 | 4.000 | .7500 | 168" | 3 | 6 | 6.28 |
| WSS 24 x L | 1-1/2 | 4.250 | 4.750 | .8750 | 168" | 4 | 8 | 8.60 |
| WSS 32 x L | 2 | 5.375 | 6.000 | 1.1250 | 168" | 4 | 8 | 14.88 |

Notes:

- (1) Specify Length (L) when ordering.
- (2) Reference to nominal shaft diameter, measured while clamped.
- (3) Dimension "N" will be provided equal (both ends) unless otherwise requested.
- (4) Ordering Example:
Need 1-1/2" x 48" order Part Number as WSS 24 x 48.0"
- (5) Longer than "Maximum Std Length" contact NB for quotation.
- (6) For Custom Hole Location or Non-Standard Lengths, contact NB for quotation.



Ordering

Ordering By Part Number

Ordering by part number code makes it unnecessary to specify all the dimensions listed in the tables of specifications associated with each product. All associated dimensions will be indicated by the code.

All you have to do to order is specify:

A. PART CODE

The first letters in the table that symbolize the product series. They also specify whether it is an inch or metric series.

B. DIAMETER CODE

A single code number corresponds to either the inscribed diameter for TOPBALL bushings, or the nominal shaft diameter for all shaft associated products. For example, Code 4 is ¼ inch; diameter Code 16 is 1 inch.

C. WIDTH SYMBOL

Indicate whether block housing is double wide or not.

D. SEAL CODE

Indicate whether TOPBALL bushings and combined TOPBALL block housing units are sealed or not.

E. X LENGTH

Indicate the length of support rails or shafts.

F. SHAFT MODIFICATION

There are only two symbols, PD for Pre-Drilled or M for custom shaft. Indicate which. For non-standard lengths or non-standard hole locations, or any other questions...

**Do not hesitate to call NB Corp.
Customer Service for assistance:
1-800 521-2045**

Explanation Of TOPBALL P/N (Part Number) Symbols

| T | W | # | UU | OP |
|---|------------------|----------------------------------|-------------------------------|----------------------|
| Series | Measurement Type | Inscribed Circle Diameter (inch) | Seal Symbol | Modification |
| T =TOPBALL® | W =Inch | 4 =0.250 | UU =Seals on Both Ends | OP =Open Type |
| Example: You need a slide bush that has a ½" interior diameter, that's not open, with seals on both ends. Order TW8UU. | | 6 =0.375 | No Entry= | No Entry= |
| | | 8 =0.500 | Not Open | No Seals |
| | | 10 =0.625 | (Standard) | |
| | | 12 =0.750 | | |
| | | 16 =1.000 | | |
| | | 20 =1.250 | | |
| | | 24 =1.500 | | |
| | | 32 =2.000 | | |

Explanation Of TOPBALL SLIDE UNIT P/N (Part Number) Symbols

| TW | # | W | UU |
|-------------------------|----------------------------------|--|-------------------------------|
| Series | Inscribed Circle Diameter (Inch) | Width Symbol | Seal Symbol |
| TWA = Block | 4 =0.250 | W =Double Width | UU =Seals on Both Ends |
| TWJ = Adjustable | 6 =0.375 | No Entry= | No Entry= |
| TWD = Open | 8 =0.500 | Single Width | No Seals |
| | 10 =0.625 | | |
| | 12 =0.750 | | |
| | 16 =1.000 | | |
| | 20 =1.250 | | |
| | 24 =1.500 | | |
| | 32 =2.000 | | |
| | | Example: You need a slide bush in a block that is adjustable, has a ¾" interior diameter, with seals and is double wide. Order TWJ12UU. | |

Information

Explanation Slide Shaft (Part Number) Symbols

| SFW | # | h5 | x | 72 | - | PD |
|---|-------------------------------|-------------------|---|--------------------------|---|--------------------------|
| Series | Nominal Shaft Diameter (inch) | Tolerance | | Overall Length In Inches | | Shaft Modifications |
| SFW =Carbon Steel | 2 =0.125 | h5 =ISO h5 | | | | PD =Pre-Drilled |
| SFWS =Anti-Corrosive | 3 =0.1875 | No Entry= ISO g6 | | | | M =Custom Shaft |
| Example: You need an anti-corrosive slide shaft that has a 2" diameter, is ISO g6, is 72" long with no holes. Order SFWS32x72. | 4 =0.250 | | | | | No Entry= Straight Shaft |
| | 6 =0.375 | | | | | |
| | 8 =0.500 | | | | | |
| | 10 =0.625 | | | | | |
| | 12 =0.750 | | | | | |
| | 16 =1.000 | | | | | |
| | 20 =1.250 | | | | | |
| | 24 =1.500 | | | | | |
| | 32 =2.000 | | | | | |

Explanation Of SHAFT RAIL ASSEMBLIES P/N (Part Number) Symbols

| WSS | # | x | 144 |
|--|-------------------------------|---|---|
| Series | Nominal Shaft Diameter (inch) | | Overall Length In Inches |
| WSS =Inch Measurement Shaft Rail Assembly | 8 =0.500 | | Example: You need a slide shaft that has a 1½" diameter and is affixed onto a support that is 48" long. Order WSS24x48". |
| | 10 =0.625 | | |
| | 12 =0.750 | | |
| | 16 =1.000 | | |
| | 20 =1.250 | | |
| | 24 =1.500 | | |
| | 32 =2.000 | | |

Explanation Of END SHAFT SUPPORT P/N (Part Number) Symbols

| WH | # |
|--|-------------------------------|
| Series | Nominal Shaft Diameter (inch) |
| WH =Machined Aluminum, Die Cast, Block | 4A =0.250 |
| | 6A =0.375 |
| | 8A =0.500 |
| Example: You need an end support to support a 3/8" shaft. Order WH6A. | 10A =0.625 |
| | 12A =0.750 |
| | 16A =1.000 |
| | 20A =1.250 |
| | 24A =1.500 |
| | 32A =2.000 |

Explanation Of SHAFT SUPPORT RAIL P/N (Part Number) Symbols

| WA | # | x | 24 | - | PD |
|------------------------------------|-------------------------------|---|--|---|------------------------|
| Series | Nominal Shaft Diameter (inch) | | Overall Length In Inches | | Shaft Modifications |
| WA =Inch Aluminum Extrusion | 8 =0.500 | | Example: You need a shaft support that is 1½" by 24" with pre-drilled mounting holes. Order WA24x24-PD. | | PD =Pre-Drilled |
| | 10 =0.625 | | | | |
| | 12 =0.750 | | | | |
| | 16 =1.000 | | | | |
| | 20 =1.250 | | | | |
| | 32 =2.000 | | | | |

For assistance on any questions, please call 1-800-521-2045

NB

CONTACT INFORMATION

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