

NTN[®]

HAND

NTN BEARPHITE

**OIL-IMPREGNATED
SINTERED BEARINGS
HANDBOOK**



HANDBOOK

CAT. No. 9015-IV/E

NTN BEARPHITE

**OIL-IMPREGNATED
SINTERED BEARINGS
HANDBOOK**

| | | |
|----------|---|-----------|
| 1 | Oil-impregnated sintered bearings | 4 |
| 1.1 | Introduction | 4 |
| 1.2 | Strong points and weak points of the Oil-impregnated sintered bearing | 4 |
| 1.3 | Operation principle of the bearing | 5 |
| 2 | Features of NTN BEARPHITE | 6 |
| 3 | Manufacturing processes for NTN BEARPHITE | 7 |
| 4 | Design for NTN BEARPHITE | 10 |
| 4.1 | Shape and typical applications | 10 |
| 4.2 | Material and typical applications | 11 |
| 4.3 | Bearing selection | 12 |
| 4.3.1 | Allowable PV value and speed | 12 |
| 4.3.2 | Selection of lubricating oil | 13 |
| 4.3.3 | Bearing life | 13 |
| 4.3.4 | Bearing accuracy | 14 |
| 4.3.5 | Shaft specifications | 15 |
| 4.4 | Check items for operating conditions | 16 |
| 4.5 | Bearing design | 17 |
| 4.5.1 | Fitting | 17 |
| 4.5.2 | Study on fitting | 17 |
| 4.5.3 | Mounted clearance | 18 |
| 4.6 | Mounting of the bearing | 19 |
| 4.6.1 | Mounting of the sleeve type bearing and the flange type bearing | 19 |
| 4.6.2 | Mounting of the spherical type bearing | 19 |
| 4.7 | Care and handling of bearings | 20 |
| 4.7.1 | Precautions for mounting bearings | 20 |
| 4.7.2 | Maintenance | 20 |
| 4.7.3 | Storage | 20 |
| 5 | Technical data | 21 |
| 5.1 | Effect of the mating shaft to wear | 21 |
| 5.2 | Relationships of PV value to temperature rise and coefficient of friction depending on the different materials | 22 |
| 5.3 | Relationships of the mounted clearance to temperature rise and coefficient of friction depending on the different lubricating oil | 23 |

| | | |
|-----------|---|-----------|
| 5. 4 | Friction characteristics when the bearing is sliding | 24 |
| 5. 5 | Oil resistance test of the resin | 25 |
| 5. 6 | Evaporative test of the lubricants | 26 |
| 6 | Examples of product application | 27 |
| 7 | Examples of use by application | 28 |
| 8 | Product introduction | 32 |
| | Hydrodynamic BEARPHITE | 32 |
| | Twin BEARPHITE | 34 |
| | Hybrid BEARPHITE | 35 |
| | BEARPHITE SG | 36 |
| | Mini pillow unit | 38 |
| | Parts for machineries use | 40 |
| 9 | Number code | 42 |
| 9. 1 | Oil-impregnated sintered bearings | 42 |
| 9. 2 | Mini pillow unit | 43 |
| 9. 3 | Sintered machinery parts | 43 |
| 10 | Cause of trouble and countermeasures | 44 |
| 11 | Dimension table of the standard product | 46 |
| | Sleeve type bearing | 46 |
| | Flange type bearing | 47 |
| 12 | Dimension table of made-to-order products (when molds are available) | 48 |
| | Sleeve type bearing | 48 |
| | Flange type bearing | 54 |
| | Spherical type bearing | 66 |
| | Mini pillow unit/ Mini flange unit/ Mini side flange unit bearing | 67 |

1
2
3
4
5
6
7
8
9
10
11
12

1. Oil-impregnated sintered bearings

1.1 Introduction

The oil-impregnated sintered bearing is generally called the oil-impregnated bearing, the oil-less bearing, or simply the metal and is defined as “a bearing which is made of the oil-impregnated porous sintered compact mainly composed of metal powder” according to the JIS definition. This is a product in which powder metallurgy is well utilized.

* Powder metallurgy is “a technology concerning manufacturing metal powder and manufacturing parts and products based on forming and sintering of the metal powder” (See JIS Z2500)

Table 1.1 Type of bearing

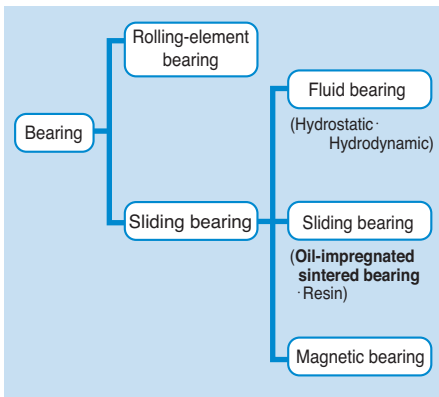


Table 1.2 Coefficient of friction

| Coefficient of friction | | Bearing type |
|-------------------------|------------|---|
| Large | 0.3 ~0.8 | Dry metal Plastic |
| Medium | 0.03~0.3 | Boundary lubrication (Oil-impregnated sintered bearing) |
| Small | 0.001~0.03 | Ball bearing, Roller bearing Fluid bearing (Oil) |
| Very small | 0.001 max. | Hydrostatic bearing Fluid bearing (Air) |

1.2 Strong points and weak points of the oil-impregnated sintered bearing

Strong points

- (1) Time for lubricating work can be saved.
- (2) The composites can be created which are composed of various metals and are not available from the common metal manufacturing method, or from those which are composed of metals and non-metals.
- (3) Machining can be eliminated and the materials can be saved.
- (4) The porous metal materials can be created.
- (5) The noise level generated is lower than that generated by the ball bearing.
- (6) Production cost is cheap if the production number is large, since the mass-productivity is very high.
- (7) No special lubrication system is required.

Weak points

- (1) Coefficient of friction is larger than that of the ball bearing, since this is a sliding bearing.
- (2) It has a limit of *PV* value and is not suitable for high load applications, since this has the “hydraulic pressure-relief groove”.
- (3) Production cost is rather high, if the production number is small.
- (4) Mechanical strength is lower than that made from the ingot materials.
- (5) When machining is required, surface porosity becomes poor.

1.3 Operation principle of the bearing

The oil-impregnated sintered bearing is one of the sliding bearings and requires intervention of the lubricating oil to work normally as the bearing. Although the non-porous bearing made of the ingot metal always requires the lubricating oil applied during operation when it is used, the oil-impregnated sintered bearing does not require lubricating oil, since it has pores in the bearing itself and the lubricating oil is contained inside of these pores. This lubricating oil is circulated and plays the role of

lubricant in the bearing system during operation.

Conditions during halt

In the conditions during halt while the shaft is not rotating, the shaft contacts the lower part of the bore diameter of the bearing due to the self-weight of the body of rotation, and the lubricating oil is absorbed inside the pores of the bearing. When taking a look at the enlarged view of the contact area between the shaft and the bearing, the shaft rests on the surface of the bore diameter of the bearing as shown in **Fig. 1.1**. It is considered that the oil that is filled in the gap between them links with itself like the meshes of a net due to the capillary action.

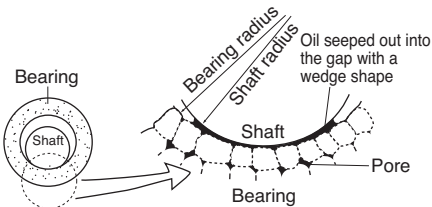


Fig. 1.1 Conditions of the oil-impregnated sintered bearing during halt

Conditions during operation

When the shaft starts rotating, the shaft starts sliding while the slight oil film is being caught in the gap between the shaft and the bearing. If the oil film is thick, contact between the metals of the shaft and the bearing does not occur. The oil film, however, generally is not so thick, and irregularities exist on both surfaces of the shaft and the bearing. Therefore, contact of both metals occurs resulting in generation of friction and frictional heat between the metals.

So far it has been considered that the temperature is raised caused by such frictional heat resulting in decreased oil viscosity contained inside of the bearing and better oil flow, and that the oil is gradually seeped out into the sliding surface of the bearing with the additional help of thermal expansion resulting in providing a lubricating effect. It has been revealed, however, that the effective mechanism called pumping action, in addition to the

thermal effect, works as a mechanism which provides lubrication with the oil that is seeped out from the oil-impregnated sintered bearing. As a result, superiority of the oil-impregnated sintered bearing has been generally known. In other words, the oil inside of the bearing is sucked out due to rotation of the shaft, and the oil flows from the upper part, where the oil pressure is low, to the sliding part which is subjected to high pressure as shown in **Fig. 1.2**. The wedge of the oil generated by this oil flow lifts up the shaft from the bottom surface of the bearing and functions to prevent the contact between these two metals. In addition, since the shaft is shifted towards the rotational direction by the force of the oil flow coming in, the oil pressure distribution on the surface of the bore diameter of the bearing becomes as shown in **Fig. 1.2**.

On the other hand, the oil-impregnated sintered bearing has less load capacity compared with that of the bearing made of the ingot metal, since the oil pressure is reduced due to oil release through the pores even if the oil pressure is generated. However, helped by the existence of these pores, oil circulation by pumping action works effectively for bearing lubrication.

When the shaft stops rotating, the excessive oil on the surface of the bore diameter of the bearing is absorbed again into the pores originally in the sintered metal by the capillary force. Although the oil is actually consumed gradually due to scattering and evaporation, the oil-impregnated sintered bearing can be regarded as an economic bearing which can be used without lubrication functionally.

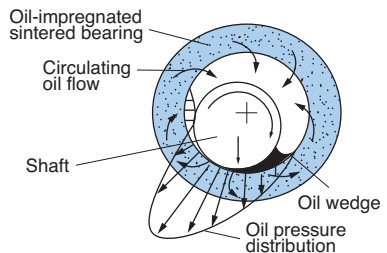


Fig. 1.2 Mechanism of pumping action

2. Features of NTN BEARPHITE

- (1) **NTN BEARPHITE** Bearings incorporate a unique material comprising a metal combined with a fine powder of quality natural graphite. This material contributes to excellent bearing performance across a wide variety of applications.

The graphite skeleton is formed in the metal cavity structure of the material of the bearing incorporating a metal combined with a fine graphite powder

Photo 2.1 shows the situations where there is graphite remaining after solution of copper and tin for the NTN copper series spherical BEARPHITE.

- (2) **NTN BEARPHITE** can have a fine communicating porous meal structure made possible by the addition of the graphite fine powder and is superior in retention capability and circulation function of the lubricating oil which are most needed for the oil-impregnated sintered bearings.
- (3) Thanks to their stable lubrication function, provides a longer life and excellent bearing performance across a wide temperature range.

- (4) Products with **NTN BEARPHITE** maintain stable quality in accuracy, density, and oil retention percentage based on the unique manufacturing technology and quality control.

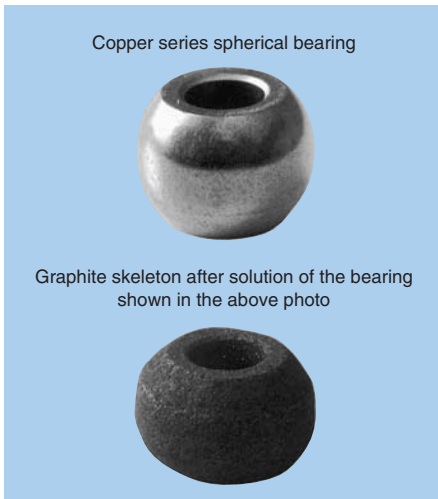


Photo 2.1

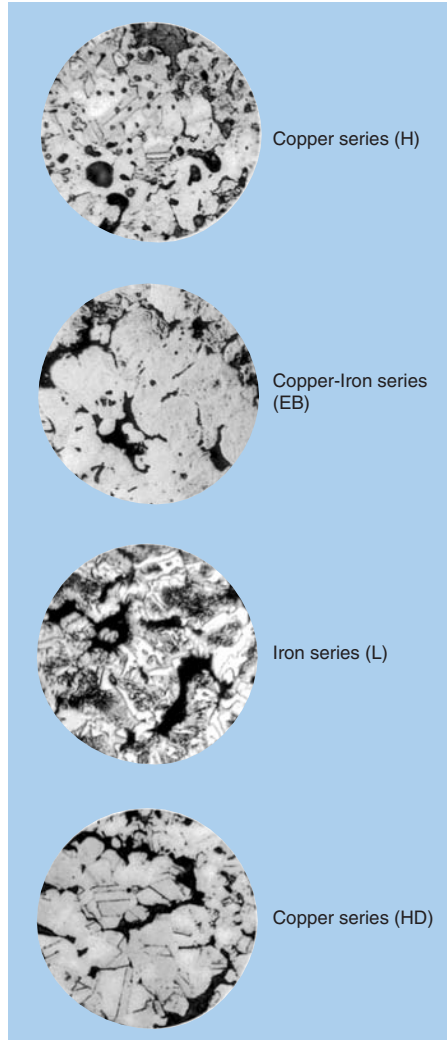


Photo 2.2 Photo of the metallographic structure of NTN BEARPHITE

3. Manufacturing processes for NTN BEARPHITE

Blending of raw materials → Forming

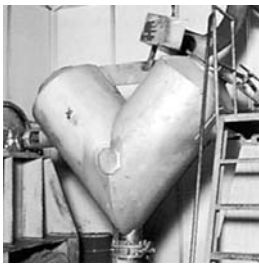
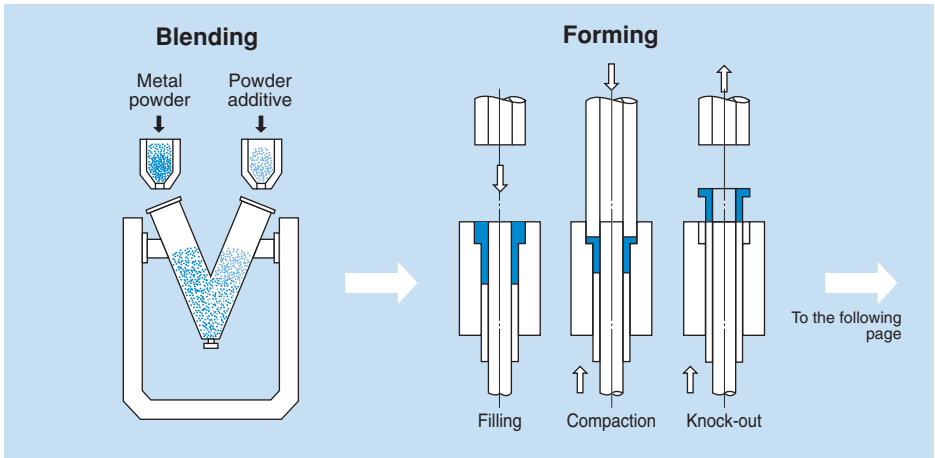
●Blending of raw materials

Raw materials are poured in the V-shape blender and are rotated to be blended to obtain the required components of the metal powder. The unique know-how of changing the blending ratio of the metal powder and the graphite depending on the type and the application required for each bearing material creates the differences in performance of our oil-impregnated bearings from that of the bearings made by other companies.

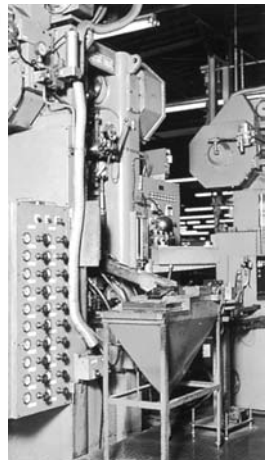
●Forming

The mixed powder made by the blending of several raw material powders is filled in the die through the hopper and compacted by the forming press. During this stage the various porous green compacts of the bearings including those of the sleeve type, the flange type, and the spherical type are formed. After the forming process measurement of mass, length, and run-out accuracy is implemented.

3



●Blending



●Forming



●Raw material

Roughly three kinds of powders; copper, iron, and tin are used for the metal powder as the major raw materials of "NTN BEARPHITE" and graphite is added to each of these metal powders.

Sintering → Shaping

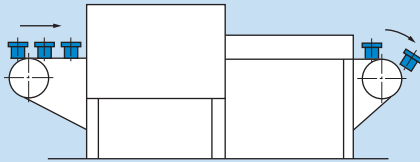
●Sintering

The sintering process is the process where the porous green compact made during the forming process is heated and fusion-bonded to obtain higher strength. The mesh-belt type continuous sintering furnace is employed to convey the green compacts automatically to each temperature zone in the reducing atmosphere without any oxidization of the surface.

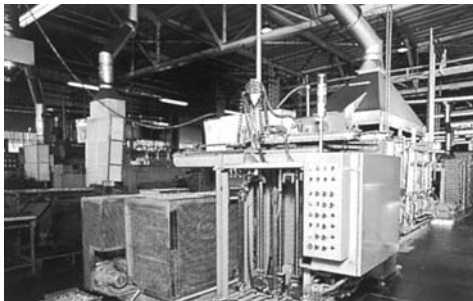
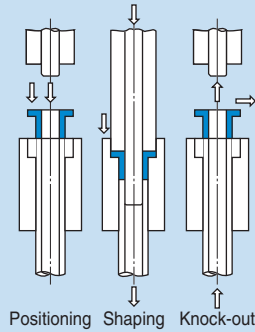
●Shaping

During the shaping press process, the inside and outside diameters are pressed with the required accuracy.

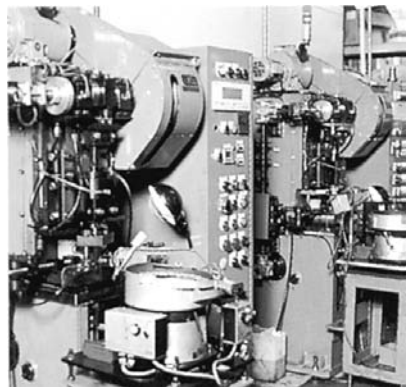
Sintering



Shaping



●Sintering



●Shaping

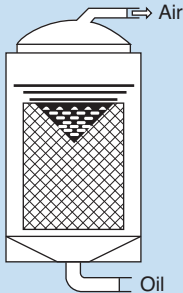
Oil impregnation

●Oil impregnation

The pressure inside the oil impregnation tank is reduced to the atmospheric pressure or lower so that the oil is easily impregnated into the product. This is for impregnating the oil into the the whole clearance of the porous material by the use of the capillary phenomenon.

At this stage the completed product, "NTN BEARPHITE" is done.

Oil impregnation



●Oil impregnation

NTN BEARPHITE

NTN BEARPHITE was created through the pursuit of high quality and saving manpower.



●Research and development



●Automatic line

The state-of-the-art automatic system is employed integrating the processes from forming to sintering, shaping, and inspection into one line.



●Inspection

Dimensional accuracy check is implemented.

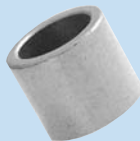

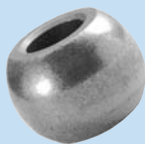
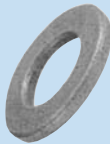
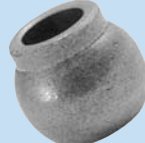
●Managing system



4. Design for NTN BEARPHITE

4.1 Shape and typical applications

Table 4.1 Types and typical applications of NTN BEARPHITE

| Type | Shape | Function | Typical Applications |
|--------------------|---|--|--|
| Sleeve type |  | (1) Supports radial loads. | Household appliances Audiovisual equipment Automotive electrical equipment Office equipment Agricultural machinery |
| Flange type |  | (1) Supports both radial and axial loads (2) Flange area simplifies locating. | Automotive electrical equipment Office equipment |
| Spherical Type |  | (1) Supports radial loads. (2) Designed to be self-aligning. | Household appliances Audiovisual equipment Automotive electrical equipment |
| Thrust Washer Type |  | (1) Supports axial loads. | Household appliances Audiovisual equipment |
| Special Type |  | (1) Supports both radial and one-directional axial loads. (2) Designed to be self-aligning. (3) Extension of the bearing length is possible. | General machinery |

4. 2 Material characteristics of the oil-impregnated sintered bearing

Table 4.2 Material characteristics of NTN BEARPHITE

| Series | Material Code | Chemical Components | | | | | | Density g/cm ³ (±0.2) | Oil Retention Percentage vol. % (min.) | Radial Crushing Strength MPa (min.) | Features |
|---------------------------|---------------|---------------------|--------------------|-------------------|-----------------|------------|----------------------|--|---|--|--|
| | | Cu | Sn | C | Fe | Ni | Others | | | | |
| Copper Series | H | Residual amount | 8 } 11 | 1 } 2 | — | — | — | 6.6 | 18 | 150 | Standard copper series material |
| | HQ | Residual amount | 8 } 11 | — | — | — | — | 6.6 | 18 | 150 | Suitable for sliding motion |
| | HR | Residual amount | 8 } 11 | 3 } 4 | — | — | — | 6.6 | 12 | 120 | Superior in seizure resistance |
| | HZ16 | Residual amount | 8 } 11 | 0.5 } 1.5 | 8 } 12 | — | 0.2 } 0.6 (P) | 6.9 7.2 | 15 | 200 | Superior in wear resistance and ease of caulking |
| Copper Series Alternative | CL01 | 15 } 22 | 0.5 } 2.5 | 0.5 } 2.5 | Residual amount | — | 1 max. | 6.4 | 17 | 150 | Sliding performance equivalent to that of copper H series |
| | CL02 | 28 } 35 | 0.5 } 2.5 | 0.1 } 2.2 | Residual amount | — | 1 max. | 6.4 | 18 | 150 | Excellent ease of caulking |
| Copper-Iron Series | EE | 33 } 38 | 3 } 6 | 1 } 2 | Residual amount | — | 3 max. | 6.2 | 18 | 150 | Used as a substitute for copper H series |
| | EB | 18 } 22 | 0.5 } 2.5 | 0.5 } 2.5 | Residual amount | — | 1 max. | 6.2 | 18 | 150 | Used as a substitute for copper-iron EC series |
| | EC | 38 } 42 | 1 } 3 | 0.5 } 2.5 | Residual amount | — | 1 max. | 6.4 | 18 | 150 | Offers acoustic characteristics superior to those of the EB series |
| | EZ06 | Residual amount | 1 } 3 | 0.5 } 2.5 | 38 } 42 | — | 1 max. | 6.5 6.9 | 18 12 | 150 | Superior in wear resistance |
| Iron Series | P | 8 } 11 | — | — | Residual amount | — | 3 max. | 6.1 | 18 | 200 | Used as a high-strength material for general-purpose applications |
| | F | — | — | — | Residual amount | — | 3 max. | 5.9 | 20 | 180 | Standard iron-series material |
| | LB | 1 } 3 | — | 2 } 4 | Residual amount | — | 1 max. | 6.0 | 15 | 180 | Offers excellent high-speed operation and wear resistance |
| | S06 | — | 15 } 20 (Cr) | 1 } 3 (MnS) | Residual amount | 10 } 15 | 0.5 } 1.0 (Si) | 6.5 } 7.0 | 8 | — | Excellent corrosion resistance (equivalent to SUS 304) |

4.3 Bearing selection

4.3.1 Allowable PV value and speed

Study allowable PV values calculated by the contact pressure P (MPa) and circumferential speed (m/min) before using the oil-impregnated sintered bearing.

Table 4.3 Generally recommended allowable PV values (MPa·m/min)

| Application | Allowable PV values |
|-------------------------------------|---------------------|
| General-purpose machinery | 100 |
| Household appliances | 50 |
| Office electric appliances | 50 |
| Low noise and low wear applications | 25 |
| Especially low noise applications | 20 |
| Axial loaded applications | 20 |

[Calculation method]

(1) Calculation method of the contact pressure P

$$P \text{ (MPa)} = \text{Radial load (N)} / \{ \text{Bore diameter (mm)} \times \text{Length (mm)} \}$$

(2) Calculation method of the circumferential speed V

$$V \text{ (m/min)} = \text{Shaft diameter (mm)} \times \pi \text{ (Circular constant)} \times \text{Number of revolutions (min}^{-1}\text{)} \times 10^{-3}$$

(3) Calculation method of the PV value

$$PV \text{ value (MPa} \cdot \text{m/min)} = P \text{ (MPa)} \times V \text{ (m/min)}$$

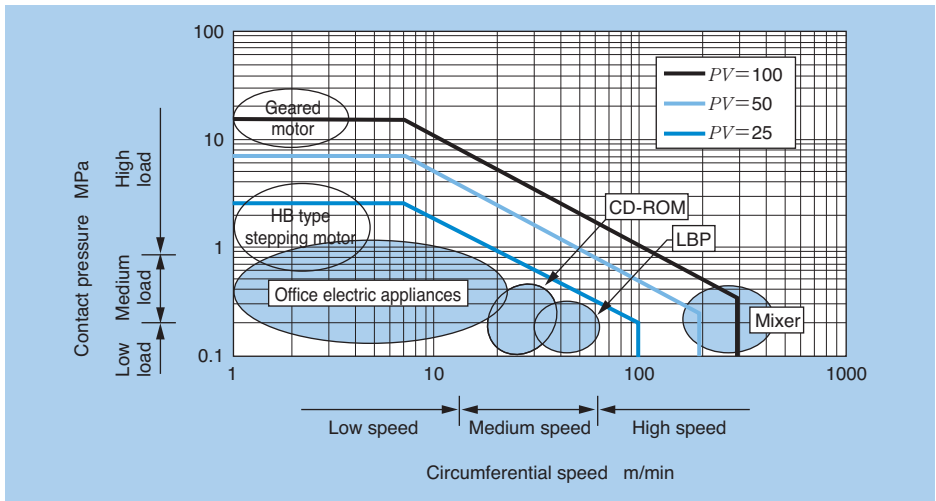


Fig. 4.1 Relationship between contact pressure and circumferential speed

4. 3. 2 Selection of lubricating oil

The type of the lubricating oil impregnated into the bearing shall be selected based on the bearing load, the sliding speed, and the bearing temperature. **Table 4.4** shows the guideline for determining the lubricating oil viscosity for a given application.

For the standard bearing operating

temperature range (0 to 80°C), mineral-based lubricating oil can be used. In addition, if the operating temperature range is expected to be higher or lower than this range or to be the whole range between higher and lower temperature, synthetic-based lubricating oil suitable for the application temperature shall be selected.

Table 4.4 Operating conditions and the type of the lubricating oil

| Operating conditions | | Lubricating oil viscosity | Oil type (reference) |
|----------------------|-------------|---------------------------|--------------------------|
| Load MPa | Speed m/min | | |
| ~0.3 | 15~ 80 | ISO VG 22~ 68 | Spindle oil, turbine oil |
| | 60~250 | ISO VG 10~ 32 | Spindle oil |
| 0.2~0.8 | ~20 | ISO VG 46~100 | Gasoline engine oil |
| | 15~ 80 | ISO VG 32~ 68 | Turbine oil |
| 0.7~2.5 | ~ 20 | ISO VG 100~220 | Gear oil |

4. 3. 3 Bearing life

The life of the oil-impregnated sintered bearing is determined by the rate of consumption of the lubricating oil impregnated into the bearing. Once 40% of the impregnated oil has been consumed, bearing wear begins to accelerate and bearing performance deteriorates accordingly. Therefore, once the residual lubricating oil

drops to 60%, the bearing is generally regarded as having reached the end of its service life.

In addition, the lubricating oil is adversely affected by high temperature, and the maximum allowable temperature is generally considered to be 80°C.

The bearing life based on the bearing temperature is shown in **Fig. 4.2**.

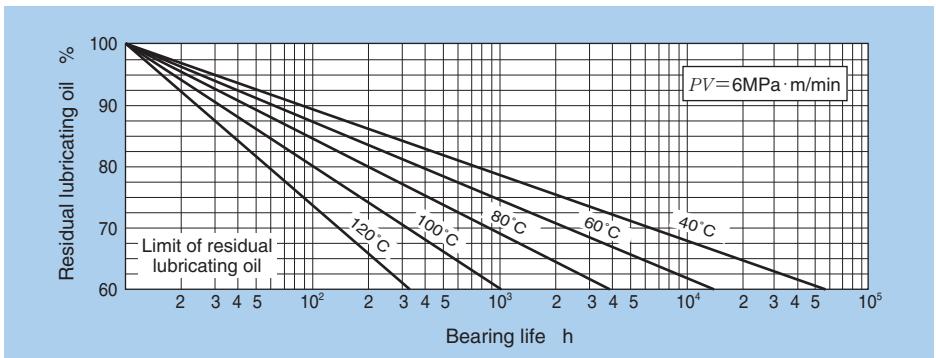


Fig. 4.2 Typical bearing life at varying temperature levels

4. 3. 4 Bearing accuracy

The accuracy of the following three types of general oil-impregnated sintered bearings is shown in **Table 4.5**; sleeve type, flange type, and spherical type.

The accuracy of the **NTN BEARPHITE** conforms to the values shown in this table. In addition, a bearing with higher accuracy than is defined in this standard can be manufactured and the dimensional tolerance of the part of those high-accuracy bearings is shown in **Fig. 4.3**.

In addition, a wide line-up of **NTN BEARPHITE** products are available in various sizes. See 11. Dimension table of the standard product of this handbook for details. Consult with **NTN** for information, as the dimension tolerance settings are different depending on the products. Inquire **NTN** for products not listed in the dimension table as we may be able to address your requirements.

Table 4.5 Accuracy of the general oil-impregnated sintered bearing

Table 4.5 (1) Tolerance of the bore diameter d

Unit : mm

| Bore diameter | | Tolerance of the bore diameter |
|---------------|------|--|
| Over | Max. | |
| — | 3 | H7 $\begin{smallmatrix} +0.010 \\ 0 \end{smallmatrix}$ |
| 3 | 6 | H7 $\begin{smallmatrix} +0.012 \\ 0 \end{smallmatrix}$ |
| 6 | 10 | H7 $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ |
| 10 | 18 | H7 $\begin{smallmatrix} +0.018 \\ 0 \end{smallmatrix}$ |
| 18 | 24 | H7 $\begin{smallmatrix} +0.021 \\ 0 \end{smallmatrix}$ |
| 24 | 30 | H8 $\begin{smallmatrix} +0.033 \\ 0 \end{smallmatrix}$ |
| 30 | 50 | H8 $\begin{smallmatrix} +0.039 \\ 0 \end{smallmatrix}$ |

Table 4.5 (2) Tolerance of the outside diameter D

Unit : mm

| Outside diameter | | Tolerance of the outside diameter |
|------------------|------|---|
| Over | Max. | |
| — | 6 | s7 $\begin{smallmatrix} +0.031 \\ +0.019 \end{smallmatrix}$ |
| 6 | 10 | s7 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ |
| 10 | 18 | s7 $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ |
| 18 | 24 | s7 $\begin{smallmatrix} +0.056 \\ +0.035 \end{smallmatrix}$ |
| 24 | 30 | t7 $\begin{smallmatrix} +0.062 \\ +0.041 \end{smallmatrix}$ |
| 30 | 40 | t7 $\begin{smallmatrix} +0.073 \\ +0.048 \end{smallmatrix}$ |
| 40 | 50 | t7 $\begin{smallmatrix} +0.079 \\ +0.054 \end{smallmatrix}$ |
| 50 | 65 | t7 $\begin{smallmatrix} +0.096 \\ +0.066 \end{smallmatrix}$ |

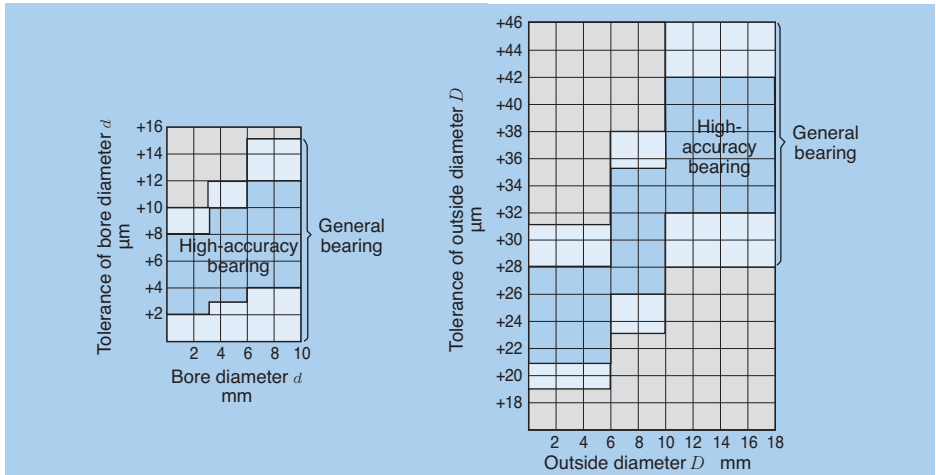
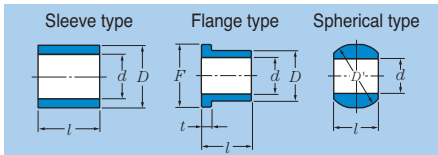


Fig. 4.3 Dimensional tolerance of NTN BEARPHITE

Table 4.5 (3) Tolerance of length *l* Unit : mm

| Length | | Tolerance of length |
|--------|------|---------------------|
| Over | Max. | |
| — | 6 | ±0.10 |
| 6 | 24 | ±0.15 |
| 24 | 65 | ±0.20 |

Table 4.5 (4) Tolerance of flange outside diameter *F'* Unit : mm

| Flange outside diameter | Tolerance of outside diameter |
|-------------------------|-------------------------------|
| Max. | |
| 100 | ±0.10 |

Table 4.5 (5) Tolerance of flange thickness *t* Unit : mm

| Flange thickness | Tolerance of flange thickness |
|------------------|-------------------------------|
| Max. | |
| 10 | ±0.20 |

Table 4.5 (6) Tolerance of the spherical diameter *D'* Unit : mm

| Spherical diameter | | Tolerance of spherical diameter |
|--------------------|------|---------------------------------|
| Over | Max. | |
| — | 10 | ±0.06 |
| 10 | 18 | ±0.08 |
| 18 | 30 | ±0.10 |

Table 4.5 (7) Run-out of the outside diameter surface Unit : mm

| Bore diameter | | Run out of the outside diameter surface (max.) |
|---------------|------|--|
| Over | Max. | |
| — | 6 | 0.040 |
| 6 | 10 | 0.050 |
| 10 | 24 | 0.070 |
| 24 | 50 | 0.100 |

Table 4.5 (8) Run-out of the spherical surface Unit : mm

| Bore diameter | | Run-out of the spherical surface (max.) |
|---------------|------|---|
| Over | Max. | |
| — | 10 | 0.050 |
| 10 | 18 | 0.070 |

4. 3. 5 Shaft specifications

■ Material component

The material component of the mating shaft is generally carbon steel for machine structural use or alloy steel, or stainless steel for special applications.

■ Hardness

The minimum allowable shaft hardness may be generally HV300 or over, and higher hardness can provide improved performance.

■ Surface roughness

Surface roughness is generally recommended to be 0.4Ra or better. Especially for operating conditions with stricter sound requirements, a finish of 0.2Ra or better is required.

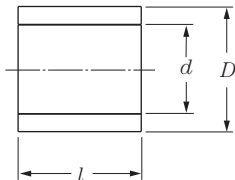
4. 4 Check items for operating conditions

| | | | | | | | | | |
|-----------------------------|-------------|----------|-------------------|-----------|--------------------------|--|----------------|---------|----------------|
| Equipment name | | | | | Using location | | | | |
| Dimension | | | | | Number of bearings | · Continuous · Intermittent Pieces/month | | | |
| Shaft | mm | Material | Hardness | Roughness | Load | kN | Static | Dynamic | Impact |
| Housing | mm | Material | Thickness mm | | Number of revolutions | min ⁻¹ | Vibration | Swing | Reciprocation |
| Mounted clearance | mm | | | | Operating time | · Continuous · Intermittent Hour/day | | | |
| Operating temperature | Regular use | °C | Highest Lowest | °C | Environmental conditions | Temperature | · High | · Low | |
| | | | | | | Dust | · Large amount | | · Small amount |
| | | | | | | Pressure | · High | · Low | |
| Type of lubricating oil | | | | | Lubrication | Oil groove | · Yes | · No | |
| Noise requirement | Normal | | Strict | | Desired life span | Hour | | | |
| Accepting inspection method | | | | | | | | | |
| Other items desired | | | | | | | | | |

Entry blank for the bearing dimension and tolerance

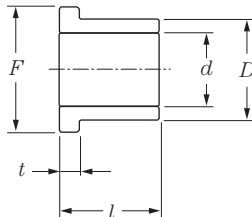
Unit : mm

Sleeve type



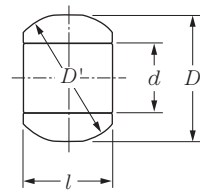
Example of dimensioning
 $S \quad d \times D \times l$

Flange type



Example of dimensioning
 $F \quad d \times D \times l : F \times t$

Spherical type



Example of dimensioning
 $A \quad d \times D \times l : D'$

4.5 Bearing design

The sleeve type and flange type bearings are usually interference fit in the housing. In order to ensure optimal mounted clearance, the amount of shrinkage of the bearing bore diameter due to the interference fit shall be examined based on the tolerance of the housing bore diameter and the bearing outside diameter.

4.5.1 Fitting

When pressing the bearing into the housing, the interference is recommended to be as small as possible as long as the bearing can be securely mounted.

The appropriate interference is shown in Fig. 4.4.

• **Large interference is required when**

- (1) the bearing load is large.
- (2) the bearing length is short.
- (3) thermal expansion coefficient of the housing material is large.

• **Small interference is required when**

- (1) the bearing length is long.
- (2) the bearing wall thickness is thin.

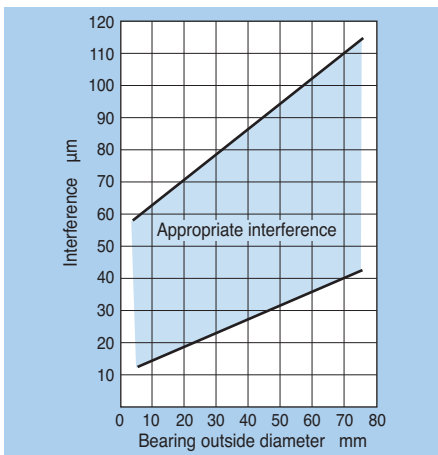


Fig. 4.4 Appropriate interference

Generally, the shrinkage of the bearing bore diameter due to press fitting becomes large when the bearing outside diameter is large, the wall thickness is thin, the interference is large, or the housing rigidity is high.

The bore diameter shrinkage percentage to the interference of the copper series bearing is shown in Fig. 4.5.

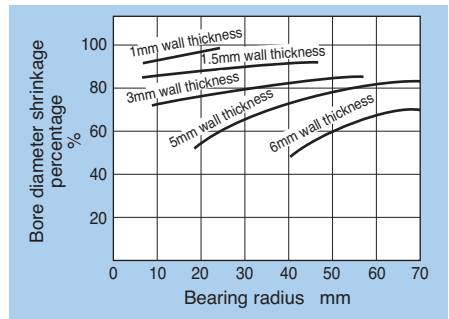


Fig. 4.5 Bore diameter shrinkage percentage to the interference of the copper series bearing

4.5.2 Study on fitting

(a) Fitting contact pressure P

$$P = \frac{E_1 \cdot E_2}{E_2 (Q_1 + \tau_1) + E_1 (Q_2 - \tau_2)} \times \frac{\Delta_{d\text{eff}}}{d_2}$$

$$Q_1 = \frac{d_1^2 + d_2^2}{d_1^2 - d_2^2} \quad Q_2 = \frac{d_2^2 + d_3^2}{d_2^2 - d_3^2}$$

(b) Shrinkage percentage of the bearing bore diameter λ_0

$$\lambda_0 = \frac{E_1 (Q_2 + 1)}{E_2 (Q_1 + \tau_1) + E_1 (Q_2 - \tau_2)} \times \frac{d_3}{d_2}$$

| | |
|------------------------|---|
| τ_1, τ_2 | : Poisson's ratio of the materials of the housing and the bearing |
| E_1, E_2 | : Young's modulus of materials of the housing and the bearing |
| $\Delta_{d\text{eff}}$ | : Press-fitting interference |
| d_1 | : Outside diameter of the housing (mm) |
| d_2 | : Bearing outside diameter (mm) |
| d_3 | : Bearing bore diameter (mm) |

| Material code | Young's modulus MPa | Poisson's ratio | |
|---------------|---------------------|-----------------|-----|
| Bearing | H | 47000 | 0.2 |
| | HB | 56000 | 0.2 |
| | HR | 40000 | 0.2 |
| | HQ | 54000 | 0.2 |
| | HD | 43000 | 0.2 |
| | EE | 59000 | 0.2 |
| | EC | 59000 | 0.2 |
| | EB | 65000 | 0.2 |
| | P | 91000 | 0.2 |
| | F | 79000 | 0.2 |
| | L | 83000 | 0.2 |
| Housing | Brass | 103000 | 0.3 |
| | Mild Steel | 206000 | 0.3 |
| | ADC | 77000 | 0.3 |
| | ZDC | 94000 | 0.3 |

[Calculation Example]

In the case where the bearing dimension is equal to S6 × 12 × 8 (material of H) and the material of the housing is mild steel,

$$Q_1 = \frac{d_1^2 + d_2^2}{d_1^2 - d_2^2} = \frac{15^2 + 12^2}{15^2 - 12^2} = 4.56$$

$$Q_2 = \frac{d_2^2 + d_3^2}{d_2^2 - d_3^2} = \frac{12^2 + 6^2}{12^2 - 6^2} = 1.67$$

$$\begin{aligned} \delta &= \frac{E_1(Q_2 + 1)}{E_2(Q_1 + \tau_1) + E_1(Q_2 - \tau_2)} \times \frac{d_3}{d_2} \\ &= \frac{206000(1.67 + 1)}{47000(4.56 + 0.3) + 206000(1.67 - 0.2)} \times \frac{6}{12} \\ &= 0.52 \end{aligned}$$

As the result of these calculations, the shrinkage percentage of the bearing bore diameter after press-fitting is 52% of the press-fitting interference.

When the press-fitting interference is designed to be 10 to 46 μm, the amount of shrinkage of the bearing bore diameter is 5 to 24 μm. The tolerance of the bearing

dimension is designed to be as shown below, based on the study on the mounted clearance in the previous section and the calculation result of the fitting.

Bearing bore diameter : $\phi 6 \begin{smallmatrix} +0.012 \\ 0 \end{smallmatrix}$

Bearing outside diameter : $\phi 12 \begin{smallmatrix} +0.022 \\ +0.010 \end{smallmatrix}$

4. 5. 3 Mounted clearance

The mounted clearance of the bearing is determined by PV value, viscosity of the lubricating oil, the distance between bearings, and the bearing length.

• **Larger clearance is required when**

- (1) PV value is large.
- (2) the load is heavy and the viscosity of the lubricating oil is high.
- (3) the shaft deflection occurs due to the long distance between bearings.
- (4) multiple bearings are used on one shaft.
- (5) the bearing length is long.

• **Smaller clearance is required when**

- (1) higher running accuracy is required.
- (2) noise and vibration are concerned.

The recommended standard mounted clearance for NTN BEARPHITE is shown in

Fig. 4.6.

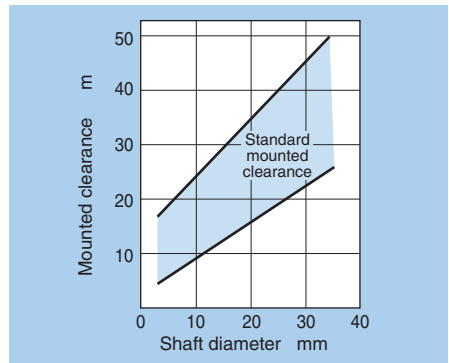


Fig. 4.6 Standard mounted clearance

4. 6 Mounting of the bearing

4. 6. 1 Mounting of the sleeve type bearing and the flange type bearing

Generally there are two mounting methods for the sleeve type bearing and the flange type bearing; press-fitting with no tool and press-fitting with a press-fitting arbor.

- **In case of press-fitting with no tool**

Press-fitting with no tool is the mounting method of the bearing without using a press-fitting arbor (Fig. 4.7).

With this method, the bearing bore diameter is shrunk depending on the interference between the bearing and the housing and on the bearing material.

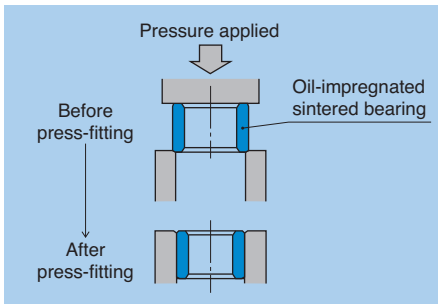


Fig. 4.7 Press-fitting with no tool

- **In case of press-fitting with a press-fitting arbor**

Press-fitting with a press-fitting arbor is the mounting method of the bearing to the housing with a press-fitting arbor inserted in the bearing (Fig. 4.8).

With this method, stable accuracy of the bearing bore diameter can be obtained and the porous metallographic structure is not damaged.

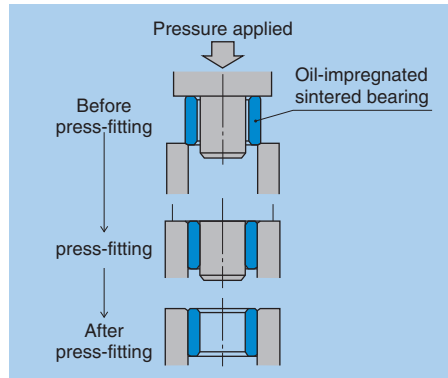


Fig. 4.8 Press-fitting with a press-fitting arbor

4. 6. 2 Mounting of the spherical type bearing

The spherical type bearing uses a different mounting method from that for the sleeve type bearing and the flange type bearing, and is mounted generally in the housing with the spring retainer as shown in Fig. 4.9.

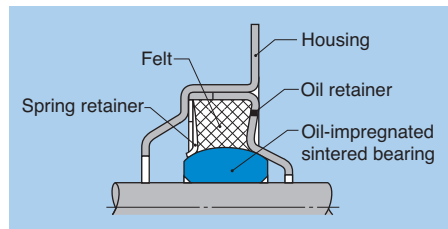


Fig. 4.9

In this case, attention shall be paid to the following.

- (1) Spring pressure of the spring retainer shall not be too high.
- (2) The housing shall be designed so that any oil leakage can be prevented and the oil retainer shall be installed.
- (3) Use felt with high retaining capability of the lubricating oil.
- (4) The lubricating oil shall be fully impregnated in the felt before using it.

4. 7 Care and handling of bearings

4. 7. 1 Precautions for mounting bearings

When mounting the bearing, attention shall be paid to the following.

- (1) Work at a clean workshop.
- (2) Use mounting tools with hard and solid ones.
- (3) Make sure that there is no dent, burr, or dust on the fitting surfaces of the shaft and the housing.
- (4) Do not use a hammer to mount the bearing into the housing.

4. 7. 2 Maintenance

The following points shall be taken into consideration for maintenance of the bearing.

- (1) Re-lubrication is recommended for continuous operation. Although the lubrication interval may vary depending on the operating conditions, lubrication shall be performed about every 500 to 1000 operating hours as a guideline.

- (2) When impregnating the lubricating oil, immerse the bearing in the oil bath which is heated to about 60°C, and keep it warm uniformly for 1 to 2 hours. When no bubbles are released in the oil bath, cool down the oil bath with the bearing inside or immerse the bearing in the cool oil.

4. 7. 3 Storage

The following points shall be taken into consideration for storage of the bearing.

- (1) Store the bearing at a location with low humidity.
- (2) Store the bearing in a cool area since the lubricating oil impregnated into the bearing deteriorates if the temperature of the bearing exceeds 70°C.
- (3) Keep the bearings away from objects that absorb the lubricating oil such as paper or wood.



Terms for powder metallurgy

Terms and Definition

Powder metallurgy

Technology concerning manufacturing metal powder and manufacturing parts and products based on forming and sintering of the metal powder

Powder

The aggregate of particles of 1mm maximum or smaller in size

Forming

To provide a given shape and dimensions to the powder by compacting the powder

Sintering

To bond the particles together of the powder or the green compact by heating

Sintered Product

Products made from the sintered material

5. Technical data

5.1 Effect of the mating shaft to wear

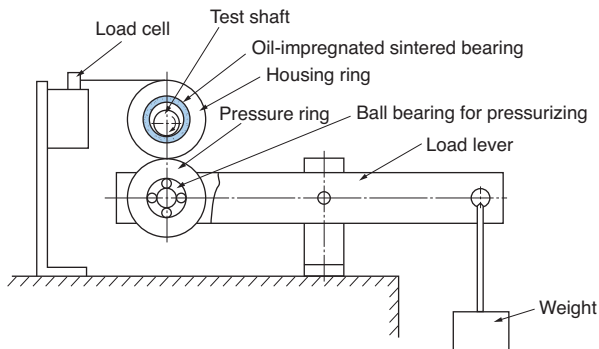
Sample and test conditions

| | | | |
|--------------------------|--------------------------|--|-----------------|
| Bearing | : S6×12×8 | Circumferential speed | : 34m/min |
| Material | : H | PV value | : 32MPa · m/min |
| Impregnating oil | : ISO VG68 (Mineral oil) | Atmosphere | : |
| Density | : 6.6g/cm ³ | Normal temperature and normal humidity | (25±2°C) |
| Oil retention percentage | : 20Vol. % | Operating hour | : 620h |
| Radial crushing strength | : 150MPa | Shaft material | : SKS-3, SUS303 |
| Clearance | : 14~16μm | Shaft surface roughness | : 0.1~0.5Ra |
| Contact pressure | : 0.94MPa | | |

Table 5.1 Test result

| No. | Mating shaft | | | Rate of oil consumption % | Amount of wear of the bearing μm |
|-----|--------------|--------------|----------------------|---------------------------|----------------------------------|
| | Material | Hardness HRC | Surface roughness Ra | | |
| 1 | SKS-3 | 12.0 | 0.30 | 4.1 | 4.0 |
| 2 | ↑ | 32.0 | 0.25 | 2.8 | 4.0 |
| 3 | ↑ | 42.5 | 0.25 | 4.3 | 3.0 |
| 4 | ↑ | 12.0 | 0.15 | 3.0 | 1.5 |
| 5 | ↑ | 32.0 | 0.15 | 4.0 | 2.0 |
| 6 | ↑ | 42.5 | 0.10 | 5.4 | 2.0 |
| 7 | SUS303 | 3.6 | 0.50 | 21.2 | 6.0 |
| 8 | ↑ | 3.6 | 0.15 | 6.3 | 3.5 |

[Testing machine] The A-type testing machine is used.



[A-type testing machine]

5.2 Relationships of PV value to temperature rise and coefficient of friction depending on the different materials

Sample

Bearing size : S6×12×8
 Lubricating oil : ISO VG68
 Bearing material : ①H ②EB ③P
 Shaft material : SUJ2
 Shaft hardness : HRC60
 Shaft finish roughness : 0.2 μmRa

Test conditions

| Test No. | Contact pressure (MPa) | Circumferential speed (m/min) | PV value (MPa · m/min) |
|----------|------------------------|-------------------------------|------------------------|
| Test 1 | 0.25~2.0 | 74 (constant) | 18.5~148 |
| Test 2 | 0.25~2.0 | 38 (constant) | 9.5~ 76 |

Operating hour : 2h
 Mounted clearance : 10~14μm
 Room temperature : 25±2°C

Test result

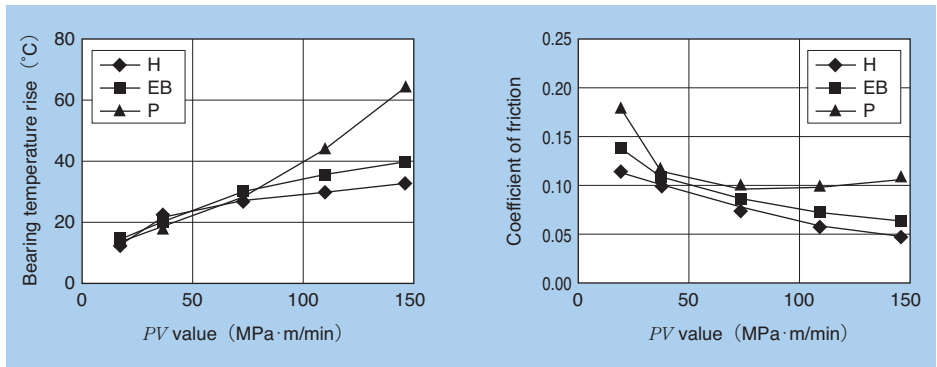


Fig. 5.1 Test 1

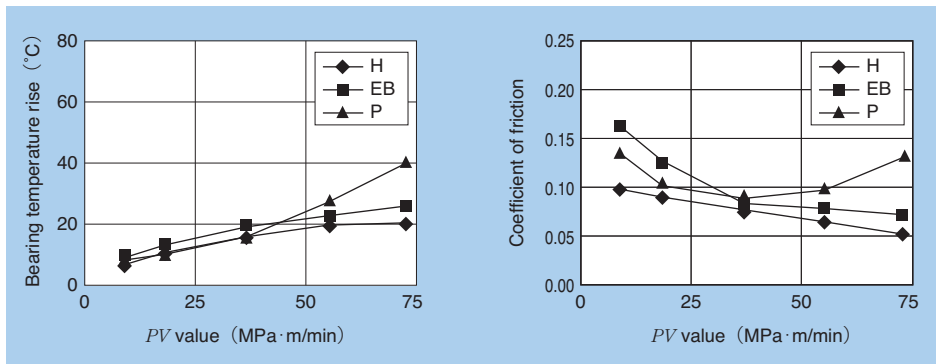


Fig. 5.2 Test 2

[Testing machine] The A-type testing machine was used.

5.3 Relationships of the mounted clearance to temperature rise and coefficient of friction depending on the different lubricating oil

Sample

Bearing size : S6×12×8
 Bearing material : H (Copper series)
 Lubricating oil : ① ISO VG32 ② ISO VG68
 ③ ISO VG100
 Shaft material : SUJ2
 Shaft hardness : HRC60
 Shaft finish roughness : 0.2 μmRa

Test conditions

| Test No. | Contact pressure (MPa) | Circumferential speed (m/min) | PV value (MPa·m/min) |
|----------|------------------------|-------------------------------|----------------------|
| Test 1 | 0.25 | 34 | 8.5 |
| Test 2 | 1.0 | 34 | 34 |

Operating hour : 2h
 Room temperature : 25±2°C

Test result

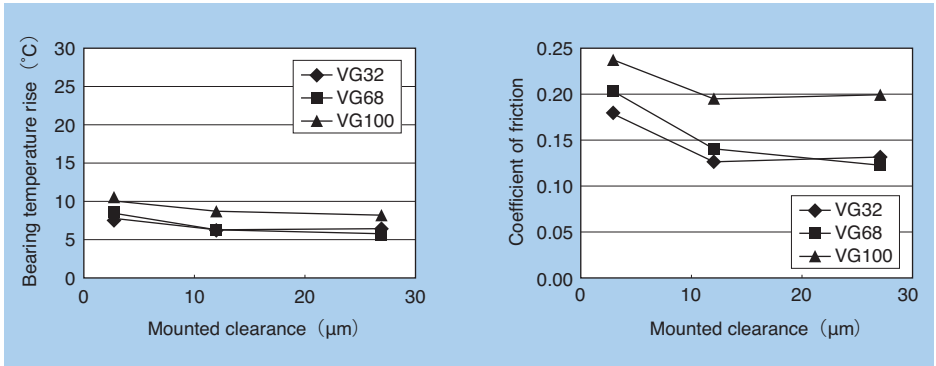


Fig. 5.3 Test 1

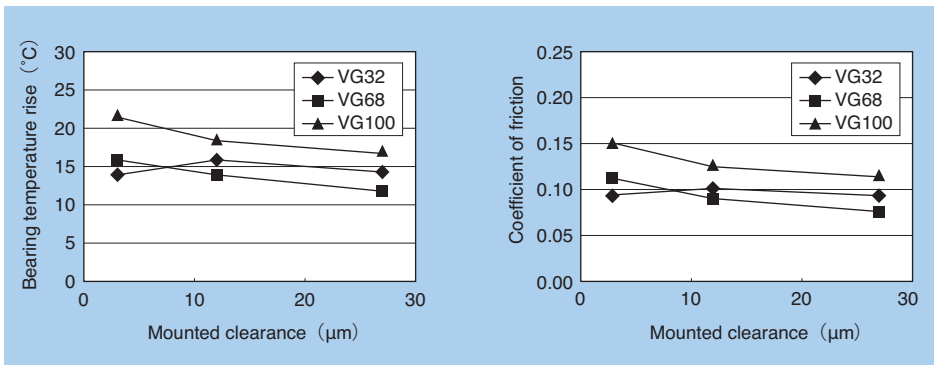


Fig. 5.4 Test 2

[Testing machine] The A-type testing machine was used.

5. 4 Friction characteristics when the bearing is sliding

Sample

Bearing size : S6×10×5
 Bearing material : H, HQ, HR
 Lubricating oil : ISO VG68
 Shaft material : SUS 420J2
 Shaft surface roughness : 0.2Ra
 Shaft hardness : HV580

Sample

Bearing size : S6×10×5
 Bearing material : H
 Shaft material : SUS 420J2
 Shaft surface roughness : 0.2Ra
 Shaft hardness : HV580

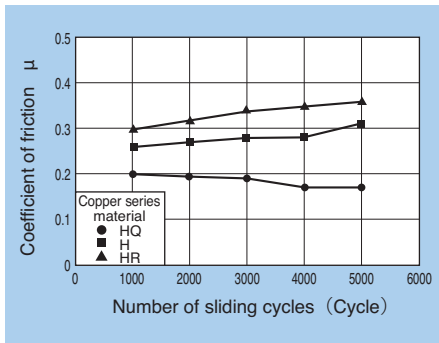
Test conditions

Contact pressure : 0.07MPa
 Sliding speed : 5.8m/min
 Stroke : 160mm
 Mounted clearance : 10~14 μm
 Room temperature : 25±2°C

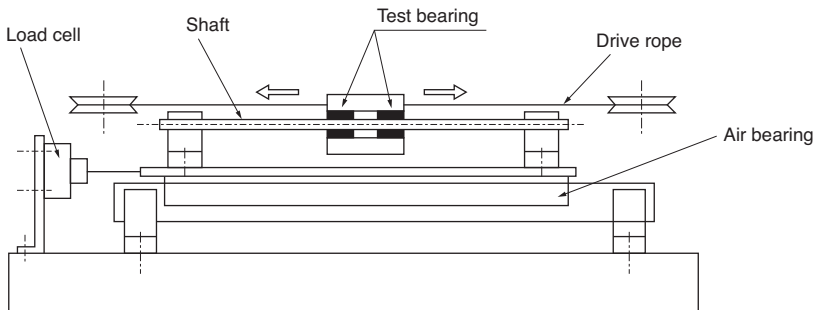
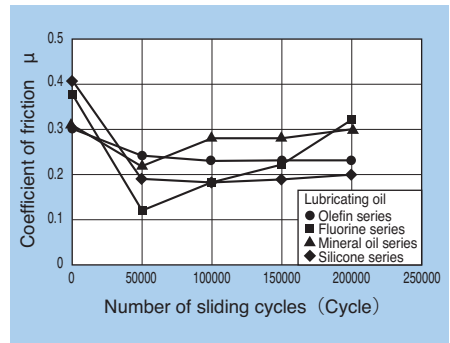
Test conditions

Contact pressure : 0.08MPa
 Sliding speed : 5.4m/min
 Stroke : 160mm
 Mounted clearance : 10~14 μm
 Room temperature : 25±2°C

Test result



Test result



[Testing machine]

5. 5 Oil resistance test of the resin

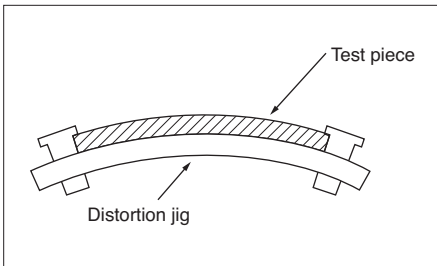
Table 5.2 Result of the oil resistance test of the resin (80°C×72h)

| No. | Name of Resin | Mineral oil | Synthetic hydrocarbon | Ester series | Alkyldiphenyl ether | Liquid grease | |
|-----|---|-------------|-----------------------|-----------------|---------------------|-----------------|------|
| | | Tellus 68 | Floil 947P | Alltime J652 | Moresco BS-100 | AL-1 | EU-1 |
| 1 | Polyphenylene ether (PPE) | ○ | △ | △ | △ | △ | ○ |
| 2 | Polyphenylene sulfide (PPS) | ○ | ○ | ○ | ○ | ○ | ○ |
| 3 | Polycarbonate (PC) | ○ | ○ | × ¹⁾ | ○ | × ²⁾ | ○ |
| 4 | Polyetherimide (PEI) | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ |
| 5 | Polybutylene terephthalate (PBT) | ○ | ○ | ○ | ○ | ○ | ○ |
| 6 | Polyamide (PA) | ○ | ○ | ○ | ○ | ○ | ◎ |
| 7 | Polyoxy methylene (POM) (=Polyacetal) | ○ | ○ | ○ | ○ | ○ | ○ |
| 8 | Acrylonitrile-Butadiene-Styrene copolymer (ABS) | △ | △ | △ | △ | △ | △ |
| 9 | Polyethylene terephthalate (PET) | ○ | ○ | ○ | ○ | ○ | ○ |
| 10 | Polyarylate | ○ | ◎ | × ¹⁾ | ◎ | ○ | ◎ |

Note) ◎ : Deformation ratio up to 40% ○ : Deformation ratio 41 to 70%
 △ : Deformation ratio 71% or greater × : Rupture occurs

- 1) : After 24h, Rupture
- 2) : After 72h, Cracks at several locations

[Testing apparatus]



5.6 Evaporative test of the lubricants

Measurement method of the evaporation amount

A similar test method to the one for the grease evaporation amount of JIS-K2220 (A-method) was used for the test. Weigh precisely 20g of the test sample and place it in a 100cc beaker and hold the beaker in a thermostatic bath with the temperature of 80°C, 100°C, and 120°C respectively. Take out the beaker from the thermostatic bath at every specified interval and cool it down before weighing to calculate the evaporation loss.

Table 5.3 Evaporation test result of the lubricants

| No. | Brand | Component ¹⁾ | Kinematic viscosity mm ² /s | | Evaporation amount g (after 2000h) | | |
|-----|------------------------|-------------------------|---|-------|---------------------------------------|-------|-------|
| | | | 40°C | 100°C | 80°C | 100°C | 120°C |
| 1 | Shell Tellus 68 | Mineral oil | 68.0 | 8.9 | 0.108 | 0.24 | 1.34 |
| 2 | Diamond Power Fluid 10 | Mineral oil | 9.8 | 2.7 | 6.81 | 11.1 | 14.5 |
| 3 | Shell Tellus T37 | Mineral oil | 37.2 | 7.14 | 0.30 | 1.17 | 3.8 |
| 4 | Mobil DTE-EH | Mineral oil | 143.6 | 14.58 | 0.111 | 0.135 | 0.29 |
| 5 | Anderol 456 | DE | 33.0 | 7.5 | 0.20 | 1.49 | 4.0 |
| 6 | Anderol 465 | DE | 58.0 | 11.3 | 0.170 | 0.33 | 1.13 |
| 7 | Floil 947P | PAO | 30.4 | 7.45 | 0.25 | 0.51 | 1.09 |
| 8 | Mobil EJ44/13AAC | PAO | 60.5 | 11.1 | 0.24 | 0.41 | 0.98 |
| 9 | Moresco Hi-Lube BS100 | ADPE | 95.3 | 12.5 | 0.016 | 0.015 | 0.062 |
| 10 | IVY Atlas 32 | PAO+PE | 32.7 | 6.34 | 0.090 | 0.131 | 0.57 |
| 11 | IVY Atlas56 | PAO+PE | 57.2 | 9.84 | 0.076 | 0.185 | 0.42 |
| 12 | AL-1 | PAO+PE+Li.st | — | — | 0.101 | 0.091 | 0.54 |
| 13 | Alltime J652 | PE | 63.9 | 12.5 | — | — | 0.46 |
| 14 | EU-1 | ADPE+PAO+Urea | — | — | — | — | 0.62 |

Note 1) PAO: Poly-alpha-olefin (Synthetic hydrocarbon) PE: Polyolester
ADPE: Alkyldiphenyl ether DE: Diester

6. Examples of product application

NTN boasts a long experience in the field of the oil-impregnated sintered bearings and has been creating various kinds of product groups making full use of our unique technologies. "NTN BEARPHITE", which has gained a favorable reputation with reliable quality realizing 100% function even under severe environmental conditions, has rapidly expanded the scope of its application field by providing cost performance with quick response to user needs of miniaturization, weight reduction, and enhancement of high precision. In addition, the demands for the unit products, which can realize streamlining of the customer's assembling process and cost reduction, have been increasing from various fields. Moreover, we are energetically striving for unique product development responding to the needs of long life products with a high quality level including special grease, and hydrodynamic BEARPHITE which are superior in the rotational accuracy during high speed rotation.

For automotive electrical equipment

We are developing unique bearing material and lubricating oil for NTN BEARPHITE to respond to requirements for durability at an elevated temperature for the oil-impregnated sintered bearing for automotive electrical equipment.

We are developing materials to respond to requirements for excellent wear resistance with high strength for sintered machine parts.



For office equipment and information equipment

We are developing materials superior in sliding characteristics and lubricating oil friendly to resin for the bearing for office equipment and information equipment, and responding to the requirements.

We developed the world's first fluid dynamic bearing "Hydrodynamic BEARPHITE" with NTN unique technologies, and they are now employed in the polygon scanner motor which requires high rotational accuracy and in the cooling fan motor which requires a severe less noise requirement.



For household appliance

We are responding to requirements for the bearing of household appliances with the bearing having low-noise characteristics and superior durability.

These bearings are playing active roles in applications of the air conditioner, the laundry machine, the ventilating fan, the mixer, etc.

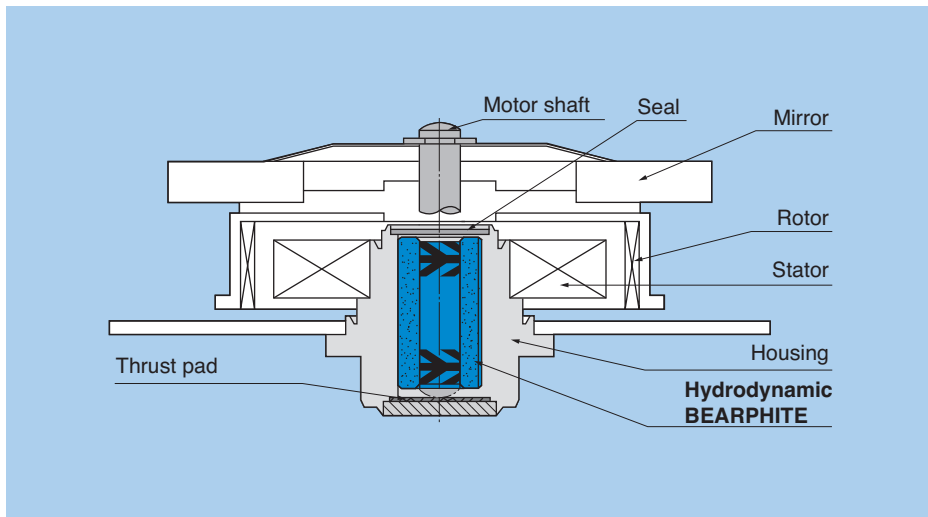


Mini pillow unit

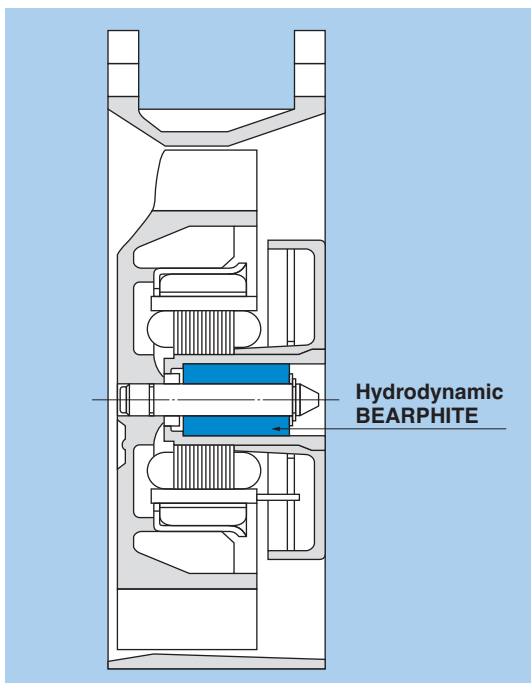
The "NTN BEARPHITE" mini pillow unit has a self-aligning property and is made by a combination of the spherical bearing and steel plate housing. Being a light and compact bearing unit, it has the characteristics of easy mounting and long life with no lubrication and is widely used for general industrial machineries.



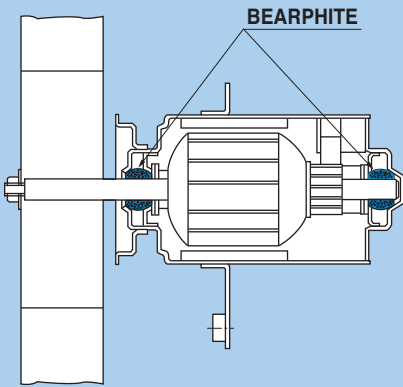
7. Examples of use by application



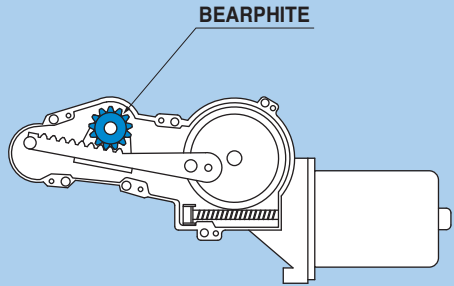
Application example to the LBP motor



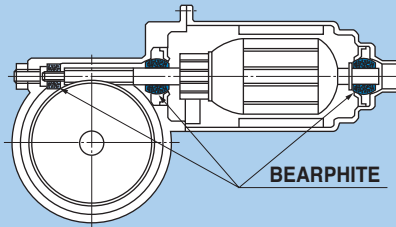
Application example to the axial flow fan



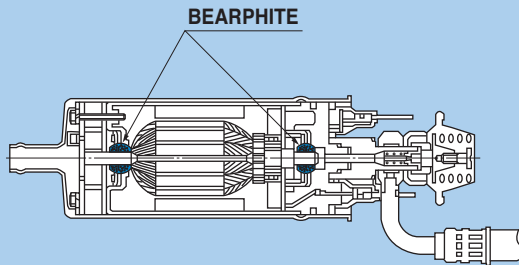
● Electric fan motor



● Wiper motor

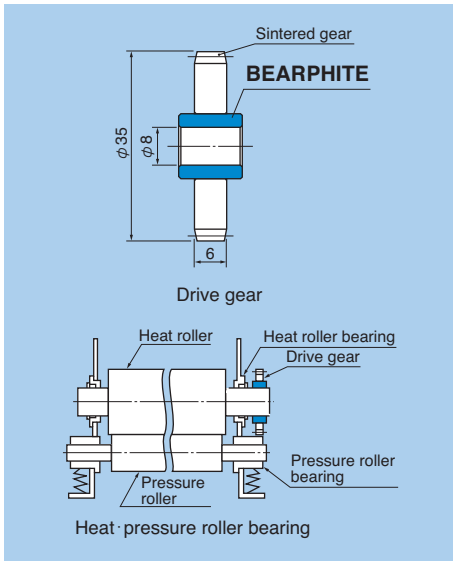


● Power window motor

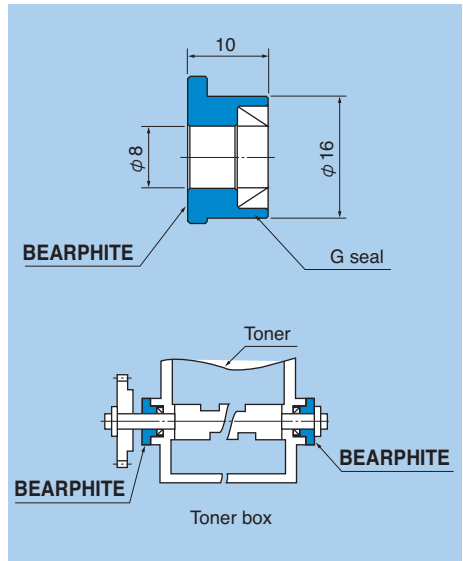


● Fuel pump motor

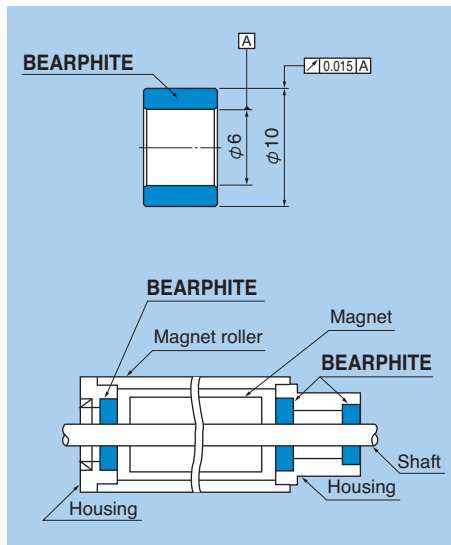
Automotive electrical equipment Electric fan motor/ Wiper motor/ Fuel pump motor/
Power window motor



Fixing part: Drive gear and BEARPHITE

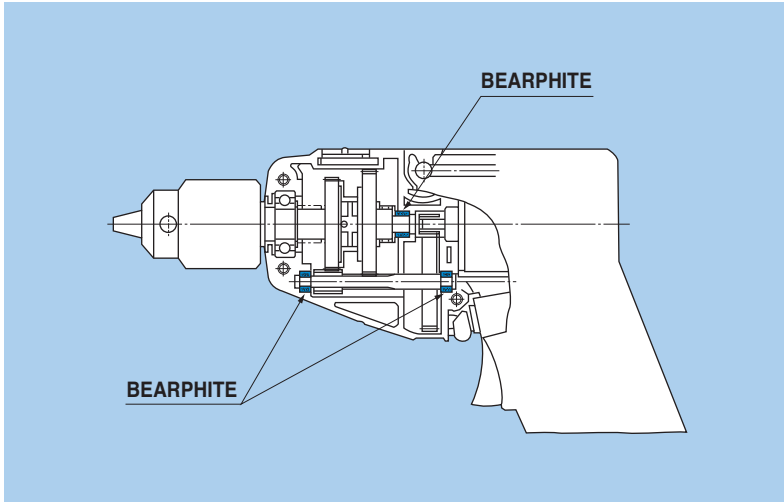


Developing part: BEARPHITE for stirring the tonner

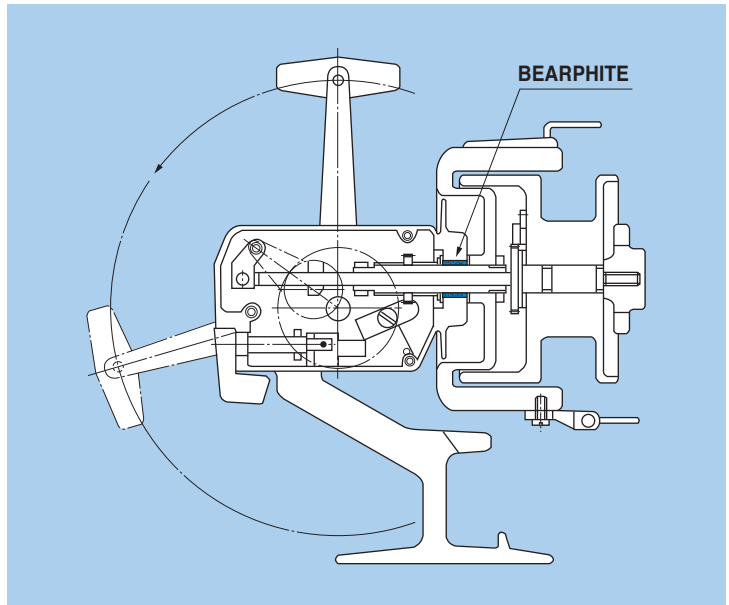


Developing part: BEARPHITE for the magnet roller

Application example for the copy machine



Electric drill



Fishing reel

8. Product introduction

Hydrodynamic BEARPHITE

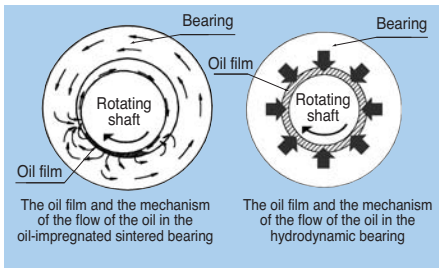
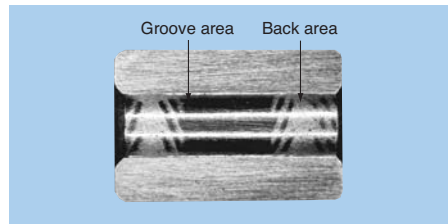
Realized high rotational accuracy during high rotation speed due to the hydrodynamic effect

1. Lubrication principle of hydrodynamic BEARPHITE

The hydrodynamic BEARPHITE is a oil-impregnated sintered bearing where herringbone shaped (fishbone shaped) hydrodynamic grooves are installed on the bore diameter surface.

The uniform oil film is formed by the hydrodynamic effect and contributes to high rotational accuracy, low noise, and super-long life span by supporting the rotating shaft without completely allowing the shaft to contact the bearing during operation. By utilizing these characteristics this bearing is widely used for equipment including the polygon scanner motor and the cooling fan. When the shaft starts rotating, the uniform oil film is formed in the clearance between the shaft and the bearing throughout the whole

circumference assisted by the action of the inclined grooves installed diagonally on the bore diameter surface of the bearing and can support the rotating shaft with high rigidity.

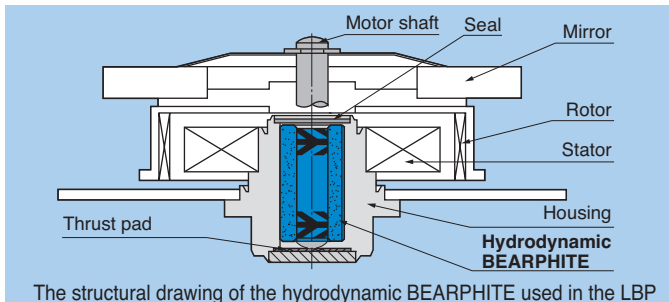


2. Comparison to other bearings

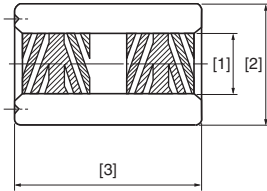
| | Hydrodynamic BEARPHITE | Fluid dynamic bearing | Rolling-element bearing | Oil-impregnated sintered bearing |
|---------------------|------------------------|-----------------------|-------------------------|----------------------------------|
| Rotational accuracy | ◎ | ◎ | ○ | × |
| High speed range | ◎ | ◎ | ○ | × |
| Low speed range | ○ | × | ◎ | ○ |
| Seizure resistance | ◎ | × | ○ | ○ |
| Degree of quietness | ◎ | ◎ | × | ○ |
| Torque | △ | △ | ◎ | ○ |
| Cost | ○ | △ | △ | ◎ |

◎Excellent ○Good △Usable × Not usable

3. Application examples of the hydrodynamic BEARPHITE



4. Accuracy of dimension of the hydrodynamic BEARPHITE

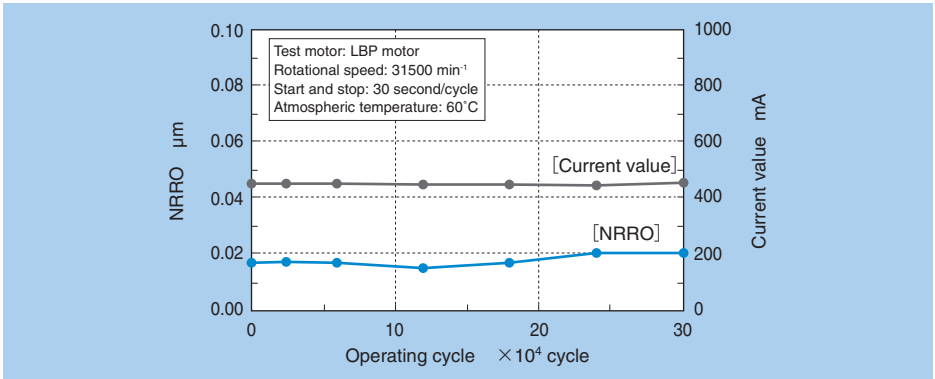


| No. | [1] Bore diameter | [2] Outside diameter | [3] Length |
|-----|-------------------|----------------------|------------|
| 1 | 1.5 | 3 | 5 |
| 2 | 2 | 4 | 6 |
| 3 | 3 | 5.5 | 8.75 |

5. Material of the hydrodynamic BEARPHITE

| Material code | Chemical components % | | | | | Density g/cm ³ | Oil retention percentage vol. % (min.) | Radial crushing strength MPa (min.) |
|---------------|-----------------------|-----|---------|-------|--------|---------------------------|--|-------------------------------------|
| | Cu | Sn | C | Fe | Others | | | |
| EZ06 | Residual amount | 1~3 | 0.5~2.5 | 38~42 | 1 max. | 6.9±0.2 | 12 min. | 150 min. |
| EZ17 | Residual amount | 1~3 | — | 38~40 | 1 max. | 7.2±0.2 | 10 min. | 180 min. |

6. Technical data



Twin BEARPHITE

Realized the lower torque due to the relief at the middle part of the bearing width



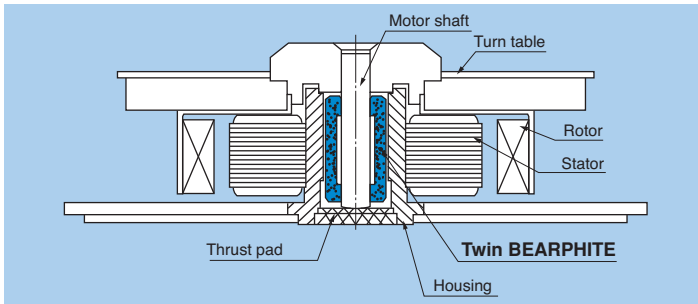
1. Features

- Enhanced concentricity of the two bearings by being integrated into one bearing
- Reduced the number of parts and manpower needed for assembling
- Reduced torque compared to that generated by one bearing currently used due to the relief at the middle part of the bearing

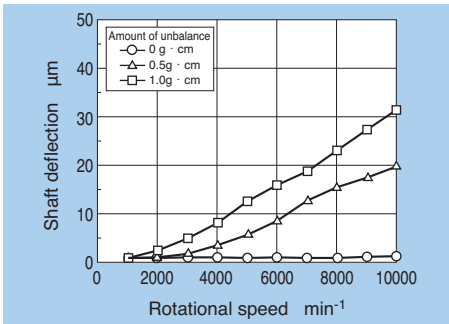
2. Application examples

- Dimension of the bore diameter: $\phi 1.5$ to $\phi 4$
- Applicable equipment: CD-ROM, CD-R/RW, DVD-ROM, axial flow fan, etc.

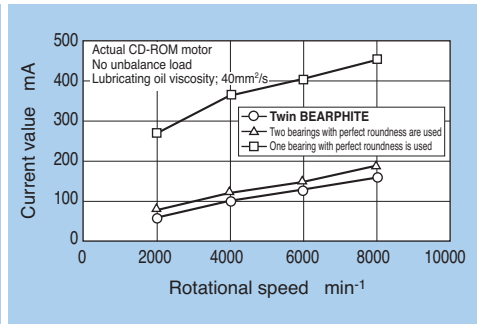
3. Application example to the CD-ROM motor



4. Shaft deflection



5. Current value



Hybrid BEARPHITE

Realized low friction, high accuracy, and high degree of quietness made possible by the hybrid structure of the resin and the sintered metal alloy



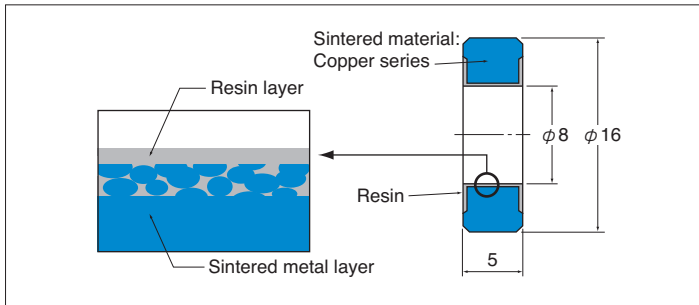
1. Features

- Low friction ($\mu = 0.05$)
- Higher running accuracy compared to that of the resin bearing
- Superior in the degree of quietness compared to that of the rolling-element bearing
- Capable to bear the axial load
- Applicable to the aluminum shaft

2. Features

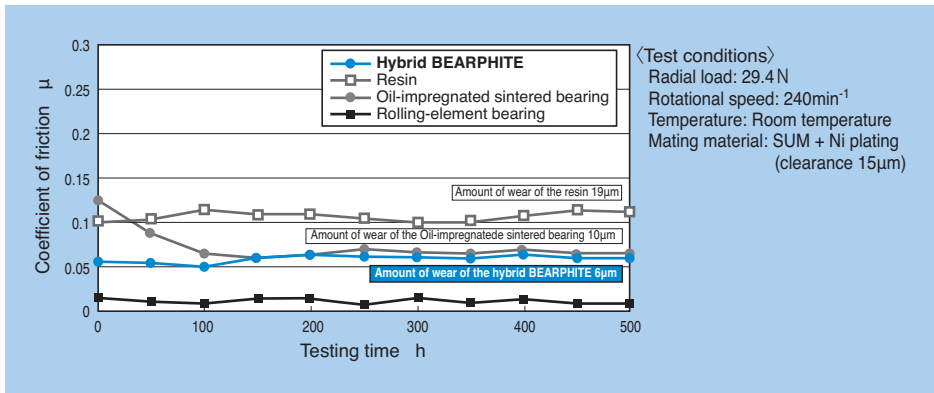
- Dimension of the bore diameter: $\phi 6$ to $\phi 10$
- Office equipment (replacement with the rolling-element bearing)

3. Structure of the hybrid BEARPHITE



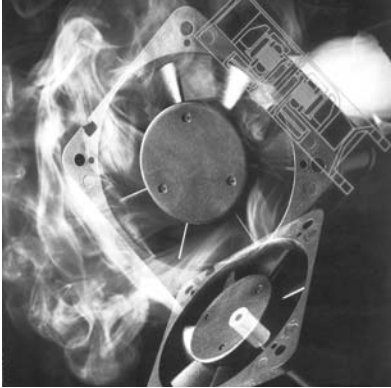
8

4. Friction and wear characteristics when the radial load is applied



BEARPHITE SG

BEARPHITE SG where the special grease is impregnated



NTN BEARPHITE SG is the oil-impregnated sintered bearing where the special liquid grease is impregnated. This grease stabilizes bearing rotation torque over a wide range of operating temperatures, and the low amount of leakage of the grease greatly enhances durability of the bearing. There are two types of greases; AL-1 for normal temperature and EU-1 for high temperature. The oil-impregnated sintered bearing where this grease is impregnated can respond to a wide range of needs.

Features

- Small rotational torque at low temperature
- Low leakage of the lubricant
- Long life span

AL-1

Representative features

AL-1 shows good characteristics in the temperature ranges from relatively low temperature to 80°C. The representative characteristics are shown in Table 8.1.

Durability

(Durability test of the prototype axial flow fan motor)

The AL-1 oil-impregnated sintered bearing showed a three times or more longer life span at (4500min⁻¹) than the normal oil-impregnated sintered bearing. In addition, at 2800min⁻¹ the bearing can be still continuously usable even after 20000h.

Table 8.1 Representative characteristics of AL-1

| | Characteristics |
|-----------------------------|---|
| Allowable temperature range | 80°C or lower (Bearing temperature) |
| Base oil, Thickener | Synthetic oil, Lithium |
| Application examples | Axial flow fan motor, ventilating fan, electric fan, various OA equipment motor |

Temperature dependence of viscosity

AL-1 is less affected by temperature, and hence, it has small agitating resistance at low temperatures, which enables low torque even in cold temperatures.

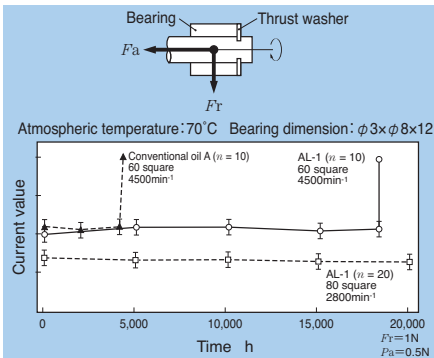


Fig. 8.1 Durability of AL-1 oil-impregnated sintered bearing

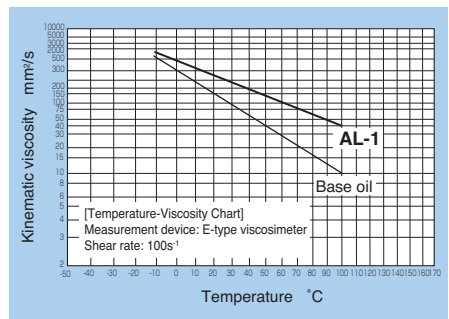


Fig. 8.2 Temperature dependency of viscosity (AL-1)

EU-1

Representative features

EU-1 shows good characteristics in the temperature ranges up to 80°C.

The representative characteristics are shown in Table 8.2.

Table 8.2.

Durability

The EU-1 oil-impregnated sintered bearing showed a three times or more longer life span according to the result of the durability test with the oil-impregnated sintered bearing alone compared to that of the oil-impregnated sintered bearing with the lubricating oil for high temperature (synthetic oil).

Table 8.2 Representative characteristics of EU-1

| | Characteristics |
|-----------------------------|---|
| Allowable temperature range | 140°C or lower (Bearing temperature) |
| Base oil, Thickener | Synthetic oil, Urea |
| Application examples | Bearings for high temperature application such as those for automobile electrical equipment motor |

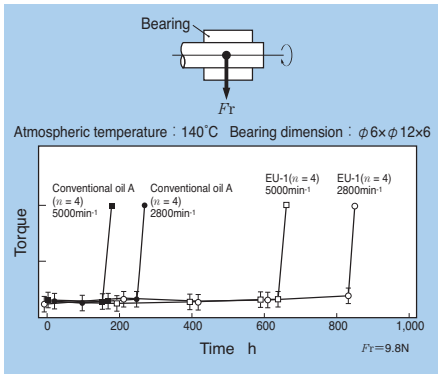


Fig. 8.3 Durability of EU-1 oil-impregnated sintered bearing

Temperature dependence of viscosity

Temperature dependence of viscosity of EU-1 has the same tendency as AL-1.

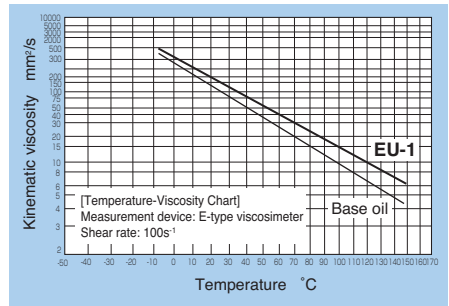


Fig. 8.4 Temperature dependency of viscosity (EU-1)

Mini pillow unit

Light and compact bearing unit responding to the needs for the vast industrial fields



1. Characteristics

Light weight, compact, and high rigid steel plate housing

The housing of NTN BEARPHITE mini pillow unit is locally reinforced by the press forming process on the steel plate. Therefore, it has not only high rigidity, but it is also light and compact.

Long life span without lubrication

The NTN BEARPHITE mini pillow unit can be used for a long time without lubrication, since the oil-impregnated sintered bearing material used for this pillow unit has a porous metallographic structure with good communication between pores and is superior in retention capability compared to lubricating oil.

Easy mounting

Appropriate installation of the NTN BEARPHITE mini pillow unit can be easily implemented, since it uses the self-aligning spherical bearing.

Wide range of application

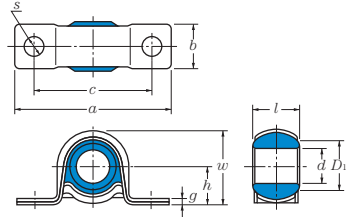
The NTN BEARPHITE mini pillow unit can be used widely as a general purpose bearing unit, since the allowable PV value of the oil-impregnated sintered bearing used in its pillow unit is $50 \text{ MPa} \cdot \text{m/min}$ (P : contact pressure MPa V : circumferential speed m/min).

Heavy duty mini pillow unit

In addition to the standard type, a heavy duty type NTN BEARPHITE mini pillow unit for high allowable load is available. The symbol H is suffixed at the end of the unit number code to distinguish it from the standard type.

2. Dimension table

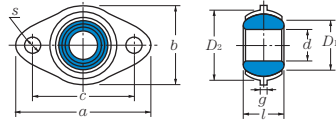
Mini pillow unit



Unit: mm

| | Unit Number Code | Dimension | | | | | | | | | | Mounting Bolt | Recommended Shaft Dimension | Bearing Number Code |
|-----------------|------------------|-----------|----|----|-----|------|----|------|----|----------------|---|---------------|--|---------------------|
| | | d | a | b | g | h | l | w | c | D ₁ | s | | | |
| Standard type | B-BAP 608 | 6 | 36 | 11 | 1.2 | 7 | 8 | 13.6 | 26 | 8.9 | 6 | M5 | 6 ^{-0.004} 8 ^{-0.016} | B-A6-3E |
| | B-BAP 810 | 8 | 42 | 12 | 1.6 | 9 | 10 | 17.8 | 30 | 12.5 | 6 | M5 | 8 ^{-0.005} 10 ^{-0.020} | B-A8-10E |
| | B-BAP 1012 | 10 | 48 | 15 | 1.6 | 11 | 12 | 21.8 | 36 | 16 | 6 | M5 | 10 ^{-0.005} 12 ^{-0.020} | B-A10-1E |
| | B-BAP 1214 | 12 | 56 | 18 | 2 | 13 | 14 | 26 | 42 | 19.5 | 7 | M6 | 12 ^{-0.006} 15 ^{-0.024} | B-A12-2E |
| | B-BAP 1518 | 15 | 63 | 22 | 3.2 | 14.9 | 18 | 30 | 48 | 20.1 | 7 | M6 | 15 ^{-0.006} 17 ^{-0.024} | B-A15-2E |
| | B-BAP 1720 | 17 | 74 | 24 | 3.2 | 16.8 | 20 | 33.4 | 56 | 22.4 | 9 | M8 | 17 ^{-0.006} 20 ^{-0.024} | B-A17-1E |
| | B-BAP 2022 | 20 | 81 | 27 | 3.2 | 18.8 | 22 | 37.4 | 63 | 25.9 | 9 | M8 | 20 ^{-0.007} 22 ^{-0.028} | B-A20-2E |
| Heavy duty type | B-BAP 1518H | 15 | 65 | 22 | 4.6 | 15.6 | 18 | 31.4 | 50 | 20.1 | 7 | M6 | 15 ^{-0.006} 17 ^{-0.024} | B-A15-2E |
| | B-BAP 1720H | 17 | 76 | 24 | 4.6 | 17.5 | 20 | 34.8 | 58 | 22.4 | 9 | M8 | 17 ^{-0.006} 20 ^{-0.024} | B-A17-1E |
| | B-BAP 2022H | 20 | 83 | 27 | 4.6 | 19.5 | 22 | 38.8 | 65 | 25.9 | 9 | M8 | 20 ^{-0.007} 22 ^{-0.028} | B-A20-2E |

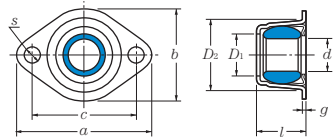
Mini flange unit



Unit: mm

| | Unit Number Code | Dimension | | | | | | | | | | Mounting Bolt | Recommended Shaft Dimension | Bearing Number Code |
|--|------------------|-----------|----|----|-----|----|----------------|----------------|----|---|----|--|-----------------------------|---------------------|
| | | d | a | b | g | l | D ₁ | D ₂ | c | s | | | | |
| | B-BAF 608 | 6 | 36 | 20 | 1.6 | 8 | 8.9 | 14 | 26 | 6 | M5 | 6 ^{-0.004} 8 ^{-0.016} | B-A6-3E | |
| | B-BAF 810 | 8 | 42 | 24 | 2 | 10 | 12.5 | 19 | 30 | 6 | M5 | 8 ^{-0.005} 10 ^{-0.020} | B-A8-10E | |
| | B-BAF 1012 | 10 | 48 | 28 | 2 | 12 | 16 | 23 | 35 | 6 | M5 | 10 ^{-0.005} 12 ^{-0.020} | B-A10-1E | |
| | B-BAF 1214 | 12 | 56 | 36 | 2.8 | 14 | 19.5 | 28 | 42 | 7 | M6 | 12 ^{-0.006} 15 ^{-0.024} | B-A12-2E | |
| | B-BAF 1518 | 15 | 63 | 42 | 3.2 | 18 | 20.1 | 32 | 48 | 7 | M6 | 15 ^{-0.006} 17 ^{-0.024} | B-A15-2E | |
| | B-BAF 1720 | 17 | 74 | 48 | 3.6 | 20 | 22.4 | 36 | 56 | 9 | M8 | 17 ^{-0.006} 20 ^{-0.024} | B-A17-1E | |
| | B-BAF 2022 | 20 | 81 | 55 | 4 | 22 | 25.9 | 40 | 63 | 9 | M8 | 20 ^{-0.007} 22 ^{-0.028} | B-A20-2E | |

Mini side flange unit



Unit: mm

| | Unit Number Code | Dimension | | | | | | | | | | Mounting Bolt | Recommended Shaft Dimension | Bearing Number Code |
|--|------------------|-----------|----|----|-----|----|----------------|----------------|----|---|----|--|-----------------------------|---------------------|
| | | d | a | b | g | l | D ₁ | D ₂ | c | s | | | | |
| | B-BSF 1012 | 10 | 48 | 31 | 1 | 16 | 14 | 24 | 35 | 6 | M5 | 10 ^{-0.005} 12 ^{-0.020} | B-A10-1E | |
| | B-BSF 1214 | 12 | 56 | 36 | 1.5 | 18 | 17 | 30 | 42 | 7 | M6 | 12 ^{-0.006} 15 ^{-0.024} | B-A12-2E | |
| | B-BSF 1518 | 15 | 63 | 42 | 1.5 | 23 | 19 | 34 | 48 | 7 | M6 | 15 ^{-0.006} 17 ^{-0.024} | B-A15-2E | |

Parts for machineries use

Responding to the diversified needs with superior quality



8

Table 8.3 Material characteristics of the sintered machinery parts

| Material Code | Chemical Components % | | | | | | Density g/cm ³ (±0.2) | Tensile Strength MPa (min.) | Apparent Hardness HRF | Radial Crushing Strength MPa (min.) | Features |
|---------------|-----------------------|---------|------------|-------|---------|--------------|----------------------------------|-----------------------------|-----------------------|-------------------------------------|--|
| | Fe | C | Cu | Ni | Mo | Others | | | | | |
| FB60 | Residual amount | — | — | — | — | — | 6.0 | 70 | 40 | 147 | Small high-precision product |
| FB64 | Residual amount | — | — | — | — | — | 6.4 | 98 | 50 | 245 | |
| FB68 | Residual amount | — | — | — | — | — | 6.8 | 147 | 70 | 294 | |
| FE60 | Residual amount | 0.2~0.8 | 0.5~2.0 | — | — | — | 6.0 | 147 | 70 | 294 | Light-load structural components |
| FE64 | Residual amount | 0.2~0.8 | 0.5~2.0 | — | — | — | 6.4 | 196 | 75 | 490 | |
| FE68 | Residual amount | 0.2~0.8 | 0.5~2.0 | — | — | — | 6.8 | 245 | 85 | 637 | |
| FG60 | Residual amount | 0.2~0.8 | 2~5 | — | — | — | 6.0 | 245 | 80 | 392 | Strength is enhanced by quench and temper. Excellent durability. |
| FG64 | Residual amount | 0.2~0.8 | 2~5 | — | — | — | 6.4 | 343 | 90 | 588 | |
| FG68 | Residual amount | 0.2~0.8 | 2~5 | — | — | — | 6.8 | 441 | 95 | 735 | |
| Z15 | Residual amount | 0.2~1.0 | 2~5 | — | — | — | 6.4 | — | — | — | Small dimensional change (high-precision product) |
| Z24 | Residual amount | 0.3~0.9 | 1~3 | 2~4 | 0.5~1.5 | 1 max. | 7.0 | 800 | HRA55 | 1300 | High hardness without heat treatment |
| Z25 | Residual amount | 0.2~1.0 | 2~5 | — | — | — | 6.8 | — | — | — | Small module for gears |
| S01 | Residual amount | 0.1以下 | 15~20 (Cr) | 10~15 | 2~4 | 2 max. | 6.6 | — | — | — | Excellent corrosion resistance and wear resistance (equivalent to SUS316L) |
| S03 | Residual amount | 0.1以下 | 15~20 (Cr) | 10~15 | — | 0.5~1.0 (Si) | 6.6 | — | — | — | Excellent corrosion resistance (SUS304L) |

* Density is different in the materials with the same chemical components.

The characteristic values described above are the representative test results obtained under the specified test conditions. The characteristic values are representative values and are not guaranteed values.

One point advice



Bits of knowledge for
the oil-impregnated bearing

Bits of knowledge for the oil-impregnated sintered bearing

■ Outline of NTN Powder Metal Corporation

NTN Powder Metal introduces the state-of-the-art testing and inspecting equipment to develop the oil-impregnated sintered bearing with higher performance and higher quality and continues to conduct ongoing research activities. NTN Powder Metal is aiming to become the leading manufacturer of the oil-impregnated sintered bearing by not only efforts of the daily work to improve the product characteristics including chemical components, lubricating performance and finish of surface conditions, but also continuous efforts in the fields of research, development, and manufacturing.

■ History of NTN Powder Metal Corporation

1965/ NTN Corporation concluded the agreement of technical cooperation with Birfield Ltd. in England. NTN Corporation introduced powder metallurgy technologies from Bound Brook Oil-less Bearing Company who is a member of Birfield Ltd. in England.

1966/ Toyo Bearing Powder Metal Company was established in Kanie-cho, Kaifu-gun, Aichi Prefecture. It started production of oil-impregnated sintered bearing for the first time in the rolling-element bearing industry.
Capital 50 million yen Trademark NTN-BBB

1967/ No.1 Plant (450m²) was completed.

1980/ No.2 Plant (225m²) was completed.

1984/ Technical cooperation was terminated. Trademark was changed.

NTN BEARPHITE

No.3 Plant (900m²) was completed.

1989/ Changed company name to **NTN Powder Metal Corporation**

1990/ Capital 200 million yen

1991/ New plant (3,150m² including No.3 Plant) was completed.
Capital 400 million yen

1994/ Administration building was completed. Steel construction building with three floors above ground
Total floor space is 1,785m².

1996/ Transforming of the main plant to one floor was completed (Added floor space: 473m²)

1998/ Acquired the certificate of ISO 9001

1999/ ISO 14001 approved with a multi-site system

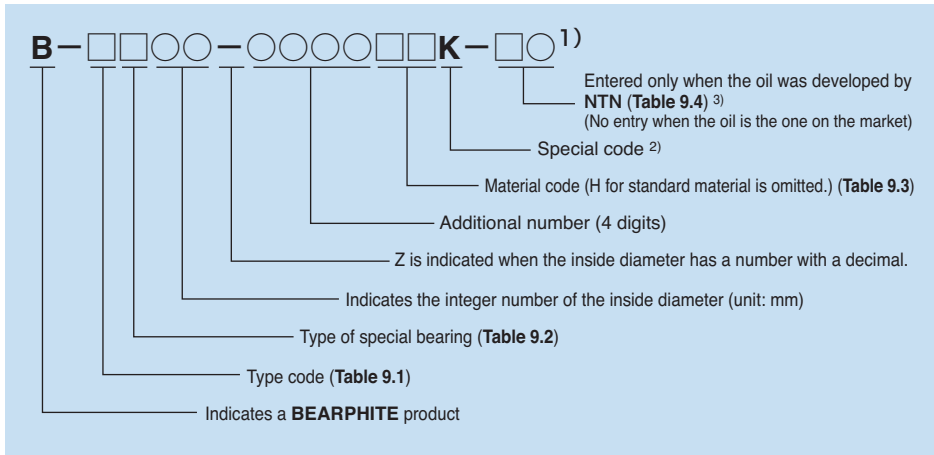
2008/ Becomes a wholly owned subsidiary of **NTN Corp.**

2009/ Extension (722m²) of new factory completed.



9. Number code

9.1 Oil-impregnated sintered bearing



Note 1) The ○ symbol represents the numerical number, and the □ symbol the alphabet.

2) The special code K shall be indicated when the oil-impregnated sintered bearing is partially modified in its shape in each model including addition of key, cut, groove, notch on the end surface, or modification to another shape.

Table 9.1 Type of the oil-impregnated sintered bearing

| Type code | Type |
|-----------|---|
| S | Sleeve type |
| F | Flange type |
| A | Spherical type |
| W | Thrust washer type |
| T | Inside diameter middle part relief type |
| Z | Other type |

Table 9.2 Special bearing type

| Code | Special bearing |
|------|----------------------|
| D | Hydrodynamic bearing |

Table 9.3 Material code

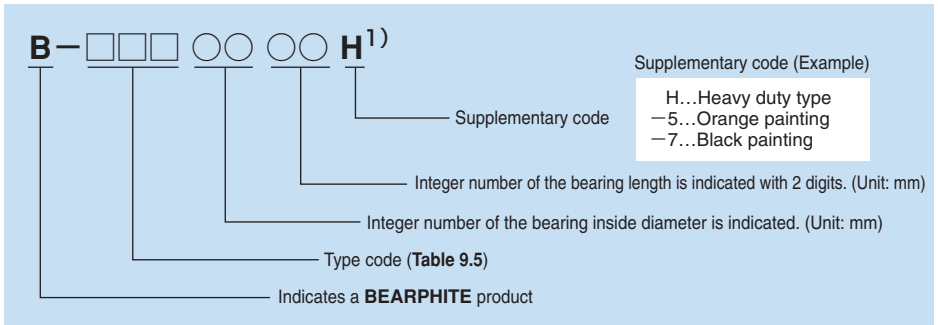
| Material code | Series | Material |
|---------------|--------------------|----------|
| H | Copper series | H |
| HB | | HB |
| HC | | HC |
| HD | | HD |
| HQ | | HE |
| HR | | R |
| EE | Copper-iron series | E |
| EB | | EB |
| EC | | EC |
| F | | F |
| L | | LB |
| P | | P |

※ Refer to **Table 4.2** for details.

Table 9.4 Code for the oil that NTN has developed

| Developed oil code | Name of lubricating oil | Details |
|--------------------|-------------------------|----------------------------------|
| A1 | AL-1 | Synthetic oil, Lithium |
| A2 | EU-1 | Synthetic oil, Urea |
| C1 | NC101 | Poly-alpha-olefin |
| C2 | NC103 | Poly-alpha-olefin |
| C3 | NC105 | Poly-alpha-olefin |
| C4 | NC201 | Polyol ester |
| C5 | NSM101 | Poly-alpha-olefin |
| C6 | NL202 | Diester |
| C7 | NC403 | Polyol ester + Poly-alpha-olefin |
| C8 | NC404 | Polyol ester + Poly-alpha-olefin |
| C9 | NC401 | Polyol ester + Poly-alpha-olefin |

9.2 Mini pillow unit

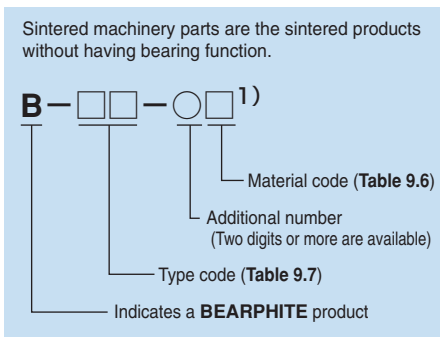


Note 1) The ○ symbol represents the numerical number, and the □ symbol the alphabet.

Table 9.5 Type code

| Type code | Type |
|-----------|------------------|
| BAP | Pillow type |
| BAF | Flange type |
| BSF | Side flange type |

9.3 Sintered machinery parts



Note 1) The ○ symbol represents the numerical number, and the □ symbol the alphabet.

Table 9.6 Material code

| Material code | Series |
|---------------|-------------|
| B | Iron series |
| C | |
| D | |
| E | |
| G | |

Table 9.7 Type and type code

| Type code | Type |
|-----------|---------------------------|
| BS | Boss |
| CM | Cam |
| CR | Collar |
| GR | Gear |
| HS | Journal box |
| NC | One way clutch (NCU, NCR) |
| NT | Torque limiter (NTL) |
| PN | Pin |
| PU | Pulley |
| RL | Roller |
| SE | Serration |
| SR | Sprocket |
| ZZ | Others |

10. Cause of trouble and countermeasures

| Details of the trouble | Phenomena | Cause | Countermeasures |
|-------------------------|---|--|---------------------------------|
| | | | Bearing |
| Seizure | Abnormal heat Galling Rough sliding surface Blockade of the pore | Excessive load | Review of the material |
| | | High speed | |
| | | Too-small clearance | |
| | | Poor lubricating oil | |
| | | Inappropriate shaft | |
| Abnormal wear | Rough sliding surface Discoloration Galling Blockade of the pore | Foreign material contamination | Cleaning of the bearing |
| | | Excessive load | Review of the material |
| | | Poor lubricating oil | |
| | | Inappropriate shaft | |
| Noise | Rough sliding surface Galling Blockade of the pore Wear | Excessive load | Review of the material |
| | | Excessive clearance | |
| | | Inappropriate shaft | |
| | | Shaft misalignment | Improvement of run-out accuracy |
| Breakage | Crack·Chipping Deformation Dent | Excessive impact load | Review of the material |
| | | Excessive press-fitting interference | |
| | | Poor handling | |
| Creep | Discoloration Galling Rough sliding surface | Too small press-fitting interference | |
| | | Abnormal temperature rise | |
| | | Excessive load | |
| Rust (Corrosion) | Discoloration (Oxidization) Verdigris (Copper) | Poor storage condition Package fault Intrusion of water and acid Handling with bare hands | |

| Countermeasures | | | |
|-------------------------------|---|-----------------------------------|--------------------------------------|
| Lubricating Oil | Shaft | Mounted clearance | Others |
| Increase viscosity (Higher) | Increase hardness Improve the surface roughness Improve roundness | Increase the clearance | Review of the operating conditions |
| Decrease viscosity (Lower) | | | |
| Review of the lubricating oil | | Adjust to the specified clearance | |
| | | | |
| | Increase hardness Improve the surface roughness Improve roundness | | Review of the operating conditions |
| Increase viscosity | | Increase the clearance | |
| Review of the lubricating oil | | | |
| | Improve the surface roughness Improve roundness | | Review of the assembling method |
| Increase viscosity. | | Decrease the clearance | |
| | | | |
| | | | Review of the operating conditions |
| | | | Review of the specified interference |
| | | | Improve the handling method |
| | | | Review of the specified interference |
| | | | Review of the operating conditions |
| Review of the lubricating oil | | Review of the specified clearance | |
| | | | Improve the handling method |
| Review of the lubricating oil | | | Improve the handling method |

11. Dimension table of standard products

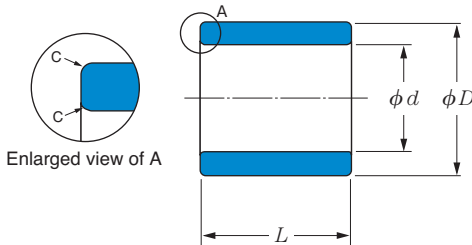
● **Material:** Copper-base (H)

The material based on Cu and Sn have superb characteristics of "low-friction", "quietness" and "wear resistance".

| Material code | | Chemical components % | | | | Density | Oil retention percentage | Radial crushing strength |
|---------------|---------------|-----------------------|--------|-------|--------|-----------------------------|--------------------------|--------------------------|
| | | Cu | Sn | C | Others | g/cm ³ (±0.2) | vol. % (min.) | MPa (min.) |
| H | Copper series | Residual amount | 8 ~ 11 | 1 ~ 2 | — | 6.6 | 18 | 150 |

● **14. Lubrication:** mineral oil, operating temperature range 0 to 80°C

● **Dimension table (Sleeve type)**



(1) **Sleeve type product number:** B-BRS□□□□□□

Select product number from the bore diameter, outside diameter and length in the table below:

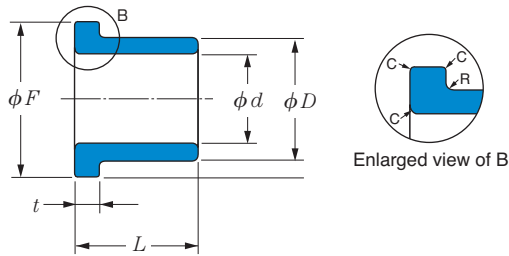
(Example) **B-BRS081210**, in case of bore diameter of 8 mm, outside diameter of 12 mm and length of 10 mm

Unit: mm

| Bore diameter | | Outside diameter | | Length L tolerance/Product number | | | | | | | | | | | Corner | Bore diameter after press-fitting (reference) | Recommended clearance | | |
|---------------|--------------|------------------|-------------------|-----------------------------------|--------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---|-----------------------|---------------|---------------|
| φd | Tolerance | φD | Tolerance | ±0.10 | | | | ±0.15 | | | | ±0.20 | | | | | | | |
| | | | | 2 | 4 | 5 | 6 | 8 | 10 | 12 | 15 | 18 | 20 | 25 | | | | | |
| 3 | +0.010 /0 | H7 | 5 | +0.031 /+0.019 | 030502 | 030504 | 030505 | | | | | | | | | C0.3 | 2.977~3.005 | +0.004~+0.016 | |
| 4 | +0.012 /0 | | 6 | +0.038 /+0.023 | | 040604 | 040605 | 040606 | | | | | | | | | C0.3 | 3.976~4.007 | +0.005~+0.017 |
| 5 | | | 8 | | | 050804 | | 050806 | 050808 | | | | | | | | | C0.3 | 4.973~5.006 |
| 6 | +0.015 /0 | | 10 | +0.046 /+0.028 | | | 061006 | 061008 | 061010 | 061012 | | | | | | | C0.3 | 5.975~6.007 | +0.006~+0.020 |
| 8 | | | 12 | | | 081206 | 081208 | 081210 | 081212 | | | | | | | | C0.3 | 7.969~8.008 | +0.008~+0.022 |
| 10 | | | 14 | | | 101406 | 101410 | 101412 | 101415 | 101418 | | | | | | | C0.3 | 9.968~10.008 | +0.009~+0.024 |
| 12 | +0.018 /0 | | 18 | +0.056 /+0.035 | s7 | 121806 | 121810 | 121812 | 121815 | 121818 | 121820 | | | | | | C0.3 | 11.972~12.012 | +0.010~+0.026 |
| 14 | | | 20 | | | | 142010 | 142012 | 142015 | 142018 | 142020 | | | | | | C0.3 | 13.965~14.009 | +0.012~+0.028 |
| 16 | | | 22 | | | | 162210 | 162215 | 162220 | 162225 | | | | | | | C0.3 | 15.965~16.009 | +0.013~+0.031 |
| 18 | | | 24 | | | | 182410 | 182415 | 182420 | 182425 | | | | | | | C0.3 | 17.964~18.009 | +0.015~+0.033 |
| 20 | +0.021 /0 | H8 | +0.062 /+0.041 | t7 | | | | | | 202615 | 202618 | 202620 | 202625 | | C0.3 | 19.960~20.008 | +0.016~+0.035 | | |
| 25 | | | | | +0.033 /0 | 30 | | | | | | | 253015 | 253020 | 253025 | | C0.3 | 24.957~25.019 | +0.020~+0.041 |

(Note) The dimension ranges after press-fitting are reference only, under the assumptions of soft steel housing material, bore diameter tolerance of H7 and wall thickness of 3 mm. Contact NTN for details, as the values vary depending on the housing, wall thickness, etc.

● Dimension table (Flange type)



(2) Flange type product number: B-BRF□□□□□□

Select product number from the bore diameter, outside diameter, length, flange outside diameter and flange width in the table below:

(Example) **B-BRF081210** in case of bore diameter of 8 mm, outside diameter of 12 mm, length of 10 mm, flange outside diameter of 16 mm and flange width of 2 mm.

Unit: mm

| Bore diameter | | Outside diameter | | Length | | Flange | | Flange width | | Product number | Corner | Interior corner | Bore diameter after press-fitting (reference) | Recommended clearance |
|---------------|----------------|------------------|---------------------|--------|------------|----------|------------|--------------|------------|----------------|--------|-----------------|---|-----------------------|
| ϕd | Tolerance | ϕD | Tolerance | L | Tolerance | ϕF | Tolerance | t | Tolerance | | | | | |
| 3 | $+0.010$ /0 | 6 | $+0.031$ /+0.019 | 3 | | 7 | | 1 | | 030603 | C0.2 | R0.2 or less | 2.981~3.006 | +0.004~+0.016 |
| 4 | | 6 | | 5 | ± 0.10 | 8 | | 1 | | 040605 | C0.2 | R0.2 or less | 3.976~4.007 | +0.005~+0.017 |
| 5 | $+0.012$ /0 | 8 | $+0.038$ /+0.023 | 6 | | 10 | | 1 | | 050806 | C0.3 | R0.3 or less | 4.973~5.006 | +0.006~+0.019 |
| 6 | | 10 | | 8 | | 12 | | 1 | | 061008 | C0.3 | R0.3 or less | 5.975~6.007 | +0.006~+0.020 |
| 8 | $+0.015$ /0 | 12 | | 10 | | 16 | | 2 | | 081210 | C0.3 | R0.3 or less | 7.969~8.008 | +0.008~+0.022 |
| 10 | | 14 | $+0.046$ /+0.028 | 12 | | 18 | | 2 | | 101412 | C0.5 | R0.3 or less | 9.968~10.008 | +0.009~+0.024 |
| 12 | | 18 | | 14 | ± 0.15 | 20 | ± 0.10 | 2 | ± 0.20 | 121814 | C0.5 | R0.3 or less | 11.972~12.012 | +0.010~+0.026 |
| 14 | $+0.018$ /0 | 20 | | 16 | | 24 | | 2 | | 142016 | C0.5 | R0.3 or less | 13.965~14.009 | +0.012~+0.028 |
| 16 | | 22 | $+0.056$ /+0.035 | 18 | | 26 | | 3 | | 162218 | C0.5 | R0.3 or less | 15.965~16.009 | +0.013~+0.031 |
| 18 | | 24 | | 20 | | 28 | | 3 | | 182420 | C0.5 | R0.3 or less | 17.964~18.009 | +0.015~+0.033 |
| 20 | $+0.021$ /0 | 26 | | 22 | | 32 | | 4 | | 202622 | C0.5 | R0.5 or less | 19.960~20.008 | +0.016~+0.035 |
| 25 | $+0.033$ /0 | 30 | $+0.062$ /+0.041 | 25 | ± 0.20 | 35 | | 4 | | 253025 | C0.5 | R0.5 or less | 24.957~25.019 | +0.020~+0.041 |

(Note) The dimension ranges after press-fitting are reference only, under the assumptions of soft steel housing material, bore diameter tolerance of H7 and wall thickness of 3 mm. Contact NTN for details, as the values vary depending on the housing, wall thickness, etc.

12. Dimension table of made-to-order products (when molds are available)

Sleeve type bearing Dimension table

d 1~4mm

| Dimension mm | | | | Product number |
|---------------|------------------|----------------------|-----------------|------------------|
| Bore diameter | Outside diameter | Length | | |
| ϕd | ϕD | l | | |
| 1 | +0.010 +0.005 | 2.5 -0.005 -0.015 | 1.3 ±0.050 | B-S1-1024 |
| 1 | +0.014 +0.008 | 3 +0.020 +0.010 | 0.9 ±0.100 | B-S1-21 |
| 1.5 | +0.010 +0.004 | 3 +0.031 +0.019 | 2 0 -0.100 | B-S1Z89 |
| 1.5 | +0.010 +0.004 | 4 +0.020 +0.010 | 2.5 0 -0.100 | B-S1Z72 |
| 2 | +0.010 0 | 4 +0.031 +0.019 | 1.5 0 -0.100 | B-S2-131 |
| 2 | +0.010 +0.001 | 4 +0.030 +0.020 | 5 0 -0.080 | B-S2-104 |
| 2 | +0.014 +0.004 | 5 +0.020 +0.010 | 1.5 ±0.050 | B-S2-188 |
| 2 | +0.013 +0.008 | 5 +0.015 +0.008 | 2 ±0.050 | B-S2-1165 |
| 2 | +0.012 +0.002 | 5 +0.023 +0.015 | 8 ±0.150 | B-S2-66 |
| 2.5 | +0.035 +0.020 | 4 +0.040 +0.025 | 3 0 -0.300 | B-S2Z1026 |
| 2.5 | +0.015 +0.010 | 4 +0.030 +0.020 | 3 0 -0.100 | B-S2Z27 |
| 2.5 | +0.034 +0.020 | 6 +0.031 +0.019 | 3 0 -0.100 | B-S2Z38 |
| 3 | +0.025 +0.020 | 4 +0.010 0 | 2.5 0 -0.100 | B-S3-61 |
| 3 | +0.043 +0.031 | 5 +0.022 +0.010 | 2 ±0.100 | B-S3-90 |
| 3 | +0.015 +0.010 | 5 +0.030 +0.020 | 2.5 0 -0.100 | B-S3-122 |
| 3 | +0.010 +0.002 | 5 +0.015 +0.005 | 5 0 -0.200 | B-S3-104 |
| 3 | +0.020 +0.010 | 6 +0.034 +0.024 | 2 ±0.100 | B-S3-95 |
| 3 | +0.010 0 | 6 +0.031 +0.019 | 4 ±0.100 | B-S3-4 |
| 3 | +0.030 +0.010 | 6 +0.030 +0.010 | 6 ±0.100 | B-S3-7 |
| 3 | +0.020 +0.010 | 7 +0.025 +0.010 | 3 ±0.100 | B-S3-1024 |
| 3 | +0.026 +0.016 | 7 +0.038 +0.023 | 4.5 ±0.100 | B-S3-32 |
| 3 | +0.010 0 | 8 +0.038 +0.023 | 6 ±0.100 | B-S3-22 |
| 4 | +0.030 +0.010 | 6 +0.055 +0.035 | 3 0 -0.100 | B-S4-1047 |
| 4 | +0.030 0 | 6 0 -0.030 | 4.5 ±0.100 | B-S4-1040 |
| 4 | +0.012 0 | 6 +0.038 +0.023 | 5 ±0.100 | B-S4-1220 |
| 4 | +0.012 0 | 6 +0.038 +0.023 | 6 0 -0.100 | B-S4-73 |

d 4~5mm

| Dimension mm | | | | Product number |
|---------------|------------------|---------------------|-----------------|------------------|
| Bore diameter | Outside diameter | Length | | |
| ϕd | ϕD | l | | |
| 4 | +0.020 +0.012 | 6 +0.015 +0.005 | 6 0 -0.100 | B-S4-1142 |
| 4 | +0.028 +0.010 | 6 +0.034 +0.019 | 7 0 -0.100 | B-S4-110 |
| 4 | +0.030 0 | 7 +0.038 +0.023 | 2 0 -0.100 | B-S4-1042 |
| 4 | +0.004 -0.002 | 7 +0.020 +0.010 | 4 ±0.100 | B-S4-87 |
| 4 | +0.012 0 | 7 +0.038 +0.023 | 6 ±0.100 | B-S4-11 |
| 4 | +0.012 0 | 7 +0.038 +0.023 | 8 ±0.150 | B-S4-1218 |
| 4 | +0.012 0 | 7 +0.038 +0.023 | 8 0 -0.150 | B-S4-105 |
| 4 | +0.012 0 | 7 +0.038 +0.023 | 10 0 -0.150 | B-S4-1242 |
| 4 | +0.012 0 | 8 +0.038 +0.023 | 3 ±0.100 | B-S4-21 |
| 4 | +0.015 +0.007 | 8 +0.008 0 | 3 ±0.100 | B-S4-1023 |
| 4 | +0.022 +0.010 | 8 +0.038 +0.023 | 4 ±0.100 | B-S4-84 |
| 4 | +0.020 +0.010 | 8 +0.038 +0.023 | 5 0 -0.100 | B-S4-1225 |
| 4 | +0.012 0 | 8 +0.038 +0.023 | 6 ±0.100 | B-S4-30 |
| 4 | +0.012 0 | 8 +0.038 +0.023 | 8 ±0.100 | B-S4-31 |
| 4 | +0.012 0 | 9 +0.038 +0.023 | 5 0 -0.200 | B-S4-36 |
| 4 | +0.012 0 | 9 +0.038 +0.023 | 6 ±0.100 | B-S4-37 |
| 4 | +0.012 0 | 10 +0.038 +0.023 | 8 ±0.150 | B-S4-40 |
| 5 | +0.020 +0.013 | 7 +0.040 +0.025 | 3 ±0.100 | B-S5-146 |
| 5 | +0.035 +0.020 | 7 +0.040 +0.025 | 4 0 -0.300 | B-S5-1084 |
| 5 | +0.040 +0.025 | 7 +0.040 +0.020 | 4 ±0.050 | B-S5-1099 |
| 5 | +0.035 +0.020 | 7 +0.040 +0.025 | 5 0 -0.300 | B-S5-1213 |
| 5 | +0.025 +0.005 | 7 +0.050 +0.020 | 6 ±0.100 | B-S5-1152 |
| 5 | +0.030 +0.010 | 8 +0.040 +0.020 | 3.5 0 -0.100 | B-S5-1024 |
| 5 | +0.023 +0.013 | 8 +0.023 +0.013 | 4 ±0.100 | B-S5-41 |
| 5 | +0.070 +0.050 | 8 +0.030 +0.010 | 5 ±0.100 | B-S5-1241 |
| 5 | +0.035 +0.025 | 8 +0.038 +0.023 | 5 ±0.050 | B-S5-89 |

Note) Please contact NTN for the type of oil.
Material is copper series (H).

Sleeve type bearing Dimension table

d 5~6mm

| Dimension mm | | | | Product number |
|--|---|---|--|------------------|
| Bore diameter | Outside diameter | Length | | |
| ϕd | ϕD | l | | |
| 5 $\begin{smallmatrix} +0.040 \\ +0.020 \end{smallmatrix}$ | 8 $\begin{smallmatrix} +0.020 \\ 0 \end{smallmatrix}$ | 6 ± 0.100 | | B-S5-5 |
| 5 $\begin{smallmatrix} +0.012 \\ 0 \end{smallmatrix}$ | 8 $\begin{smallmatrix} +0.028 \\ +0.012 \end{smallmatrix}$ | 8 ± 0.150 | | B-S5-10 |
| 5 $\begin{smallmatrix} +0.012 \\ 0 \end{smallmatrix}$ | 8 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 10 ± 0.150 | | B-S5-39 |
| 5 $\begin{smallmatrix} +0.012 \\ 0 \end{smallmatrix}$ | 8 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 12 ± 0.150 | | B-S5-14 |
| 5 $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | 9 $\begin{smallmatrix} +0.030 \\ +0.015 \end{smallmatrix}$ | 4 ± 0.100 | | B-S5-1123 |
| 5 $\begin{smallmatrix} +0.025 \\ +0.013 \end{smallmatrix}$ | 9 $\begin{smallmatrix} +0.039 \\ +0.018 \end{smallmatrix}$ | 6 ± 0.100 | | B-S5-19 |
| 5 $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | 10 $\begin{smallmatrix} +0.030 \\ +0.015 \end{smallmatrix}$ | 3 ± 0.100 | | B-S5-1125 |
| 5 $\begin{smallmatrix} +0.012 \\ 0 \end{smallmatrix}$ | 10 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 4 ± 0.100 | | B-S5-22 |
| 5 $\begin{smallmatrix} +0.028 \\ +0.018 \end{smallmatrix}$ | 10 $\begin{smallmatrix} +0.020 \\ +0.010 \end{smallmatrix}$ | 6 ± 0.100 | | B-S5-25 |
| 5 $\begin{smallmatrix} +0.018 \\ +0.006 \end{smallmatrix}$ | 10 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 7 ± 0.100 | | B-S5-40 |
| 5 $\begin{smallmatrix} +0.012 \\ +0.006 \end{smallmatrix}$ | 11 $\begin{smallmatrix} +0.040 \\ +0.032 \end{smallmatrix}$ | 5 ± 0.100 | | B-S5-109 |
| 5 $\begin{smallmatrix} +0.050 \\ +0.020 \end{smallmatrix}$ | 13 $\begin{smallmatrix} +0.030 \\ +0.010 \end{smallmatrix}$ | 5 $\begin{smallmatrix} 0 \\ -0.100 \end{smallmatrix}$ | | B-S5-66 |
| 6 $\begin{smallmatrix} +0.030 \\ +0.010 \end{smallmatrix}$ | 8 $\begin{smallmatrix} +0.040 \\ +0.020 \end{smallmatrix}$ | 3 $\begin{smallmatrix} 0 \\ -0.100 \end{smallmatrix}$ | | B-S6-1292 |
| 6 $\begin{smallmatrix} +0.040 \\ +0.025 \end{smallmatrix}$ | 8 $\begin{smallmatrix} +0.040 \\ +0.020 \end{smallmatrix}$ | 3 $\begin{smallmatrix} 0 \\ -0.100 \end{smallmatrix}$ | | B-S6-1051 |
| 6 $\begin{smallmatrix} +0.020 \\ +0.012 \end{smallmatrix}$ | 8 $\begin{smallmatrix} +0.015 \\ +0.005 \end{smallmatrix}$ | 3 $\begin{smallmatrix} 0 \\ -0.100 \end{smallmatrix}$ | | B-S6-311 |
| 6 $\begin{smallmatrix} +0.027 \\ +0.017 \end{smallmatrix}$ | 8 $\begin{smallmatrix} +0.035 \\ +0.020 \end{smallmatrix}$ | 4 ± 0.100 | | B-S6-168 |
| 6 $\begin{smallmatrix} +0.040 \\ +0.025 \end{smallmatrix}$ | 8 $\begin{smallmatrix} +0.040 \\ +0.020 \end{smallmatrix}$ | 4 ± 0.050 | | B-S6-1035 |
| 6 $\begin{smallmatrix} +0.030 \\ +0.010 \end{smallmatrix}$ | 8 $\begin{smallmatrix} +0.040 \\ +0.020 \end{smallmatrix}$ | 4 $\begin{smallmatrix} 0 \\ -0.100 \end{smallmatrix}$ | | B-S6-1048 |
| 6 $\begin{smallmatrix} +0.020 \\ 0 \end{smallmatrix}$ | 8 $\begin{smallmatrix} +0.050 \\ +0.020 \end{smallmatrix}$ | 4 ± 0.100 | | B-S6-1060 |
| 6 $\begin{smallmatrix} +0.020 \\ 0 \end{smallmatrix}$ | 8 $\begin{smallmatrix} +0.050 \\ +0.020 \end{smallmatrix}$ | 5 $\begin{smallmatrix} 0 \\ -0.100 \end{smallmatrix}$ | | B-S6-2 |
| 6 $\begin{smallmatrix} +0.020 \\ +0.005 \end{smallmatrix}$ | 8 $\begin{smallmatrix} +0.040 \\ +0.020 \end{smallmatrix}$ | 5 ± 0.050 | | B-S6-1050 |
| 6 $\begin{smallmatrix} +0.027 \\ +0.017 \end{smallmatrix}$ | 8 $\begin{smallmatrix} +0.035 \\ +0.020 \end{smallmatrix}$ | 6 ± 0.100 | | B-S6-4 |
| 6 $\begin{smallmatrix} +0.020 \\ 0 \end{smallmatrix}$ | 8 $\begin{smallmatrix} +0.050 \\ +0.020 \end{smallmatrix}$ | 8 $\begin{smallmatrix} -0.050 \\ -0.250 \end{smallmatrix}$ | | B-S6-7 |
| 6 $\begin{smallmatrix} +0.040 \\ +0.020 \end{smallmatrix}$ | 8 $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 10 $\begin{smallmatrix} -0.050 \\ -0.200 \end{smallmatrix}$ | | B-S6-177 |
| 6 $\begin{smallmatrix} +0.012 \\ 0 \end{smallmatrix}$ | 8 $\begin{smallmatrix} +0.110 \\ +0.075 \end{smallmatrix}$ | 12 ± 0.150 | | B-S6-1080 |
| 6 $\begin{smallmatrix} +0.023 \\ +0.008 \end{smallmatrix}$ | 8 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 13 $\begin{smallmatrix} 0 \\ -0.150 \end{smallmatrix}$ | | B-S6-146 |

d 6mm

| Dimension mm | | | | Product number |
|--|---|---|--|------------------|
| Bore diameter | Outside diameter | Length | | |
| ϕd | ϕD | l | | |
| 6 $\begin{smallmatrix} +0.018 \\ 0 \end{smallmatrix}$ | 9 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 3 ± 0.100 | | B-S6-194 |
| 6 $\begin{smallmatrix} +0.035 \\ +0.025 \end{smallmatrix}$ | 9 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 3 $\begin{smallmatrix} 0 \\ -0.200 \end{smallmatrix}$ | | B-S6-342 |
| 6 $\begin{smallmatrix} +0.035 \\ +0.025 \end{smallmatrix}$ | 9 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 5 ± 0.050 | | B-S6-180 |
| 6 $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | 9 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 6 ± 0.100 | | B-S6-17 |
| 6 $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | 9 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 6 ± 0.100 | | B-S6-1343 |
| 6 $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | 9 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 8 ± 0.100 | | B-S6-18 |
| 6 $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | 9 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 10 ± 0.100 | | B-S6-19 |
| 6 $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | 9 $\begin{smallmatrix} +0.030 \\ +0.015 \end{smallmatrix}$ | 16 ± 0.100 | | B-S6-230 |
| 6 $\begin{smallmatrix} +0.035 \\ +0.023 \end{smallmatrix}$ | 10 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 3 ± 0.100 | | B-S6-219 |
| 6 $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | 10 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 4 ± 0.100 | | B-S6-110 |
| 6 $\begin{smallmatrix} +0.045 \\ +0.035 \end{smallmatrix}$ | 10 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 4 $\begin{smallmatrix} 0 \\ -0.100 \end{smallmatrix}$ | | B-S6-1256 |
| 6 $\begin{smallmatrix} +0.035 \\ +0.023 \end{smallmatrix}$ | 10 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 5 $\begin{smallmatrix} +0.200 \\ 0 \end{smallmatrix}$ | | B-S6-272 |
| 6 $\begin{smallmatrix} +0.030 \\ +0.015 \end{smallmatrix}$ | 10 $\begin{smallmatrix} +0.041 \\ +0.025 \end{smallmatrix}$ | 5 ± 0.100 | | B-S6-197 |
| 6 $\begin{smallmatrix} +0.020 \\ +0.012 \end{smallmatrix}$ | 10 $\begin{smallmatrix} +0.015 \\ +0.005 \end{smallmatrix}$ | 6 $\begin{smallmatrix} 0 \\ -0.100 \end{smallmatrix}$ | | B-S6-1197 |
| 6 $\begin{smallmatrix} +0.012 \\ 0 \end{smallmatrix}$ | 10 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 7 ± 0.100 | | B-S6-117 |
| 6 $\begin{smallmatrix} +0.012 \\ 0 \end{smallmatrix}$ | 10 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 8 ± 0.100 | | B-S6-85 |
| 6 $\begin{smallmatrix} +0.045 \\ +0.033 \end{smallmatrix}$ | 10 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 8 $\begin{smallmatrix} 0 \\ -0.100 \end{smallmatrix}$ | | B-S6-1312 |
| 6 $\begin{smallmatrix} +0.012 \\ 0 \end{smallmatrix}$ | 10 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 9 ± 0.100 | | B-S6-39 |
| 6 $\begin{smallmatrix} +0.012 \\ 0 \end{smallmatrix}$ | 10 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 10 $\begin{smallmatrix} 0 \\ -0.100 \end{smallmatrix}$ | | B-S6-43 |
| 6 $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | 10 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 11 ± 0.100 | | B-S6-45 |
| 6 $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | 10 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 12 ± 0.150 | | B-S6-46 |
| 6 $\begin{smallmatrix} +0.012 \\ 0 \end{smallmatrix}$ | 10 $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 13 ± 0.100 | | B-S6-48 |
| 6 $\begin{smallmatrix} +0.020 \\ +0.012 \end{smallmatrix}$ | 10 $\begin{smallmatrix} +0.033 \\ +0.023 \end{smallmatrix}$ | 14 $\begin{smallmatrix} -0.300 \\ -0.500 \end{smallmatrix}$ | | B-S6-160 |
| 6 $\begin{smallmatrix} +0.012 \\ 0 \end{smallmatrix}$ | 10 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 15 ± 0.150 | | B-S6-52 |
| 6 $\begin{smallmatrix} +0.050 \\ +0.020 \end{smallmatrix}$ | 10 $\begin{smallmatrix} 0 \\ -0.030 \end{smallmatrix}$ | 17 ± 0.150 | | B-S6-88 |
| 6 $\begin{smallmatrix} +0.040 \\ +0.020 \end{smallmatrix}$ | 11 $\begin{smallmatrix} +0.041 \\ +0.023 \end{smallmatrix}$ | 4 ± 0.100 | | B-S6-175 |

Note) Please contact NTN for the type of oil.

Sleeve type bearing Dimension table

d 6~8mm

| Dimension mm | | | | Product number | | |
|---------------|------------------|--------|------------------|----------------|------------------|------------------|
| Bore diameter | Outside diameter | Length | | | | |
| ϕd | ϕD | l | | | | |
| 6 | +0.033 +0.018 | 11 | +0.038 +0.023 | 5 | +0.200 0 | B-S6-1325 |
| 6 | +0.012 0 | 12 | +0.046 +0.028 | 3 | ± 0.100 | B-S6-1359 |
| 6 | +0.010 0 | 12 | +0.046 +0.028 | 3 | -0.100 -0.300 | B-S6-1061 |
| 6 | +0.012 0 | 12 | +0.046 +0.028 | 4 | ± 0.100 | B-S6-1395 |
| 6 | +0.012 0 | 12 | +0.038 +0.023 | 6 | ± 0.100 | B-S6-353 |
| 6 | +0.012 0 | 12 | +0.046 +0.028 | 7 | ± 0.100 | B-S6-196 |
| 6 | +0.040 +0.020 | 12 | +0.200 0 | 9 | ± 0.150 | B-S6-65 |
| 6 | +0.015 0 | 13 | -0.020 -0.040 | 5 | ± 0.100 | B-S6-1340 |
| 6 | +0.018 +0.006 | 15 | +0.046 +0.028 | 5 | ± 0.100 | B-S6-184 |
| 7 | +0.015 0 | 10 | +0.035 +0.023 | 10 | ± 0.150 | B-S7-4 |
| 7 | +0.025 +0.010 | 10 | +0.038 +0.023 | 10 | ± 0.050 | B-S7-1110 |
| 7 | +0.012 0 | 10 | ± 0.030 | 12 | 0 -0.100 | B-S7-23 |
| 7 | +0.040 +0.020 | 11 | +0.051 +0.033 | 7 | ± 0.100 | B-S7-6 |
| 7 | +0.015 0 | 11 | +0.046 +0.028 | 10 | ± 0.150 | B-S7-24 |
| 7 | +0.053 +0.038 | 12 | +0.046 +0.028 | 7 | ± 0.100 | B-S7-46 |
| 7 | +0.015 0 | 13 | 0 -0.020 | 4 | ± 0.050 | B-S7-14 |
| 7 | +0.048 +0.033 | 14 | +0.046 +0.028 | 10 | ± 0.100 | B-S7-48 |
| 8 | +0.030 +0.015 | 10 | +0.038 +0.023 | 3 | ± 0.100 | B-S8-413 |
| 8 | +0.020 +0.012 | 10 | +0.015 +0.005 | 3.5 | 0 -0.100 | B-S8-411 |
| 8 | +0.030 +0.015 | 10 | +0.038 +0.023 | 5 | ± 0.100 | B-S8-1406 |
| 8 | +0.030 +0.010 | 10 | 0 -0.020 | 5 | 0 -0.500 | B-S8-394 |
| 8 | +0.045 +0.030 | 10 | +0.038 +0.023 | 6 | ± 0.100 | B-S8-235 |
| 8 | +0.030 +0.015 | 10 | +0.038 +0.023 | 8 | ± 0.100 | B-S8-1504 |
| 8 | +0.015 0 | 10 | +0.038 +0.023 | 8 | ± 0.100 | B-S8-187 |
| 8 | +0.015 0 | 10 | +0.038 +0.023 | 10 | ± 0.100 | B-S8-5 |
| 8 | +0.035 +0.020 | 10 | +0.040 +0.020 | 15 | ± 0.150 | B-S8-1497 |

d 8mm

| Dimension mm | | | | Product number | | |
|---------------|------------------|--------|------------------|----------------|-------------|------------------|
| Bore diameter | Outside diameter | Length | | | | |
| ϕd | ϕD | l | | | | |
| 8 | +0.018 0 | 11 | +0.038 +0.023 | 4 | ± 0.100 | B-S8-342 |
| 8 | +0.029 +0.014 | 11 | +0.043 +0.028 | 10 | ± 0.100 | B-S8-160 |
| 8 | +0.015 0 | 11 | +0.046 +0.028 | 12 | ± 0.150 | B-S8-17 |
| 8 | +0.022 0 | 11 | +0.055 +0.028 | 18 | ± 0.150 | B-S8-20 |
| 8 | +0.015 0 | 11 | +0.046 +0.028 | 20 | ± 0.150 | B-S8-21 |
| 8 | +0.040 +0.015 | 11 | +0.046 +0.016 | 25 | 0 -0.300 | B-S8-243 |
| 8 | +0.020 0 | 12 | +0.030 +0.010 | 2 | 0 -0.100 | B-S8-1388 |
| 8 | +0.040 +0.025 | 12 | +0.046 +0.028 | 4 | 0 -0.100 | B-S8-192 |
| 8 | +0.030 +0.010 | 12 | +0.040 +0.020 | 4 | 0 -0.100 | B-S8-358 |
| 8 | +0.015 0 | 12 | +0.038 +0.023 | 5 | ± 0.100 | B-S8-356 |
| 8 | +0.030 +0.015 | 12 | +0.041 +0.023 | 5 | 0 -0.100 | B-S8-1252 |
| 8 | +0.018 0 | 12 | +0.046 +0.028 | 6 | ± 0.100 | B-S8-32 |
| 8 | +0.015 0 | 12 | +0.046 +0.028 | 6 | ± 0.100 | B-S8-36 |
| 8 | +0.034 +0.025 | 12 | +0.046 +0.028 | 6 | ± 0.100 | B-S8-370 |
| 8 | +0.055 +0.040 | 12 | +0.046 +0.028 | 6 | ± 0.100 | B-S8-1100 |
| 8 | +0.015 0 | 12 | +0.046 +0.028 | 8 | ± 0.100 | B-S8-42 |
| 8 | +0.040 +0.025 | 12 | +0.046 +0.028 | 8 | 0 -0.100 | B-S8-169 |
| 8 | +0.030 +0.015 | 12 | +0.041 +0.023 | 8 | 0 -0.100 | B-S8-1253 |
| 8 | +0.015 0 | 12 | +0.046 +0.028 | 10 | ± 0.100 | B-S8-1402 |
| 8 | +0.018 0 | 12 | +0.046 +0.028 | 10 | 0 -0.300 | B-S8-381 |
| 8 | +0.015 0 | 12 | +0.046 +0.028 | 12 | ± 0.100 | B-S8-1311 |
| 8 | +0.035 +0.013 | 12 | +0.041 +0.023 | 12 | ± 0.100 | B-S8-63 |
| 8 | +0.035 +0.013 | 12 | +0.041 +0.023 | 14 | ± 0.100 | B-S8-209 |
| 8 | +0.035 +0.013 | 12 | +0.041 +0.023 | 15 | 0 -0.200 | B-S8-73 |
| 8 | +0.015 +0.008 | 12 | +0.034 +0.023 | 16 | 0 -0.100 | B-S8-75 |
| 8 | +0.035 +0.013 | 12 | +0.041 +0.023 | 18 | 0 -0.200 | B-S8-79 |

Note) Please contact NTN for the type of oil.

Sleeve type bearing Dimension table

d 8~10mm

| Dimension mm | | | | | Product number | |
|---------------|--|--------|--|----------------|---|-------------------|
| Bore diameter | Outside diameter | Length | | Product number | | |
| ϕd | ϕD | l | | | | |
| 8 | $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | 12 | $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 18 | ± 0.150 | B-S8-81 |
| 8 | $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | 12 | $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 20 | ± 0.100 | B-S8-84 |
| 8 | $\begin{smallmatrix} +0.022 \\ 0 \end{smallmatrix}$ | 12 | $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 35 | ± 0.500 | B-S8-296 |
| 8 | $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | 13 | $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 5 | ± 0.100 | B-S8-90 |
| 8 | $\begin{smallmatrix} +0.035 \\ +0.013 \end{smallmatrix}$ | 13 | $\begin{smallmatrix} +0.041 \\ +0.023 \end{smallmatrix}$ | 9 | ± 0.150 | B-S8-91 |
| 8 | $\begin{smallmatrix} +0.035 \\ +0.013 \end{smallmatrix}$ | 13 | $\begin{smallmatrix} +0.041 \\ +0.023 \end{smallmatrix}$ | 15 | $\begin{smallmatrix} 0 \\ -0.200 \end{smallmatrix}$ | B-S8-93 |
| 8 | $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | 14 | $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 3.5 | ± 0.100 | B-S8-231 |
| 8 | $\begin{smallmatrix} +0.025 \\ +0.010 \end{smallmatrix}$ | 14 | $\begin{smallmatrix} +0.045 \\ +0.026 \end{smallmatrix}$ | 16 | ± 0.100 | B-S8-115 |
| 8 | $\begin{smallmatrix} +0.017 \\ 0 \end{smallmatrix}$ | 15 | $\begin{smallmatrix} +0.045 \\ +0.025 \end{smallmatrix}$ | 24 | ± 0.200 | B-S8-130 |
| 8 | $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | 16 | $\begin{smallmatrix} +0.036 \\ +0.018 \end{smallmatrix}$ | 5 | $\begin{smallmatrix} 0 \\ -0.200 \end{smallmatrix}$ | B-S8-132 |
| 8 | $\begin{smallmatrix} +0.028 \\ +0.005 \end{smallmatrix}$ | 16 | $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 10 | ± 0.100 | B-S8-234 |
| 8 | $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | 16 | $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 13 | ± 0.150 | B-S8-376 |
| 8 | $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | 16 | $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 20 | ± 0.150 | B-S8-258 |
| 9 | $\begin{smallmatrix} +0.025 \\ +0.010 \end{smallmatrix}$ | 12 | $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 13 | ± 0.050 | B-S9-1014 |
| 9 | $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | 13 | $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 8 | ± 0.150 | B-S9-37 |
| 9 | $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | 14 | $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 12 | ± 0.100 | B-S9-12 |
| 10 | $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | 12 | $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 7.8 | ± 0.150 | B-S10-1194 |
| 10 | $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | 13 | $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 8 | ± 0.100 | B-S10-3 |
| 10 | $\begin{smallmatrix} +0.070 \\ +0.050 \end{smallmatrix}$ | 14 | $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 4 | ± 0.100 | B-S10-132 |
| 10 | $\begin{smallmatrix} +0.070 \\ +0.050 \end{smallmatrix}$ | 14 | $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 5 | ± 0.100 | B-S10-21 |
| 10 | $\begin{smallmatrix} +0.018 \\ 0 \end{smallmatrix}$ | 14 | $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 7 | ± 0.100 | B-S10-25 |
| 10 | $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | 14 | $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 12 | ± 0.150 | B-S10-136 |
| 10 | $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | 14 | $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 15 | ± 0.100 | B-S10-144 |
| 10 | $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | 14 | $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 16 | ± 0.150 | B-S10-42 |
| 10 | $\begin{smallmatrix} +0.030 \\ +0.010 \end{smallmatrix}$ | 14 | $\begin{smallmatrix} +0.036 \\ +0.018 \end{smallmatrix}$ | 18 | ± 0.100 | B-S10-44 |
| 10 | $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | 15 | $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 4 | ± 0.100 | B-S10-1025 |

d 10~12mm

| Dimension mm | | | | | Product number | |
|---------------|--|--------|--|----------------|---|-------------------|
| Bore diameter | Outside diameter | Length | | Product number | | |
| ϕd | ϕD | l | | | | |
| 10 | $\begin{smallmatrix} +0.035 \\ +0.013 \end{smallmatrix}$ | 15 | $\begin{smallmatrix} +0.041 \\ +0.023 \end{smallmatrix}$ | 19 | $\begin{smallmatrix} 0 \\ -0.100 \end{smallmatrix}$ | B-S10-53 |
| 10 | $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | 16 | $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 9 | ± 0.150 | B-S10-1050 |
| 10 | $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | 16 | $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 15 | ± 0.150 | B-S10-60 |
| 10 | $\begin{smallmatrix} +0.035 \\ +0.020 \end{smallmatrix}$ | 16 | $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 20 | ± 0.150 | B-S10-125 |
| 10 | $\begin{smallmatrix} +0.045 \\ +0.027 \end{smallmatrix}$ | 18 | $\begin{smallmatrix} +0.050 \\ +0.032 \end{smallmatrix}$ | 5 | ± 0.100 | B-S10-1102 |
| 11 | $\begin{smallmatrix} +0.080 \\ +0.030 \end{smallmatrix}$ | 14 | $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 19 | ± 0.150 | B-S11-5 |
| 12 | $\begin{smallmatrix} +0.053 \\ +0.034 \end{smallmatrix}$ | 14 | $\begin{smallmatrix} +0.043 \\ +0.028 \end{smallmatrix}$ | 8 | ± 0.200 | B-S12-1021 |
| 12 | $\begin{smallmatrix} +0.053 \\ +0.034 \end{smallmatrix}$ | 14 | $\begin{smallmatrix} +0.043 \\ +0.028 \end{smallmatrix}$ | 14 | ± 0.200 | B-S12-1132 |
| 12 | $\begin{smallmatrix} +0.018 \\ 0 \end{smallmatrix}$ | 15 | $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 15 | ± 0.150 | B-S12-6 |
| 12 | $\begin{smallmatrix} +0.018 \\ 0 \end{smallmatrix}$ | 15 | $\begin{smallmatrix} +0.053 \\ +0.033 \end{smallmatrix}$ | 20 | ± 0.150 | B-S12-7 |
| 12 | $\begin{smallmatrix} +0.018 \\ 0 \end{smallmatrix}$ | 16 | $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 9 | ± 0.150 | B-S12-120 |
| 12 | $\begin{smallmatrix} +0.018 \\ 0 \end{smallmatrix}$ | 16 | $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 10 | ± 0.100 | B-S12-10 |
| 12 | $\begin{smallmatrix} +0.018 \\ 0 \end{smallmatrix}$ | 16 | $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 12 | ± 0.150 | B-S12-14 |
| 12 | $\begin{smallmatrix} +0.036 \\ +0.018 \end{smallmatrix}$ | 16 | $\begin{smallmatrix} +0.041 \\ +0.023 \end{smallmatrix}$ | 14 | ± 0.100 | B-S12-15 |
| 12 | $\begin{smallmatrix} +0.018 \\ 0 \end{smallmatrix}$ | 16 | $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 15 | ± 0.150 | B-S12-16 |
| 12 | $\begin{smallmatrix} +0.036 \\ +0.018 \end{smallmatrix}$ | 16 | $\begin{smallmatrix} +0.041 \\ +0.023 \end{smallmatrix}$ | 20 | $\begin{smallmatrix} 0 \\ -0.400 \end{smallmatrix}$ | B-S12-20 |
| 12 | $\begin{smallmatrix} +0.043 \\ +0.025 \end{smallmatrix}$ | 16 | $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 22 | ± 0.300 | B-S12-62 |
| 12 | $\begin{smallmatrix} +0.050 \\ +0.030 \end{smallmatrix}$ | 17 | $\begin{smallmatrix} +0.050 \\ +0.030 \end{smallmatrix}$ | 7 | $\begin{smallmatrix} 0 \\ -0.200 \end{smallmatrix}$ | B-S12-122 |
| 12 | $\begin{smallmatrix} +0.050 \\ +0.030 \end{smallmatrix}$ | 17 | $\begin{smallmatrix} +0.050 \\ +0.030 \end{smallmatrix}$ | 11 | ± 0.150 | B-S12-27 |
| 12 | $\begin{smallmatrix} +0.080 \\ +0.060 \end{smallmatrix}$ | 18 | $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 5 | ± 0.100 | B-S12-32 |
| 12 | $\begin{smallmatrix} +0.018 \\ 0 \end{smallmatrix}$ | 18 | $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 5 | ± 0.100 | B-S12-33 |
| 12 | $\begin{smallmatrix} +0.030 \\ +0.010 \end{smallmatrix}$ | 18 | $\begin{smallmatrix} +0.050 \\ +0.030 \end{smallmatrix}$ | 10 | ± 0.100 | B-S12-35 |
| 12 | $\begin{smallmatrix} +0.018 \\ 0 \end{smallmatrix}$ | 18 | $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 12 | ± 0.100 | B-S12-37 |
| 12 | $\begin{smallmatrix} +0.025 \\ +0.010 \end{smallmatrix}$ | 18 | $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 18 | $\begin{smallmatrix} 0 \\ -0.200 \end{smallmatrix}$ | B-S12-71 |
| 12 | $\begin{smallmatrix} +0.018 \\ 0 \end{smallmatrix}$ | 18 | $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 20 | ± 0.100 | B-S12-45 |
| 12 | $\begin{smallmatrix} +0.018 \\ 0 \end{smallmatrix}$ | 18 | $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 38 | ± 0.200 | B-S12-48 |

Note) Please contact NTN for the type of oil.

Sleeve type bearing Dimension table

d 12~16mm

| Dimension mm | | | | | Product number | |
|---------------|------------------|--------|------------------|----|---|-------------------|
| Bore diameter | Outside diameter | Length | | | | |
| ϕd | ϕD | l | | | | |
| 12 | +0.028 +0.020 | 20 | +0.040 +0.022 | 15 | ± 0.100 | B-S12-83 |
| 13 | +0.018 0 | 18 | +0.046 +0.028 | 15 | ± 0.150 | B-S13-5 |
| 13 | +0.018 0 | 18 | +0.046 +0.028 | 26 | ± 0.150 | B-S13-9 |
| 14 | +0.027 0 | 18 | +0.046 +0.028 | 10 | ± 0.100 | B-S14-2 |
| 14 | +0.018 0 | 18 | +0.046 +0.028 | 12 | ± 0.150 | B-S14-3 |
| 14 | +0.060 +0.040 | 18 | +0.060 +0.030 | 14 | ± 0.200 | B-S14-31 |
| 14 | +0.080 +0.060 | 20 | +0.030 +0.015 | 5 | ± 0.100 | B-S14-13 |
| 14 | +0.053 +0.035 | 20 | +0.081 +0.063 | 10 | ± 0.100 | B-S14-1032 |
| 14 | +0.015 0 | 20 | +0.056 +0.035 | 12 | ± 0.100 | B-S14-17 |
| 14 | +0.015 0 | 20 | +0.056 +0.035 | 15 | ± 0.150 | B-S14-18 |
| 14 | +0.018 0 | 20 | +0.056 +0.035 | 19 | ± 0.100 | B-S14-20 |
| 14 | +0.018 0 | 20 | +0.056 +0.035 | 21 | ± 0.100 | B-S14-21 |
| 15 | +0.048 +0.030 | 19 | +0.056 +0.036 | 10 | ± 0.100 | B-S15-3 |
| 15 | +0.018 0 | 19 | +0.056 +0.035 | 25 | ± 0.200 | B-S15-6 |
| 15 | +0.080 +0.050 | 20 | +0.050 +0.020 | 15 | ± 0.150 | B-S15-1066 |
| 15 | +0.018 0 | 20 | +0.056 +0.035 | 20 | ± 0.150 | B-S15-11 |
| 15 | +0.067 +0.052 | 21 | +0.056 +0.035 | 12 | ± 0.100 | B-S15-42 |
| 15 | +0.018 0 | 21 | +0.056 +0.035 | 14 | $\begin{matrix} 0 \\ -0.300 \end{matrix}$ | B-S15-12 |
| 15 | +0.018 0 | 21 | +0.056 +0.035 | 20 | ± 0.150 | B-S15-14 |
| 15 | +0.018 0 | 22 | +0.056 +0.035 | 25 | ± 0.200 | B-S15-51 |
| 16 | +0.018 0 | 20 | +0.056 +0.035 | 10 | ± 0.100 | B-S16-1 |
| 16 | +0.018 0 | 20 | +0.046 +0.028 | 20 | ± 0.150 | B-S16-7 |
| 16 | +0.018 0 | 20 | +0.056 +0.035 | 25 | ± 0.200 | B-S16-9 |
| 16 | +0.018 0 | 21 | +0.056 +0.035 | 16 | ± 0.150 | B-S16-11 |
| 16 | +0.018 0 | 22 | +0.056 +0.035 | 15 | ± 0.150 | B-S16-15 |
| 16 | +0.018 0 | 22 | +0.056 +0.035 | 20 | ± 0.150 | B-S16-21 |

d 17~25mm

| Dimension mm | | | | | Product number | |
|---------------|------------------|--------|------------------|----|---|-------------------|
| Bore diameter | Outside diameter | Length | | | | |
| ϕd | ϕD | l | | | | |
| 17 | +0.018 0 | 22 | +0.056 +0.035 | 25 | ± 0.100 | B-S17-2 |
| 17 | +0.018 0 | 23 | +0.056 +0.035 | 18 | $\begin{matrix} 0 \\ -0.100 \end{matrix}$ | B-S17-6 |
| 18 | +0.018 0 | 22 | +0.055 +0.040 | 15 | ± 0.150 | B-S18-3 |
| 18 | +0.018 0 | 22 | +0.056 +0.035 | 20 | ± 0.150 | B-S18-5 |
| 18 | +0.018 0 | 24 | +0.056 +0.035 | 20 | ± 0.150 | B-S18-13 |
| 20 | +0.021 0 | 24 | +0.062 +0.041 | 15 | ± 0.100 | B-S20-1 |
| 20 | +0.041 +0.020 | 25 | +0.043 +0.022 | 13 | $\begin{matrix} 0 \\ -0.200 \end{matrix}$ | B-S20-1046 |
| 20 | +0.021 0 | 25 | +0.062 +0.041 | 20 | ± 0.150 | B-S20-12 |
| 20 | +0.055 +0.035 | 25 | +0.047 +0.027 | 25 | ± 0.200 | B-S20-13 |
| 20 | +0.021 0 | 26 | +0.062 +0.041 | 15 | $\begin{matrix} 0 \\ -0.300 \end{matrix}$ | B-S20-22 |
| 20 | +0.021 0 | 26 | +0.062 +0.041 | 20 | ± 0.150 | B-S20-24 |
| 20 | +0.021 0 | 26 | +0.062 +0.041 | 25 | ± 0.150 | B-S20-26 |
| 20 | +0.021 0 | 26 | +0.062 +0.041 | 28 | ± 0.150 | B-S20-1027 |
| 20 | +0.045 +0.025 | 26 | +0.062 +0.041 | 30 | ± 0.150 | B-S20-81 |
| 20 | +0.021 0 | 28 | +0.062 +0.041 | 25 | $\begin{matrix} 0 \\ -0.100 \end{matrix}$ | B-S20-37 |
| 20 | +0.021 0 | 28 | +0.062 +0.041 | 30 | ± 0.150 | B-S20-40 |
| 22 | +0.041 +0.020 | 28 | +0.062 +0.041 | 9 | ± 0.150 | B-S22-1002 |
| 22 | +0.021 0 | 28 | +0.062 +0.041 | 20 | ± 0.150 | B-S22-4 |
| 22 | +0.021 0 | 28 | +0.062 +0.041 | 30 | ± 0.150 | B-S22-8 |
| 24 | +0.033 0 | 30 | +0.073 +0.048 | 18 | ± 0.150 | B-S24-1 |
| 24 | +0.073 +0.043 | 30 | +0.056 +0.035 | 29 | $\begin{matrix} 0 \\ -0.400 \end{matrix}$ | B-S24-2 |
| 25 | +0.033 0 | 30 | +0.062 +0.041 | 15 | ± 0.150 | B-S25-3 |
| 25 | +0.033 0 | 30 | +0.073 +0.048 | 20 | ± 0.150 | B-S25-4 |
| 25 | +0.033 0 | 30 | +0.073 +0.048 | 25 | ± 0.150 | B-S25-5 |
| 25 | +0.033 0 | 31 | +0.062 +0.041 | 16 | $\begin{matrix} 0 \\ -0.300 \end{matrix}$ | B-S25-8 |
| 25 | +0.033 0 | 32 | +0.073 +0.048 | 25 | ± 0.200 | B-S25-35 |

Note) Please contact NTN for the type of oil.

Sleeve type bearing Dimension table

d 28~50mm

| | Dimension mm | | | Product number | | |
|----|--|------------------|--|----------------|-------------|-----------------|
| | Bore diameter | Outside diameter | Length | | | |
| | ϕd | ϕD | l | | | |
| 28 | $\begin{matrix} +0.033 \\ 0 \end{matrix}$ | 36 | $\begin{matrix} +0.073 \\ +0.048 \end{matrix}$ | 30 | ± 0.150 | B-S28-5 |
| 30 | $\begin{matrix} +0.033 \\ 0 \end{matrix}$ | 35 | $\begin{matrix} +0.073 \\ +0.048 \end{matrix}$ | 35 | ± 0.200 | B-S30-8 |
| 30 | $\begin{matrix} +0.033 \\ 0 \end{matrix}$ | 36 | $\begin{matrix} +0.073 \\ +0.048 \end{matrix}$ | 20 | ± 0.150 | B-S30-13 |
| 30 | $\begin{matrix} +0.033 \\ 0 \end{matrix}$ | 36 | $\begin{matrix} +0.073 \\ +0.048 \end{matrix}$ | 30 | ± 0.200 | B-S30-17 |
| 30 | $\begin{matrix} +0.090 \\ +0.070 \end{matrix}$ | 37 | $\begin{matrix} +0.025 \\ +0.010 \end{matrix}$ | 10 | ± 0.100 | B-S30-19 |
| 30 | $\begin{matrix} +0.039 \\ 0 \end{matrix}$ | 38 | $\begin{matrix} +0.073 \\ +0.048 \end{matrix}$ | 30 | ± 0.200 | B-S30-35 |
| 35 | $\begin{matrix} +0.039 \\ 0 \end{matrix}$ | 40 | $\begin{matrix} +0.073 \\ +0.048 \end{matrix}$ | 30 | ± 0.200 | B-S35-1 |
| 35 | $\begin{matrix} +0.039 \\ 0 \end{matrix}$ | 41 | $\begin{matrix} +0.079 \\ +0.054 \end{matrix}$ | 40 | ± 0.200 | B-S35-6 |
| 35 | $\begin{matrix} +0.090 \\ +0.070 \end{matrix}$ | 42 | $\begin{matrix} +0.025 \\ +0.010 \end{matrix}$ | 10 | ± 0.100 | B-S35-7 |
| 35 | $\begin{matrix} +0.039 \\ 0 \end{matrix}$ | 42 | $\begin{matrix} +0.079 \\ +0.054 \end{matrix}$ | 40 | ± 0.200 | B-S35-13 |
| 35 | $\begin{matrix} +0.039 \\ 0 \end{matrix}$ | 43 | $\begin{matrix} +0.079 \\ +0.054 \end{matrix}$ | 30 | ± 0.150 | B-S35-17 |
| 40 | $\begin{matrix} +0.039 \\ 0 \end{matrix}$ | 48 | $\begin{matrix} +0.079 \\ +0.054 \end{matrix}$ | 30 | ± 0.150 | B-S40-4 |
| 40 | $\begin{matrix} +0.039 \\ 0 \end{matrix}$ | 48 | $\begin{matrix} +0.079 \\ +0.054 \end{matrix}$ | 35 | ± 0.200 | B-S40-11 |
| 45 | $\begin{matrix} +0.110 \\ +0.071 \end{matrix}$ | 52 | $\begin{matrix} +0.096 \\ +0.066 \end{matrix}$ | 40 | ± 0.200 | B-S45-3 |
| 50 | $\begin{matrix} +0.039 \\ 0 \end{matrix}$ | 58 | $\begin{matrix} +0.096 \\ +0.066 \end{matrix}$ | 40 | ± 0.150 | B-S50-4 |

Note) Please contact NTN for the type of oil.

Flange type bearing Dimension table

d 1.5~4mm

| Bore diameter ϕd | Outside diameter ϕD | Dimension mm | | | Flange thickness t | Product number |
|--|--|--|--|---|-------------------------|----------------|
| | | Length ℓ | Flange outside diameter ϕF | | | |
| 1.5 $\begin{smallmatrix} +0.014 \\ +0.009 \end{smallmatrix}$ | 3 $\begin{smallmatrix} +0.037 \\ +0.027 \end{smallmatrix}$ | 1.6 | 4 $\begin{smallmatrix} +0.030 \\ -0.100 \end{smallmatrix}$ | 0.5 ± 0.050 | B-FIZ1008 | |
| 1.5 $\begin{smallmatrix} +0.014 \\ +0.008 \end{smallmatrix}$ | 4 $\begin{smallmatrix} +0.020 \\ +0.010 \end{smallmatrix}$ | 1.7 | 6 $\begin{smallmatrix} 0 \\ -0.050 \end{smallmatrix}$ | 0.8 ± 0.100 | B-FIZ1003 | |
| 2 $\begin{smallmatrix} +0.020 \\ 0 \end{smallmatrix}$ | 3 $\begin{smallmatrix} 0 \\ -0.100 \end{smallmatrix}$ | 2 ± 0.100 | 4 ± 0.100 | 0.5 ± 0.100 | B-F2-16 | |
| 2 $\begin{smallmatrix} +0.020 \\ +0.010 \end{smallmatrix}$ | 3.5 $\begin{smallmatrix} +0.030 \\ +0.020 \end{smallmatrix}$ | 2.9 | 5 ± 0.100 | 1.4 ± 0.100 | B-F2-76 | |
| 2 $\begin{smallmatrix} +0.004 \\ 0 \end{smallmatrix}$ | 4.5 $\begin{smallmatrix} +0.060 \\ +0.040 \end{smallmatrix}$ | 2.5 $\begin{smallmatrix} 0 \\ -0.200 \end{smallmatrix}$ | 6 ± 0.100 | 0.5 ± 0.100 | B-F2-1 | |
| 2 $\begin{smallmatrix} +0.014 \\ +0.004 \end{smallmatrix}$ | 5 $\begin{smallmatrix} +0.040 \\ +0.030 \end{smallmatrix}$ | 2 $\begin{smallmatrix} +0.050 \\ -0.100 \end{smallmatrix}$ | 6 ± 0.070 | 0.5 ± 0.050 | B-F2-3 | |
| 2 $\begin{smallmatrix} +0.010 \\ 0 \end{smallmatrix}$ | 6 $\begin{smallmatrix} +0.025 \\ +0.015 \end{smallmatrix}$ | 3 ± 0.150 | 7 ± 0.100 | 0.7 ± 0.200 | B-F2-8 | |
| 3 $\begin{smallmatrix} +0.025 \\ 0 \end{smallmatrix}$ | 5 $\begin{smallmatrix} 0 \\ -0.030 \end{smallmatrix}$ | 3 ± 0.150 | 8 ± 0.100 | 1.4 $\begin{smallmatrix} 0 \\ -0.100 \end{smallmatrix}$ | B-F3-1 | |
| 3 $\begin{smallmatrix} +0.010 \\ 0 \end{smallmatrix}$ | 6 ± 0.010 | 2.4 ± 0.100 | 7 ± 0.100 | 1 ± 0.100 | B-F3-3 | |
| 3 $\begin{smallmatrix} +0.010 \\ 0 \end{smallmatrix}$ | 6 ± 0.010 | 2.9 ± 0.100 | 7 ± 0.150 | 1 $\begin{smallmatrix} 0 \\ -0.100 \end{smallmatrix}$ | B-F3-1123 | |
| 3 $\begin{smallmatrix} +0.010 \\ 0 \end{smallmatrix}$ | 6 ± 0.050 | 4 ± 0.100 | 7 ± 0.050 | 1 $\begin{smallmatrix} 0 \\ -0.100 \end{smallmatrix}$ | B-F3-7 | |
| 3 $\begin{smallmatrix} +0.020 \\ +0.010 \end{smallmatrix}$ | 6 $\begin{smallmatrix} 0 \\ -0.100 \end{smallmatrix}$ 5 $\begin{smallmatrix} 0 \\ -0.100 \end{smallmatrix}$ | 4 $\begin{smallmatrix} 0 \\ -0.100 \end{smallmatrix}$ | 7 ± 0.100 | 1 $\begin{smallmatrix} 0 \\ -0.100 \end{smallmatrix}$ | B-F3-1136K※ | |
| 3 $\begin{smallmatrix} +0.017 \\ +0.010 \end{smallmatrix}$ | 6.3 $\begin{smallmatrix} +0.033 \\ +0.020 \end{smallmatrix}$ | 3.6 ± 0.100 | 9 ± 0.100 | 0.8 ± 0.100 | B-F3-27 | |
| 3 $\begin{smallmatrix} +0.028 \\ +0.022 \end{smallmatrix}$ | 7 $\begin{smallmatrix} +0.045 \\ +0.030 \end{smallmatrix}$ | 3 ± 0.100 | 10 $\begin{smallmatrix} -0.050 \\ -0.070 \end{smallmatrix}$ | 1.2 ± 0.100 | B-F3-38※ | |
| 3 $\begin{smallmatrix} +0.015 \\ +0.005 \end{smallmatrix}$ | 7.5 $\begin{smallmatrix} +0.010 \\ 0 \end{smallmatrix}$ | 2.2 ± 0.100 | 10 $\begin{smallmatrix} 0 \\ -0.050 \end{smallmatrix}$ | 0.9 | B-F3-32※ | |
| 3 $\begin{smallmatrix} +0.009 \\ +0.003 \end{smallmatrix}$ | 8 $\begin{smallmatrix} 0 \\ -0.012 \end{smallmatrix}$ | 2.8 ± 0.100 | 10 $\begin{smallmatrix} 0 \\ -0.018 \end{smallmatrix}$ | 1.5 | B-F3-29 | |
| 4 $\begin{smallmatrix} +0.030 \\ +0.010 \end{smallmatrix}$ | 6 $\begin{smallmatrix} 0 \\ -0.050 \end{smallmatrix}$ | 2.5 ± 0.100 | 8 ± 0.100 | 1 ± 0.100 | B-F4-1 | |
| 4 $\begin{smallmatrix} +0.030 \\ 0 \end{smallmatrix}$ | 6 $\begin{smallmatrix} -0.020 \\ -0.050 \end{smallmatrix}$ | 3 ± 0.200 | 11 $\begin{smallmatrix} \pm 0.200 \\ 0 \end{smallmatrix}$ 9.5 $\begin{smallmatrix} 0 \\ -0.100 \end{smallmatrix}$ | 1.5 ± 0.200 | B-F4-2※ | |
| 4 $\begin{smallmatrix} +0.030 \\ +0.010 \end{smallmatrix}$ | 6 $\begin{smallmatrix} 0 \\ -0.050 \end{smallmatrix}$ | 5 ± 0.100 | 8 ± 0.100 | 1 ± 0.100 | B-F4-73 | |
| 4 $\begin{smallmatrix} +0.030 \\ 0 \end{smallmatrix}$ | 6 $\begin{smallmatrix} -0.020 \\ -0.050 \end{smallmatrix}$ | 5 ± 0.200 | 10 ± 0.200 | 1.5 ± 0.200 | B-F4-43 | |
| 4 $\begin{smallmatrix} +0.030 \\ +0.010 \end{smallmatrix}$ | 6 $\begin{smallmatrix} 0 \\ -0.050 \end{smallmatrix}$ | 7 ± 0.100 | 8 ± 0.100 | 1 ± 0.100 | B-F4-1079 | |
| 4 $\begin{smallmatrix} +0.038 \\ +0.020 \end{smallmatrix}$ | 6 $\begin{smallmatrix} 0 \\ -0.018 \end{smallmatrix}$ 5.6 $\begin{smallmatrix} 0 \\ -0.100 \end{smallmatrix}$ | 5.9 ± 0.100 | 9 ± 0.100 | 1 ± 0.100 | B-F4-1045K※ | |
| 4 $\begin{smallmatrix} +0.030 \\ 0 \end{smallmatrix}$ | 7 $\begin{smallmatrix} 0 \\ -0.018 \end{smallmatrix}$ | 2.5 ± 0.100 | 8.2 ± 0.100 | 0.6 ± 0.100 | B-F4-5 | |

Note) The※symbol indicates the bearing with a special shape. Please contact NTN for details.
Please contact NTN for the type of oil.

Flange type bearing Dimension table

d 4~5mm

| | Dimension mm | | | | | Product number |
|---|--|---|-----------------|--------------------------------------|--|---------------------|
| | Bore diameter ϕd | Outside diameter ϕD | Length l | Flange outside diameter $\phi F'$ | Flange thickness t | |
| 4 | $\begin{matrix} +0.030 \\ 0 \end{matrix}$ | $\begin{matrix} 7 \\ 0 \\ -0.058 \end{matrix}$ | 3 ± 0.300 | 8.2 ± 0.100 | 0.6 ± 0.100 | B-F4-50 ※ |
| 4 | $\begin{matrix} +0.050 \\ +0.020 \end{matrix}$ | $\begin{matrix} 7 \\ 0 \\ -0.050 \end{matrix}$ | 3 ± 0.100 | 9 ± 0.150 | 0.9 ± 0.100 | B-F4-6 |
| 4 | $\begin{matrix} +0.030 \\ 0 \end{matrix}$ | $\begin{matrix} 7 \\ -0.025 \\ -0.083 \end{matrix}$ | 3 ± 0.300 | 10 ± 0.300 | 1.5 | B-F4-7 |
| 4 | $\begin{matrix} +0.020 \\ 0 \end{matrix}$ | $\begin{matrix} 7 \\ 0 \\ -0.020 \end{matrix}$ | 4.7 | 9 ± 0.100 | 1.5 ± 0.100 | B-F4-101 |
| 4 | $\begin{matrix} +0.050 \\ +0.020 \end{matrix}$ | $\begin{matrix} 7 \\ -0.010 \\ -0.030 \end{matrix}$ | 5 ± 0.100 | 9 ± 0.100 | 1 ± 0.100 | B-F4-93 |
| 4 | $\begin{matrix} +0.048 \\ 0 \end{matrix}$ | $\begin{matrix} 7 \\ -0.040 \\ -0.098 \end{matrix}$ | 6 ± 0.100 | 10 ± 0.200 | 1.5 ± 0.100 | B-F4-9 |
| 4 | $\begin{matrix} +0.012 \\ 0 \end{matrix}$ | $\begin{matrix} 7 \\ +0.038 \\ +0.023 \end{matrix}$ | 10 ± 0.100 | 9 ± 0.200 | 1.5 ± 0.100 | B-F4-49 |
| 4 | $\begin{matrix} +0.020 \\ 0 \end{matrix}$ | $\begin{matrix} 7 \\ 0 \\ -0.020 \\ 6 \\ -0.100 \\ -0.200 \end{matrix}$ | 4.7 | 9 ± 0.100 | 1.5 ± 0.100 | B-F4-102 ※ |
| 4 | $\begin{matrix} +0.048 \\ 0 \end{matrix}$ | $\begin{matrix} 7 \\ -0.040 \\ -0.098 \\ 6.5 \\ 0 \\ -0.200 \end{matrix}$ | 6 ± 0.100 | 10 ± 0.100 | 1.5 ± 0.100 | B-F4-10 ※ |
| 4 | $\begin{matrix} +0.030 \\ 0 \end{matrix}$ | $\begin{matrix} 8 \\ -0.025 \\ -0.083 \end{matrix}$ | 3 ± 0.300 | 12 ± 0.300 | 1.5 | B-F4-40 |
| 4 | $\begin{matrix} +0.012 \\ 0 \end{matrix}$ | $\begin{matrix} 8 \\ +0.046 \\ +0.028 \end{matrix}$ | 3.5 ± 0.100 | 10 ± 0.200 | 1 ± 0.100 | B-F4-36 |
| 4 | $\begin{matrix} +0.018 \\ 0 \end{matrix}$ | $\begin{matrix} 8 \\ +0.038 \\ +0.023 \end{matrix}$ | 4 ± 0.100 | 11 ± 0.100 | 1.5 $\begin{matrix} -0.100 \\ -0.200 \end{matrix}$ | B-F4-15 |
| 4 | $\begin{matrix} +0.012 \\ 0 \end{matrix}$ | $\begin{matrix} 8 \\ +0.038 \\ +0.023 \end{matrix}$ | 5 | 12 ± 0.100 | 2 $\begin{matrix} 0 \\ -0.100 \end{matrix}$ | B-F4-18 |
| 4 | $\begin{matrix} +0.048 \\ 0 \end{matrix}$ | $\begin{matrix} 8 \\ -0.013 \\ -0.049 \end{matrix}$ | 5.4 ± 0.300 | 18 ± 0.200 | 2.2 | B-F4-35 |
| 4 | $\begin{matrix} +0.045 \\ +0.033 \end{matrix}$ | $\begin{matrix} 8 \\ +0.038 \\ +0.023 \end{matrix}$ | 6 ± 0.150 | 12 ± 0.140 | 2 ± 0.200 | B-F4-21 |
| 4 | $\begin{matrix} +0.012 \\ 0 \end{matrix}$ | $\begin{matrix} 8 \\ +0.038 \\ +0.023 \end{matrix}$ | 10 ± 0.100 | 12 ± 0.100 | 2 ± 0.050 | B-F4-33 |
| 4 | $\begin{matrix} +0.030 \\ 0 \end{matrix}$ | $\begin{matrix} 8 \\ -0.025 \\ -0.083 \\ 6.8 \\ 0 \\ -0.090 \end{matrix}$ | 8 ± 0.200 | 12 ± 0.140 | 2 ± 0.200 | B-F4-57 ※ |
| 4 | $\begin{matrix} +0.060 \\ +0.045 \end{matrix}$ | $\begin{matrix} 8 \\ +0.032 \\ +0.023 \\ 7 \\ \pm 0.200 \end{matrix}$ | 6 ± 0.100 | 10 ± 0.100 | 1.5 ± 0.200 | B-F4-42 ※ |
| 4 | $\begin{matrix} +0.080 \\ +0.050 \end{matrix}$ | $\begin{matrix} 8 \\ -0.020 \\ -0.070 \\ 7 \\ 0 \\ -0.100 \end{matrix}$ | 6 ± 0.300 | 12 ± 0.300 | 2 ± 0.300 | B-F4-1016K ※ |
| 4 | $\begin{matrix} +0.021 \\ +0.015 \end{matrix}$ | $\begin{matrix} 10 \\ +0.045 \\ +0.030 \end{matrix}$ | 4 ± 0.100 | 12 ± 0.100 | 1.5 ± 0.100 | B-F4-59 ※ |
| 5 | $\begin{matrix} +0.050 \\ 0 \end{matrix}$ | $\begin{matrix} 7 \\ 0 \\ -0.050 \end{matrix}$ | 2.5 ± 0.100 | 8 ± 0.100 | 1 ± 0.200 | B-F5-1093 |

Note) The ※ symbol indicates the bearing with a special shape. Please contact NTN for details.
Please contact NTN for the type of oil.

Flange type bearing Dimension table

d 5~6mm

| Bore diameter ϕd | Outside diameter ϕD | Dimension mm | | | Flange thickness t | Product number |
|--|---|------------------|-------------------------------------|---|-------------------------|----------------|
| | | Length ℓ | Flange outside diameter ϕF | | | |
| 5 $\begin{smallmatrix} +0.030 \\ 0 \end{smallmatrix}$ | 7 $\begin{smallmatrix} 0 \\ -0.022 \end{smallmatrix}$ | 3 ± 0.100 | 8 ± 0.100 | 1 | B-F5-1094 | |
| 5 $\begin{smallmatrix} +0.075 \\ 0 \end{smallmatrix}$ | $\begin{smallmatrix} 7.92 \\ 7.5 \end{smallmatrix}$ $\begin{smallmatrix} 0 \\ -0.090 \\ 0 \\ -0.100 \end{smallmatrix}$ | 5 | 10 ± 0.500 | 1 ± 0.150 | B-F5-67※ | |
| 5 $\begin{smallmatrix} +0.038 \\ +0.020 \end{smallmatrix}$ | 8 $\begin{smallmatrix} +0.041 \\ +0.023 \end{smallmatrix}$ | 3 ± 0.100 | 10 ± 0.100 | 1 $\begin{smallmatrix} 0 \\ -0.050 \end{smallmatrix}$ | B-F5-1056 | |
| 5 $\begin{smallmatrix} +0.038 \\ +0.020 \end{smallmatrix}$ | 8 $\begin{smallmatrix} +0.041 \\ +0.023 \end{smallmatrix}$ | 3 ± 0.100 | 10 ± 0.100 | 1 $\begin{smallmatrix} 0 \\ -0.050 \end{smallmatrix}$ | B-F5-53 | |
| 5 $\begin{smallmatrix} +0.050 \\ +0.020 \end{smallmatrix}$ | 8 $\begin{smallmatrix} +0.028 \\ +0.019 \end{smallmatrix}$ | 3.5 ± 0.100 | 11 ± 0.100 | 1.5 ± 0.100 | B-F5-2 | |
| 5 $\begin{smallmatrix} +0.012 \\ 0 \end{smallmatrix}$ | 8 $\begin{smallmatrix} +0.020 \\ 0 \end{smallmatrix}$ | 5 ± 0.100 | 10 ± 0.150 | 0.9 ± 0.100 | B-F5-4 | |
| 5 $\begin{smallmatrix} +0.025 \\ +0.010 \end{smallmatrix}$ | 8 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 5 ± 0.100 | 11 ± 0.200 | 1 ± 0.100 | B-F5-5 | |
| 5 $\begin{smallmatrix} +0.025 \\ +0.013 \end{smallmatrix}$ | 8 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 6 ± 0.100 | 11 ± 0.150 | 1.5 ± 0.100 | B-F5-7 | |
| 5 $\begin{smallmatrix} +0.025 \\ +0.010 \end{smallmatrix}$ | 8 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 7 ± 0.100 | 11 ± 0.100 | 1 ± 0.100 | B-F5-72 | |
| 5 $\begin{smallmatrix} +0.025 \\ +0.010 \end{smallmatrix}$ | 8 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 11 ± 0.150 | 11 ± 0.200 | 1 ± 0.100 | B-F5-1081 | |
| 5 $\begin{smallmatrix} +0.018 \\ 0 \end{smallmatrix}$ | 9 $\begin{smallmatrix} 0 \\ -0.018 \end{smallmatrix}$ | 4 ± 0.100 | 11 ± 0.100 | 1.5 ± 0.100 | B-F5-10 | |
| 5 $\begin{smallmatrix} +0.012 \\ 0 \end{smallmatrix}$ | 9 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 4.3 ± 0.100 | 11 ± 0.100 | 0.8 ± 0.200 | B-F5-11 | |
| 5 $\begin{smallmatrix} +0.018 \\ +0.003 \end{smallmatrix}$ | $\begin{smallmatrix} 9 \\ 8 \end{smallmatrix}$ $\begin{smallmatrix} +0.045 \\ +0.030 \\ -0.050 \\ -0.200 \end{smallmatrix}$ | 9.5 ± 0.150 | 11 ± 0.200 | 1.5 ± 0.100 | B-F5-13※ | |
| 5 $\begin{smallmatrix} +0.020 \\ +0.005 \end{smallmatrix}$ | 10 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 4 ± 0.100 | 12 ± 0.100 | 1 ± 0.100 | B-F5-30 | |
| 6 $\begin{smallmatrix} +0.048 \\ 0 \end{smallmatrix}$ | 8 $\begin{smallmatrix} 0 \\ -0.058 \end{smallmatrix}$ | 2.6 ± 0.200 | 10 ± 0.300 | 1 ± 0.100 | B-F6-1272 | |
| 6 $\begin{smallmatrix} +0.120 \\ 0 \end{smallmatrix}$ | 8 $\begin{smallmatrix} -0.013 \\ -0.103 \end{smallmatrix}$ | 3 ± 0.300 | 10 ± 0.300 | 1 ± 0.300 | B-F6-1247 | |
| 6 $\begin{smallmatrix} +0.030 \\ +0.010 \end{smallmatrix}$ | 8 $\begin{smallmatrix} 0 \\ -0.050 \end{smallmatrix}$ | 3 ± 0.100 | 10 ± 0.100 | 1 ± 0.100 | B-F6-3 | |
| 6 $\begin{smallmatrix} +0.120 \\ 0 \end{smallmatrix}$ | 8 $\begin{smallmatrix} -0.010 \\ -0.030 \end{smallmatrix}$ | 4 ± 0.500 | 10 ± 0.500 | 1 ± 0.500 | B-F6-1068 | |
| 6 $\begin{smallmatrix} +0.038 \\ +0.020 \end{smallmatrix}$ | 8 $\begin{smallmatrix} -0.013 \\ -0.035 \end{smallmatrix}$ | 4 ± 0.100 | 10 ± 0.200 | 1 ± 0.100 | B-F6-1099 | |
| 6 $\begin{smallmatrix} +0.030 \\ +0.010 \end{smallmatrix}$ | 8 $\begin{smallmatrix} 0 \\ -0.050 \end{smallmatrix}$ | 4 ± 0.100 | 10 ± 0.100 | 1 ± 0.100 | B-F6-1292 | |
| 6 $\begin{smallmatrix} +0.012 \\ 0 \end{smallmatrix}$ | 8 $\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$ | 5 ± 0.100 | 12 ± 0.100 | 1 ± 0.200 | B-F6-121 | |
| 6 $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | 8 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 5.8 ± 0.150 | 12 ± 0.100 | 2 ± 0.100 | B-F6-92 | |
| 6 $\begin{smallmatrix} +0.030 \\ +0.010 \end{smallmatrix}$ | 8 $\begin{smallmatrix} 0 \\ -0.050 \end{smallmatrix}$ | 6 ± 0.100 | 10 ± 0.100 | 1 ± 0.100 | B-F6-1111 | |
| 6 $\begin{smallmatrix} +0.020 \\ 0 \end{smallmatrix}$ | 8 $\begin{smallmatrix} -0.008 \\ -0.030 \end{smallmatrix}$ | 9 ± 0.200 | 10 ± 0.200 | 1 ± 0.100 | B-F6-1122 | |

Note) The※symbol indicates the bearing with a special shape. Please contact NTN for details.
Please contact NTN for the type of oil.

Flange type bearing Dimension table

d 6mm

| Bore diameter ϕd | Outside diameter ϕD | Dimension mm | | | | | Product number | |
|--|--|--------------|---|--------------------------------------|-------------------------|-----|---|---------------------|
| | | Length | | Flange outside diameter $\phi F'$ | Flange thickness t | | | |
| | | | l | | | | | |
| 6 $\begin{smallmatrix} +0.030 \\ +0.010 \end{smallmatrix}$ | 8 $\begin{smallmatrix} 0 \\ -0.043 \end{smallmatrix}$ | 10 | ± 0.150 | 10 | ± 0.100 | 1 | ± 0.100 | B-F6-306 |
| 6 $\begin{smallmatrix} +0.035 \\ +0.025 \end{smallmatrix}$ | 9 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 4 | $\begin{smallmatrix} 0 \\ -0.100 \end{smallmatrix}$ | 11 | ± 0.100 | 1 | $\begin{smallmatrix} 0 \\ -0.100 \end{smallmatrix}$ | B-F6-180 |
| 6 $\begin{smallmatrix} +0.018 \\ 0 \end{smallmatrix}$ | 9 $\begin{smallmatrix} +0.034 \\ +0.019 \end{smallmatrix}$ | 4 | ± 0.100 | 11 | ± 0.100 | 1 | ± 0.100 | B-F6-6 |
| 6 $\begin{smallmatrix} +0.012 \\ 0 \end{smallmatrix}$ | 9 $\begin{smallmatrix} +0.030 \\ +0.015 \end{smallmatrix}$ | 6 | ± 0.100 | 12 | ± 0.100 | 1.5 | ± 0.100 | B-F6-168 |
| 6 $\begin{smallmatrix} +0.018 \\ 0 \end{smallmatrix}$ | 9 $\begin{smallmatrix} +0.034 \\ +0.019 \end{smallmatrix}$ | 7 | ± 0.100 | 11 | ± 0.100 | 1 | ± 0.100 | B-F6-8 |
| 6 $\begin{smallmatrix} +0.012 \\ 0 \end{smallmatrix}$ | 9 $\begin{smallmatrix} +0.028 \\ +0.019 \end{smallmatrix}$ | 7 | ± 0.150 | 12 | ± 0.100 | 2 | ± 0.200 | B-F6-289 |
| 6 $\begin{smallmatrix} +0.018 \\ 0 \end{smallmatrix}$ | 9 $\begin{smallmatrix} +0.034 \\ +0.019 \end{smallmatrix}$ | 9 | $\begin{smallmatrix} +0.200 \\ 0 \end{smallmatrix}$ | 11 | ± 0.200 | 1 | $\begin{smallmatrix} 0 \\ -0.100 \end{smallmatrix}$ | B-F6-10 |
| 6 $\begin{smallmatrix} +0.032 \\ +0.020 \end{smallmatrix}$ | 9 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 10 | ± 0.100 | 11 | ± 0.100 | 1 | $\begin{smallmatrix} 0 \\ -0.200 \end{smallmatrix}$ | B-F6-1324 |
| 6 $\begin{smallmatrix} +0.030 \\ 0 \end{smallmatrix}$ | $\begin{smallmatrix} 9 \\ 7.8 \end{smallmatrix}$ $\begin{smallmatrix} -0.025 \\ -0.083 \\ 0 \\ -0.090 \end{smallmatrix}$ | 5 | ± 0.200 | 11 | ± 0.200 | 2 | ± 0.200 | B-F6-283 ※ |
| 6 $\begin{smallmatrix} +0.030 \\ 0 \end{smallmatrix}$ | $\begin{smallmatrix} 9 \\ 8 \end{smallmatrix}$ $\begin{smallmatrix} -0.013 \\ -0.036 \\ 0 \\ -0.058 \end{smallmatrix}$ | 5.5 | ± 0.300 | 13 | ± 0.300 | 1.5 | ± 0.300 | B-F6-84 ※ |
| 6 $\begin{smallmatrix} +0.012 \\ 0 \end{smallmatrix}$ | $\begin{smallmatrix} 9 \\ 8.5 \end{smallmatrix}$ $\begin{smallmatrix} +0.021 \\ +0.006 \\ 0 \\ -0.100 \end{smallmatrix}$ | 3 | ± 0.100 | 12 | ± 0.100 | 1.5 | $\begin{smallmatrix} 0 \\ -0.200 \end{smallmatrix}$ | B-F6-1123K ※ |
| 6 $\begin{smallmatrix} +0.012 \\ 0 \end{smallmatrix}$ | $\begin{smallmatrix} 9 \\ 8.5 \end{smallmatrix}$ $\begin{smallmatrix} +0.021 \\ +0.006 \\ 0 \\ -0.100 \end{smallmatrix}$ | 5.5 | ± 0.200 | 12 | ± 0.100 | 1.5 | $\begin{smallmatrix} 0 \\ -0.200 \end{smallmatrix}$ | B-F6-7 ※ |
| 6 $\begin{smallmatrix} +0.030 \\ 0 \end{smallmatrix}$ | $\begin{smallmatrix} 9.6 \\ 8 \end{smallmatrix}$ $\begin{smallmatrix} 0 \\ -0.040 \\ 0 \\ -0.100 \end{smallmatrix}$ | 10 | $\begin{smallmatrix} 0 \\ -0.200 \end{smallmatrix}$ | 12 | ± 0.100 | 1.5 | $\begin{smallmatrix} 0 \\ -0.200 \end{smallmatrix}$ | B-F6-185 ※ |
| 6 $\begin{smallmatrix} +0.012 \\ 0 \end{smallmatrix}$ | 10 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 2.5 | ± 0.100 | 12 | ± 0.100 | 1 | ± 0.100 | B-F6-181 |
| 6 $\begin{smallmatrix} +0.012 \\ 0 \end{smallmatrix}$ | 10 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 3.5 | ± 0.100 | 12 | ± 0.100 | 1 | ± 0.100 | B-F6-14 |
| 6 $\begin{smallmatrix} +0.045 \\ +0.033 \end{smallmatrix}$ | 10 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 3.8 | ± 0.200 | 14 | ± 0.140 | 1 | ± 0.200 | B-F6-116 |
| 6 $\begin{smallmatrix} +0.012 \\ 0 \end{smallmatrix}$ | 10 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 4 | ± 0.100 | 12 | ± 0.100 | 1.5 | ± 0.100 | B-F6-15 |
| 6 $\begin{smallmatrix} +0.048 \\ 0 \end{smallmatrix}$ | 10 $\begin{smallmatrix} -0.025 \\ -0.061 \end{smallmatrix}$ | 4 | ± 0.200 | 14 | ± 0.200 | 1 | ± 0.200 | B-F6-182 |
| 6 $\begin{smallmatrix} +0.030 \\ 0 \end{smallmatrix}$ | 10 $\begin{smallmatrix} -0.025 \\ -0.061 \end{smallmatrix}$ | 4 | ± 0.100 | 14 | ± 0.140 | 2 | ± 0.200 | B-F6-18 |
| 6 $\begin{smallmatrix} +0.030 \\ 0 \end{smallmatrix}$ | 10 $\begin{smallmatrix} 0 \\ -0.036 \end{smallmatrix}$ | 4.5 | $\begin{smallmatrix} 0 \\ -0.100 \end{smallmatrix}$ | 12 | ± 0.200 | 1 | ± 0.100 | B-F6-178 |
| 6 $\begin{smallmatrix} +0.020 \\ 0 \end{smallmatrix}$ | 10 $\begin{smallmatrix} 0 \\ -0.020 \end{smallmatrix}$ | 4.5 | $\begin{smallmatrix} 0 \\ -0.200 \end{smallmatrix}$ | 12 | ± 0.200 | 2 | $\begin{smallmatrix} 0 \\ -0.100 \end{smallmatrix}$ | B-F6-20 |

Note) The※symbol indicates the bearing with a special shape. Please contact NTN for details.
Please contact NTN for the type of oil.

Flange type bearing Dimension table

d 6mm

| Bore diameter ϕd | Outside diameter ϕD | Dimension mm | | Flange outside diameter ϕF | Flange thickness t | Product number |
|---|---|--|--|---|--|---------------------|
| | | Length ℓ | | | | |
| 6 $\begin{matrix} +0.030 \\ +0.015 \end{matrix}$ | 10 $\begin{matrix} +0.038 \\ +0.023 \end{matrix}$ | 5 ± 0.100 | | 12 ± 0.100 | 1 ± 0.100 | B-F6-163 |
| 6 $\begin{matrix} +0.012 \\ 0 \end{matrix}$ | 10 $\begin{matrix} +0.038 \\ +0.023 \end{matrix}$ | 5 ± 0.100 | | 12 ± 0.100 | 2 ± 0.100 | B-F6-24 |
| 6 $\begin{matrix} +0.078 \\ +0.030 \end{matrix}$ | 10 $\begin{matrix} 0 \\ -0.058 \end{matrix}$ | 5 ± 0.100 | | 14 $\begin{matrix} 0 \\ -0.200 \end{matrix}$ | 1.5 $\begin{matrix} 0 \\ -0.300 \end{matrix}$ | B-F6-128 |
| 6 $\begin{matrix} +0.045 \\ +0.033 \end{matrix}$ | 10 $\begin{matrix} +0.038 \\ +0.023 \end{matrix}$ | 5 ± 0.200 | | 14 ± 0.140 | 2 ± 0.200 | B-F6-106 |
| 6 $\begin{matrix} +0.025 \\ 0 \end{matrix}$ | 10 $\begin{matrix} 0 \\ -0.015 \end{matrix}$ | 6 ± 0.100 | | 12 ± 0.120 | 2 ± 0.100 | B-F6-1112 |
| 6 $\begin{matrix} +0.045 \\ +0.033 \end{matrix}$ | 10 $\begin{matrix} +0.038 \\ +0.023 \end{matrix}$ | 6 ± 0.220 | | 14 ± 0.140 | 2 ± 0.200 | B-F6-30 |
| 6 $\begin{matrix} +0.012 \\ 0 \end{matrix}$ | 10 $\begin{matrix} +0.038 \\ +0.023 \end{matrix}$ | 6.5 ± 0.100 | | 12 ± 0.100 | 1.5 $\begin{matrix} 0 \\ -0.100 \end{matrix}$ | B-F6-130 |
| 6 $\begin{matrix} +0.025 \\ 0 \end{matrix}$ | 10 $\begin{matrix} 0 \\ -0.015 \end{matrix}$ | 7 ± 0.100 | | 12 ± 0.120 | 2 ± 0.100 | B-F6-35 |
| 6 $\begin{matrix} +0.012 \\ 0 \end{matrix}$ | 10 $\begin{matrix} +0.046 \\ +0.028 \end{matrix}$ | 7 ± 0.150 | | 14 ± 0.100 | 2 ± 0.100 | B-F6-36 |
| 6 $\begin{matrix} +0.050 \\ +0.020 \end{matrix}$ | 10 $\begin{matrix} 0 \\ -0.050 \end{matrix}$ | 7.5 $\begin{matrix} 0 \\ -0.300 \end{matrix}$ | | 14 ± 0.100 | 2 $\begin{matrix} 0 \\ -0.100 \end{matrix}$ | B-F6-269 ※ |
| 6 $\begin{matrix} +0.015 \\ 0 \end{matrix}$ | 10 $\begin{matrix} +0.038 \\ +0.023 \end{matrix}$ | 8 ± 0.100 | | 14 ± 0.200 | 1 ± 0.050 | B-F6-40 |
| 6 $\begin{matrix} +0.035 \\ +0.015 \end{matrix}$ | 10 $\begin{matrix} +0.046 \\ +0.028 \end{matrix}$ | 8 ± 0.150 | | 14 ± 0.100 | 2 ± 0.200 | B-F6-41 |
| 6 $\begin{matrix} +0.012 \\ 0 \end{matrix}$ | 10 $\begin{matrix} +0.046 \\ +0.028 \end{matrix}$ | 9 ± 0.150 | | 14 ± 0.100 | 2 ± 0.100 | B-F6-46 |
| 6 $\begin{matrix} +0.035 \\ +0.015 \end{matrix}$ | 10 $\begin{matrix} +0.046 \\ +0.028 \end{matrix}$ | 9 ± 0.100 | | 14 ± 0.100 | 2 $\begin{matrix} 0 \\ -0.050 \end{matrix}$ | B-F6-47 |
| 6 $\begin{matrix} +0.015 \\ 0 \end{matrix}$ | 10 $\begin{matrix} +0.046 \\ +0.028 \end{matrix}$ | 10 ± 0.150 | | 14 ± 0.100 | 2 ± 0.100 | B-F6-1035 |
| 6 $\begin{matrix} +0.070 \\ +0.020 \end{matrix}$ | $\begin{matrix} 10 \\ 8 \end{matrix}$ $\begin{matrix} -0.025 \\ -0.061 \\ -0.020 \\ -0.170 \end{matrix}$ | 4.5 $\begin{matrix} 0 \\ -0.300 \end{matrix}$ | | 14 ± 0.100 | 1.5 $\begin{matrix} 0 \\ -0.100 \end{matrix}$ | B-F6-270 ※ |
| 6 $\begin{matrix} +0.060 \\ +0.010 \end{matrix}$ | $\begin{matrix} 10 \\ 8 \end{matrix}$ $\begin{matrix} -0.010 \\ -0.050 \\ 0 \\ -0.100 \end{matrix}$ | 6 ± 0.200 | | 12 ± 0.300 | 2 $\begin{matrix} 0 \\ -0.200 \end{matrix}$ | B-F6-1201K ※ |
| 6 $\begin{matrix} +0.070 \\ +0.020 \end{matrix}$ | $\begin{matrix} 10 \\ 8 \end{matrix}$ $\begin{matrix} -0.025 \\ -0.061 \\ -0.020 \\ -0.170 \end{matrix}$ | 6 $\begin{matrix} 0 \\ -0.300 \end{matrix}$ | | 14 ± 0.100 | 1.5 $\begin{matrix} 0 \\ -0.100 \end{matrix}$ | B-F6-29 ※ |
| 6 $\begin{matrix} +0.050 \\ +0.020 \end{matrix}$ | $\begin{matrix} 10 \\ 8 \end{matrix}$ $\begin{matrix} -0.025 \\ -0.047 \\ -0.040 \\ -0.180 \end{matrix}$ | 7 ± 0.150 | | 12 ± 0.150 | 1 ± 0.100 | B-F6-34 ※ |
| 6 $\begin{matrix} +0.030 \\ +0.010 \end{matrix}$ | $\begin{matrix} 10 \\ 8 \end{matrix}$ $\begin{matrix} -0.010 \\ -0.030 \\ 0 \\ -0.150 \end{matrix}$ | 7 ± 0.100 | | 12 ± 0.200 | 1 ± 0.100 | B-F6-83 ※ |

Note) The※symbol indicates the bearing with a special shape. Please contact NTN for details.
Please contact NTN for the type of oil.

Flange type bearing Dimension table

d 6mm

| Bore diameter ϕd | Outside diameter ϕD | Dimension mm | | | Flange thickness t | Product number |
|--|--|-----------------|--|--|-------------------------|----------------|
| | | Length l | Flange outside diameter $\phi F'$ | | | |
| 6 $\begin{matrix} +0.030 \\ +0.010 \end{matrix}$ | $\frac{10}{8}$ $\begin{matrix} -0.010 \\ -0.030 \\ 0 \\ -0.150 \end{matrix}$ | 8 ± 0.100 | 12 ± 0.200 | 1 ± 0.100 | B-F6-364K ※ | |
| 6 $\begin{matrix} +0.030 \\ 0 \end{matrix}$ | $\frac{10}{8.8}$ $\begin{matrix} -0.025 \\ -0.083 \\ 0 \\ -0.090 \end{matrix}$ | 3.5 ± 0.500 | 12 ± 0.500 | 1.5 $\begin{matrix} +0.100 \\ -0.200 \end{matrix}$ | B-F6-78 ※ | |
| 6 $\begin{matrix} +0.030 \\ 0 \end{matrix}$ | $\frac{10}{8.8}$ $\begin{matrix} -0.025 \\ -0.083 \\ 0 \\ -0.090 \end{matrix}$ | 4 ± 0.200 | 14 ± 0.140 | 2 ± 0.200 | B-F6-112 ※ | |
| 6 $\begin{matrix} +0.030 \\ 0 \end{matrix}$ | $\frac{10}{8.8}$ $\begin{matrix} -0.025 \\ -0.083 \\ 0 \\ -0.090 \end{matrix}$ | 6 ± 0.200 | 14 ± 0.140 | 2 ± 0.200 | B-F6-1187K ※ | |
| 6 $\begin{matrix} +0.030 \\ 0 \end{matrix}$ | $\frac{10}{8.8}$ $\begin{matrix} -0.025 \\ -0.083 \\ 0 \\ -0.090 \end{matrix}$ | 8 ± 0.200 | 14 ± 0.140 | 2 ± 0.200 | B-F6-45 ※ | |
| 6 $\begin{matrix} +0.030 \\ 0 \end{matrix}$ | $\frac{10}{8.8}$ $\begin{matrix} -0.025 \\ -0.083 \\ 0 \\ -0.090 \end{matrix}$ | 12 ± 0.200 | 14 ± 0.300 | 2 ± 0.200 | B-F6-104 ※ | |
| 6 $\begin{matrix} +0.030 \\ 0 \end{matrix}$ | $\frac{10}{8.8}$ $\begin{matrix} \pm 0.200 \\ 0 \\ -0.090 \end{matrix}$ | 12 ± 0.200 | 14 ± 0.200 | 2 ± 0.200 | B-F6-1301K ※ | |
| 6 $\begin{matrix} +0.012 \\ 0 \end{matrix}$ | $\frac{10}{9}$ $\begin{matrix} +0.038 \\ +0.023 \\ 0 \\ -0.100 \end{matrix}$ | 4 ± 0.100 | 12 ± 0.150 | 1.5 ± 0.100 | B-F6-16 ※ | |
| 6 $\begin{matrix} +0.012 \\ 0 \end{matrix}$ | $\frac{10}{9}$ $\begin{matrix} +0.038 \\ +0.023 \\ 0 \\ -0.100 \end{matrix}$ | 6 ± 0.100 | 12 ± 0.150 | 1.5 ± 0.100 | B-F6-98 ※ | |
| 6 $\begin{matrix} +0.022 \\ +0.010 \end{matrix}$ | 11 $\begin{matrix} +0.041 \\ +0.023 \end{matrix}$ | 5 ± 0.100 | 14 ± 0.100 | 2 ± 0.100 | B-F6-57 | |
| 6 $\begin{matrix} +0.022 \\ +0.010 \end{matrix}$ | 11 $\begin{matrix} 0 \\ -0.025 \end{matrix}$ | 7 ± 0.150 | 14 ± 0.100 | 2 ± 0.100 | B-F6-58 | |
| 6 $\begin{matrix} +0.025 \\ +0.003 \end{matrix}$ | 11 $\begin{matrix} +0.040 \\ +0.025 \end{matrix}$ | 10 ± 0.150 | 14 ± 0.100 | 3 ± 0.100 | B-F6-60 | |
| 6 $\begin{matrix} +0.024 \\ +0.008 \end{matrix}$ | $\frac{11}{10}$ $\begin{matrix} 0 \\ -0.200 \\ 0 \\ -0.050 \end{matrix}$ | 3 ± 0.100 | 13 ± 0.100 | 1 ± 0.100 | B-F6-169 ※ | |
| 6 $\begin{matrix} +0.020 \\ +0.010 \end{matrix}$ | 12 $\begin{matrix} +0.019 \\ +0.001 \end{matrix}$ | 4 ± 0.100 | 12.7 $\begin{matrix} 0 \\ -0.300 \end{matrix}$ | 1 $\begin{matrix} 0 \\ -0.150 \end{matrix}$ | B-F6-171 | |
| 6 $\begin{matrix} +0.050 \\ +0.010 \end{matrix}$ | 12 $\begin{matrix} 0 \\ -0.050 \end{matrix}$ | 4 ± 0.200 | 15.8 $\begin{matrix} 0 \\ -0.300 \end{matrix}$ | 1.5 ± 0.100 | B-F6-176 ※ | |

Note) The※symbol indicates the bearing with a special shape. Please contact NTN for details.
Please contact NTN for the type of oil.

Flange type bearing Dimension table

d 6~8mm

| Bore diameter ϕd | Outside diameter ϕD | Dimension mm | | | Flange thickness t | Product number |
|--|---|---|--|---|-------------------------|----------------|
| | | Length ℓ | Flange outside diameter ϕF | | | |
| 6 $\begin{smallmatrix} +0.012 \\ 0 \end{smallmatrix}$ | 12 $\begin{smallmatrix} -0.050 \\ -0.077 \end{smallmatrix}$ | 5 $\begin{smallmatrix} 0 \\ -0.100 \end{smallmatrix}$ | $\frac{16 \pm 0.250}{14.5 \pm 0.150}$ | 2 ± 0.100 | B-F6-63※ | |
| 7 $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | 10 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 6 ± 0.100 | 13 ± 0.100 | 1.3 ± 0.100 | B-F7-1 | |
| 7 $\begin{smallmatrix} +0.036 \\ 0 \end{smallmatrix}$ | 10 $\begin{smallmatrix} -0.025 \\ -0.061 \end{smallmatrix}$ | 8 ± 0.100 | 12 ± 0.100 | 2 ± 0.100 | B-F7-3 | |
| 8 $\begin{smallmatrix} +0.036 \\ 0 \end{smallmatrix}$ | 10 $\begin{smallmatrix} -0.025 \\ -0.047 \end{smallmatrix}$ | 3 ± 0.200 | 11.2 ± 0.200 | 0.6 | B-F8-285 | |
| 8 $\begin{smallmatrix} +0.021 \\ +0.005 \end{smallmatrix}$ | 10 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 5 ± 0.100 | 13 ± 0.100 | 2 ± 0.200 | B-F8-1 | |
| 8 $\begin{smallmatrix} +0.058 \\ 0 \end{smallmatrix}$ | 10 $\begin{smallmatrix} 0 \\ -0.036 \end{smallmatrix}$ | 5.5 ± 0.300 | 12 ± 0.300 | 2 ± 0.100 | B-F8-200 | |
| 8 $\begin{smallmatrix} +0.060 \\ +0.040 \end{smallmatrix}$ | 10 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 10 ± 0.300 | 14 ± 0.300 | 1 ± 0.100 | B-F8-310 | |
| 8 $\begin{smallmatrix} +0.035 \\ +0.013 \end{smallmatrix}$ | 11 $\begin{smallmatrix} -0.016 \\ -0.043 \end{smallmatrix}$ | 4.5 ± 0.100 | 13 ± 0.100 | 1.5 ± 0.100 | B-F8-1078 | |
| 8 $\begin{smallmatrix} +0.020 \\ 0 \end{smallmatrix}$ | 11 $\begin{smallmatrix} +0.050 \\ +0.030 \end{smallmatrix}$ | 7 ± 0.100 | 14 ± 0.100 | 2 ± 0.100 | B-F8-3 | |
| 8 $\begin{smallmatrix} +0.060 \\ +0.040 \end{smallmatrix}$ | 11 $\begin{smallmatrix} +0.038 \\ +0.023 \end{smallmatrix}$ | 7 ± 0.100 | $\frac{15.5}{-0.150}$ | 2 ± 0.100 | B-F8-4 | |
| 8 $\begin{smallmatrix} +0.022 \\ 0 \end{smallmatrix}$ | 12 $\begin{smallmatrix} +0.060 \\ +0.033 \end{smallmatrix}$ | 4 ± 0.100 | 16 ± 0.100 | 1.5 ± 0.100 | B-F8-8 | |
| 8 $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | 12 $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 4.5 ± 0.100 | 16 ± 0.100 | 2 ± 0.200 | B-F8-100 | |
| 8 $\begin{smallmatrix} +0.049 \\ +0.013 \end{smallmatrix}$ | 12 $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 5 ± 0.200 | 14 ± 0.200 | 2 ± 0.200 | B-F8-199 | |
| 8 $\begin{smallmatrix} +0.050 \\ +0.020 \end{smallmatrix}$ | 12 $\begin{smallmatrix} 0 \\ -0.050 \end{smallmatrix}$ | 5 ± 0.100 | 16 ± 0.150 | 2 ± 0.100 | B-F8-13※ | |
| 8 $\begin{smallmatrix} +0.036 \\ 0 \end{smallmatrix}$ | 12 $\begin{smallmatrix} -0.032 \\ -0.075 \end{smallmatrix}$ | 5 ± 0.300 | 16 ± 0.300 | 2 ± 0.300 | B-F8-16 | |
| 8 $\begin{smallmatrix} +0.070 \\ +0.050 \end{smallmatrix}$ | 12 $\begin{smallmatrix} +0.040 \\ +0.020 \end{smallmatrix}$ | 6 ± 0.100 | 14 ± 0.100 | 2 ± 0.200 | B-F8-188 | |
| 8 $\begin{smallmatrix} +0.020 \\ 0 \end{smallmatrix}$ | 12 $\begin{smallmatrix} +0.050 \\ +0.030 \end{smallmatrix}$ | 6 $\begin{smallmatrix} 0 \\ -0.100 \end{smallmatrix}$ | 16 ± 0.100 | 2 $\begin{smallmatrix} 0 \\ -0.100 \end{smallmatrix}$ | B-F8-23 | |
| 8 $\begin{smallmatrix} +0.020 \\ 0 \end{smallmatrix}$ | 12 $\begin{smallmatrix} +0.050 \\ +0.030 \end{smallmatrix}$ | 7 ± 0.100 | 14 ± 0.100 | 2 ± 0.100 | B-F8-25 | |
| 8 $\begin{smallmatrix} +0.020 \\ 0 \end{smallmatrix}$ | 12 $\begin{smallmatrix} -0.005 \\ -0.025 \end{smallmatrix}$ | 7 ± 0.150 | $\frac{14 \pm 0.150}{13 \pm 0.050}$ | 2 ± 0.100 | B-F8-26※ | |
| 8 $\begin{smallmatrix} +0.020 \\ 0 \end{smallmatrix}$ | 12 $\begin{smallmatrix} -0.005 \\ -0.025 \end{smallmatrix}$ | 7 ± 0.150 | $\frac{14}{13} \begin{smallmatrix} +0.050 \\ -0.150 \end{smallmatrix}$ | 2 ± 0.100 | B-F8-27※ | |
| 8 $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | 12 $\begin{smallmatrix} +0.046 \\ +0.028 \end{smallmatrix}$ | 7 ± 0.200 | 16 ± 0.100 | 1.5 ± 0.100 | B-F8-29 | |
| 8 $\begin{smallmatrix} +0.015 \\ +0.003 \end{smallmatrix}$ | 12 $\begin{smallmatrix} +0.040 \\ +0.012 \end{smallmatrix}$ | 8 $\begin{smallmatrix} 0 \\ -0.100 \end{smallmatrix}$ | 16 ± 0.150 | 2 $\begin{smallmatrix} 0 \\ -0.100 \end{smallmatrix}$ | B-F8-1015 | |
| 8 $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | 12 $\begin{smallmatrix} +0.040 \\ +0.012 \end{smallmatrix}$ | 8 $\begin{smallmatrix} 0 \\ -0.100 \end{smallmatrix}$ | 16 ± 0.150 | 2 $\begin{smallmatrix} 0 \\ -0.100 \end{smallmatrix}$ | B-F8-33 | |

Note) The※symbol indicates the bearing with a special shape. Please contact NTN for details.
Please contact NTN for the type of oil.

Flange type bearing Dimension table

d 8mm

| Bore diameter ϕd | Outside diameter ϕD | Dimension mm | | | | Product number |
|---------------------------|---|--------------|---|--------------------------------------|--|---------------------|
| | | Length | | Flange outside diameter $\phi F'$ | Flange thickness t | |
| | | ℓ | | | | |
| 8 +0.049 +0.013 | 12 +0.075 +0.032 | 10 | ± 0.300 | 14 ± 0.300 | 1 ± 0.100 | B-F8-146 |
| 8 +0.015 0 | 12 +0.046 +0.028 | 10 | $\begin{matrix} 0 \\ -0.300 \end{matrix}$ | 15 ± 0.100 | 2 ± 0.100 | B-F8-41 |
| 8 +0.050 +0.020 | 12 $\begin{matrix} 0 \\ -0.050 \end{matrix}$ | 10 | ± 0.150 | 16 ± 0.150 | 2 ± 0.100 | B-F8-45 ※ |
| 8 +0.040 +0.020 | 12 $\begin{matrix} 0 \\ -0.050 \end{matrix}$ | 10 | ± 0.100 | $\frac{16 \pm 0.200}{14 \pm 0.200}$ | 1.7 ± 0.100 | B-F8-121 ※ |
| 8 +0.050 +0.020 | 12 $\begin{matrix} 0 \\ -0.050 \end{matrix}$ | 12 | $\begin{matrix} 0 \\ -0.300 \end{matrix}$ | 14 ± 0.100 | 1.5 $\begin{matrix} 0 \\ -0.100 \end{matrix}$ | B-F8-50 |
| 8 +0.015 0 | 12 +0.046 +0.028 | 12 | ± 0.150 | 14 ± 0.100 | 2.5 ± 0.100 | B-F8-52 |
| 8 +0.055 +0.040 | 12 +0.046 +0.028 | 12 | ± 0.220 | 16 ± 0.140 | 2 ± 0.200 | B-F8-103 |
| 8 +0.036 0 | 12 $\begin{matrix} -0.032 \\ -0.102 \end{matrix}$ | 15 | ± 0.500 | 16 ± 0.300 | 2 ± 0.200 | B-F8-58 |
| 8 +0.061 +0.025 | $\frac{12 \begin{matrix} -0.032 \\ -0.075 \end{matrix}}{10 \begin{matrix} -0.040 \\ -0.200 \end{matrix}}$ | 6.5 | ± 0.100 | 14 ± 0.100 | 1 ± 0.100 | B-F8-160 ※ |
| 8 +0.036 0 | $\frac{12 \begin{matrix} -0.050 \\ -0.080 \end{matrix}}{10.8 \begin{matrix} 0 \\ -0.110 \end{matrix}}$ | 4 | ± 0.100 | 16 ± 0.140 | 2 ± 0.200 | B-F8-1110K ※ |
| 8 +0.036 0 | $\frac{12 \begin{matrix} -0.032 \\ -0.102 \end{matrix}}{10.8 \begin{matrix} 0 \\ -0.110 \end{matrix}}$ | 4 | ± 0.200 | 16 ± 0.140 | 2 ± 0.200 | B-F8-9 ※ |
| 8 +0.036 0 | $\frac{12 \begin{matrix} -0.032 \\ -0.102 \end{matrix}}{10.8 \begin{matrix} 0 \\ -0.070 \end{matrix}}$ | 4.5 | ± 0.200 | 16 ± 0.150 | 1 ± 0.150 | B-F8-10 ※ |
| 8 +0.036 0 | $\frac{12 \begin{matrix} -0.032 \\ -0.102 \end{matrix}}{10.8 \begin{matrix} 0 \\ -0.110 \end{matrix}}$ | 4.8 | ± 0.200 | 16 ± 0.500 | 2 ± 0.200 | B-F8-12 ※ |
| 8 +0.036 0 | $\frac{12 \begin{matrix} -0.032 \\ -0.102 \end{matrix}}{10.8 \begin{matrix} 0 \\ -0.110 \end{matrix}}$ | 5 | ± 0.200 | $\frac{16 \pm 0.140}{12 \pm 0.200}$ | 2 ± 0.200 | B-F8-195 ※ |
| 8 +0.022 0 | $\frac{12 \begin{matrix} -0.032 \\ -0.102 \end{matrix}}{10.8 \begin{matrix} 0 \\ -0.110 \end{matrix}}$ | 6 | ± 0.200 | 16 ± 0.140 | 2 ± 0.200 | B-F8-112 ※ |
| 8 +0.036 0 | $\frac{12 \begin{matrix} -0.032 \\ -0.102 \end{matrix}}{10.8 \begin{matrix} 0 \\ -0.110 \end{matrix}}$ | 8 | ± 0.200 | 16 ± 0.140 | 2 ± 0.100 | B-F8-101 ※ |

Note) The※symbol indicates the bearing with a special shape. Please contact NTN for details.
Please contact NTN for the type of oil.

Flange type bearing Dimension table

d 8~10mm

| Bore diameter ϕd | Outside diameter ϕD | Dimension mm | | Flange outside diameter ϕF | Flange thickness t | Product number | | |
|---|---|------------------|---|---|-------------------------|----------------|---|-------------------|
| | | Length ℓ | | | | | | |
| 8 $\begin{smallmatrix} +0.036 \\ 0 \end{smallmatrix}$ | $\begin{smallmatrix} 12 & -0.032 \\ & -0.102 \\ \hline & 0 \\ 10.8 & -0.110 \end{smallmatrix}$ | 12 | ± 0.200 | 16 | ± 0.200 | 2 | ± 0.100 | B-F8-116 ※ |
| 8 $\begin{smallmatrix} +0.036 \\ 0 \end{smallmatrix}$ | $\begin{smallmatrix} 12 & -0.032 \\ & -0.102 \\ \hline & 0 \\ 10.8 & -0.110 \end{smallmatrix}$ | 14 | ± 0.200 | 16 | ± 0.140 | 2 | ± 0.200 | B-F8-56 ※ |
| 8 $\begin{smallmatrix} +0.036 \\ 0 \end{smallmatrix}$ | $\begin{smallmatrix} 12 & 0 \\ & -0.100 \\ \hline & 0 \\ 11 & -0.100 \end{smallmatrix}$ | 10 | ± 0.100 | 15 | ± 0.100 | 2 | ± 0.100 | B-F8-152 ※ |
| 8 $\begin{smallmatrix} +0.040 \\ +0.025 \\ 0 \end{smallmatrix}$ | $\begin{smallmatrix} 12.5 & 0 \\ & -0.100 \end{smallmatrix}$ | 6 | ± 0.100 | 19 | ± 0.100 | 2 | ± 0.100 | B-F8-60 |
| 8 $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | $\begin{smallmatrix} 12.5 & +0.100 \\ & 0 \end{smallmatrix}$ | 12 | ± 0.150 | 25 | ± 0.150 | 3 | $\begin{smallmatrix} +0.100 \\ 0 \end{smallmatrix}$ | B-F8-62 |
| 8 $\begin{smallmatrix} +0.050 \\ +0.030 \end{smallmatrix}$ | $\begin{smallmatrix} 13 & +0.050 \\ & +0.030 \end{smallmatrix}$ | 12 | ± 0.100 | 15 | ± 0.100 | 3 | ± 0.100 | B-F8-68 |
| 8 $\begin{smallmatrix} +0.050 \\ +0.010 \end{smallmatrix}$ | $\begin{smallmatrix} 13 & -0.010 \\ & -0.050 \\ \hline & +0.100 \\ 10 & -0.050 \end{smallmatrix}$ | 9.5 | ± 0.150 | 16 | ± 0.100 | 1.5 | ± 0.100 | B-F8-65 ※ |
| 8 $\begin{smallmatrix} +0.017 \\ 0 \end{smallmatrix}$ | $\begin{smallmatrix} 13 & +0.041 \\ & +0.023 \\ \hline & 0 \\ 12 & -0.100 \end{smallmatrix}$ | 5 | ± 0.100 | 16 | ± 0.150 | 2 | ± 0.100 | B-F8-64 ※ |
| 8 $\begin{smallmatrix} +0.020 \\ 0 \end{smallmatrix}$ | $\begin{smallmatrix} 14 & -0.032 \\ & -0.075 \end{smallmatrix}$ | 4 | ± 0.300 | 15.6 | ± 0.100 | 0.8 | $\begin{smallmatrix} 0 \\ -0.200 \end{smallmatrix}$ | B-F8-305 |
| 8 $\begin{smallmatrix} +0.036 \\ 0 \end{smallmatrix}$ | $\begin{smallmatrix} 14 & -0.032 \\ & -0.075 \end{smallmatrix}$ | 4 | ± 0.150 | 18 | ± 0.200 | 1 | ± 0.300 | B-F8-74 |
| 8 $\begin{smallmatrix} +0.020 \\ 0 \end{smallmatrix}$ | $\begin{smallmatrix} 14 & -0.005 \\ & -0.025 \end{smallmatrix}$ | 6 | $\begin{smallmatrix} 0 \\ -0.100 \end{smallmatrix}$ | $\begin{smallmatrix} 16 & \pm 0.150 \\ \hline 15 & \pm 0.050 \end{smallmatrix}$ | | 2 | ± 0.100 | B-F8-78 ※ |
| 8 $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | $\begin{smallmatrix} 15 & 0 \\ & -0.018 \\ \hline & -0.050 \\ 12 & -0.200 \end{smallmatrix}$ | 8 | ± 0.100 | 20 | ± 0.100 | 3 | $\begin{smallmatrix} 0 \\ -0.100 \end{smallmatrix}$ | B-F8-88 ※ |
| 8 $\begin{smallmatrix} +0.028 \\ +0.005 \end{smallmatrix}$ | $\begin{smallmatrix} 16 & +0.046 \\ & +0.028 \end{smallmatrix}$ | 17 | ± 0.100 | 22 | ± 0.100 | 2 | ± 0.100 | B-F8-169 |
| 9 $\begin{smallmatrix} +0.040 \\ +0.020 \end{smallmatrix}$ | $\begin{smallmatrix} 12 & +0.026 \\ & +0.006 \end{smallmatrix}$ | 10.5 | ± 0.100 | 14 | ± 0.200 | 1.5 | ± 0.100 | B-F9-2 |
| 10 $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | $\begin{smallmatrix} 13 & +0.046 \\ & +0.028 \end{smallmatrix}$ | 5.7 | ± 0.100 | 14 | ± 0.100 | 1 | ± 0.100 | B-F10-117 |
| 10 $\begin{smallmatrix} +0.036 \\ 0 \end{smallmatrix}$ | $\begin{smallmatrix} 14 & 0 \\ & -0.110 \end{smallmatrix}$ | 4 | ± 0.300 | 16 | ± 0.400 | 2 | ± 0.150 | B-F10-3 |
| 10 $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | $\begin{smallmatrix} 14 & +0.046 \\ & +0.028 \end{smallmatrix}$ | 5 | ± 0.100 | 18 | ± 0.100 | 2 | ± 0.100 | B-F10-7 |
| 10 $\begin{smallmatrix} +0.020 \\ +0.005 \end{smallmatrix}$ | $\begin{smallmatrix} 14 & +0.046 \\ & +0.028 \end{smallmatrix}$ | 5 | ± 0.100 | 19 | ± 0.150 | 2 | ± 0.100 | B-F10-87 |
| 10 $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | $\begin{smallmatrix} 14 & +0.046 \\ & +0.028 \end{smallmatrix}$ | 6 | ± 0.100 | 18 | ± 0.100 | 2 | ± 0.100 | B-F10-72 |

Note) The※symbol indicates the bearing with a special shape. Please contact NTN for details.
Please contact NTN for the type of oil.

Flange type bearing Dimension table

d 10mm

| Bore diameter ϕd | Outside diameter ϕD | Dimension mm | | | Flange outside diameter $\phi F'$ | Flange thickness t | Product number | |
|---------------------------|---------------------------------------|--------------|-------------|-------------------|--------------------------------------|-------------------------|----------------|----------------------|
| | | Length | | Flange thickness | | | | |
| | | ℓ | | | | | | |
| 10 +0.045 +0.030 | 14 +0.050 +0.032 | 6 | ± 0.100 | 18 | ± 0.200 | 2 | ± 0.100 | B-F10-96 |
| 10 +0.050 +0.020 | 14 0 -0.050 | 7 | ± 0.150 | 18 | ± 0.100 | 2 | ± 0.100 | B-F10-10 |
| 10 +0.040 +0.025 | 14 +0.046 +0.028 | 7.5 | ± 0.150 | 18 | ± 0.100 | 2 | ± 0.100 | B-F10-11 |
| 10 +0.055 +0.040 | 14 +0.046 +0.028 | 8 | ± 0.100 | 18 | ± 0.100 | 2 | ± 0.100 | B-F10-12 |
| 10 +0.015 0 | 14 +0.046 +0.028 | 10 | ± 0.100 | 18 | ± 0.100 | 2 | ± 0.100 | B-F10-15 |
| 10 +0.050 +0.020 | 14 0 -0.050 | 10 | ± 0.300 | 18 | ± 0.150 | 2 | ± 0.100 | B-F10-17 ※ |
| 10 +0.055 +0.040 | 14 +0.046 +0.028 | 12 | ± 0.220 | 18 | ± 0.140 | 2 | ± 0.200 | B-F10-23 |
| 10 +0.015 0 | 14 +0.046 +0.028 | 16 | ± 0.100 | 18 | ± 0.100 | 2 | ± 0.100 | B-F10-26 |
| 10 +0.015 0 | 14 +0.046 +0.028 | 18 | ± 0.200 | 18 | ± 0.100 | 2 | ± 0.100 | B-F10-70 |
| 10 +0.036 +0.016 | 14 -0.043 0 -0.200 | 7 | ± 0.200 | 17 0 -0.200 | ± 0.200 | 1.5 | ± 0.200 | B-F10-9 ※ |
| 10 +0.036 0 | 14 -0.032 -0.102 0 -0.110 | 4 | ± 0.200 | 18 | ± 0.140 | 2 | ± 0.200 | B-F10-63 ※ |
| 10 +0.036 0 | 14 -0.032 -0.102 0 -0.110 | 6 | ± 0.200 | 18 | ± 0.140 | 2 | ± 0.200 | B-F10-131K ※ |
| 10 +0.036 0 | 14 -0.032 -0.102 0 -0.110 | 8 | ± 0.200 | 18 | ± 0.140 | 2 | ± 0.200 | B-F10-60 ※ |
| 10 +0.015 0 | 15 +0.046 +0.028 | 6.5 | ± 0.100 | 18 | ± 0.100 | 2 | ± 0.100 | B-F10-28 |
| 10 +0.035 +0.013 | 15 +0.041 +0.023 | 10 | ± 0.100 | 18 | ± 0.100 | 2 | ± 0.100 | B-F10-30 |
| 10 +0.020 0 | 15 +0.050 +0.030 | 13 | ± 0.100 | 18 | ± 0.100 | 2.5 | ± 0.100 | B-F10-32 |
| 10 +0.035 +0.013 | 15 +0.041 +0.023 | 15 | ± 0.100 | 18 | ± 0.100 | 2 | ± 0.100 | B-F10-80 |
| 10 +0.035 +0.013 | 15 +0.041 +0.023 0 -0.100 | 6 | ± 0.100 | 18 | ± 0.100 | 2 | ± 0.100 | B-F10-1026K ※ |
| 10 +0.040 +0.025 | 16 +0.041 +0.023 | 6 | ± 0.100 | 22 | ± 0.100 | 3 | ± 0.100 | B-F10-37 |
| 10 +0.055 +0.040 | 16 +0.046 +0.028 | 10 | ± 0.180 | 22 | ± 0.170 | 3 | ± 0.200 | B-F10-54 |
| 10 +0.090 +0.070 | 16 +0.040 0 | 12 | ± 0.100 | 19 | ± 0.040 0 | 2 | ± 0.100 | B-F10-41 |

Note) The ※ symbol indicates the bearing with a special shape. Please contact NTN for details.
Please contact NTN for the type of oil.

Flange type bearing Dimension table

d 10~16mm

| Bore diameter ϕd | Outside diameter ϕD | Dimension mm | | | Flange outside diameter ϕF | Flange thickness t | Product number | |
|--|---|------------------|---|----|---|-------------------------|---|-------------------|
| | | Length ℓ | | | | | | |
| 10 $\begin{matrix} +0.040 \\ +0.025 \end{matrix}$ | 16 $\begin{matrix} +0.041 \\ +0.023 \end{matrix}$ | 16 | ± 0.100 | 22 | ± 0.100 | 3 | ± 0.100 | B-F10-42 |
| 10 $\begin{matrix} +0.015 \\ 0 \end{matrix}$ | 16 $\begin{matrix} +0.046 \\ +0.028 \end{matrix}$ | 16 | ± 0.150 | 22 | ± 0.200 | 3 | ± 0.100 | B-F10-65 |
| 10 $\begin{matrix} +0.040 \\ +0.025 \end{matrix}$ | 16 $\begin{matrix} +0.041 \\ +0.023 \end{matrix}$ | 17 | ± 0.150 | 22 | ± 0.150 | 3 | ± 0.100 | B-F10-44 |
| 10 $\begin{matrix} +0.015 \\ 0 \end{matrix}$ | 16 $\begin{matrix} +0.046 \\ +0.028 \end{matrix}$ | 20 | ± 0.150 | 22 | ± 0.150 | 3 | ± 0.100 | B-F10-45 |
| 10 $\begin{matrix} +0.070 \\ +0.050 \end{matrix}$ | $\begin{matrix} 16 \\ 15 \end{matrix}$ $\begin{matrix} +0.025 \\ +0.005 \\ 0 \\ -0.150 \end{matrix}$ | 6 | ± 0.200 | 19 | ± 0.100 | 2 | ± 0.100 | B-F10-36※ |
| 12 $\begin{matrix} +0.058 \\ +0.040 \end{matrix}$ | 16 $\begin{matrix} +0.046 \\ +0.028 \end{matrix}$ | 8 | $\begin{matrix} 0 \\ -0.100 \end{matrix}$ | 20 | ± 0.170 | 2 | ± 0.100 | B-F12-5 |
| 12 $\begin{matrix} +0.058 \\ +0.040 \end{matrix}$ | 16 $\begin{matrix} +0.046 \\ +0.028 \end{matrix}$ | 10 | ± 0.180 | 20 | ± 0.170 | 2 | ± 0.200 | B-F12-6 |
| 12 $\begin{matrix} +0.018 \\ 0 \end{matrix}$ | 16 $\begin{matrix} +0.036 \\ +0.018 \end{matrix}$ | 11 | ± 0.100 | 22 | ± 0.100 | 2 | ± 0.100 | B-F12-8 |
| 12 $\begin{matrix} +0.058 \\ +0.040 \end{matrix}$ | 16 $\begin{matrix} +0.046 \\ +0.028 \end{matrix}$ | 14 | ± 0.220 | 20 | ± 0.170 | 2 | $\begin{matrix} 0 \\ -0.200 \end{matrix}$ | B-F12-1054 |
| 12 $\begin{matrix} +0.043 \\ 0 \end{matrix}$ | $\begin{matrix} 16 \\ 14.8 \end{matrix}$ $\begin{matrix} -0.032 \\ -0.102 \\ 0 \\ -0.150 \end{matrix}$ | 8 | ± 0.200 | 20 | ± 0.140 | 2 | ± 0.200 | B-F12-4※ |
| 12 $\begin{matrix} +0.018 \\ 0 \end{matrix}$ | 17 $\begin{matrix} +0.046 \\ +0.028 \end{matrix}$ | 18 | ± 0.150 | 20 | ± 0.100 | 3 | ± 0.100 | B-F12-16 |
| 12 $\begin{matrix} +0.058 \\ +0.040 \end{matrix}$ | 18 $\begin{matrix} +0.046 \\ +0.028 \end{matrix}$ | 5.6 | ± 0.100 | 24 | ± 0.170 | 3 | ± 0.200 | B-F12-1018 |
| 12 $\begin{matrix} +0.058 \\ +0.040 \end{matrix}$ | 18 $\begin{matrix} +0.046 \\ +0.028 \end{matrix}$ | 8 | ± 0.200 | 24 | ± 0.170 | 3 | ± 0.200 | B-F12-63 |
| 12 $\begin{matrix} +0.018 \\ 0 \end{matrix}$ | 18 $\begin{matrix} +0.046 \\ +0.028 \end{matrix}$ | 12 | ± 0.150 | 24 | ± 0.100 | 3 | ± 0.100 | B-F12-22 |
| 12 $\begin{matrix} +0.018 \\ 0 \end{matrix}$ | 18 $\begin{matrix} +0.046 \\ +0.028 \end{matrix}$ | 15 | ± 0.100 | 24 | ± 0.100 | 3 | ± 0.100 | B-F12-25 |
| 12 $\begin{matrix} +0.018 \\ 0 \end{matrix}$ | 18 $\begin{matrix} +0.046 \\ +0.028 \end{matrix}$ | 20 | ± 0.150 | 24 | ± 0.100 | 3 | ± 0.100 | B-F12-27 |
| 12 $\begin{matrix} +0.032 \\ +0.012 \end{matrix}$ | 18 $\begin{matrix} +0.046 \\ +0.028 \end{matrix}$ | 25 | ± 0.200 | 21 | ± 0.150 | 2 | $\begin{matrix} 0 \\ -0.200 \end{matrix}$ | B-F12-28 |
| 14 $\begin{matrix} +0.058 \\ +0.040 \end{matrix}$ | 18 $\begin{matrix} +0.046 \\ +0.028 \end{matrix}$ | 14 | ± 0.220 | 22 | ± 0.170 | 2 | ± 0.200 | B-F14-6 |
| 14 $\begin{matrix} +0.018 \\ 0 \end{matrix}$ | 20 $\begin{matrix} +0.056 \\ +0.035 \end{matrix}$ | 16 | ± 0.150 | 24 | ± 0.100 | 2 | ± 0.100 | B-F14-3 |
| 14 $\begin{matrix} +0.041 \\ +0.020 \end{matrix}$ | 20 $\begin{matrix} +0.056 \\ +0.035 \end{matrix}$ | 20 | ± 0.150 | 26 | ± 0.100 | 3 | ± 0.100 | B-F14-4 |
| 15 $\begin{matrix} +0.034 \\ +0.016 \end{matrix}$ | 19 $\begin{matrix} -0.100 \\ -0.150 \end{matrix}$ | 12 | ± 0.500 | 23 | ± 0.200 | 2 | ± 0.200 | B-F15-11 |
| 15 $\begin{matrix} +0.080 \\ +0.050 \end{matrix}$ | 20 $\begin{matrix} +0.050 \\ +0.020 \end{matrix}$ | 18 | ± 0.150 | 24 | $\begin{matrix} 0 \\ -0.300 \end{matrix}$ | 9 | ± 0.100 | B-F15-1※ |
| 15 $\begin{matrix} +0.018 \\ 0 \end{matrix}$ | 21 $\begin{matrix} +0.056 \\ +0.035 \end{matrix}$ | 16 | ± 0.150 | 25 | ± 0.120 | 2.5 | ± 0.100 | B-F15-1013 |
| 16 $\begin{matrix} +0.035 \\ +0.015 \end{matrix}$ | 20 $\begin{matrix} +0.056 \\ +0.035 \end{matrix}$ | 13.5 | ± 0.120 | 28 | ± 0.150 | 2 | ± 0.100 | B-F16-1014 |

Note) The※symbol indicates the bearing with a special shape. Please contact NTN for details.
Please contact NTN for the type of oil.

Flange type bearing Dimension table

d 16~40mm

| Bore diameter ϕd | Outside diameter ϕD | Dimension mm | | | | | | Product number |
|--|--|--------------|-------------|-------------------------|---|------------------|---|-------------------|
| | | Length | | Flange outside diameter | | Flange thickness | | |
| | | ℓ | | $\phi F'$ | | t | | |
| 16 $\begin{smallmatrix} +0.024 \\ +0.006 \end{smallmatrix}$ | 21 $\begin{smallmatrix} +0.056 \\ +0.035 \end{smallmatrix}$ | 8.5 | ± 0.150 | 23 | ± 0.100 | 1.5 | ± 0.100 | B-F16-7 |
| 16 $\begin{smallmatrix} +0.018 \\ 0 \end{smallmatrix}$ | 22 $\begin{smallmatrix} +0.035 \\ +0.015 \end{smallmatrix}$ | 25 | ± 0.150 | 28 | ± 0.100 | 3 | ± 0.100 | B-F16-12 |
| 18 $\begin{smallmatrix} +0.018 \\ 0 \end{smallmatrix}$ | 23 $\begin{smallmatrix} +0.043 \\ +0.022 \end{smallmatrix}$ | 20 | ± 0.150 | 29 | ± 0.100 | 3 | ± 0.100 | B-F18-1 |
| 20 $\begin{smallmatrix} +0.021 \\ 0 \end{smallmatrix}$ | 26 $\begin{smallmatrix} +0.079 \\ +0.054 \end{smallmatrix}$ | 15 | ± 0.150 | 32 | ± 0.100 | 3 | ± 0.100 | B-F20-1006 |
| 20 $\begin{smallmatrix} +0.041 \\ +0.020 \end{smallmatrix}$ | 26 $\begin{smallmatrix} 0 \\ -0.025 \end{smallmatrix}$ | 20 | ± 0.150 | 32 | ± 0.150 | 4 | ± 0.100 | B-F20-5 |
| 22 $\begin{smallmatrix} +0.021 \\ 0 \end{smallmatrix}$ | 28 $\begin{smallmatrix} +0.062 \\ +0.041 \end{smallmatrix}$ | 12 | ± 0.200 | 34 | ± 0.300 | 3 | ± 0.200 | B-F22-2 |
| 22 $\begin{smallmatrix} +0.021 \\ 0 \end{smallmatrix}$ | 28 $\begin{smallmatrix} +0.062 \\ +0.041 \end{smallmatrix}$ | 18 | ± 0.100 | 34 | ± 0.100 | 3 | ± 0.100 | B-F22-1 |
| 25 $\begin{smallmatrix} +0.041 \\ +0.020 \end{smallmatrix}$ | 32 $\begin{smallmatrix} +0.060 \\ +0.028 \end{smallmatrix}$ | 30 | ± 0.200 | 39 | ± 0.100 | 3.5 | ± 0.100 | B-F25-4 |
| 30 $\begin{smallmatrix} +0.053 \\ +0.020 \end{smallmatrix}$ | 35 $\begin{smallmatrix} +0.010 \\ -0.015 \end{smallmatrix}$ | 30 | ± 0.150 | 39 | $\begin{smallmatrix} 0 \\ -0.100 \end{smallmatrix}$ | 2.5 | $\begin{smallmatrix} 0 \\ -0.200 \end{smallmatrix}$ | B-F30-1 |
| 40 $\begin{smallmatrix} +0.216 \\ +0.177 \end{smallmatrix}$ | 50 $\begin{smallmatrix} +0.073 \\ +0.041 \end{smallmatrix}$ | 30 | ± 0.150 | 60 | ± 0.150 | 5 | ± 0.150 | B-F40-1 |

Note) The※symbol indicates the bearing with a special shape. Please contact NTN for details.
Please contact NTN for the type of oil.

Spherical type bearing Dimension table

d 3~8mm

| | Dimension mm | | | | Product number |
|-----|--|---|-----------------|--|---------------------|
| | Bore diameter ϕd | Outside diameter ϕD | Length l | Spherical diameter $\phi D'$ | |
| 3 | $\begin{matrix} +0.008 \\ 0 \end{matrix}$ | 6.9 | 4 ± 0.100 | 7 ± 0.050 | B-A3-7 |
| 3 | $\begin{matrix} +0.010 \\ 0 \end{matrix}$ | 7.8 | 5 ± 0.100 | 8 ± 0.050 | B-A3-16 |
| 3.5 | $\begin{matrix} +0.011 \\ +0.006 \end{matrix}$ | 7.8 $\begin{matrix} +0.200 \\ 0 \end{matrix}$ | 6 ± 0.100 | 8 ± 0.050 | B-A3Z8 |
| 4 | $\begin{matrix} +0.010 \\ +0.002 \end{matrix}$ | 7.8 | 6 ± 0.100 | 8 ± 0.050 | B-A4-29 |
| 4 | $\begin{matrix} +0.008 \\ 0 \end{matrix}$ | 7.8 | 6 ± 0.100 | 8 ± 0.050 | B-A4-22 |
| 4 | $\begin{matrix} +0.012 \\ 0 \end{matrix}$ | 7.95 $\begin{matrix} 0 \\ -0.150 \end{matrix}$ | 5.4 ± 0.100 | 8 ± 0.050 | B-A4-1038-A1 |
| 4 | $\begin{matrix} +0.020 \\ +0.012 \end{matrix}$ | 9.8 $\begin{matrix} +0.150 \\ 0 \end{matrix}$ | 7 ± 0.100 | 10 ± 0.050 | B-A4-57 |
| 4.8 | $\begin{matrix} +0.016 \\ +0.006 \end{matrix}$ | 10.8 | 8 ± 0.150 | 11 $\begin{matrix} 0 \\ -0.150 \end{matrix}$ | B-A4Z13 |
| 5 | $\begin{matrix} +0.012 \\ 0 \end{matrix}$ | 9.8 $\begin{matrix} +0.150 \\ 0 \end{matrix}$ | 7 ± 0.100 | 10 ± 0.050 | B-A5-32 |
| 5 | $\begin{matrix} +0.012 \\ +0.002 \end{matrix}$ | 9.9 | 7 ± 0.100 | 10 ± 0.050 | B-A5-46 |
| 5 | $\begin{matrix} +0.012 \\ 0 \end{matrix}$ | 11.8 ± 0.100 | 8 ± 0.100 | 12 ± 0.050 | B-A5-19 |
| 5 | $\begin{matrix} +0.012 \\ 0 \end{matrix}$ | 11.8 ± 0.120 | 8 ± 0.150 | 12 ± 0.150 | B-A5-16 |
| 6 | $\begin{matrix} +0.010 \\ +0.002 \end{matrix}$ | 11.7 | 8 ± 0.150 | 12 ± 0.050 | B-A6-2 |
| 8 | $\begin{matrix} +0.015 \\ 0 \end{matrix}$ | 14.75 | 9 ± 0.100 | 15 ± 0.050 | B-A8-7 |
| 8 | $\begin{matrix} +0.015 \\ 0 \end{matrix}$ | 15.7 $\begin{matrix} +0.200 \\ -0.100 \end{matrix}$ | 11 ± 0.100 | 16 ± 0.070 | B-A8-37 |

Mini pillow unit/ Mini flange unit/ Mini side flange unit bearing Dimension table

d 6~20mm

| Bore diameter ϕd | Dimension mm | | | Bearing product number | Unit product number |
|--|---|----------------|---------------------------------|------------------------|---|
| | Outside diameter ϕD | Length l | Spherical diameter $\phi D'$ | | |
| 6 $\begin{smallmatrix} +0.012 \\ 0 \end{smallmatrix}$ | 11.8 | 8 ± 0.100 | 12 ± 0.050 | B-A6-3E | B-BAP608 B-BAF608 |
| 8 $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | 15.8 | 10 ± 0.100 | 16 ± 0.100 | B-A8-10E | B-BAP810 B-BAF810 |
| 10 $\begin{smallmatrix} +0.015 \\ 0 \end{smallmatrix}$ | 19.8 | 12 ± 0.100 | 20 ± 0.100 | B-A10-1E | B-BAP1012 B-BAF1012 B-BSF1012 |
| 12 $\begin{smallmatrix} +0.018 \\ 0 \end{smallmatrix}$ | 23.8 $\begin{smallmatrix} +0.100 \\ -0.200 \end{smallmatrix}$ | 14 ± 0.150 | 24 ± 0.100 | B-A12-2E | B-BAP1214 B-BAF1214 B-BSF1214 |
| 15 $\begin{smallmatrix} +0.018 \\ 0 \end{smallmatrix}$ | 26.7 | 18 ± 0.150 | 27 ± 0.120 | B-A15-2E | B-BAP1518 B-BAP1518H B-BAF1518 B-BSF1518 |
| 17 $\begin{smallmatrix} +0.018 \\ 0 \end{smallmatrix}$ | 29.7 | 20 ± 0.150 | 30 ± 0.120 | B-A17-1E | B-BAP1720 B-BAP1720H B-BAF1720 |
| 20 $\begin{smallmatrix} +0.021 \\ 0 \end{smallmatrix}$ | 33.6 | 22 ± 0.150 | 34 ± 0.100 | B-A20-2E | B-BAP2022 B-BAP2022H B-BAF2022 |