

## 2. Design Features and Advantages

### 2.1 Maintenance free type

The NTN Maintenance free bearing unit contains a high-grade lithium-based grease, good for use over a long period, which is ideally suited to sealed-type bearings. Also provided is an excellent sealing device, unique to NTN, which prevents any leakage of grease or penetration of dust and water from outside.

It is designed so that the rotation of the shaft causes the sealed-in grease to circulate through the inside space, effectively providing maximum lubrication. The lubrication effect is maintained over a long period with no need for replenishment of grease.

To summarize the advantages of the NTN maintenance free bearing unit:

- 1) As an adequate amount of good quality grease is sealed in at the time of manufacture, there is no need for replenishment. This means savings in terms of time and maintenance costs.
- 2) Since there is no need for any regreasing facilities, such as piping, a more compact design is possible.
- 3) The sealed-in design eliminates the possibility of grease leakage, which could lead to stained products.

### 2.2 Relubricatable type

The NTN relubricatable type bearing unit has an advantage over other similar units being so designed as to permit regreasing even in the case of misalignment of  $2^\circ$  to the right or left. The hole through which the grease fitting is mounted usually causes structural weakening of the housing.

However, as a result of extensive testing, in the NTN bearing unit the hole is positioned so as to minimize this adverse effect. In addition, the regreasing groove has been designed to minimize weakening of the housing.

While the NTN maintenance free type bearing unit is satisfactory for use under normal operating conditions in-doors, in the following circumstances it is necessary to use the relubricatable type bearing unit:

- 1) Cases where the temperature of the bearing rises above  $100^\circ\text{C}$ ,  $212^\circ\text{F}$ :
  - \*-Normal temperature of up to  $140^\circ\text{C}$ ,  $284^\circ\text{F}$  heat-resistant bearing units.
  - \*-Normal temperature of up to  $200^\circ\text{C}$ ,  $392^\circ\text{F}$  heat-resistant bearing units.
- 2) Cases where there is excessive dust, but space does not permit using a bearing unit with a cover.
- 3) Cases where the bearing unit is constantly exposed to splashes of water or any other liquid, but space does not permit using a bearing unit with a cover.
- 4) Cases in which the humidity is very high, and the

machine in which the bearing unit is used is run only intermittently.

- 5) Cases involving a heavy load of which the Cr/Pr value is about 10 or below, and the speed is 10 rpm or below. or the movement is oscillatory.
- 6) Cases where the number of revolutions is relatively high and the noise problem has to be considered; for example, then the bearing is used the fan of an air conditioner.

### 2.3 Special sealing feature

#### 2.3.1 Standard bearing units

The sealing device of the ball bearing for the NTN bearing unit is a combination of a heat-resistant and oil-proof synthetic rubber seal and a slinger of an exclusive NTN design.

The seal, which is fixed in the outer ring, is steel-reinforced, and its lip, in contact with the inner ring, is designed to minimize frictional torque.

The slinger is fixed to the inner ring of the bearing with which it rotates. There is a small clearance between its periphery and the outer ring.

There are triangular protrusions on the outside face of the slinger and, as the bearing rotates, these protrusions on the slinger creates a flow of air outward from the bearing. In this way, the slinger acts as a fan which keeps dust and water away from the bearing.

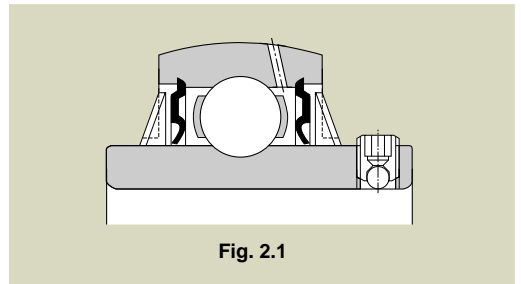


Fig. 2.1

These two types of seals on both sides of the bearing prevent grease leakage, and foreign matter is prevented from entering the bearing from outside.

## 2.3.2 Bearing units with covers

The NTN bearing unit with a cover consists of a standard bearing unit and an outside covering for extra protection against dust. Special consideration has been given to its design with respect to dust-proofing.

Sealing devices are provided in both the bearing and the housing, so that units of this type operate satisfactorily even in such adverse environments as flour mills, steel mills, foundries, galvanizing plants and chemical plants, where excessive dust is produced and/or liquids are used. They are also eminently suitable for outdoor environments where dust and rain are inevitable, and in heavy industrial machinery such as construction and transportation equipment.

The rubber seal of the cover contacts with a shaft by its two lips, as shown in Fig. 2.2 and 2.3. by filling the groove between the two lips with grease, an excellent sealing effect is obtained and, at the same time, the contacting portions of the lips are lubricated. Furthermore, the groove is so designed that when the shaft is included the rubber seal can move in the radial direction.

When bearing units are exposed to splashes of water rather than to dust, a drain hole ( 5 to 8 mm, 0.2 to 0.3 inches in diameter) is provided at the bottom of the cover, and grease should be applied to the side of the bearing itself instead of into the cover.

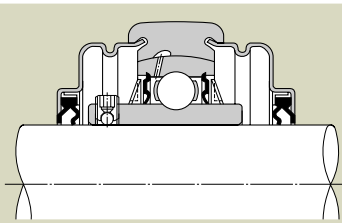


Fig. 2.2 Pressed steel cover

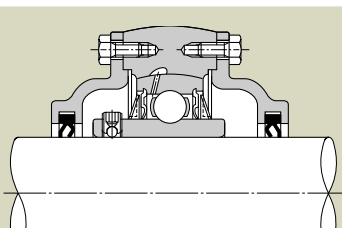


Fig. 2.3 Cast iron cover

## 2.4 Secure fitting

Fastening the bearing to the shaft is effected by tightening the ball-end set screw, situated on the inner ring. This is a unique NTN feature which prevents loosening, even if the bearing is subjected to intense vibrations and shocks.

## 2.5 Self-aligning

With the NTN bearing unit, the outer surface of the ball bearing and the inner surface of the housing are spherical, thus alignment of the assembly is automatic. Any misalignment of axis that may arise from poor workmanship on the shaft or errors in fitting will be automatically adjusted.

## 2.6 Higher rated load capacity

The bearing used in the unit is of the same internal construction as those in NTN bearing series 62 and 63, and is capable of accommodating axial load as well as radial load, or composite load. The rated load capacity of this bearing is considerably higher than that of the corresponding self-aligning ball bearings used for standard plummer blocks.

## 2.7 Light weight yet strong housing

Housings for NTN bearing units come in various shapes. They consist of either high-grade cast iron, one-piece casting, or of precision finished pressed steel, the latter being lighter in weight. In either case, they are practically designed to combine lightness with maximum strength.

## 2.8 Easy mounting

The NTN bearing unit is an integrated unit consisting of a bearing and a housing.

As the bearing is prelubricated at manufacture with the correct amount of high-grade lithium base, it can be mounted on a shaft just as it is. It is sufficient to carry out a short test run after mounting.

## 2.9 Accurate fitting of the housing

In order to simplify the fitting of the pillow block and flange type bearing units, the housings are provided with a seat for a dowel pin, which may be utilized as needed.

### 2.10 Bearing replaceability

The bearing used in the NTN bearing unit is replaceable. In the event of bearing failure, a new bearing can be fitted to the existing housing.

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