Mounting of rolling bearings
Mounting of angular contact ball bearings and tapered roller bearings

Mounting of special types

Features

Selection of the suitable mounting method is based not only on the bearing type but also on the adjacent construction and the relevant dimensions. In the case of some rolling bearing types, attention must be paid during mounting to particular features or a particular procedure must be applied, which is discussed in detail below. Further details are given in the product-specific catalogues and brochures. The decisive factor for correct mounting is, however, the mounting manual relating to the application.

Mounting of angular contact ball bearings and tapered roller bearings

Angular contact ball bearings and tapered roller bearings are always mounted in pairs. The axial internal clearance and thus also the radial internal clearance of two bearings adjusted against each other is set at the time of mounting. The magnitude of the internal clearance or preload is based on the operational requirements. Angular contact ball bearings of the universal design can be mounted directly adjacent to each other in any arrangement required.

High loads and high speeds lead to an increase in temperature in the bearing position. As a result of thermal expansion, the internal clearance set at the time of mounting may change during operation. Whether the internal clearance will increase or decrease depends on the arrangement and size of the bearings, the materials of the shaft and housing and the spacing between the two bearings.

If the shaft requires the closest possible guidance, the internal clearance is set in steps. A test run must be carried out after each new adjustment and the temperature must be checked. This ensures that the internal clearance does not become too small, leading to an excessive increase in running temperature. During the test runs, the bearing arrangement will “settle” such that the internal clearance undergoes hardly any further change.

The guide value for the correct bearing temperature at moderate to high speed and moderate load can be taken as follows: If there is no heating due to an external source, a correctly adjusted bearing arrangement may reach a temperature of approx. +60 °C to +70 °C during the test run; the temperature should decrease after between two and three hours of operation, however, especially in the case of grease lubrication, once the excess grease has been driven out of the bearing interior and the churning work has decreased.

Bearings exposed to vibrations at low speed, are mounted free from clearance or even with preload, otherwise there is a risk that the rolling elements will impact against the roller raceways. Angular contact ball bearings and tapered roller bearings are adjusted against each other on the shaft by means of locknuts, *Figure 1*, page 3, shims, *Figure 2*, page 3, or ring nuts in the housing.

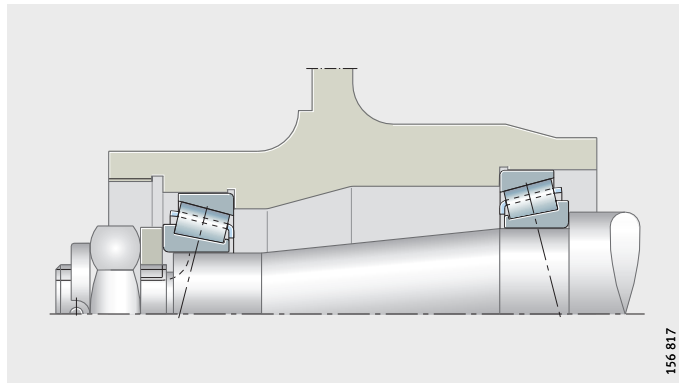

Figure 1
Adjustment of tapered roller bearings of a freewheel using the kingpin nut

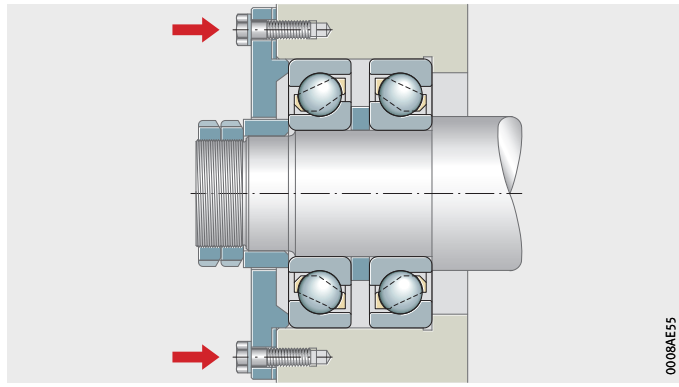

Figure 2
Axial location of an angular contact ball bearing pair – setting of internal clearance using shim

The axial internal clearance or preload of an adjustable bearing arrangement is set – starting from a clearance-free state – by loosening or tightening of the locknut or by insertion of calibrated plates. The axial internal clearance and preload can be converted into revolutions of the locknut with the aid of the thread pitch.

The transition from internal clearance to preload is sought during the adjustment process by rotating the shaft continuously by hand and simultaneously checking the possible movement of the shaft by means of a dial gauge.

The correct setting can be found more easily using a torque wrench. The locknut is tightened to the specified torque as a function of the bearing size. The necessary internal clearance is then achieved by reversing the locknut by approx. $^{1}/_{12}$ of a revolution. In the case of tapered roller bearings, it must be ensure that the rolling elements are in contact with the guide rib during mounting. This ensures that all the tapered rollers (rolling elements) are in position and prevents an increase in the internal clearance of the bearing in operation as a result of later positioning. The bearing arrangement must therefore be rotated several times alternately in both directions during mounting.

Mounting of special types

In the case of matched pairs and multiple-row tapered roller bearings, *Figure 3* and *Figure 4*, the axial internal clearance is determined by the width of the intermediate ring. Suitable gauges can be requested from Schaeffler.

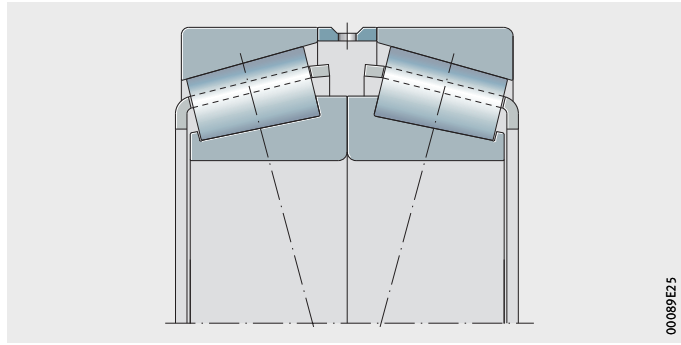

Figure 3
Matched tapered roller bearings in X arrangement (suffix N11CA)

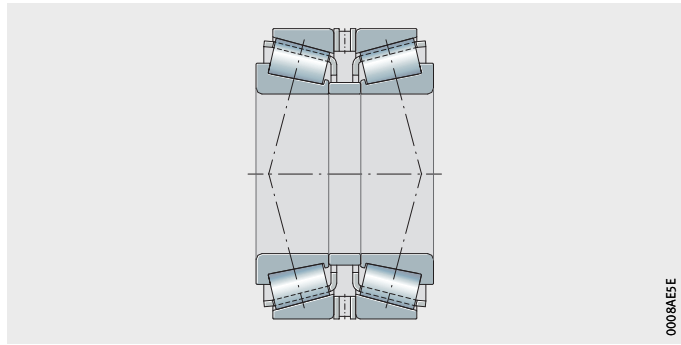

Figure 4
Double row tapered roller bearing in O arrangement

Further information

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