

Adjustments

The good functioning of a ball bearing depends on the quality of mating parts.

The following points ought to be taken in to consideration while choosing different tolerances of mating parts:

- **Surface roughness** and geometrical forms of shafts influence the performance and noise of a bearing.
- Absolute **temperature** and temperature variations create fluctuations in clamping.
- Axial and radial expansion, due to temperature size and direction of the **applied load** to the bearing. In general, the tightening of the bearing on the shaft or in the housing (depends which one is turning) should become tighter with increased load.
- The **kinematic situation**: rotating rings must be tightened more than stationary rings to prevent them moving axially.
- **Accuracy of rotation** and **radial rigidity** of the bearing: linked to requirements regarding surface finish and geometric shapes.
- Influence of **bearing clearance**: shaft diameters that are too large cause spacing pressures on the inner ring, while housing diameters that are too small have the effect of contracting the outer ring. In both cases, the radial clearance will be reduced and may cause the bearing to jam.

The following tolerances are given in μm and may be used only in cases where the groove and the shaft materials have the same thermic dilatation coefficient as has the bearing steel.

Tolerance of shaft

Shaft	Charge / modes	Tolerance Δdmp of bearings			Precision of the assembly
		Adjustment	0 - 8 μm	0 - 5 μm	
Tolerance of shaft					
Turning or fixed (alternatively)	Low requests, low to average modes, without vibrations	Adjustment with play	- 5 - 13	- 5 - 11	Normal precision without any particular requirements. normal precision, the inferior ring must be able to slide axially (dilatation).
Fixed	Average requests, average modes, high frequency vibrations	Adjustment with light tightening	0 - 8	0 - 6	Precise radial guidance Important radial rigidity
Turning	Average requests, average modes, vibrations at low frequency				Normal precision
Fixed	Raised requests, high modes of rotation, high frequency vibrations	Adjustment with tightening / overtightening	+ 4 - 4	+ 4 - 2	The adjustment with tightening must be guaranteed even to high mode. Great radial rigidity is necessary.
Turning	Average to raised requests, high modes of rotation, high frequency vibrations				

Tolerance of housing

Exterior ring	Charge / modes	Tolerance Δdmp of bearings			Precision of the assembly
		Adjustment	0 - 8 μm	0 - 5 μm	
Tolerance of the housing					
Turning or fixed (alternatively)	Low requests, low to average modes, without vibrations	Adjustment with play	+ 5 - 3	+ 5 - 1	Normal precision without any particular requirements. normal precision, the inferior ring must be able to slide axially (dilatation).
Fixed	Average requests, average modes, high frequency vibrations	Adjustment with light tightening	0 - 8	0 - 6	Precise radial guidance Important radial rigidity The exterior ring must be locked laterally
Turning	Average requests, average modes, vibrations at low frequency				Normal precision
Fixed	Raised requests, high modes of rotation, high frequency vibrations	Adjustment with tightening / overtightening	- 4 - 12	- 3 - 9	The adjustment with tightening must be guaranteed even to high mode. It is not necessary to lock the exterior ring in axial position. Great radial rigidity is necessary.
Turning	Average to raised requests, high modes of rotation, high frequency vibrations				