

## 2. Bearing selection

Rolling element bearings are available in a wide variety of type, configurations and sizes. The most important factor to consider in bearing selection is a bearing that will enable the machine or part in which it is installed to satisfactorily perform as expected.

When selecting a bearing, having an accurate and comprehensive knowledge of which part of the machine or equipment it is to be installed in and the operating requirements and environment in which it will function, is the basis for selecting just the right bearing for the job. In the selection process, the following data is needed.

- (1) The equipment's function and construction.
- (2) Bearing mounting location(point).
- (3) Bearing load(direction and magnitude).
- (4) Bearing speed.
- (5) Vibration and shock load.
- (6) Bearing temperature(ambient and friction generated).
- (7) Environment(corrosion, lubrication, cleanliness of the environment, etc.).

When selecting the correct bearing for your application, it is important to consider several factors, such as the calculation of various angle and clearances, which ensure proper fit. In the selection process, the following data is needed.

- (1) Bearing dimensions selection is generally based on the operating load and the bearing's life expectancy requirements, as well as the bearing's rated load capacity.
- (2) The dimensional accuracy and operating tolerances of bearings are regulated by ISO Standard. For equipment requiring high tolerance shaft runout or high speed operation.
- (3) Select appropriate bearing clearance according to effect of interference fitting, thermal expansion and elastic deformation when under load on inner/outer rings, and shaft/housing form accuracy.
- (4) Select the cage type and its material according to bearing speed, noise level, vibration and shock load, and lubrication method.

- (5) Select lubricant, lubrication method and sealing method according to operating temperature, rotational speed, lubrication and sealing methods, its maintenance and inspection.
- (6) Select special bearing specifications for its operating environment such as high/low temperature, vacuum, pharmaceutical, etc. or requirement for high reliability.
- (7) Confirm bearing handling procedures such as installation-related dimensions and installation and disassembly procedures according to specific design purposes such as bearings with separable inner/outer rings.

When selecting a bearing, frequently all the data required for the selection of the bearing is not necessarily clearly specified. Thus, some elements governing selection must be factored in on an estimated basis.

Over the years, TPI has gained considerable expertise in bearing selection. Please consult TPI for advice and assistance with any bearing selection problem.

Procedure	Confirmation items	Pages	Confirmation items	Pages
<div style="border: 1px solid black; padding: 5px; text-align: center;">Confirm operating conditions and operating environment</div>	● Function and construction of components to house bearings	2	● Vibration and shock load	-
	● Bearing mounting location	-	● Bearing temperature (ambient and friction-generated)	38
	● Bearing load (direction and magnitude)	25	● Operating environment (potential for corrosion, degree of contamination, extent of lubrication)	-
	● Rotational speed	38		
<div style="border: 1px solid black; padding: 5px; text-align: center;">Select bearing type and configuration</div>	● Dimensional limitations	-	● Allowable misalignment of inner/outer rings	54
	● Bearing load (magnitude, direction, vibration; presence of shock load)	25	● Friction torque	-
	● Rotational speed	38	● Bearing arrangement (fixed side, floating side)	7
	● Bearing tolerances	15	● Installation and disassembly requirements	55
	● Rigidity	37	● Bearing availability and cost	-
<div style="border: 1px solid black; padding: 5px; text-align: center;">Select bearing dimensions</div>	● Design life of components to house bearings	21	● Safety factor	22
	● Dynamic/static equivalent load conditions	29	● Allowable speed	38
			● Allowable axial load	21~30
			● Allowable space	-
<div style="border: 1px solid black; padding: 5px; text-align: center;">Select bearing tolerances</div>		15		
	● Shaft runout tolerances	15		
	● Torque fluctuation	15		
<div style="border: 1px solid black; padding: 5px; text-align: center;">Select bearing's internal clearance</div>	● Material and shape of shaft and housing	52	● Allowable misalignment of inner/outer rings	54
	● Fit	31	● Load (magnitude, nature)	25
	● Temperature differential between inner/outer rings	36	● Amount of preload	37
			● Rotational speed	38
<div style="border: 1px solid black; padding: 5px; text-align: center;">Select cage type and material</div>	● Rotational speed	38	● Momentary load	-
	● Noise level	-	● Lubrication type and method	39
	● Vibration and shock load	-		
<div style="border: 1px solid black; padding: 5px; text-align: center;">Select lubricant, lubrication method, sealing method</div>	● Operating temperature	39	● Sealing method	46
	● Rotational speed	38	● Maintenance and inspection	-
	● Lubrication type and method	39		
<div style="border: 1px solid black; padding: 5px; text-align: center;">Select any special bearing specifications</div>	● Operating environment (high/low temperature, vacuum, pharmaceutical, etc.)	4		
	● Requirement for high reliability	22		
<div style="border: 1px solid black; padding: 5px; text-align: center;">Confirm handling procedures</div>	● Installation-related dimensions	53		
	● Installation and disassembly procedures	55		