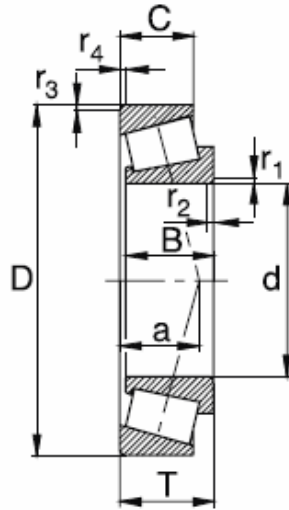


Tapered Roller Bearings – General Information

Basic Designs

The inner and outer ring raceways and rollers of this type of bearing are made with a taper so that the planes of the surfaces of the raceways and roller axis meet at a point. The rollers are guided by the cone (inner ring) backface rib. A single-row tapered roller bearing can support a combined radial and axial load. If either a radial load or bi-directional axial load is to be carried, a pair of bearings must be used in a “face-to-face” or “back-to-back” position. Tapered roller bearings are separable into the components: outer ring, inner ring and roller assembly. The nonseparable inner ring and roller assembly is called the “cone”, and the outer ring is called the “cup”. Internal clearance is established during mounting by the axial positioning of the cone relative to the cup. This bearing type can be used in a preload situation to obtain higher rigidity and better running accuracy of the shaft. Metric dimensioned tapered roller bearings are made to ISO355. Inch dimensioned tapered roller bearings are manufactured to ABMA standards.



Double-row and four-row Tapered roller bearings are designed to carry radial, and bi-directional axial loads. Four-row tapered roller bearings are used for the roll necks of rolling machines and for other applications where heavy or impact loads are present. Multi-row tapered roller bearings have the serial number and the combination symbol stamped on the faces of the rings for clearance adjustment and must be assembled according to this number and symbol.

Pressed steel cages are used for small bore bearings and machined, high-strength brass or mild steel cages are used for bearings with larger bores. Heavy-duty pin-type cages are used for some large-bore bearings.

Tapered roller bearings of the basic designs in metric dimensions have a normal tolerance, and the inch series tapered roller bearings have the tolerances of ABMA Class 4. The bearings with an increased precision can be supplied on request.

The modified line contact between the tapered rollers and the raceways eliminates edge stressing and allows the tapered roller bearings to align. For single row tapered roller bearings, a maximum angular alignment of 4 angular minutes is allowed.



Bearing Mounting (Setting)

Tapered roller bearings can be set to any desired axial or radial clearance when installed in equipment being manufactured on the production line. This feature lets a designer control bearing clearance to meet operating conditions, and thereby optimize bearing and machine performance. Tapered bearings can be set by a variety of methods, either manual or automatic. You can also get them as preset assemblies.

The term “setting” indicates a specific amount of end play (axial clearance) or preload in a bearing. Unlike other rolling element bearings, tapered bearings don’t require close control of shaft or housing fits to obtain an accurate setting. Because they are mounted in pairs, their setting depends mostly on the location of one bearing row relative to the other on the shaft.

Bearings can be set to achieve one of two conditions:

- End play — Axial clearance between bearing rollers and races, which allows axial shaft movement when axial (thrust) force is applied.
- Preload — Axial interference between rollers and races so there is no axial shaft movement.

Generally, a setting ranging from near zero to slight preload maximizes bearing life. Some applications use moderate preload to increase rigidity of highly stressed parts that would otherwise be adversely affected by excessive deflection and misalignment. Excessive preload, though, can drastically reduce bearing fatigue life or cause high temperatures that can quickly lead to bearing damage.