Correct Fits for Your Wheel Bearing

Proper bearing cup (outer race) and bearing cone (inner race) fitting is essential to get the most life from commercial vehicle wheel ends.

Proper Wheel Bearing Fits Ensure Proper Function

In commercial vehicle wheel ends, the outer race has a tight fit while the inner race, has a loose fit on the spindle.

A tight fit keeps the outer race from turning in the housing (hub). When the outer race turns in the hub, it wears away the hub inside diameter (ID) and backing shoulder, creating debris particles. Debris can cause seal wear and leaks, bearing race, rib and roller wear, and weakening of the hub. Debris can oxidize, degrading the lubricant and reducing bearing life. Wearing of the hub ID (at the bearing locations) increases the hub bore and results in an out of tolerance hub. When removing the bearings for service, measure the hub ID to check the tolerance. Replace the hub if the ID is larger than the OEM's specifications (see tables on back of sheet).

Loose inner race fit helps ease assembly and bearing adjustment. The loose fit allows the inner race to easily slide along the spindle while tightening the nut during bearing adjustment.

Avoid excessively loose fits to prevent misalignment within the wheel end. Misalignment will cause premature wear of bearings and seals. Measure spindle diameter during wheel end service to ensure that there is not excessive spindle wear. Inspect the top and bottom of the spindle. The underside may show wear even when the top appears in good condition. Replace the spindle if the spindle diameter is less than the OEM's specifications.



Bearing cup (outer race) damage caused by an excessively loose fit in a rotating hub.



Bearing cone (inner race) bore damage - Fractured inner race cause by out-of-round or oversized shaft.

Skill Level: Difficult | Special Tools: Dial Indicator

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Below are reference tables of suggested fitting practices for wheel ends with hubs and shafts made of iron or steel accounting for bearing, spindle and hub tolerances. To find the appropriate fitting practices read across the row for the appropriate bearing size range. For example, a outer race with a 5 in. outside diameter (OD) assembled into an iron or steel hub should be 0.001 in. tight to 0.004 in. tight. For a tight fit, the wheel hub inside diameter (ID) should be smaller than the outer race OD by the fit values shown on the tables. For inner race fits, the spindle OD should be smaller than the inner race bore within the loose fit range. The suggested fitting practice for outer races directly pressed into aluminum hubs is a minimum tight fit of 0.001 in. per 1 in. of outside outer race diameter. For example, if you are installing a outer race with a 5 in. OD into an aluminum hub, the minimum tight fit should be 0.005 in. tight.

Truck Wheel End Bearing cone (inner race)s: Front, Rear & Trailer

Bearing cone (inner race) Bore Diameter				
Over	**Inclusive**	**Tolerance**	**Bearing cone (inner race) Seat (Spindle OD) Deviation**	**Resultant Fit**
0″	3.0000″	0″	-.0002″	.0002″ Loose
		+.0005″	-.0007″	.0012″ Loose
3.0000″	12.0000″	0″	-.0007″	.0005″ Loose
		+.0010″	-.0015″	.0025″ Loose

Truck Wheel End Bearing Cups (Outer Race) With Iron or Steel Hubs: Front, Rear & Trailer

Bearing cup (outer race) Outside Diameter				
Over	**Inclusive**	**Tolerance**	**Bearing cone (inner race) Seat (Spindle OD) Deviation**	**Resultant Fit**
0″	3.0000″	+.0010″	-.0020″	.0030″ Tight
		-0″	-.0005″	.0005″ Tight
3.0000″	12.0000″	+.0010″	-.0030″	.0040″ Tight
		-0″	-.0010″	.0010″ Tight

⚠WARNING
Failure to observe the following warnings could create a risk of death or serious injury.

Never spin a bearing with compressed air. The components may be forcefully expelled.

Proper maintenance and handling practices are critical. Always follow installation instructions and maintain proper lubrication.

A bearing/component should not be put into service if its shelf life has been exceeded.

CAUTION
Failure to follow these cautions may result in property damage

Use of improper bearing fits may cause damage to equipment.

Do not use damaged bearings.

TechTips is not intended to substitute for the specific recommendations of your equipment suppliers.

Every reasonable effort has been made to ensure the accuracy of the information contained in this writing, but no liability is accepted for errors, omissions or for any other reason.

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