

# Heavy-Duty TechTips

**TIMKEN**  
Where You Turn

## Volume 4 • Issue 1

Maximizing bearing performance and life remains an objective throughout The Timken Company, from design teams and manufacturing associates to our field sales team and distributors. TechTips help you install and maintain Timken® bearings, seals and components to take advantage of their performance and the systems in which they operate. For more information regarding Timken heavy-duty products and services, visit [www.timken.com/aftermarket](http://www.timken.com/aftermarket) or contact your local Timken distributor.

## THE IMPORTANCE OF CORRECT FITS FOR YOUR WHEEL BEARING



To help ensure proper bearing function, it is important to mount a wheel bearing with the proper fits. Generally, rotating components are installed with tight or press fits (known as interference fits) while stationary components can be designed as either tight- or loose-fits, depending on the application. In heavy-duty truck wheel ends, the cup, or outer race, has a tight fit, while the cone, or inner race, has a loose fit.



**Cone bore damage - Fractured cone due to out-of-round or oversized shaft.**

Tight fits keep the rotating bearing component (cup) from turning in the housing (hub). When the bearing cup turns in the hub, it wears away the hub inside diameter (ID) and backing shoulder, creating debris particles, which can cause seal wear and leaks; bearing race, rib, and roller wear; and weakening of the hub. Additionally, these wear particles can oxidize in the lubricant causing it to degrade



**Cup spinning - Loose cup fit in a rotating wheel hub.**

and reduce bearing life. Wearing of the hub ID (at the bearing locations) also increases the hub bore and results in an out of tolerance hub. For this reason, the hub ID should be measured when the bearings are removed for service. If the hub ID is larger than the OEM's specifications, the hub should be replaced.

Loose fits are used for the stationary component (cone). The loose fits are used primarily to accommodate ease of assembly and bearing adjustment. The loose fit allows the cone to easily slide along the spindle as the nut is tightened during bearing adjustment. However, excessively loose fits should be avoided or misalignment will occur within the wheelend. Misalignment will prematurely wear out the bearings and seals. Similar to the hub ID, the spindle diameter should be measured during wheel end service to ensure

that there is not excessive spindle wear. Inspect the top and bottom of the spindle because the underside may show wear even when the top appears in good condition. If the spindle diameter is out of the original manufacturing specifications, the spindle should be replaced.

Below are reference tables of suggested fitting practices for wheel ends where the hub and shaft are

made of iron or steel. The tables account for the bearing, spindle and hub tolerances. Read across the row with the appropriate bearing size range to find the appropriate fitting practices. For example, a cup with a 5 inch outside diameter (OD) assembled into an iron or steel hub should be 0.001 inch tight to 0.004 inch tight. For tight fits, the wheel hub inside diameter (ID) should be smaller than the cup OD by the resultant fit values shown on the

tables. For cone fits, the spindle OD should be smaller than the cone bore within the resultant loose fit range.

When the cups are pressed directly into aluminum hubs, the suggested fitting practice is a minimum tight fit of 0.001 inch per 1 inch of outside cup diameter. For example, if you are installing a cup with a 5 inch OD into an aluminum hub, the minimum tight fit should be 0.005 inch tight.

TRUCK WHEEL-END CONES: FRONT, REAR & TRAILER				
Cone Bore Diameter				
Over	Inclusive	Tolerance	Cone Seat (Spindle OD) Deviation	Resultant Fit
0"	3.0000"	0"	-0.0002"	0.0002" Loose
		+0.0005"	-0.0007"	.0012" Loose
3.0000"	12.0000"	0"	-0.0005"	.0005" Loose
		+0.0010"	-0.0015"	.0025" Loose

TRUCK WHEEL-END CUPS WITH IRON OR STEEL HUBS: FRONT, REAR & TRAILER				
Cup Outside Diameter				
Over	Inclusive	Tolerance	Cup Seat (Hub ID) Deviation	Resultant Fit
0"	3.0000"	+0.0010"	-0.0020"	.0030" Tight
		-0"	-0.0005"	.0005" Tight
3.0000"	12.0000"	+0.0010"	-0.0030"	.0040" Tight
		-0"	-0.0010"	.0010" Tight

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

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

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



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 Printed in U.S.A.  
 ?M 05-11:29 Order No. 10460

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