TT 08-010
April 2008

Proper lubricant selection

Tech tip

Lubricant selection depends on a combination of factors: the type of housing, operating temperature, operating speed and any particular requirement of that bearing type. In all cases, the best guide for proper selection of a lubricant is the recommendation of the vehicle's manufacturer.

There are two lubricant types - grease and oil. There are certain guidelines to follow when selecting the right lube for the job. For example, open bearings are only lubricated with a film of oil or light grease to protect them from corrosion before use. They must also be lubricated while running. Sealed and shielded bearings are grease packed from the factory and are sealed for life.

The lubrication used in ball and other bearing types is usually a sodium or lithium based grease or oil.

As a general rule, bearings run the coolest and with the least amount of friction when a minimum amount of the lightest-bodied lubricant that will keep the bearing surfaces apart is used. Use a heavier lubricant only if:

- Operating conditions require it
- The load is too heavy for the lube
- It is specifically called for in the application

Heavy penetration grease will normally increase friction.

TT 08-013
April 2008

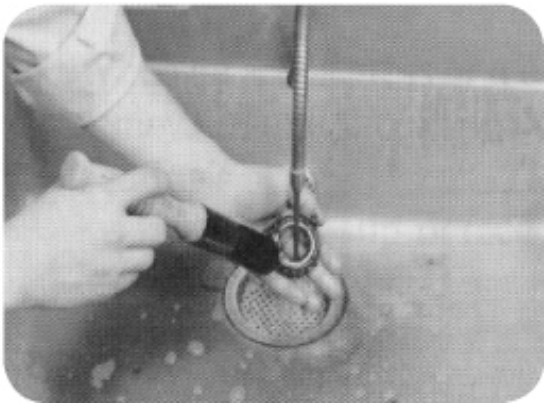
Proper bearing cleaning

Tech tip

Proper bearing cleaning can mean the difference between good performance and bearing failure. While you must always remember to handle any bearing with extreme care, you also must follow specific procedures when cleaning the bearing. If cleaning is done incorrectly, the bearing, shaft or housing may become damaged, creating a more costly repair job.

To begin the cleaning process for your bearings, soak the bearings in a metal basket suspended in a clean container or tank holding a recommended solvent, overnight if possible. If a basket is not available, suspend the bearings with a wire or place them on a metal plate at the bottom of the container. Do not rest the bearings directly on the bottom of the bucket. (They may not clean as efficiently due to sediment on the bottom of the container.)

After dirt and grease are removed, rinse the bearings in another clean bucket of solvent (fig. 1). The bearings should then be thoroughly dried. The safest method is natural air-drying. Compressed air, which is free from condensed moisture, may be used to blow out the bearings, but only after all dirt and chips have been removed (fig. 2). If compressed air is used, do not allow bearings to spin and always wear safety glasses to protect your eyes from injury.

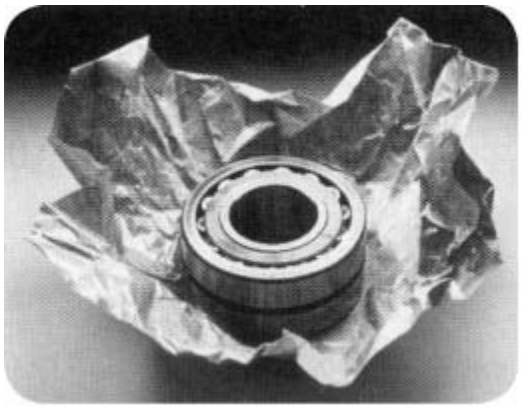


After cleaning, inspect the bearing thoroughly for nicks, leftover dirt and damage. Inspected bearings, which are considered “good” may be used again. However, if re-assembly cannot be done immediately, they should be protected.

Proper bearing cleaning – cont.

Dip the cleaned bearings in a protective lubricant or coat all surfaces with a light grease (fig. 3). Rotate each bearing to work the grease thoroughly in and around the roller and on the races. Then wrap the bearings in waterproof paper and place each in a clean box or carton (fig. 4). If cartons are not available, just wrap them in waterproof paper. Mark the outside of each package to identify the bearing enclosed.

(fig. 3)



(fig. 4)

TT 08-014
April 2008

Avoiding bearing failure

Tech tip

The mileage of vehicles most likely to need wheel bearing replacement is between 80,000 and 118,000 miles. Even so, for maximum safety and reliability, SKF recommends that you inspect the wheel bearings during any brake replacement work regardless of the age of the vehicle.

Most manufacturers recommend lubrication at 24,000 miles for the front wheel bearings on rear wheel drive vehicles. However, many times the bearings are not lubricated until the brakes are replaced, which means that bearings can go almost twice as long as recommended before being re-lubricated.

Always be alert for the early warning signs of worn bearings including any friction noise on wheel rotation or unusual slowness in the turning action of the suspended wheel assembly.

When replacing wheel bearings, SKF recommends that you replace the bearings or hubs on both wheels because both wheels have the same mileage and were subjected to the same wear and road condition. This practice helps assure your customers' safety and helps you avoid costly callbacks.

Whenever brakes are replaced, it's a good practice to check the bearings and replace the seals.

Handle with care. Bearings, despite their rugged construction and solid feel, are actually very sensitive machinery components. They must always be handled with extreme care. Even the smallest mishandling during transport, storage or mounting can damage the internal geometry of the bearing which in turn will result in premature bearing failure and potential damage to other related components.

Dirt is deadly. When working with bearings make sure that the workplace is as clean as possible. Even tiny particles of dirt or grit entering a bearing will damage the bearing internally and inevitably shorten its operating life.

The right tools. An important consideration is the type of tools that are used for removal and installation of the bearings. The right kinds of tools can be one of your best investments, enabling you to do the job better and faster.

Avoiding bearing failure – cont.

Mounting Procedures. Follow the correct mounting procedure. Always consult the car manufacturer's workshop manuals. In particular, mounting force applied incorrectly to parts of the bearing will produce indentations in the bearing raceways, which in turn will lead to early bearing failure. If the bearing or the seal are in any way damaged during mounting, early failure will occur. You will hear noise from the bearing after only a short time on the road.

General Recommendations.

1. Work with clean tools in clean surroundings.
2. Always choose the correct grease.
3. Always be sure to check the contact surface for the seal lip. It must be in good condition. Even the smallest mark or rust will damage the seal lip and allow water penetration and eventual corrosion.
4. Never use a hammer to hit directly on the bearing.
5. Do not try to set clearances on Hub units. They are set at the factory with the correct preload. However, tighten the nut to the correct preload as written in the workshop manual.
6. Do not try to set clearances on "set right" arrangements. These bearings are manufactured so that the bearing will have the correct clearance when the locking nut is tightened to the torque specified in the car's shop manual.
7. Always check the condition of the housing and axle when changing wheel bearings. Even the smallest wear will create misalignment, which will result in early failure.
8. Never take a Hub Unit apart before mounting. The raceways and seals will be damaged and the bearings destroyed. The unit will fail prematurely.
9. Do not try to move or adjust the seal on a hub unit. The seal will be destroyed and water penetration will occur, leading to corrosion and premature failure.

TT 08-015

April 2008

Proper bearing and seal maintenance

Tech tip

For Improved Bearing Performance.

1. Work with clean tools, in clean surroundings.
2. Keep bearings wrapped until ready to install.
3. Pre-lube bearings before installation. The SKF Taper Bearing Packer, BP270 assures a professional job.

4. Keep bearing lubricants clean and in covered containers when not in use.
5. Remove all outside dirt from housing before exposing bearings.
6. Clean the inside of the housing before replacing bearings.
7. Never spin a bearing dry with compressed air.
8. Never hammer directly on a bearing.
9. Never mix old and new bearing parts.

For Improved Seal Performance.

1. Work with clean tools.
2. Pre-lube the seal with the same lubricant being retained.
3. Double-check the seal part number before installation.
4. Inspect the shaft and bore for burrs, nicks or other damage before installing a new seal.
5. Never reuse old seals.
6. Never hammer directly on a seal. The SKF seal drivers, included in the #19 Cabinet assures a professional job.

Water and debris contamination in bearings

TT 09-004
March 2009

Tech tip

The life of a bearing depends to a great extent on the proper lubrication of the bearing. Lubricants aid in carrying away heat, protecting bearing surfaces from corrosion and reducing friction. Statistics show that nearly 50 percent of all bearing damage can be attributed to inadequate lubrication. Although a very broad term, inadequate lubrication can be classified into eight basic categories: 1) overfilling, 2) under filling, 3) incorrect grease, 4) mixing greases, 5) incorrect lubrication systems and intervals, 6) worn-out grease, 7) water contamination, and 8) debris contamination. The following offers a quick reference to two of these eight basic categories: water contamination and debris contamination.

Water contamination

Figure 1 shows the effect of water on grease by comparing fresh grease (left) to a grease emulsified with 30 percent water (right). The fresh grease is smooth and buttery compared to the water laden grease, which is milky white in appearance. As little as 1 percent water in grease can have a significant impact on bearing life.

Figure 1

Figure 2 shows a tapered roller bearing and Figures 3 and 4 show a ball bearing outer race and balls rusting with pitting and corrosion from moisture/water exposure. This condition is referred to as etching.

Figure 2

Figure 3

Figure 4

Water and debris contamination in bearings – cont.

An easy, non-technical method of determining the presence of water in grease is known as the 'crackle test.' To perform this test, place a sample of grease on a piece of aluminum foil (Figure 5) and put a flame under the foil (Figure 6). If the grease melts and lightly smokes, the presence of water is minimal or absent. However, if the grease crackles, sizzles and/or pops, the grease contains a considerable amount of water.
Note: When performing this test, always wear safety glasses or goggles, and wear protective clothing. Ensure adequate ventilation.

Figure 5

Figure 6

Water and debris contamination in bearings – cont.

Debris contamination

Common causes of external debris contamination include dirt, sand and environmental particles. Common causes of internal debris contamination include wear from gears, splines, seals, clutches, brakes, joints and failed or spalled components. These hard particles travel within the lubrication, through the bearing, and eventually bruise (dent) the internal surfaces. The dents form shoulders that act as surface-stress risers, causing premature surface damage and reduced bearing life. Figure 7 shows a debris contamination bruise on a bearing race (photo taken with a microscope) and Figure 8 shows the corresponding surface map of the dent.

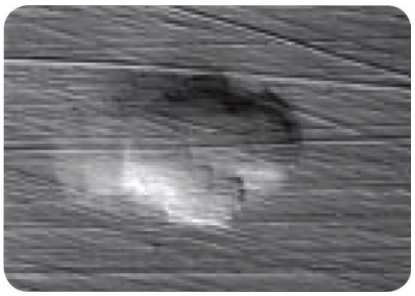


Figure 7

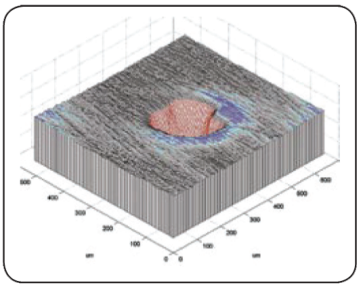


Figure 8

Figure 9 shows a tapered roller bearing inner race (cone) with spalling from debris contamination bruises.

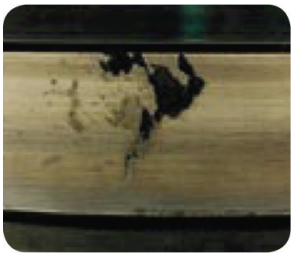


Figure 9

How to find a replacement tapered bearing

Tech tip

There are 3 ways to identify any component part, including bearings.

1) Application
   a. ie: Arvin Meritor 9,000 lb front axle model FD931N uses outer bearings BR3585/BR3525 and can be found in catalog 457601.

Model	Capacity	Line No.
FD931N	9000 lbs.	2
FD931TW	9000 lbs.	2
FD933	9000 lbs.	34
FD961	10000 lbs.	30

Mfr Line Number	Scotseal® PlusXL	Scotseal® Classic	Scotseal® Longlife	Inner (Cone/Cup)	Outer (Cone/Cup)	Grease Seal Location	Grease Seal Number
ArvinMeritor Standard							
1							
Standard Axle		28820		BR45284/ BR45220 ▲SET410	BR2780/ BR2720		
Ford		28820		BR45284/ BR45220 ▲SET410	BR25880/ BR25820	Inner	28828
Navistar		28820		BR45284/ BR45220 ▲SET410	BR2780/ BR2720		
2							
	35058	35066	35103	BR39581/ BR39520	BR3585/ BR3525	Inner	34980

(continued next page)

How to find a replacement tapered bearing-cont.

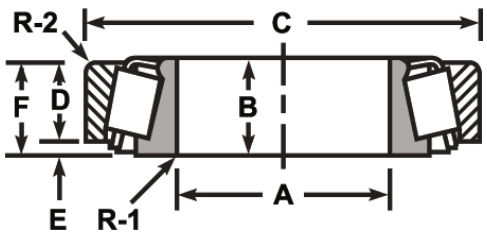
1) Application - continued
   b) Application information for transmissions and differentials may be found in catalog 457604.

Eaton model index

Front axle

34D3	F-34,000	w/ Taper Brg. On Input Shaft	SDK64-FE
34DP	F-34,000	w/ Taper Brg. On Input Shaft	SDK64-FE
34DS	F-34,000	w/ Ribbed Carrier & Taper Brg. On Input Shaft	SDK64-FE
		w/ Conical Carrier & Taper Brg. On Input Shaft	SDK64-FD
34DT	F-34,000	w/ Taper Brg. On Input Shaft	SDK64-FE
38D3	F-38,000	w/ Taper Brg. On Input Shaft	SDK64-FE

2) Size and type
   a. ie: Cone BR3782 has an ID of 1.7500", length of 1.1930", and radius of .1400".
      i. Cup BR3720 has a OD of 3.6718", length of .9375" and radius of .1300".
      ii. The set SET406 has a standout of .2500" and set width of 1.875".
      iii. Catalog 457601 SKF Heavy Duty Bearings and Seals catalog provides dimensional information.



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How to find a replacement tapered bearing-cont.

3) Interchange
   a. SKF uses industry part numbers for bearings. However, a BR prefix is applied to the part number when the number does not include an existing alpha prefix.
      i. ie: BR3720 = 3720
      ii. ie: HM212011 = HM212011
   b. Interchanges may be found in SKF Bearing Interchange catalog 457013.
   c. Scotseal to bearing interchanges may be found in catalog 457601.

Inner Cone/ Cup	Outer Cone/ Cup	Scotseal(s)
BR28995/ BR28920	BR25580/ BR25523	28820
BR33281/ BR33462	BR39585/ BR39520	34387, 35000
	BR3982/ BR3920	34387

Inner Cone/ Cup	Outer Cone/ Cup	Scotseal(s)
BR47686/ BR47620	BR39590/ BR39520	38750
BR47686/ BR47620	BR39585/ BR39520	38780
	BR39590/ BR39520	38750, 38780, 42550

Catalogs 457601, 457604 and 457013.