

Automotive TechTips

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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* helps you install and maintain Timken® bearings, seals and components to take full advantage of their performance and the systems in which they operate. For more information regarding Timken automotive products and services, visit www.timken.com or contact your local Timken distributor.

NEEDLE BEARING INSTALLATION

Installation Procedures for Drawn Cup Needle Roller Bearings

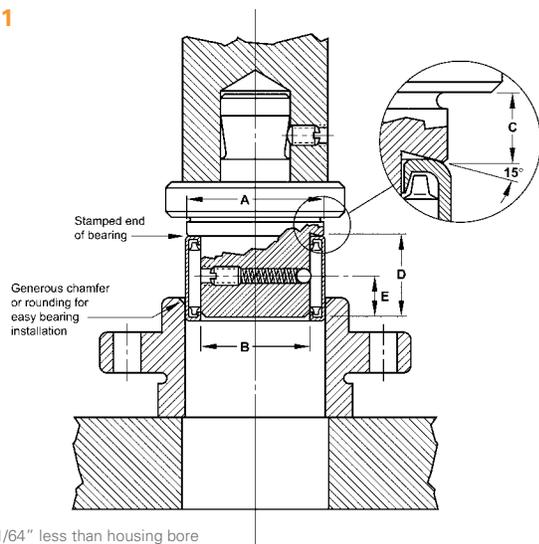


Proper installation is critical if you want a drawn cup needle bearing to perform correctly in an application. Highlighted below are general guidelines that apply when installing a drawn cup needle roller bearing.

- A drawn cup bearing must be pressed into its housing.
 - An installation tool must be used in conjunction with a standard press. The installation tool should:
 - Have a back angle, around 15 degrees, on the shoulder
- used to apply the press force to the bearing outer ring.
- Have a pilot to center and guide the bearing.
 - Have a ball detent on the pilot if the bearing being installed is a full complement type.
 - Be on the same axis as the housing bore.
 - Be made to specific dimensions, based on the equipment manufacturer's recommendations.
- The bearing must not be hammered into its housing even if a proper installation tool is being used.
 - The bearing should not be pressed tightly against a shoulder in the housing. If it is necessary to use a shouldered housing, the depth of the housing bore must be sufficient to ensure that the housing shoulder fillet and shoulder face clear the bearing.

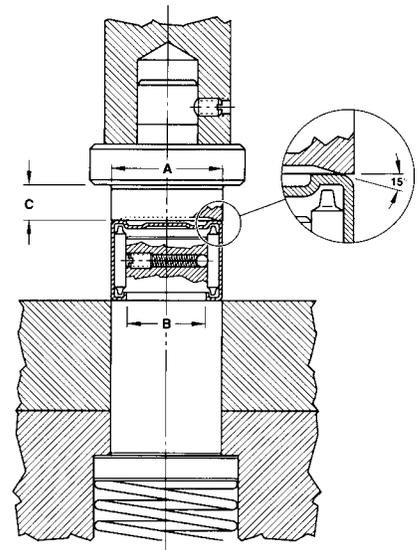
If these guidelines are not followed, the bearing may be damaged during installation.

Fig. 1



- A - 1/64" less than housing bore
- B - 0.003" less than shaft diameter
- C - distance bearing will be inset into housing, minimum of 0.008"
- D - pilot length should be length of bearing less 1/32"
- E - approximately 1/2 D

Fig. 2



- A - 1/64" less than housing bore
- B - 0.003" less than shaft diameter
- C - distance bearing will be inset into housing, minimum of 0.008"

Installation of Open-End Bearings

To install an open-end bearing, use a positive stop on the press tool to properly locate the bearing in the housing. The installation tool should also have a pilot to aid in making the bearing true in the housing from the start. The ball detent shown in Fig. 1 assists in aligning the rollers of a full complement bearing during installation. It also assists in holding the bearing on the installation tool. A caged-type drawn

cup bearing does not require a ball detent to align its rollers, although the ball detent may still be used to hold the bearing on the installation tool. An O-ring also may be used for this purpose. The bearing should be installed with the stamped end – the end with identification markings – against the angled shoulder of the pressing tool.

Installation of Closed-End Bearings

To install a closed-end bearing, a slightly different tool is required. The installation tool combines all the features of the tool used to install open-end bearings, but the pilot is spring loaded and is part of the press bed. The angled shoulder of the pressing tool should bear against the closed end, with the bearing held on the pilot to aid in starting the bearing true in the housing (Fig. 2).

⚠ WARNING Failure to observe the following warning could create a risk of serious injury.

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

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NEEDLE BEARING REMOVAL

Removal Procedures for Drawn Cup Needle Roller Bearings



Removal from a Straight Housing

To remove a bearing from a straight (through bored) housing (Fig. 1), use a tool similar to the installation tool, but one that does not have the stop. Pressure should be applied to the stamped end of the bearing. This will help avoid damage.

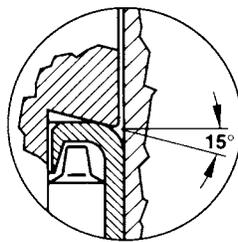
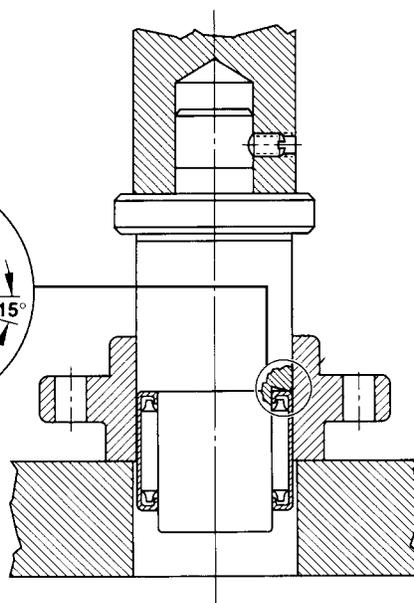


Fig. 1



Removal from a Shouldered or Dead-End Housing with Space between the Bearing and the Housing Shoulder

Bearings may be removed from shouldered or dead-end housings with a common bearing puller tool as shown in Fig. 2. This type of tool is slotted in two places at right angles to form four prongs. The puller prongs are pressed together and inserted into the space between the end of the bearing and the shoulder. The prongs are forced outward by inserting the expansion

Fig. 2

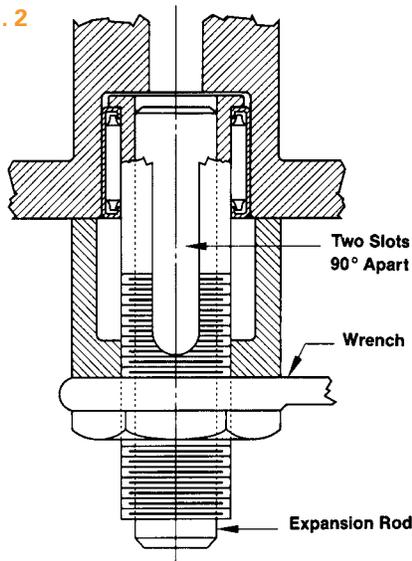
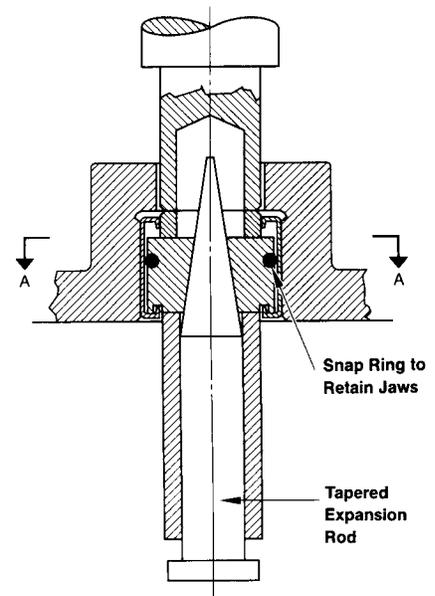
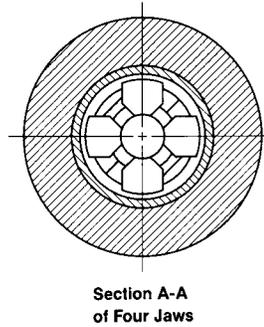


Fig. 3



rod. The bearing is then removed. Do not reuse the bearing after extraction.

In a dead-end housing, you may use a hydraulic puller to remove a bearing. First, fill the bearing with very stiff grease, then insert a close-fitting arbor or shaft about halfway into the bearing. A heavy blow to the end of the shaft will usually push the bearing up a short distance in the housing. Remove the bearing by repeating the process until the desired effect is achieved. Be sure to wrap a safety blanket around the shaft, puller and pulled part

while removing the bearing. Do not reuse the bearing after extraction.

Removal from a Shouldered Housing with Bearing Pressed up close to the Shoulder

The tool shown in Fig. 3 is a similar type to the one used for a shouldered or dead-end housing, but the rollers must be removed first. To remove the rollers from a full complement bearing, break out a piece of the cup lip with a hammer and punch then shake out the rollers or remove them with a

magnetized pick. To remove the rollers from a caged bearing, cut or bend the cage so it can be pulled out to the cup bore, then remove the rollers.

The four-segment puller jaws are collapsed and slipped into the empty cup. The jaws are then forced outward into the cup bore by using the tapered extension rod. The jaws should bear on the lips as near to the top cup bore as possible. The cup is then pressed out from the top. The bearing cannot be reused.

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NEEDLE BEARING INSTALLATION

Guidelines for Proper Installation & Common Types of Damage Resulting from Improper Installation



Proper installation is critical if you want a drawn cup needle bearing to perform correctly in an application. Highlighted below are general guidelines that apply when installing a drawn cup needle roller bearing.

- A drawn cup bearing must be pressed into its housing.
- An installation tool must be used in conjunction with a standard press. The installation tool should:
 - Have a back angle, around 15 degrees, on the shoulder

used to apply the press force to the bearing outer ring.

- Have a pilot to center and guide the bearing.
- Have a ball detent on the pilot if the bearing being installed is a full complement type.
- Be on the same axis as the housing bore.
- Be made to specific dimensions, based on the equipment manufacturer's recommendations.

- The bearing must not be hammered into its housing even if a proper installation tool is being used.

- The bearing should not be pressed tightly against a shoulder in the housing. If it is necessary to use a shouldered housing, the depth of the housing bore must be sufficient to ensure that the housing shoulder fillet and shoulder face clear the bearing.

If these guidelines are not followed, the bearing may be damaged during installation.

Listed below are some common types of installation damage that may occur in needle bearings. These types of damage may occur if the installation guidelines listed on the front of this sheet and the specific recommendations of your equipment suppliers are not followed.

If a bearing is installed with an improper installation tool, such as a hammer and punch or a piece of tubing, the thin-walled cup may become badly damaged, causing the rollers to lock up. Use of a hammer – even with a correct tool – may cause lip damage (Fig. 1).



Fig. 1

If no pilot is used to guide the bearing, the bearing may become tipped or cocked relative to the housing. As the bearing is pressed in, the housing bore corner will crimp the cup outer diameter against the rollers damaging the bearing (Fig. 2). This damage could result in reduced service life, increased operating noise level or lead to other damage.



Fig. 2

The installation tool should have a 15-degree angle on its shoulder. This assures that the press load is delivered in line with the cup wall. A lip on the bearing may collapse, fracture or break during assembly if the proper angle is not used (Fig. 3).



Fig. 3

A ball detent is important when installing a full complement bearing. It forces the rollers apart, gathering circumferential clearance in a single location. This action straightens the rollers within the cup, making them parallel with the bearing axis. If the rollers are cocked or skewed, it is likely that they will lock up when installed, creating the potential for the bearing to burn up during service (Fig. 4).



Fig. 4

When the bearing was installed using a pusher without a ball detent to align the rollers, the rollers locked in place as the cup shrunk during installation. The shaft then spun against the locked rollers.

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