

TIMKEN



GUIDE TO TRACKSIDE
INSPECTION OF
ROLLER BEARINGS

TRACKSIDE INSPECTION OF ROLLER BEARINGS

FOREWORD

Trackside inspections help extend bearing life and improve the reliability of your rolling stock by aiding in the detection of component damage and advanced wear that could lead to overheated or damaged bearings. Timken provides this trackside bearing inspection guide to help you recognize when a journal bearing should be serviced or replaced.

General information from any railroad governing body should take precedence over and supplement this instructional brochure for roller bearings operated under the jurisdiction of that governing body.



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 rolling elements may be forcefully expelled.

JOURNAL ROLLER BEARING INSPECTION

Whenever a vehicle is at a terminal or on a repair track, look the entire truck over for any signs of problems as a result of derailment, collision or other handling damage. Check each bearing for the following:

1. Look for signs of overheating, such as discoloration or parts fused together.



When a wheel set is removed for Association of American Railroads (AAR) "Why Made" Codes 50 or 95 and the adapter is found to be condemnable per rule 37, the adapter must be secured to the wheel set and returned to the wheel shop.

2. Check for loose and/or missing cap screws.



3. Be sure all tabs of the locking plate are properly bent up against the flats of the cap screw heads in the loosening direction.



4. Inspect for damage or wear to the end cap from a displaced adapter.



5. Examine the bearing for welding damage or exposure to extreme heat, such as from a cutting torch. Remove the bearing from service if you find any damage.



- 6.** Check for cracked or broken outer rings (also called bearing cups).



- 7.** Inspect for a loose backing ring. If you can move or rotate the backing ring by hand, remove the bearing from service.



- 8.** Check the backing ring for damage or wear from a displaced adapter.



9. Verify that the bearing assembly size matches the frame and adapter size (for example, a 100-ton bearing in a 100-ton truck).
10. Inspect for loose or damaged seals and remove the bearing from service if you observe any of the following:
 - A. A seal case you can move laterally (back and forth) or rotate using a suitable probe, such as a screwdriver.
Note: Use caution not to contact the rubbing portion of the seal with the probe.



- B. A displaced or cocked seal.



- C. Seal case damage from an external source.



ADAPTER INSPECTION

The adapter fits the bearing to the truck side frame and distributes the load properly to the bearing. The standard freight car narrow adapter shown below is the most common style in service today.

When adapters become worn, they do not distribute the load to the bearing properly. Excessively worn adapters may result in premature bearing damage and reduce bearing life.



Standard freight car narrow adapter

INSPECTING ADAPTERS IN TRUCKS

- 1.** Check to see that the adapter is properly seated on the bearing.
- 2.** Look for cracked, broken, displaced or cocked adapters.
- 3.** Inspect for incorrect adapter size. Seal case or bearing damage can result from using the wrong adapter size.

- 4.** Evaluate the outer ring for abnormal wear patterns. Most bearings will “creep” in service, creating two wear bands as pictured below. This is a normal condition that also causes wear to the adapter’s seat pads.



Normal wear bands

- 5.** Wear bands that extend to the end of the outer ring, as shown on the left side of the image below, indicate an excessively worn adapter seat. A shiny edge at the extreme end of the outer ring, as shown on the right side of the image below, is an indication that the thrust shoulder is worn. Replace the adapter if either of these conditions exist.



Excessive wear bands

6. Check the adapter for excessive crown wear. If the frame or roof liner (if equipped) makes contact with the relief portion of the adapter, the adapter must be replaced.



Acceptable adapter: relief is not in contact with the roof liner

INSPECTING ADAPTERS REMOVED FROM TRUCKS

1. Any time wheelsets are removed from trucks, the adapters should be inspected for damage and checked using the AAR adapter wear gage.

- A. Check the bearing seat pad wear by passing the gage over the entire surface of both bearing seat pads; do not check in only one or two places. Scrap the adapter if it does not have $1/32$ " or greater depth from the bearing seats to the machined reliefs. The edge of the gage must make even contact with the bearing seat pads, as shown in the larger image below. If the bearing seat pads of the adapter are worn to the extent that the toe of the gage prevents the edge from seating, at any point in the adapter, do not return the adapter to service.



Arrows indicate an acceptable space between the toe of the gage and the machined relief of the adapter.

- B.** Look for thrust shoulder wear. If either face of the thrust shoulder is embedded or worn by the outer ring by .025" or more, scrap the adapter.

Use the nub of the AAR adapter wear gage to determine if the bearing outer ring has embedded into the thrust shoulder of the adapter to the condemning limit.

The nub of the gage should contact the thrust shoulder, keeping the flat portion of the gage away from the thrust shoulder face, as shown in the image below.



- C.** Check for adapter body wear by placing the adapter wear gauge against the body surface between the lugs. If there is a visible gap between the adapter and the relief as shown in the image below, the adapter can be returned to service. If the relief makes contact with the body of the adapter, it indicates wear greater than 1/8" and the adapter must be scrapped.



2. Look for uneven or excessive wear on the top of the adapter as shown in the image below. When crowns have worn to the extent that truck frames or roof liners contact the relief portion of the adapter, scrap the adapter.

Adapters suitable for further service that have been used in frames with roof liners should always be used in frames with roof liners in the future.



Adapter with excessive wear

3. Inspect for cracked or broken adapters. Do not attempt to repair adapters by welding or brazing.
4. Replace excessively worn roof liners. All integral-box side frames modified for use with journal roller bearings must have roof liners applied. Concave or vertical wear should not exceed 1/16".

FRAME KEY INSPECTION

Frame keys are used to keep the bearing and adapter in place during operation. Frame keys limit the amount of possible vertical separation between the bearing and adapter during unusual operating situations. Inspect to assure a proper frame key is applied and secure.

Due to the dimensional differences between a standard Class F (6 1/2" x 12") bearing and a standard Class K (6 1/2" x 9") bearing, a standard frame key normally requires a 1/8" shim under the key for Class K (6 1/2 x 9) applications to ensure proper clearance between the key and the cup outside diameter (O.D.) (reference AAR Manual Section H, Standard S-720, latest revision).

Timken recommends using frame keys on all cars.

For Class K bearings, use a 1/8" shim under the frame key to achieve a clearance between the key and the cup O.D. of 1/16" minimum to 3/16" maximum. There should be no contact on the cup O.D. after mounting and securing the key. It should be possible to easily slip a 0.010" minimum "feeler" gauge between the cup O.D. and the frame key after mounting the key and tightening the bolt. If a shim is used, it should be flat and free of any raised metal along the edges.

LET US HELP

Timken engineers are eager to share their expertise with customers to solve current issues in the field or help customers avoid issues in the future.

For more information, contact a local Timken sales or service representative or visit www.timken.com/rail.



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