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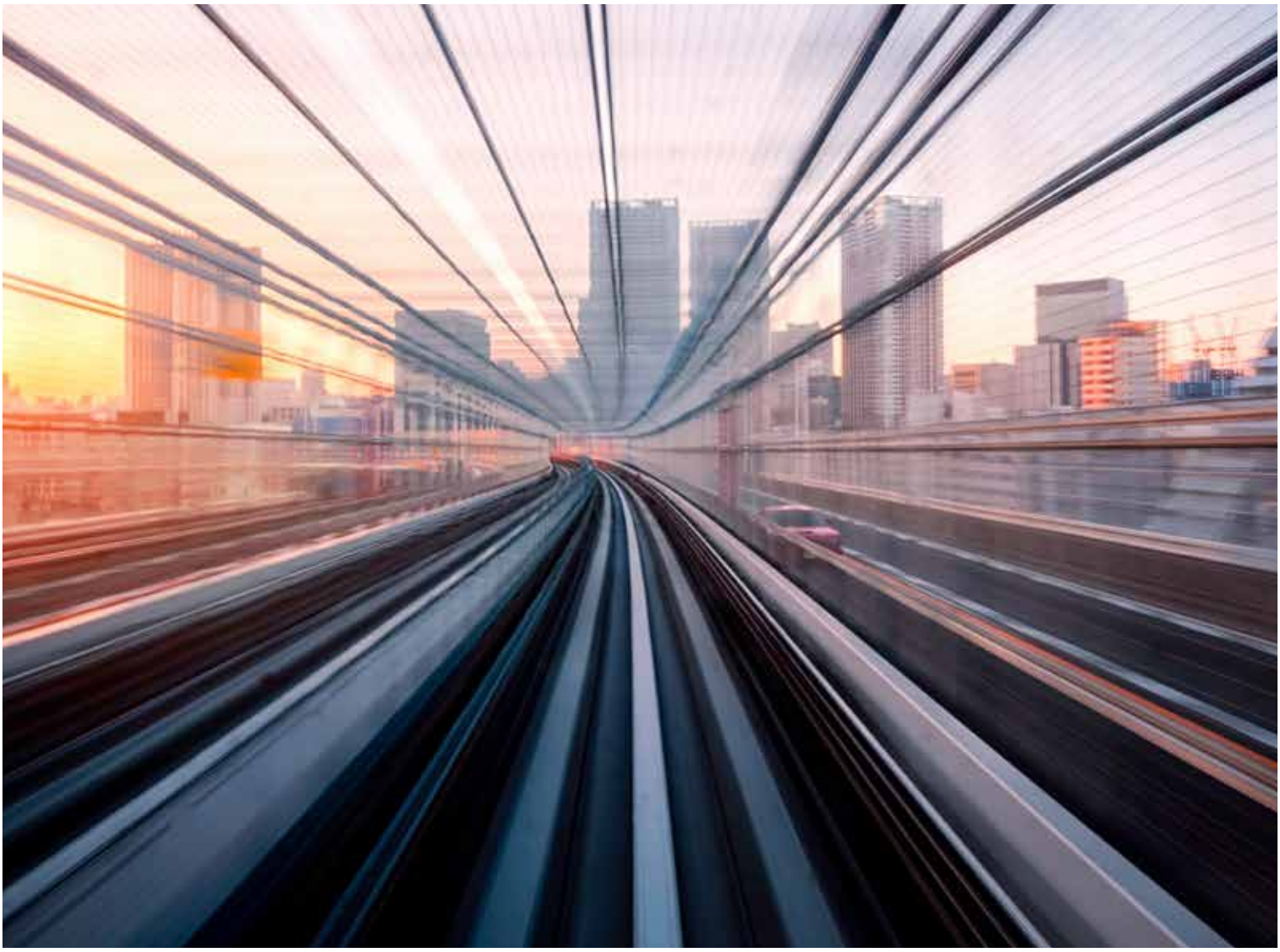

INSTALLING AND MAINTAINING TIMKEN® AP™ AND AP-2™ BEARINGS

INBOARD & OUTBOARD APPLICATIONS

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The instructions in this book represent the recommendations of The Timken Company for the proper care, installation, lubrication and maintenance of Timken® AP™ and AP-2™ bearings applied to locomotives, passenger cars and freight cars.

General information from any railroad governing body, the original equipment manufacturer's (OEM) operating instructions and your company procedures should take precedence over the instructions in this manual.

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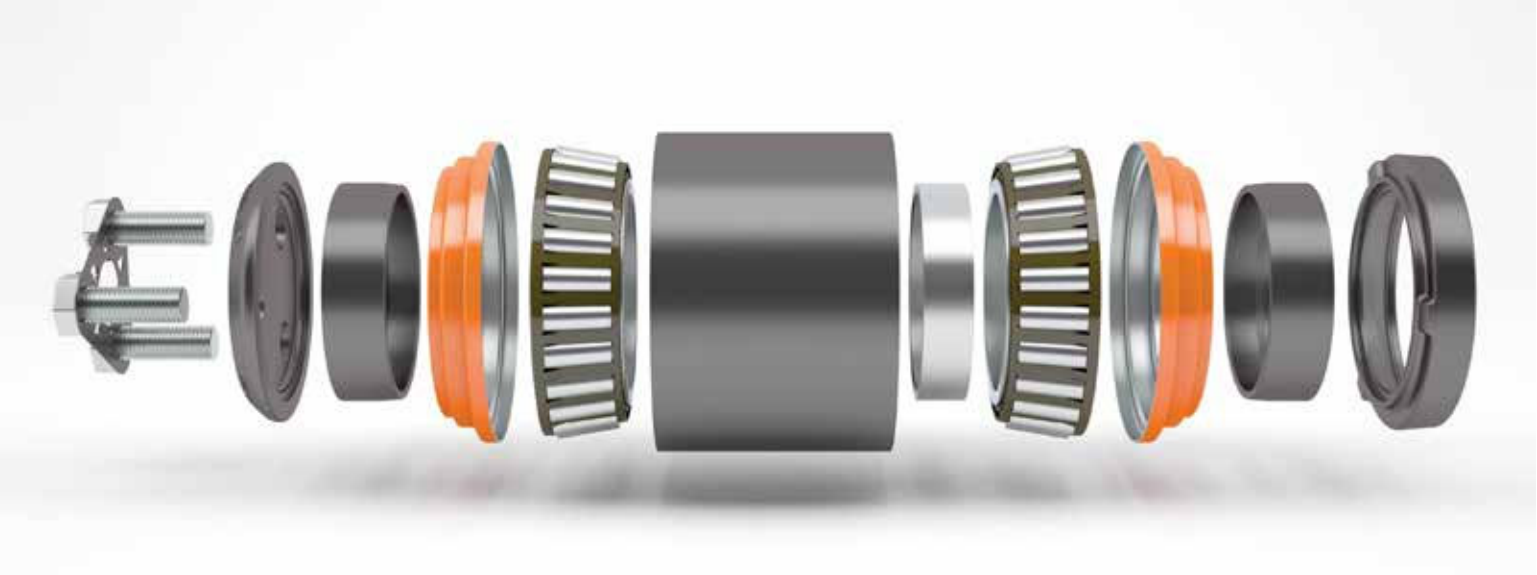
BEARING NOMENCLATURE

AP™ BEARING



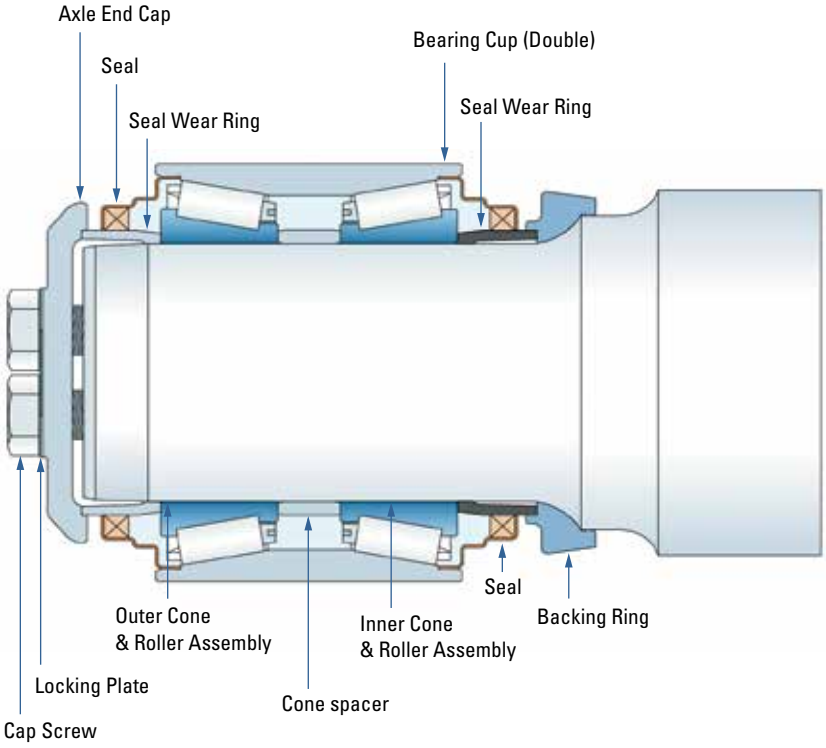


Fig. 1. AP™ bearing.

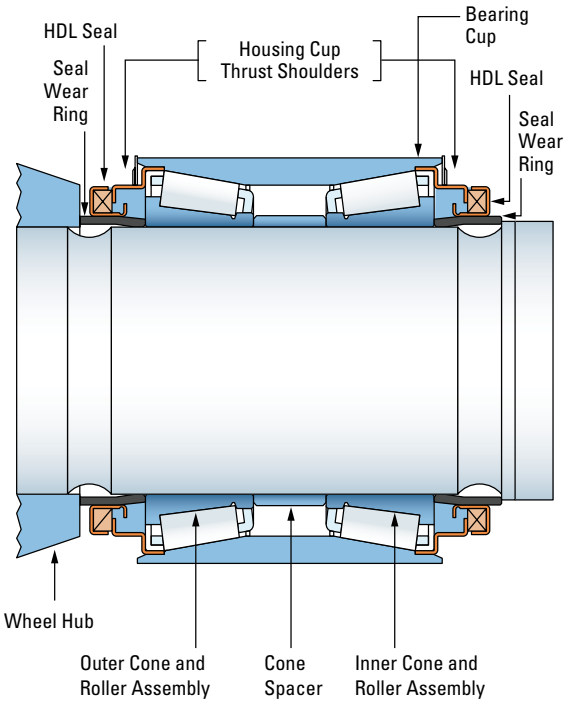
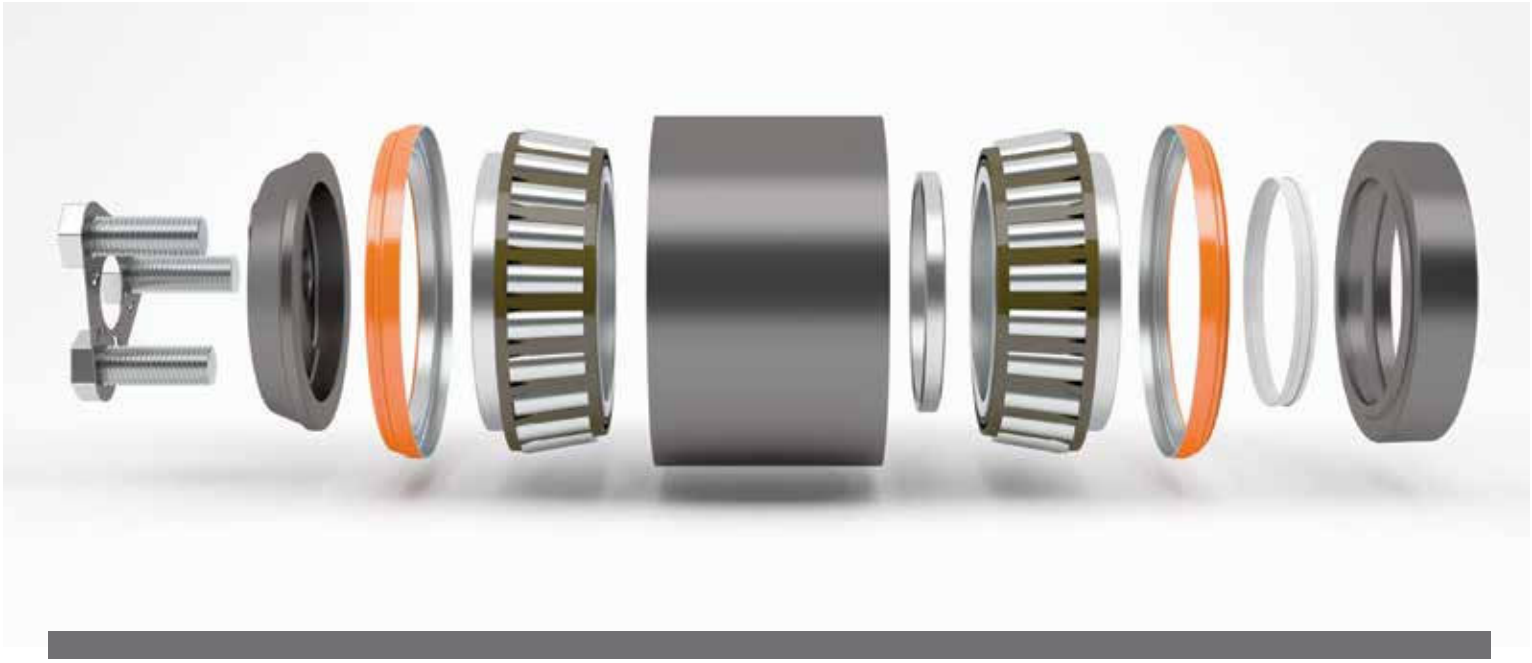


Fig. 2. Typical inboard truck application with HDL seals.

AP-2™ BEARING



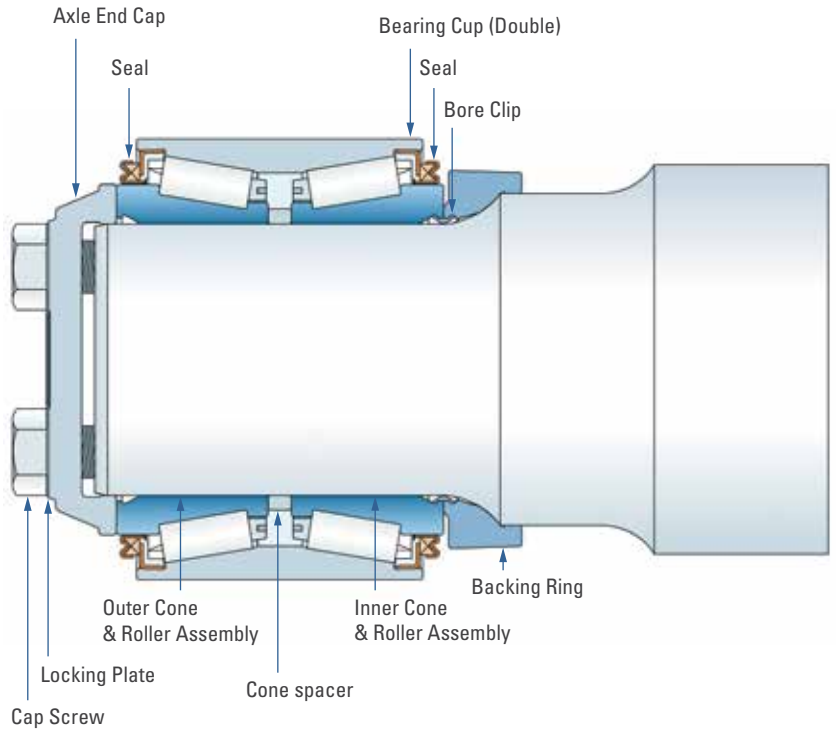


Fig. 3. AP-2™ bearing.

PRE-INSTALLATION INSTRUCTIONS

STORAGE AND HANDLING

Complete all bearing work in a designated area using machines and tools designed for roller bearing installation and removal.

Store bearings in a clean, dry place, protected from moisture and extreme temperatures. Do not remove the bearings from the shipping package or remove the protective wrapping until you are ready to install the bearings.

Do not remove the cardboard insert from the bore of the bearing assembly. This insert holds the cone spacer in alignment with the bearing cones during installation.

The bearing assemblies are shipped with a protective coating of grease over the vent fitting, if so equipped. Care should be taken so that the grease is not wiped off, then the bearings are applied to the axles.

INSPECTING THE AXLE JOURNAL

Before proceeding with the bearing installation, check the axles to make sure that they are fit for service. Axle bearing seat diameters, shoulders and radii should be within tolerance and free of defects as defined by regulatory body or OEM. These defects may include:

- Sharp corners
- Burrs
- Nicks
- Tool marks
- Scratches
- Corrosion
- Upset end/bulging

CAUTION

Failure to follow this caution may result in property damage.

Axle journals should be protected from damage or deformation resulting from mishandling, particularly damage to the axle ends.

Fig. 4. Thermal compensating snap gauge.

Axle bearing seat diameters should be concentric with the wheel seat diameters.

For outboard applications, check the bearing seat diameters, dust guard diameter, shoulders and radii to ensure the finished axle dimensions are within prescribed tolerances to obtain proper fit of the bearing assemblies.

For inboard mounted bearings, axle bearing seat diameters, length over backing shoulders and shoulder diameters should be checked to ensure that finished axle dimensions are within prescribed tolerance to obtain proper mounting of the bearings.

Various instruments can be used to measure bearing seat diameters on axles, including dial or digital snap gauges (fig. 4) and micrometers.

All instruments must be calibrated using a master disc. It is not acceptable to use pin-type standards to calibrate micrometers. Master gauges must be the same temperature as the axle being measured unless appropriate compensation is made for any temperature difference between the master disc and the journal being measured.

When mounting and de-mounting wheels, we recommend using a self-aligning pressure block (axle protection sleeve), similar to that shown in fig. 5, to avoid upsetting the ends of axles and to prevent high spots on the bearing seats that result when uneven pressure is applied to the ends of axles. This can occur when either new or service-worn wheels are applied or removed. Plastic protective sleeves can be used to help avoid damaging the axle end.

Any roller bearing axle found with high spots should be inspected and repaired per user or industry rules related to axles.

Clean all steel chips, dirt and white lead out of the lathe center holes and cap-screw holes in the ends of the axle before applying the bearings. Axles that have become magnetized must be demagnetized before you apply the bearings.

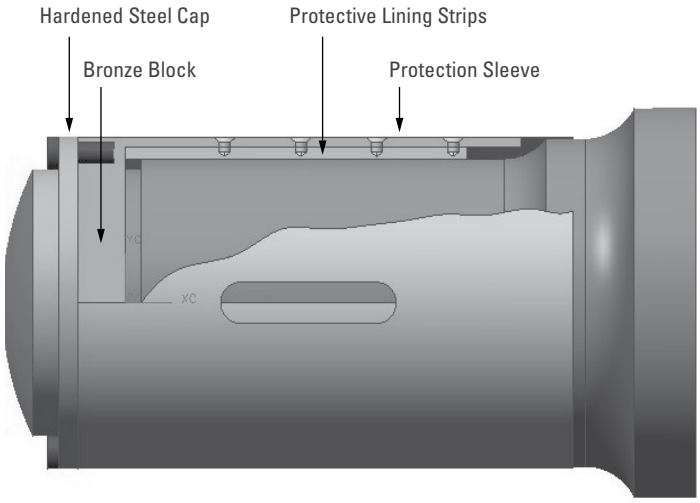


Fig. 5. Axle protection sleeve.

INSTALLING BEARINGS

COMMON INSTALLATION EQUIPMENT

You can install or remove the bearings with a bearing press, wheel press or portable press, depending on the requirements and availability of equipment.

To ensure that bearings are properly seated, bearing or wheel presses should be equipped with relief valves so that the specified pressure can be maintained for a short interval.

INSTALLATION WITH A BEARING OR WHEEL PRESS

Check bearing presses or wheel presses to ensure there is sufficient travel to seat the bearing. Verify press is equipped with a calibrated pressure gauge or load cell to confirm seating force.

You may use double-end bearing presses to apply bearing assemblies to both ends of the axle at the same time.

The figures below illustrate a typical press tool arrangement:

Fig. 6. Separate sleeve method of applying roller bearings to an axle.

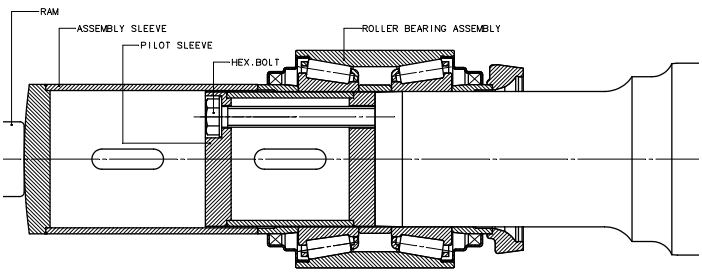
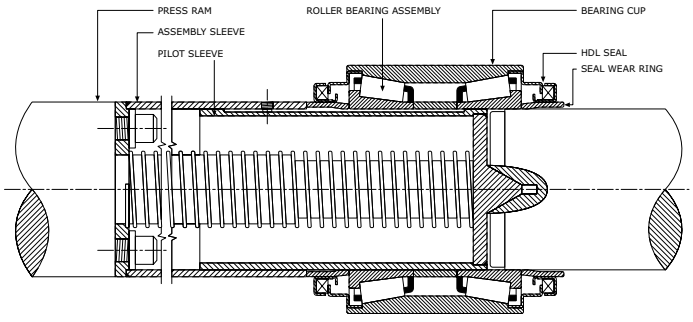


Fig. 7. Telescoping sleeve method of applying roller bearings to an axle.



WARNING

Failure to observe the following warning could create a risk of death or serious injury.

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

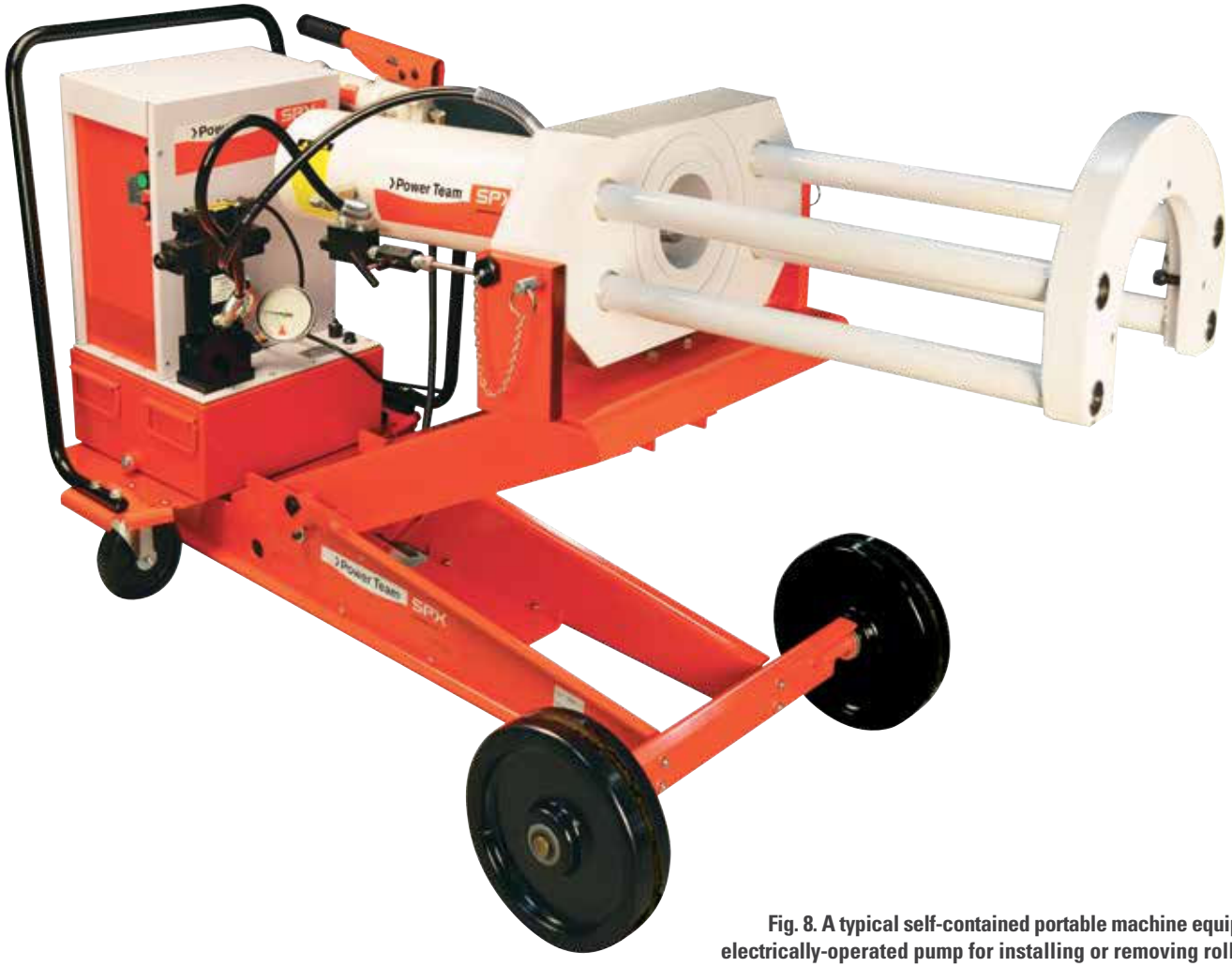


Fig. 8. A typical self-contained portable machine equipped with an electrically-operated pump for installing or removing roller bearings.

INSTALLATION WITH A PORTABLE PRESS

To install and remove bearings you may also use a portable press consisting of:

- Pilot sleeve
- Assembly sleeve
- Pulling shoe for removal
- Reach rods
- Base plate

⚠ WARNING

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

Stresses can be very high in tightly fitted bearing components. Always follow manufacturer's instructions when using presses or bearing pullers to install and remove bearings from shafts, and always use suitable personal protective equipment, including safety glasses.

⚠ WARNING

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

Use of improper bearing fits may cause damage to equipment. Do not use damaged bearings. The use of a damaged bearing can result in equipment damage.

When using large, rigid single- or double-headed bearing presses, take special care to ensure accurate alignment of the axis of the bearing to the axle centerline.

Any misalignment of bearing and/or related ancillary components during fitting to the axle journal can cause damage to the bearing and/or axle journal, and cause a reduction in bearing life and/or bearing failure during service.

APPLYING THE BEARING ASSEMBLIES

Bearing assemblies are shipped pre-assembled and ready to apply.

The temperature of the bearing and the axle should be similar. **Do not heat the bearing cone assemblies to ease installation.**

The amount of press fit of the bearing on the axle is predetermined by the dimensional tolerances of the axle and bearing mounting parts. Neither the bearings nor the axle need to be selected for fit for any given class.

You must use a pilot sleeve to keep the cone spacer in alignment with the bores of the cones and to guide the bearing assembly on the axle. You may fasten the pilot sleeve to the end of the axle or guide it with the lathe center hole in the end of the axle (fig. 6 on page 8).

CAUTION

Failure to follow this caution may result in property damage.

The use of an incorrect size pilot sleeve can damage bearing components during installation.

For outboard mounted bearings, you must apply a thin coating of a lead-free rust-preventing compound to the journal fillet and the portion of the axle between the wheel hub and journal fillet. The coating must be uniform and must be applied within 30 minutes of mounting the bearings on the axle. Coating materials must be maintained at the same consistency during use.

Coat the bearing seats of the axle with castor oil, heavy mineral oil or a molybdenum disulfide and oil mixture. Do not use white lead. Lead compounds may be detrimental to lubricating greases by acting as an oxidation catalyst.

You may use a small lift or other bearing-handling device to handle larger bearing sizes.

When an AP bearing equipped with a seal wear ring is slipped onto the pilot sleeve and the cardboard insert is ejected, use caution to ensure the seal wear ring stays in place.

If a seal wear ring slips out of the assembly, you must insert it into the seal correctly and carefully, keeping alignment with the bearing and rotating the seal wear ring, chamfered end first (highlight in fig. 9), so that the outer lip of the seal does not turn under when the seal lips are expanded over the seal wear ring.

Do not insert any tool or other instrument between the seal element lips and seal wear ring. This may damage the seal element lips or scratch the seal wear ring, causing bearing lubricant leakage.

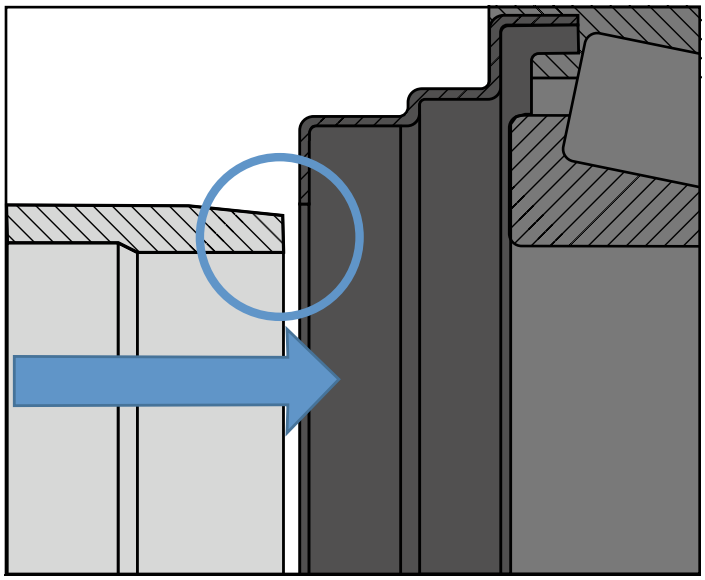
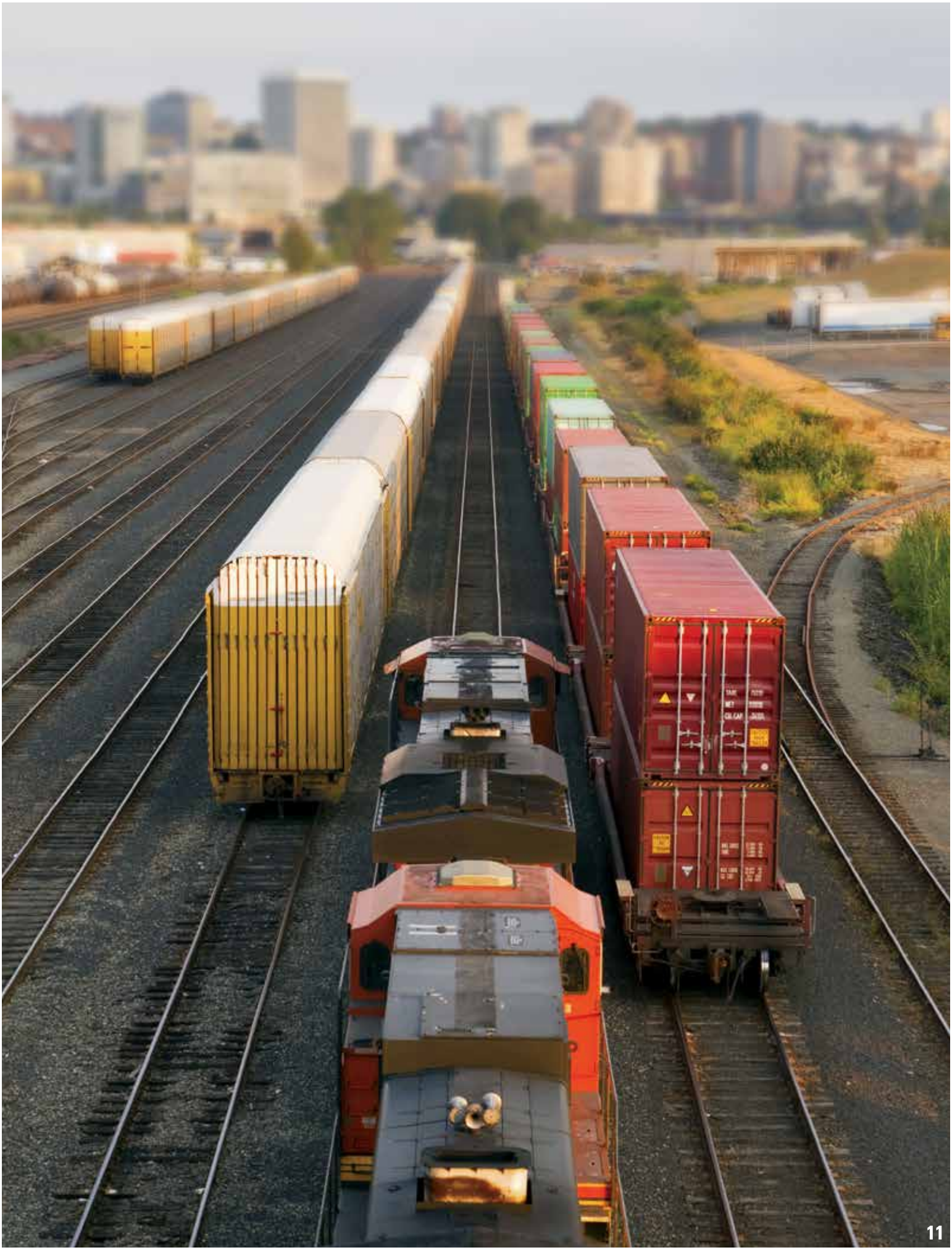


Fig. 9. Refitting seal wear ring to a bearing assembly with an NT™-type seal.



PRESSING THE BEARING ON THE AXLE

1. Use an assembly sleeve, which contacts the seal wear ring outer face on an AP bearing or the cone outer face on an AP-2 bearing and telescopes over the pilot sleeve, to press the bearing on the axle (fig. 6 on page 8).

2. To make sure that the bearing is firmly seated against the axle fillet or axle shoulder, apply the seating tonnage shown in table 1 to the bearings after the surge of the pressure gauge indicates that the bearings have contacted the axle fillet or axle shoulder.

3. Rotate the bearing assembly to make sure that it will turn. New bearing assemblies are preadjusted at the factory, so no adjustment is necessary at installation.

TABLE 1. OUTBOARD BEARING INSTALLATION PRESSURE AND CAP SCREW TORQUE FOR LUBRICATED THREADS

Bearing		Cap Screws		
Class and Size in.	**Seating Tonnage (Short Ton)**	**Size in.**	**Torque N-m**	**Torque Ft-Lbs.**
B (4 1/4 x 8)	30-40	3/4 - 10	155	115
C (5 x 9)	30-40	7/8 - 9	200	145
D (5 1/2 x 10)	45-55	7/8 - 9	220	160
E (6 x 11)	45-55	1 - 8	395	290
F (6 1/2 x 12)	45-55	3/4 - 10 High Strength	285	210
F (6 1/2 x 12)	45-55	1 1/8 - 7	570	420
G (7 x 12) GG (6 1/2 x 12)[2] GG (6 7/8 x 12)[2] Short G "AP" AP-2 G	60-70	1 1/4 - 7 7/8 - 9 High Strength 7/8 - 9 High Strength 1 1/4 - 7 1 1/4 - 7	665 430 430 665 665	490 315 315 490 490
K (6 1/2 x 9)	45-55	1 1/8 - 7	570	420
L (6 x 8)	45-55	1 - 8	395	290
M (7 x 9)	60-70	1 1/8 - 7	570	420

Contact your Timken Representative if your bearing is not listed.

[1]Torque wrench must be accurate within ± 4 percent.
[2]Bearing lateral maximum value is 0.015.

TABLE 2. SUGGESTED INBOARD BEARING AND WHEEL SEATING TONNAGES

Bearing	Seating Tonnage
Class	**Short Ton**
D	20 min. – 35 max.
D – Short Cup	20 min. – 35 max.
E	25 min. – 40 max.
E – Short Cup	25 min. – 40 max.
F	35 min. – 50 max.
F – Short Cup	35 min. – 50 max.

Fig. 10. If cap screw head is centered on a locking plate tab, see figures 11 and 12 below.

Fig. 11. Shows INCORRECT position. This position will not resist loosening (the arrow indicates loosening direction of the cap screw).

Fig. 12. Correct position of tab against cap screw head flat. This position helps resist loosening of the cap screw (the arrow indicates loosening direction of the cap screw.).

OUTBOARD APPLICATIONS: APPLYING THE AXLE END CAP

1. Apply a small amount of oil to the threads of the cap screws.

2. Apply the axle end cap, locking plate and cap screws to the end of the axle as a single unit.

3. Tighten the cap screws to less than prescribed values with a ratchet wrench or impact wrench.

4. Finish tightening the cap screws to the prescribed torque value using a calibrated torquing device. Use a slow, steady, even force and retorque the cap screws in sequence until you detect no further movement of the cap screws.

5. If you detect movement after five sequential "retorquings," you need to remove the bearing.

6. Lock the cap screws by bending all tabs of the locking plate flat against the sides of the cap screw heads. Do not tighten or loosen a cap screw after the specified torque has been obtained.

7. A cap screw tightened to the specified torque may have a corner of the cap screw head centered on one of the locking plate tabs (fig.10). If this occurs, bend the tab flat against the cap screw head (fig. 12) so that the tab will resist the cap screw from loosening. If you bend the tab on the other side of the cap screw as shown in fig. 11, it will not resist the cap screw from loosening.

OUTBOARD APPLICATIONS: APPLYING PLUGS AND LUBRICANT FITTINGS (IF EQUIPPED)

If your end cap is equipped with plugs and lubricant fittings:

1. After the axle end cap is applied and the locking plate tabs have been bent up against the cap screw heads, place the plug locking plate on the 2 7/8 in. plug.
2. Apply the plug by hand, making sure that the plug locking plate is not binding. Tighten the plug with a torque wrench to the torque shown in table 3. Do not back off the plug to obtain locking plate tab alignment with the flats on the plug. A slightly higher torque is acceptable if necessary.
3. Bend the tabs of the plug locking plate up against at least two of the flats on the plug.
4. Drive down the two tabs that are along the side of the axle end cap triangle, so they are tight against the side of the triangle to prevent the plug locking plate from turning. If you need additional installation assistance, contact a Timken engineer.

TABLE 3. TIGHTENING TORQUE FOR PLUGS AND LUBRICANT FITTINGS

National Pipe Thread (NPT)
National Extra Fine Thread (NEF)
National (N)

Size in.	Torque N·m	Torque Ft.-Lbs.
Lubricant Fittings or Pipe Plugs		
3/8 - 18 NPT	40-55	30-40
1/2 - 14 NPT	55-70	40-50
Plugs		
1 1/2 - 18 NEF	125-150	90-110
1 3/4 - 16 NEF	170-205	125-150
2 7/8 - 16 N	340-375	250-275

Fig. 13. Checking mounted lateral.

Fig. 14. The bearing lateral endplay should be 0.001 in. to 0.015 in. (Amtrak 0.001 in. to 0.020 in.).

CHECKING MOUNTED LATERAL

Contact your Timken engineer to identify the required mounted lateral value for your application.

Measure the bearing mounted lateral play by using a dial indicator mounted on a magnetic base. Place the magnetic base on the axle end cap and the indicator tip on the face of the cup edge.

Oscillate the cup slightly while forcing the cup toward the wheel hub and note the value on the dial indicator. Pull the cup away from the wheel hub while oscillating. The travel of the dial indicator needle is the mounted lateral of the bearing.

The bearing lateral endplay (fig. 14), as indicated by the dial indicator, should be 0.001 in. to 0.015 in. (Amtrak 0.001 in. to 0.020 in.). If a bearing rotates freely by hand, but measures less than 0.001 in. lateral on the dial indicator, the application is satisfactory for service. If the bearing endplay does not meet these requirements, remove the bearing assembly and contact a Timken engineer.

SPECIAL HANDLING INSTRUCTIONS FOR VENTED OR LUBE-FITTED APPLICATIONS

Timken AP and AP-2 bearings are prelubricated at the factory. Most bearings do not require field lubrication and are designed as non-field lubricated (NFL) bearings.

Some bearings operating under specialized equipment may require additional lubricant. If field lubrication is required, consult your Timken representative.

REMOVING BEARINGS

GENERAL

Bearings are normally removed from the axle journal only when wheel sets are removed from service. Bearings that have been removed from service should be sent to Timken for reconditioning or remanufacturing.

OUTBOARD – END CAP REMOVAL

If outboard bearings are to be removed, you must use a suitable shoe to make contact between the wheel hub and the backing ring.

1. Bend the tabs of the cap screw locking plate away from the heads of the cap screws.

2. Remove the cap screws, locking plate and axle end cap. You may have to tap the end cap lightly for removal.

INBOARD – WHEEL AND HOUSING REMOVAL

Wheels must be removed from the axles before removing the bearings. DO NOT press the bearings and the wheels off the axle at the same time. It requires approximately 250 tons of pressure to break the wheel fit. Damaged bearing parts would result if subjected to these extremely high pressures.

Frame adapters or housings with outer cup thrust shoulders should be removed prior to removing the bearing assemblies from the axles.

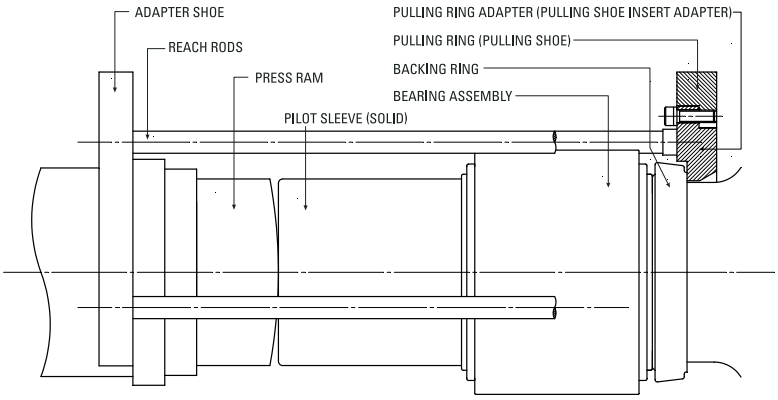


Fig. 15. Fixture for removing a bearing with a bearing press or wheel press.

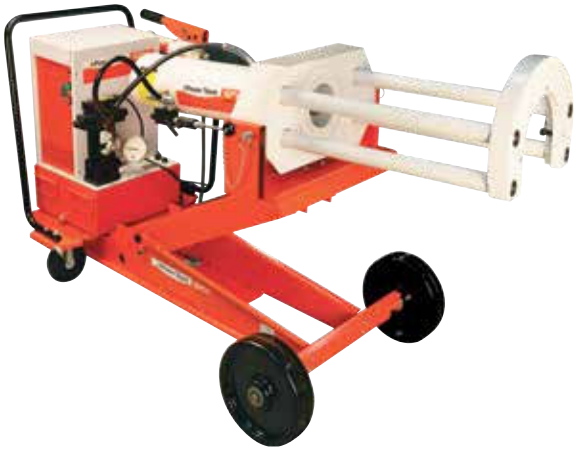


Fig. 16. A self-contained portable machine equipped with a pump for installing and removing bearings.

REMOVAL WITH A BEARING PRESS (PORTABLE OR FIXED)

To remove bearings, a press capable of 70-100 tons is required (fig. 16). 40-60 tons of pressure is normally required to break the bearing fit.

1. If you are using a portable press, tighten the guide tube against the ram head so the pressure required to remove the bearing will not shear or bend the connector pin.

The equipment required for removing a bearing with a bearing press is shown in fig. 16.

Due to limited conditions on some applications and limited contact areas on the bearings, pulling shoes for inboard applications are custom-designed.

Fig. 17. Ensure the pulling shoe adapter is securely seated inside the pulling shoe.

2. Position the pulling shoe insert adapter behind the backing ring and hold in position until the initial pressure has been applied to ensure proper contact with the backing ring. The pulling shoe contact surface of the backing ring is very narrow, so be sure the shoe insert is fully seated. This will ensure proper contact with the backing ring and prevent distorting or bending of the backing ring.

Refer to fig. 15 to see how the pulling shoe fits behind the backing ring.

Make sure that the pulling shoe adapter is the correct size for the bearing to be removed and all three bolts are tight (fig. 17). Proper contact with the backing ring and puller alignment is necessary for safe bearing removal.

3. Extend the ram to remove the bearing from the axle.

4. After removing the assembly from the pilot sleeve, the best practice is to center the spacer. Be careful not to drop the bearing when removing it from the pilot sleeve.

⚠ WARNING

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

Tensile stresses can be very high in tightly fitted bearing components. Attempting to remove such components by cutting the cone (inner race) may result in a sudden shattering of the component, causing fragments of metal to be forcefully expelled.

Stresses can be very high in tightly fitted bearing components. Always follow manufacturer's instructions when using presses or bearing pullers to install and remove bearings from shafts, and always use suitable personal protective equipment, including safety glasses.

BEARING HANDLING INSTRUCTIONS DURING TRUCK (BOGIE) ASSEMBLY AND DISASSEMBLY

Locomotive and Passenger Car (Wagon) Applications

GENERAL

Maintain trucks in good operating condition to obtain efficient roller bearing performance. Replace worn or defective parts immediately.

Follow standard procedure when assembling and disassembling trucks. Use care when handling truck frames to avoid striking and damaging the bearings with the truck frames.

Bearing housings or frame adapters are used to adapt bearing assemblies to truck frames of locomotives and passenger cars. Bearing housings and frame adapters are available for various designs of truck suspensions.

TRUCK ASSEMBLY

Bearing housing bores, adapter bearing seats and the outside surfaces of bearing cups must be clean and free of dirt and corrosion.

When applying full-bore bearing housings to bearing assemblies, apply an anti-seizure paste. This will help facilitate the fitting of the housing.

Position the housing or adapter on the bearing. A best practice is to have a new load zone at the top.

Make sure that the bearing housings or adapters are properly seated on the bearing assemblies.

Refer to the manufacturer's truck assembly instructions.

CAUTION

Failure to follow this caution may result in property damage.

When handling axle assemblies with bearing housings on the bearings, care should be exercised to prevent the components from becoming dislodged.

TRUCK DISASSEMBLY

Truck frames must not strike the roller bearings when the frames are removed from wheel and axle assemblies.

Remove the housings or adapters and clean the outside surface of the bearings. Sandblast or shotblast cleaning of roller-bearing-equipped axle assemblies is not recommended.

The outside surface of the bearing cup should be marked to indicate a new load zone to initiate a new wear surface in the bearing cup when the housing or adapter is applied to the bearing.

Adapters or housings should be cleaned and inspected for excessive wear. Adapters or housings worn to the extent that proper load distribution of the bearing is affected should be repaired or replaced.

Rotate the bearing assemblies to detect any abnormal condition and visually check the outside of the bearing assembly for broken, loose or missing parts.

Check the bearing running lateral play with a dial indicator mounted on a magnetic base. While oscillating the bearing, force the bearing cup laterally toward the wheel hub then pull the cup away from the wheel hub. Place the magnetic base on the outside surface of the bearing cup and the stem of the indicator against a surface near the center of the bearing.

If the bearing lateral play is 0.030 in. or more, or if any roughness is detected when the bearing is rotated, the bearing assembly should be removed from the axle.

Whenever the bearing assemblies are removed from the axle, the bearings should be sent to a Timken-authorized bearing reconditioning facility.

BEARING HANDLING INSTRUCTIONS DURING TRUCK ASSEMBLY AND DISASSEMBLY

Freight Car Applications

GENERAL

Be careful when applying or removing truck frames to prevent damage to the bearings caused by striking the bearings with the truck frames.

After the truck frames have been removed from the wheel and axle assemblies, remove the adapters from the bearings for cleaning and inspection.

Inspect and repair truck frames, bolsters and other truck parts before reassembling the trucks. Excessively worn frame roofs also must be repaired.

Fig. 18. Narrow frame adapter.

Fig. 19. Wide frame adapter.

When assembling a three-piece truck, be sure that frames are matched. Mismatched side frames are detrimental to roller bearing performance.

The bearing seats of adapters and the outside surfaces of bearing cups must be free of dirt or other foreign matter that may prevent the adapters from seating properly on the bearings. It is not necessary to remove the coating of rust preventive from the machined surface of the adapters before the adapters are applied to the bearings.

Ensure wheel sets and side frames are matched by size and/or class. Mismatched components will be detrimental to roller bearing performance.

TRUCK ASSEMBLY

Selecting the Correct Frame Adapter

Frame adapters are used to fit bearing assemblies to various types and sizes of truck frames. The most popular kinds are narrow, wide and composite adapters.

Similar frame adapters are available or may be designed to adapt the bearing to all types of trucks.

Frame Key Recommendations

Timken recommends using frame keys on all cars. Frame keys keep the bearing and adapter in place during operation and limit the amount of possible vertical separation between the bearing and adapter during unusual operating situations.

The target clearance between the key and cup OD should be $^{1}/_{16}$ in. to $^{3}/_{16}$ in.

TRUCK DISASSEMBLY

When disassembling a truck, use the opportunity to inspect the roller bearings and associated parts as outlined in the service inspection section (page 19).

CAUTION

Failure to follow this caution may result in property damage.

When performing any electric welding on cars or wheel and axle assemblies, clamp the ground cable to or near the part being welded so that no current will pass through the bearings. At no time should the ground wire be attached to the bearing. Failure to comply can result in damage to the bearing.

GUIDELINES FOR BEARINGS IN SERVICE

SERVICE INSPECTION RECOMMENDATIONS

Whenever equipment is on a repair track, at a terminal or in the shop, visually inspect the roller bearings for:

- Overheating
- Excessive lubrication leakage
- Broken, loose or missing parts such as backing rings, cap screws, control devices, plugs, seals, cups, end caps, housings or adapters

Also examine the housings or adapters for proper seating on the bearing and for excessive wear. Repair or replace defective parts before returning the equipment to service.

CHECK BEARING RUNNING TEMPERATURE

Running temperatures up to 100° F (37.7° C) above ambient are expected under normal operating conditions.

Various types of electronic thermal scanners are used to check temperatures during operation. Follow the manufacturer's instructions when using these devices to measure the bearing temperature.

If you identify an overheated bearing in an outboard application, it should be removed from service.

For inboard applications, 200° F (93.3° C) heat-indicating crayons or a pyrometer can be used to check bearing temperatures after electronic detectors have shown indicators of an overheated bearing. The cup outside diameter or face of the housing or adapter should be used for heat indication.

If an overheated bearing is found, follow the instructions of the railroad governing body or the appropriate guidelines.

LUBRICANT CONTAMINATION

Lubricant containing water is destructive to roller bearings, causing rapid wear. Take all possible precautions to prevent water from entering the bearing assembly. If the equipment is submerged or operated in water deep enough that water could have entered the bearings, remove the bearing assemblies from the axles and send them to Timken for reconditioning.

Drain pipes or holes in cars must be located so that drainage will not be directed at the bearing assemblies.

LOOSE SEALS

If a seal can be moved using a suitable probe, the bearing must be removed from the axle for inspection and repair.

GREASE LEAKAGE

A small amount of grease leakage around the seals may be expected during the initial run-in period. This leakage will reduce to normal "weeping" after this period.

When a bearing is found that appears to be leaking excessively, check for loose seals.

Subsequent inspections will determine if further attention is required.

INSPECT FOR DISPLACED ADAPTERS

An adapter out of position causes a load concentration on the bearing that may result in serious bearing damage while in service.

If, for any reason, the truck frames are raised to the extent that the adapters could disengage from the bearings, inspect each assembly to make sure the adapters are properly seated on the bearings. This should not occur if frame keys are used and properly applied.

ACCIDENTAL DAMAGE

Bearings involved in derailment or collision, or subject to damage by fire, floods or other causes, must be removed from the axles and sent to Timken for reconditioning or remanufacturing.

After removing the bearings, check all axles for bending using an axle lathe or other suitable equipment. A bent axle will cause premature bearing damage due to the oscillating movement and uneven load distribution in the bearing.

Inspect bearing housings or adapters for distortion or other damage before returning them to service. If a damaged adapter or housing is returned to service, it could cause damage to the replacement bearing due to uneven concentration of load.

Also, inspect truck frames to ensure that they are not bent or distorted. Bent or distorted truck frames will create undesirable loads on the bearings, which can cause premature bearing damage.

For detailed information on bearing inspection, contact your Timken engineer.

NOTE

To avoid damaging the bearing when cleaning the exterior of equipment, the water stream should not be directed at the bearing seals.

If sandblast or shotblast cleaning the vehicle, a shield should be used to protect both the front and rear of the bearing assemblies from sand or shot.

SHOP PRACTICES

INSTRUCTIONS DURING WHEEL TURNING

You can use wheel-turning lathes, wheel-truing machines or underfloor lathes to turn wheels. Use heavy grease to lubricate the lathe centers. Do not use white lead.

When removing wheel and axle assemblies from the truck for wheel turning, inspect the bearing assemblies as described in the service inspection recommendations section (page 19).

If the lathe centers of the axles are accessible by removing the plug in the end caps, do not remove the end caps.

If the end caps are removed:

1. Protect the bearings and cavities between seal wear ring and journal to ensure no ingress of dirt, swarf or other contaminants.
2. On completion of work, ensure there are no contaminants on the axle face and seal wear ring, where fitted. Clean out the cap screws.
3. Reapply the end caps using new locking plates.
4. Torque the cap screws in accordance with installation instructions on page 13. If the end caps were not removed, reapply the plugs and tighten to the specified torque (table 3) on page 14. Use a new locking plate or lock wire as required.

⚠ WARNING

Failure to observe the following warning could create a risk of death or serious injury.

Remove heat indicators if fitted during cleaning, welding or other operations that may subject the heat indicators to higher than normal temperatures.

CAUTION

Failure to follow these cautions may result in property damage.

Where underfloor wheel lathes are used, do not move rolling stock without the end caps in place. The best practice is to use special axle end caps with center access holes during machining. Failure to comply can result in reduced bearing life.

WHEELS

WHEEL TURNING

1. Wheel-turning lathes or wheel-truing machines may be used for turning wheels.

2. Protective caps, O-rings or other suitable wrapping should be used to prevent steel chips from entering the bearing or damaging the seals.

3. Heavy grease must be used to lubricate the lathe centers. Do not use white lead.

OUTBOARD APPLICATIONS

Wheel Turning

If the lathe centers of the axles are accessible by removing the plug in the end cap, do not remove the end caps.

If the end caps are removed:

1. Protect the bearings and cavities between seal wear ring and journal to ensure no ingress of dirt, swarf, or other contaminants.

2. On completion of work, ensure there are no contaminants on the axle face and seal wear rings, where fitted. Clean out the cap screws.

3. Reapply the end caps using new locking plates.

4. Torque the cap screws in accordance with installation instructions on page 13. If the end caps were not removed, reapply the plugs and tighten to the specified torque (table 3) on page 14. Use a new locking plate or lock wire as required.

Wheel Removal

1. Prior to removing the wheels, remove the bearings from the journal.

2. Return the bearing assembly to Timken.

INBOARD APPLICATIONS

Wheel Turning

Protective caps, O-rings or other suitable wrapping should be used to prevent steel chips from entering the bearing or damaging the seals.

Wheel Renewal

When worn or defective wheels are removed from wheel and axle assemblies, the roller bearings may be removed separately using portable fixtures. Do not press the bearings and wheels off the axle at the same time. It requires approximately 250 tons of pressure to break the wheel fit. Damaged bearing parts would result if subjected to these extremely high pressures.

Applying the Wheels

1. The face of the wheel hub must be machined square with the wheel bore to seat against the bearing assembly.

2. The tolerance on a standard dimension from the wheel rim to the wheel hub face must be predetermined so that the total variation between the wheel rim faces, including the tolerances of the bearing assemblies, mounting parts and axle, will fall within the specified wheel mounting gauge.

3. Install the frame adapters or housings on the bearings. Bolt the stop block assemblies to the frame adapters prior to applying the wheels.

4. The use of an excessive amount of white lead and oil as a press fit lubricant for pressing wheels on the axle must be avoided to prevent the white lead and oil mixture from getting into the bearings.

5. The wheel should be pressed on the axles slowly and carefully to avoid excessive pressure against the bearing assemblies. An accurate pressure gauge on the press is essential. When the pressure gauge indicates that the wheel hub has made contact with the bearing, allow the press pressure to increase or "spike" to make sure that the wheel is seated against the outboard seal wear ring or the outer enclosure sleeve. The pressure increase should not exceed the tonnages listed in table 2. Make sure the bearing and wheel are properly seated by attempting to insert a 0.002 in. feeler gauge between the axle shoulder and inner enclosure sleeve or seal wear ring, and between the wheel hub and outer enclosure sleeve or seal wear ring.

STORAGE PROCEDURES

Always handle bearings with care. Damage may result if the bearings are permitted to strike other objects.

Do not remove new bearings or components from the shipping package or remove the protective wrapping until you are ready to install the bearings. When removing new bearing parts from storage, do not clean the protective coating of lubricant.

Store unmounted roller bearings in an area that is clean and free from moisture. Periodically inspect stored roller bearings and correct any undesired condition immediately. Stored roller bearing assemblies that have been subjected to moisture must be sent to Timken for reconditioning.

Car wheel and axle assemblies equipped with roller bearings may be stored on a single storage track, overlapped as shown in fig. 20, to conserve storage space. With this storage track arrangement, the flanges of the wheels will not contact either the bearing or axle bodies of adjacent wheel and axle assemblies. Wheel and axle assemblies with roller bearings applied should not be stored on double track used for the storage of plain bearing axles with wheels mounted (as shown in the AAR Wheel and Axle Manual).

When these assemblies are not stored on a track, the wheels should be flange-to-flange, not overlapped.

Cars, coaches and locomotives equipped with roller bearings that remain stationary should be moved one car length every six months to distribute lubricant over the bearing surfaces. When cars and locomotives with roller bearings applied are placed in storage, the brakes should be set or the wheels chocked to prevent the equipment from moving. If the equipment is submerged in water deep enough that it could have entered the bearings, send the bearings to Timken for reconditioning.

Roller bearings placed in storage, whether new or used, should be returned to service in the order in which they were stored, oldest stock first.

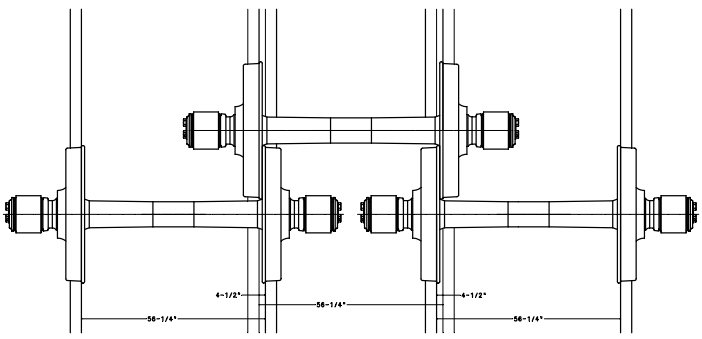


Fig. 20. Recommended storage spacing dimensions for shipping passenger car wheel and axle assemblies with bearings applied.

SHIPPING RECOMMENDATIONS

BEARINGS AND COMPONENT PARTS

When shipping bearings and component parts, you must protect them from dirt, dust, moisture and the possibility of damage.

Ship new bearings and component parts in their original shipping packages. Bearings and components that have had previous service should be wrapped in oil paper or other suitable protective wrapping and packed in sturdy cartons for shipment.

New or used seals held in storage, typically used for inboard bearings, must be kept covered to protect them from dust or other possible damage until they are installed in a bearing.

WHEEL AND AXLE ASSEMBLIES EQUIPPED WITH BEARINGS

When shipping wheel and axle assemblies equipped with bearings by rail, the wheel car should be equipped with a wheel rack that prevents objects or other wheel and axle assemblies from striking the bearings.

Certain wheel racks for plain bearing axles cannot be used because the wheel flange of adjacent wheel and axle assemblies will contact and damage the bearing. To provide and verify clearance between the wheel flanges and the bearing assemblies, use the wheel spacing dimensions shown in fig. 20 on page 22.

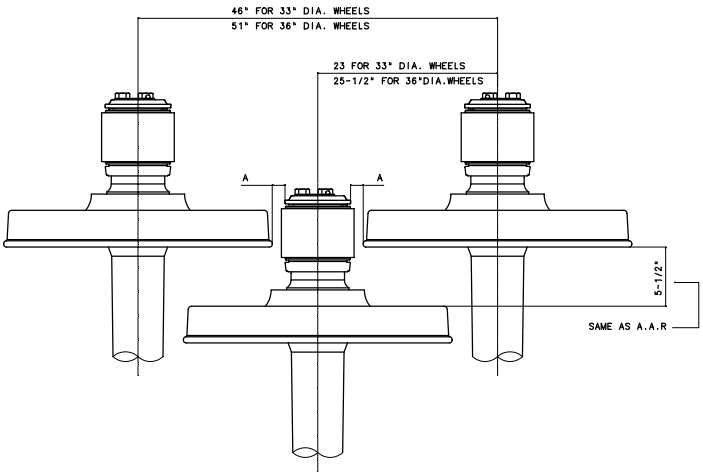


Fig. 21. Wheel rack wheel spacing dimensions for shipping wheel and axle assemblies with bearings applied.

Wheel racks for wheel sizes other than those shown in fig. 21 should provide a minimum clearance of one-half inch (see dimension A in fig. 21) between the wheel flanges and bearing assemblies on adjacent axle assemblies.

When loading or unloading wheel and axle assemblies equipped with roller bearings, care should be taken to protect the bearings.

OVERSEAS SHIPPING INSTRUCTIONS

Below-Deck Cargo

Whenever possible, load bearing-equipped trucks or axle assemblies separately below deck.

Use blocks under the truck frames to remove the weight of the truck from the bearings.

Deck Cargo

If you must store bearings on deck, completely apply heavy grease or car journal compound that is not water soluble or affected by heat (150° F/65° C) to the outside of the bearing:

- Around the exposed seal cases on both ends of each bearing
- Between the face of the cup and axle end cap
- Between the face of the cup and backing ring

Use either a calcium or lithium soap grease of not less than a number 2 consistency.

Block up cars and locomotives with trucks applied under the truck frames to remove the weight of the truck as well as the load on the center plate from the bearings. Also block up individual trucks to remove the weight of the truck from the bearings.

INSPECTION AFTER ARRIVAL

After the equipment has been unloaded at the destination point, examine each bearing assembly to make sure the adapter is properly seated on the bearing cup before the equipment is placed in service.

Further examine bearing assemblies showing evidence of direct contact with seawater. Do not move rolling stock without the end caps in place. If you find evidence of seawater inside the axle end cap, send the bearing to Timken for reconditioning or remanufacturing.

NOTE

Timken AP and AP-2 bearings are prelubricated at the factory. It is not necessary to add additional grease internally to these bearing assemblies for shipment as deck cargo or below-deck cargo.

TIMKEN

The Timken team applies their know-how to improve the reliability and performance of machinery in diverse markets worldwide. The company designs, makes and markets bearings, gear drives, automated lubrication systems, belts, brakes, clutches, chain, couplings, linear motion products and related industrial motion rebuild and repair services.

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