HARSCO RAIL

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SERVICE BULLETIN

MAINTENANCE OF WAY EQUIPMENT

DATE: 6-2012 **BULLETIN NO:** 12-011

TITLE: Bogie Inspection

RATING:

- [X] **DIRECTIVE** (Action Is Required)
- [ ] **ALERT** (Potential Problem)
- [ ] **INFORMATION** (Action Is Optional)
- [ ] **PRODUCT IMPROVEMENT** (Enhance Product)

PRODUCT SERIES / MODEL: PGM48 Series Rail Grinders, #1 through #14

SERIAL NO: 152597, 152598, 152599, 152750, 152751, 152752, 152912, 152913, 152914, 153106, 153107, 153108, 153190, 153191, 153192, 153329, 153330, 153331, 153332, 153333, 153334, 153335, 153336, 153337, 153338, 153339, 153340, 153341, 153342, 153343, 153344, 153345, 153346, 153347, 153348, 153349, 153350, 153351, 153352, 153353, 153354, 153355

SUMMARY: Harsco Rail is providing additional information and instructions on bogie inspection in this Service Bulletin. Use this Service Bulletin in conjunction with your PGM48 Series Rail Grinder Operation and Service Manual and Parts Manual.

OPERATIONAL IMPACT: The Rail Grinder will be out of service during the inspection procedures and if necessary, while making repairs.

ACTION: When performing any work on railroad bogies, always follow railroad and manufacturer's rules and guidelines. Follow the instructions in this Service Bulletin to inspect the bogies on the rail grinding consist. In addition, refer to Service Bulletin 12-008 - Axle Bearing End Cap and Axle Bearing Inspection, for specific information on inspecting the axle bearings. Also, refer to attachments where indicated.

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Safety Information

- **FOLLOW APPLICABLE RAILROAD LOCKOUT - TAGOUT PROCEDURE TO REMOVE MACHINE FROM ENERGY SOURCE.**
- **OBSERVE AND FOLLOW ALL RAILROAD SAFETY RULES AND REGULATIONS.**
- **KNOW POSITIONS AND FUNCTIONS OF ALL CONTROLS BEFORE ATTEMPTING TO OPERATE THIS RAIL GRINDER.**
- **THIS RAIL GRINDER IS DESIGNED WITH YOUR SAFETY IN MIND. DO NOT DISCONNECT AND/OR ATTEMPT TO OVERRIDE SAFETY FEATURES.**

FAILURE TO HEED THESE WARNINGS COULD RESULT IN SEVERE BODILY INJURY.

Summary of Components and Inspection Frequency

Component	Inspection Frequency
Shock Absorbers	Monthly: Inspect.
Chevron Springs	3 Months: Visual inspection on vehicle. 5 Years: Remove spring for detailed inspection. 10 Years: Replace spring.
Brake Shoes	Monthly: Check clearance. Replace: When worn to minimum limit of 9.5 mm (3/8"), including the backing plate.
Spring Brake Chambers	Monthly: Visual inspection. Replace if damaged or leaking.
Resilient Side Bearings	5 Years: Measure Clearance. Remove bogie from under car. Inspect side bearing and wear plate. 10 Year: Remove bogie from under car. Replace resilient bearing blocks.
Bogies	Yearly: Visually inspect the entire bogie. Inspect the torque arm silent bushings. 5 Years: Remove bogie from under car. Inspect pivot bowl liner. 10 Years: Remove bogie from under car. Replace torque arm silent bushings. Replace pivot bowl liner.
Axle Bearings	Continuously: Monitor running temperature using on board bearing temperature monitoring system. Yearly: Visually inspect axle bearings.

1.0 Jacking Rail Grinding Car

- **CHOCK ALL WHEELS ON THE RAIL GRINDING CONSIST. STOP ENGINES AND TURN BATTERY SWITCHES OFF.**
- **JACKS MUST BE RATED TO LIFT THE WEIGHT OF THE CAR. JACK ONLY ON DESIGNATED JACKING POINTS.**
- **DO NOT SUPPORT THE CAR WITH ONLY THE JACKS. PROVISIONS MUST BE MADE SO JACK STANDS OR BLOCKS CAN BE PLACED UNDER THE CAR'S FRAME.**
- **WHEN JACKING CAR, ALWAYS FOLLOW APPLICABLE RAILROAD RULES AND REGULATIONS.**
- **FAILURE TO HEED THESE WARNINGS COULD RESULT IN SEVERE BODILY INJURY.**

The following jacking procedure is to be used whenever a rail grinding car needs to be jacked up to perform inspection and / or repair procedures.

The rail grinding cars are equipped with designated jacking points (1). The cars can be lifted by jacking on these designated jacking points.

1.0 Jacking Rail Grinding Car

1.1 Jacking Procedure - See Figure 1

1. When jacking the car, always follow applicable railroad rules and regulations.

2. Locate the machine on a solid, level surface. Chock all wheels on the rail grinding consist. Stop the rail grinder engines. Turn the battery switches off.

3. When jacking any car in the rail grinding consist, the car must be uncoupled from the rest of the cars in the consist. Make sure that all fuel, air and hydraulic hoses and all electrical cables are properly marked to ensure that they are reconnected at the correct locations when the cars are re-coupled. Cap or plug all fuel, air and hydraulic hoses and connections to help prevent contamination.

4. If jacking the car and bogie, connect the four provided chains to each corner of the bogie and to the car frame. Remove the chains after lowering the car back to the rail.

5. The jacks used to lift the car must be rated to lift weight of the car. Place the jacks under the designated jacking points (1). Slowly jack both ends of the car level and evenly at the same time until the car is raised the desired height.

6. Do not support the car with only the jacks. Place jack stands or blocks under the car frame. Lower the car down so it is sitting on the jack stands or blocks. Make sure the car is sitting securely on the jack stands or blocks.

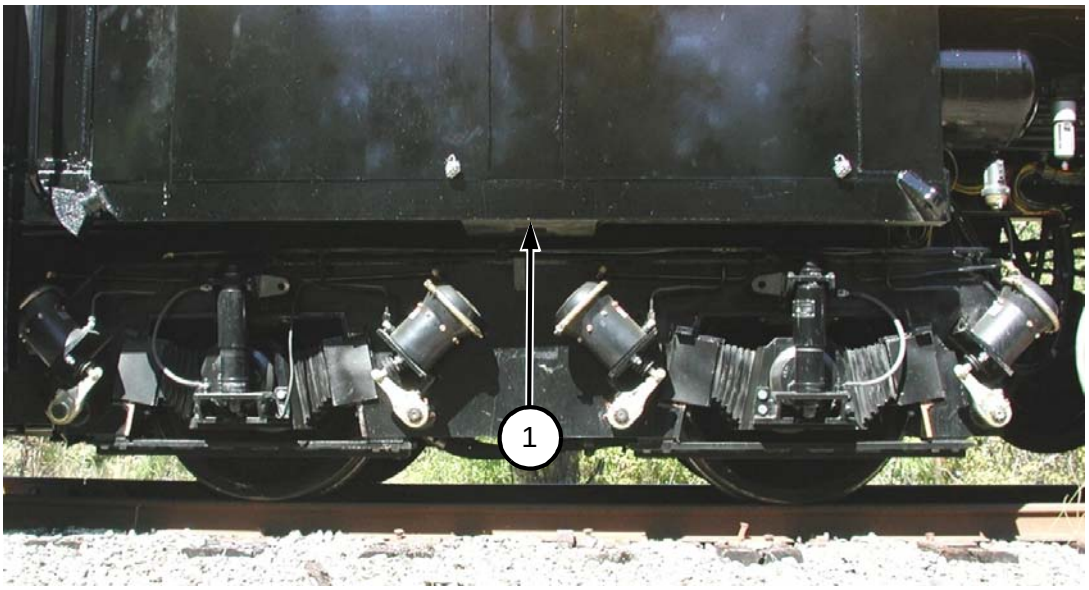
1.0 Jacking Rail Grinding Car

1.2 Lowering Procedure - See Figure 1

1. Jack the car up to allow removal of the jack stands or blocks. Remove the jack stands or blocks.

2. Slowly lower both ends of the car level and evenly at the same time until it is resting on the rail. If the bogie was lifted from the rail, make sure all wheel flanges are seated properly on the inside of the rails.

FIGURE 1
JACKING CAR



2.0 Inspecting Shock Absorbers

1. Inspect the four shock absorbers on each bogie monthly. Visually inspect for dented or broken components. Make sure the shock absorbers are securely fastened to the top and bottom mounting brackets. The M20 x 1.5 hex nuts are to be torqued to 95 N-m (70 lb-ft).

2. Check for fluid leakage. A fine coat of fluid (misting) on the shock absorber is acceptable. Misting is the process whereby very small amounts of fluid evaporate at high operating temperatures through the upper seal of the shock. When the mist reaches the cooler outside air, it condenses and forms a film on the outside of the shock body. When mixed with dust, a grime will often coat the entire body of the shock. Misting is a normal and necessary function of the shock. The fluid which evaporates through the seal area helps to lubricate and prolong the life of the seal. A leaking shock absorber will show clear signs of fluid leaking in streams from the upper seal. These streams can most easily be seen when the shock is fully extended and you inspect as far up the main body of the shock, underneath the dust cover or tube, as possible.

3. If the shock absorber is leaking as described above, replace the shock absorber.

3.0 Inspecting Chevron Spring Suspension

1. This information is provided to aid in the maintenance and storage of Chevron springs used in railway primary suspension arrangements. It is assumed that inspection personnel have the skills and equipment necessary to undertake the required tasks.

2. Primary suspension Chevron springs are designed for minimum maintenance throughout their service life. Basic materials and operating stress / strain levels are selected to achieve the design life expectancy. Rubber compounds are normally based on a natural rubber polymer to take advantage of the excellent physical properties afforded by the material with additional protection provided by compounding with anti-oxidants and antiozonants. The chemical bond achieved between the rubber and the metal elements is compatible with the proof strength of the polymer material. Metal parts are suitably finished to provide the required level of corrosion protection as specified by the vehicle builder.

3.1 Storage

1. The following requirements should be met when storing the springs for up to 6 months:

    a. The springs shall be stored at a temperature between 0° C and 25° C (32° - 77° F).

    b. The springs shall be stored in a dry place to stop water from forming on any part of the springs. The relative humidity should preferably be below 65%.

    c. The springs shall be stored away from solvents, fuels, lubricating agents, chemicals, acids, disinfectants and ozone generating equipment.

3.0 Inspecting Chevron Spring Suspension

3.1 Storage

2. The following additional requirements should be met when storing the springs for over 6 months:

   a. The springs shall be stored at least 1 meter away from any heat source.

   b. The springs shall be stored hidden from strong lights, particularly those giving off a high ultraviolet content. It is recommended that the springs be covered with either a red or orange colored sheet.

   c. It should be noted that springs stored for extended periods will exhibit some change in stiffness characteristics.

3.2 Cleaning

1. The springs shall be cleaned each time the bogie is serviced. Brushing and scraping with a cloth rag by hand is normally sufficient to remove any accumulated dirt and paint from the end metals.

2. The rubber surfaces may be cleaned with soap and warm water and left to dry at room temperature. Sharp objects, such as wire brushes, scrapers and emery cloth shall NOT be used to clean rubber surfaces. Heavy accumulations of dirt and paint may be cleaned with mild alkaline such as a 1.5% sodium bicarbonate solution. Immersion in caustic soda should be limited to a maximum 30 minutes at a maximum of 80° C (175° F). Solvents, such as trichlorethylene, carbon tetrachloride and hydrocarbons, such as paraffin shall NOT be used.

3.3 Inspection

1. The springs have been designed to function under normal railway operating conditions for a time span of 10 years, with no servicing requirements other than the following inspection schedule:

   a. Intermediate Inspection: While on the vehicle the springs shall be visually inspected to ensure no damage has taken place. It is recommended that the time interval between these inspections shall not be greater than three months.

   b. 5 Year General Service Inspection: It is recommended that after 5 years in service the springs shall be disassembled from the vehicle and a full visual inspection performed to ensure no damage has taken place.

   c. 10 Year General Service: After 10 years in service the springs shall be removed from the vehicle and replaced with new springs. Discard the old springs.

   Note: The time frame for inspections is based on normal use for a transit vehicle or freight vehicle. If vehicle use results in substantially decreased amounts of travel, then the time between inspections may be extended by up to 30%.

3.0 Inspecting Chevron Spring Suspension

3.4 Damage Assessment

1. The following guidelines should be used for assessing any damage to the springs.

   a. Bent Metal Parts: The overhanging edges of the metal parts can occasionally become bent or burred through mishandling in service. This is not detrimental to the functioning of the spring, provided that the rubber is not trapped and that there are no sharp metal edges that can come into contact with the free rubber surface.

      Any burrs should be removed carefully using a file. Care must be taken not to damage the rubber surface during this operation.

   b. Cracked Metal Parts: If, upon inspection, any of the metal plates or welds are observed to be cracked, the spring must be replaced at once.

   c. Bond Defects: Any lifting of the rubber from the metal is permissible provided the depth of the defect does not exceed 6 mm (.24 inch) from the edge of the rubber form on any one bond interface. The state of the metal surface beneath the bonding defect is of no consequence; it may be clean, rusty or coated with sticky rubber. Any spring that exhibits a bond defect outside this range shall be returned to the manufacturer for assessment.

   Note: It may not be possible to inspect the bond interfaces when the springs are in service due to the bulging of rubber beyond the bond face edge. If so it should be possible to inspect he bonded face edges once the springs are removed from the vehicle.

   d. Rubber Surface Break-up: With time and exposure to high levels of ozone, surface cracking may become apparent. Ozone cracking gives the rubber surface a crazed appearance and is most apparent in areas of high strain. Where springs have been in service for a number of years, cracks due to ozone attack can appear to be quite severe, but this is only a surface condition that will not affect spring performance. However, the crack should not exceed a depth of 10 mm (.4 inch) from the original rubber profile. If a spring exhibits a surface defect outside this range, then the axle box spring pair must be replaced at once.

      The presence of rubber crumb, often accompanied by sticky, tar-like deposits is acceptable at the rubber and metal interface.

   e. Rubber Surface Splits: Splits in the rubber surface are permissible provided their depth does not exceed 10 mm (.4 inch).

   Note: Because the rubber surface may be in a state of tension while the springs are in use, splits can appear worse than they actually are and accurate depth measurement may be difficult. It is recommended that in instances of doubt, the inspector shall request an assessment from the manufacturer.

   f. Creases: Creases formed by the folding of the rubber surface under load may be ignored. Such creases generally appear on the free rubber surface as strips of the surface become polished by wear or covered with tacky rubber.

3.0 Inspecting Chevron Spring Suspension

3.4 Damage Assessment

g. Oil and Grease Contamination: Natural rubber compound will exhibit a reasonable level of resistance to weak acids and alkalis. However, natural rubbers have a poor resistance to mineral and diesel lubricants and petroleum fluids, such contamination resulting in, at first, a softening and then swelling of the exposed rubber, and possible de-bonding of the rubber/metal bonded face in the region of the exposure.

Some contamination of the spring by fuels or lubricants will seldom be a problem. Softening of the surface by hydrocarbons can be accepted provided that the accompanying swelling does not exceed 5 mm (.2 inch) beyond its normal position. Swelling must be distinguished from any slight change in shape due to permanent set. However, any significant irregular bulging of the rubber should be referred to the manufacturer for evaluation. Springs subjected to prolonged exposure may well need to be frequently replaced.

Where springs may be subject to regular washing and spraying with underbody cleaning agents, it is recommended that the manufacturer be advised of the fluid type for an assessment of its compatibility with the polymer and bonding agent used.

3.5 Settlement

1. When subject to static and dynamic loading, springs will exhibit an increase in deflection with time, referred to as settlement or creep. The extent of the settlement will be dependent upon a number of complex factors including the static deflection, dynamic loading, time and environmental conditions relating to the application.

2. Shimming for settlement may be required to maintain clearances. See the following inspection and shimming procedure.

4.0 Checking / Shimming Spring Suspension

Refer to 3.3 Inspection for recommended inspection and replacement intervals.

4.1 Checking Suspension Height - See Figure 2

1. Locate the rail grinder on level, tangent track. A maintenance shop location is recommended because the use of jacks is required if the suspension needs to be shimmed. Chock the rail grinder wheels.

2. Make sure the rail grinder's transmission gears are shifted to neutral, propel is disabled and the propel handle is in the neutral position.

3. Inspect the Chevron Springs (1). See 3.0 Inspecting Chevron Spring Suspension. If necessary, replace any damaged or worn springs.

4. Check the suspension height with a normal load on the rail grinding car. Measure the distance between the top of the bearing block and upper bogie frame at the four locations on the bogie.

5. Add the four dimensions together and then divide the total by four. The average dimension on one bogie should be 57 - 63 mm (2.25 - 2.50 inch). If the average dimension is less than 57 mm (2.25 inch), the Chevron Springs will need to be shimmed. Record the average dimension to help determine the amount of shimming required. Installing one shim per each spring will raise the car approximately 8 mm (.31 inch).

4.2 Shimming / Replacing Chevron Springs - See Figure 2

1. Manually release the brakes on the bogie by using the slack adjusters (2).

2. Remove the lower bogie retaining bar (3). The retaining bar is secured with six fasteners on each end, two M16 x 2.0 socket head cap screws and four M16 x 2.0 hex head cap screws. The hex head cap screws have retaining plates with corners that bend up to prevent the cap screws from loosening.

3. Remove the hex nut (4) from the lower end of the shock absorber (5) to separate it from the bracket on the bearing block. Remove the Chevron spring support keeper plate (6).

4. Refer to 1.0 Jacking Rail Grinding Car. Jack the car up until the Chevron springs (1) pull away from the bogie frame.

5. If shimming the Chevron springs, install shim(s) between the bogie frame and the Chevron springs (1). Use Harsco Rail #171808-1, 1.5 mm (.06 inch) thick shims. Installing one shim per each spring will raise the car approximately 8 mm (.31 inch).

6. If replacing the Chevron spring (1), remove the spring from the bearing block. There is a boss on the spring that fits into a hole in the bearing block. Install the new spring on the bearing block aligning the boss with the hole in the bearing block.

   Note: It is NOT permissible to replace only one Chevron spring with a new one. All four Chevron springs must be replaced on a common axle.

4.0 Checking / Shimming Spring Suspension

4.2 Shimming / Replacing Chevron Springs - See Figure 2

7. Slowly lower the car. Make sure the Chevron springs (1) return to their original position on the bogie frame.

8. Install the Chevron spring support keeper plates (6).

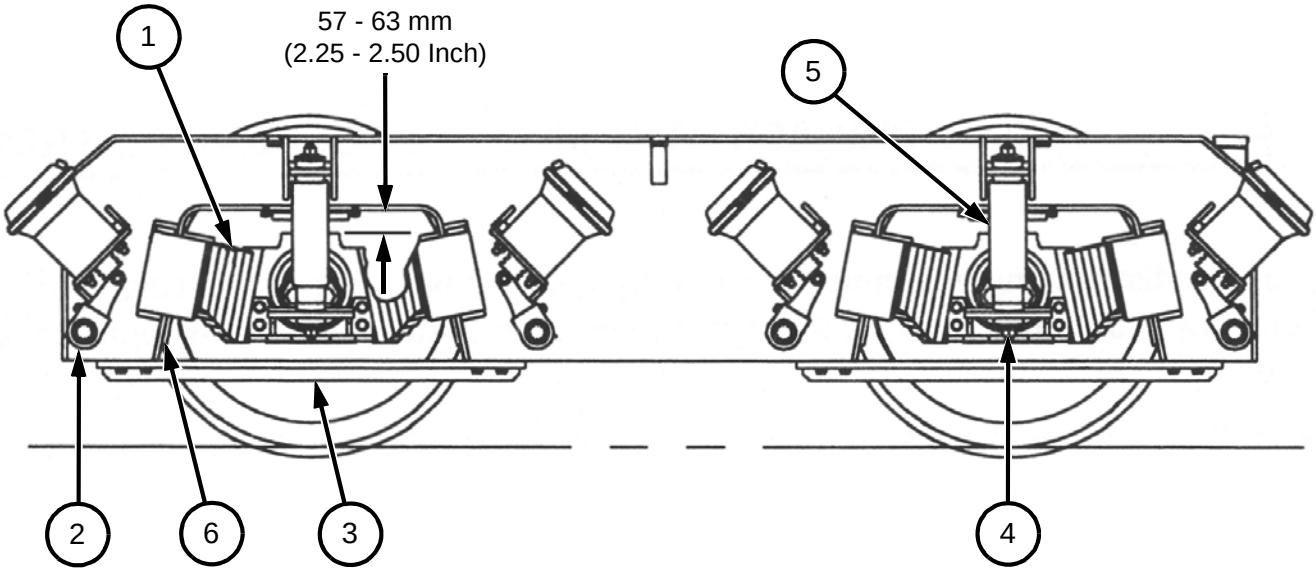
9. Install the lower bogie retaining bar (3) and secure with the fasteners per the following instructions. Install the four M16 x 2.0 socket head cap screws using Loctite #271 Red and torque to 340 N-m (250 lb-ft). Install the four bolt head retainers and eight M16 x 2.0 hex head cap screws. Torque the cap screws to 305 N-m (225 lb-ft). Bend the corners of the bolt head retainers up against one of the hex head flats to prevent loosening of the cap screws.

10. Locate the lower end of the shock absorber (5) in the bracket on the bearing block. Secure with the M20 x 1.5 hex nut (4) and torque to 95 N-m (70 lb-ft).

11. Readjust the brake shoes to the correct clearance. See 5.0 Brake Shoe Adjustment / Replacement.

12. After checking, shimming and / or replacing the suspension on one bogie, repeat the procedure on the rest of the bogies on the rail grinding consist.

FIGURE 2
CHECKING / SHIMMING SUSPENSION



5.0 Brake Shoe Adjustment / Replacement

5.1 Checking / Adjusting Brake Shoes - See Figure 3

1. Make sure the vehicle's gears are shifted to neutral and propel is disabled.

2. Chock the vehicle wheels. Release the parking and service brakes so the brake shoes are not applied against the wheels.

3. Hold the brake shoe so its full radius is equally spaced away from the wheel. Check the brake shoe to wheel tread clearance. The brake shoe to wheel clearance should be 5.0 - 6.3 mm (3/16 - 1/4 inch).

4. If not, adjust the brake shoes by turning the adjusting screw (1) on the slack adjuster (2). Adjust until the brake shoe to wheel tread clearance is 5.0 - 6.3 mm (3/16 - 1/4 inch).

5. After checking and adjusting brake shoe clearance, apply the Parking Brakes. Remove the chocks from the vehicle wheels.

5.2 Replacing Brake Shoes - See Figure 3

1. If the brake shoes are damaged, have portions missing or are worn to the recommended minimum limit of 9.5 mm (3/8"), including the backing plate, the brake shoe must be replaced.

2. Make sure the vehicle's gears are shifted to neutral and propel is disabled.

3. Chock the vehicle wheels. Release the parking and service brakes so the brake shoes are not applied against the wheels.

4. Using the adjusting screw (1) on slack adjuster (2), back the brake shoe away form the wheel tread.

5. Remove brake shoe retainer securing bolt (3). Slide the brake shoe retainer (4) down to remove it. Remove the brake shoe (5) from the bottom.

6. Install the new shoe by sliding it up into the holder from the bottom.

7. Reinstall the brake shoe retainer (4) and secure with bolt (3).

8. Adjust the brake shoe by turning the adjusting screw (1) on the slack adjuster (2). Adjust until the brake shoe to wheel tread clearance is 5.0 - 6.3 mm (3/16 - 1/4 inch).

9. Repeat the procedure to replace any other brake shoes that require replacement.

5.3 Inspect Spring Brake Chamber - See Figure 3

1. Visually inspect the Spring Brake Chamber (6). Look for external damage such as dents, cracks, etc. Make sure the brake chamber is securely mounted and all brake line hoses are properly tightened.

5.0 Brake Shoe Adjustment / Replacement

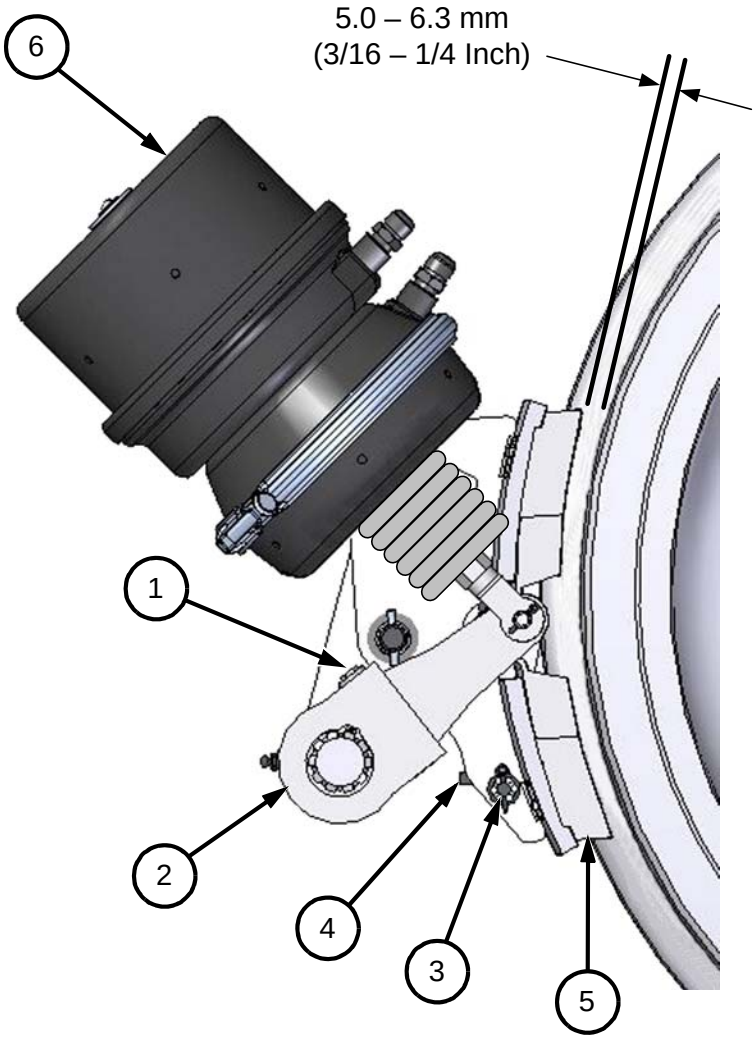
5.3 Inspect Spring Brake Chamber - See Figure 3

2. Listen for leaking air during normal operation and when the brakes are applied and released.

3. Harsco Rail recommends that the brake chamber NOT be disassembled as the internal springs are under extreme tension and if not properly disassembled, components may be expelled at high velocity which could result in personal injury. Harsco Rail recommends that the brake chamber be replaced. If the brake chamber is to be disassembled for repair, it must be done by qualified personnel in an approved repair shop that is equipped with the proper tools designed for disassembly of this type of brake chamber.

4. When removing brake chamber from bogie, use slack adjuster to adjust brake shoe away from wheel. Make sure all air is vented from brake chamber before removing the brake chamber from the bogie.

FIGURE 3
BRAKE SHOES
BOGIE FRAME NOT SHOWN FOR CLAIRITY



6.0 Resilient Side Bearings

6.1 Measuring and Inspecting Side Bearings - See Figures 4 and 5

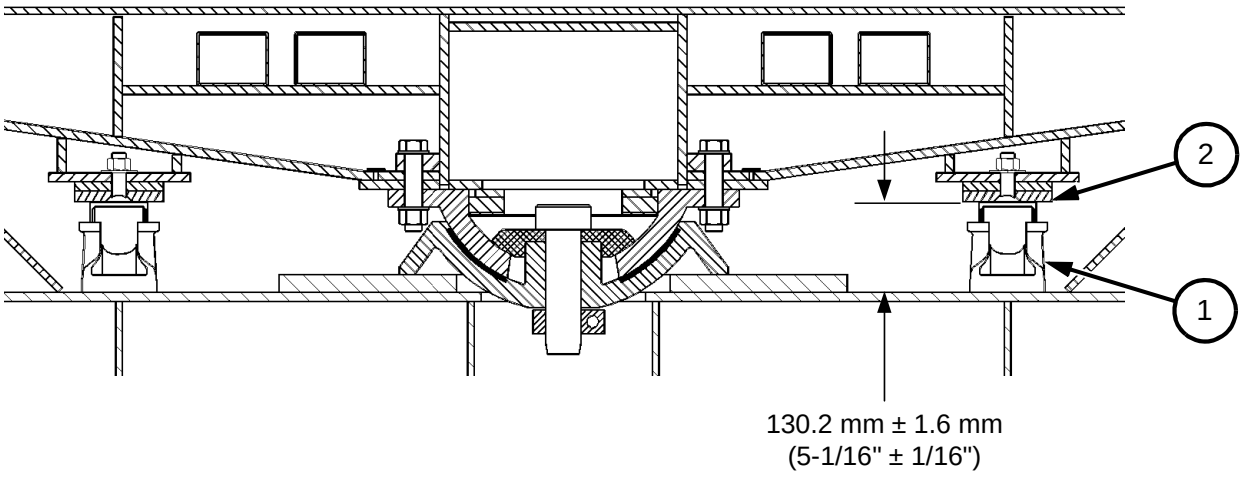
1. Locate the rail grinder on level, tangent track. A maintenance shop location is recommended because the use of jacks is required if the side bearings need to be replaced. Chock the rail grinder wheels.

2. Measure the distance between the bogie frame, where the Resilient Side Bearing (1) is mounted and the bottom of Wear Plate (2) at both side bearing locations. Add the two measurements together and divide by two to get an average dimension. The average dimension should be 130.2 mm ± 1.6 mm (5-1/16" ± 1/16"). If the dimension is not within the tolerance, this is an indication that there may be worn Wear Plates (2) and / or worn center pivot components. Refer to the attached Installation Instructions For Stucki® Dual Action Metal-Capped Resilient Side Bearings.

3. Inspect the side bearing (1). The side bearing cage must be free of flaws or cracks and must be securely fastened to the bogie frame. Refer to the attached Installation Instructions For Stucki® Dual Action Metal-Capped Resilient Side Bearings. The heads of the cage fasteners must not interfere with the seating of the resilient blocks to the cage floor. The new nominal diameter of the steel roller is 76.2 mm (3 inch). This is the only size roller that may be used in the side bearing. Maximum allowable wear is 1.6 mm (1/16 inch). Rollers under 74.6 mm (2-15/16 inch) diameter must be replaced. It is recommended to replace resilient blocks after 965,600 km (600,000 miles) or 10 years, whichever comes first. Refer to the attached Stucki® Service Bulletin RSB 8904 for date code information and height measuring information.

4. Inspect the Wear Plate (2). Body side bearing wear plates for use with Stucki® side bearings must conform to AAR Standard S-235. Surfaces must be smooth. Any heavy rust or surface projections must be removed by grinding. Fastener heads must be flush with, or recessed into, the wear plate surface. Fasteners must be properly tightened and secured. Plates with surface variations greater than 3.2 mm (1/8 inch) between fastener holes (roller impressions, convexity, or concavity), or greater than 1.6 mm (1/16 inch) over any 102 mm (4 inch) space, must be replaced. Use replacement Wear Plate #252727-1

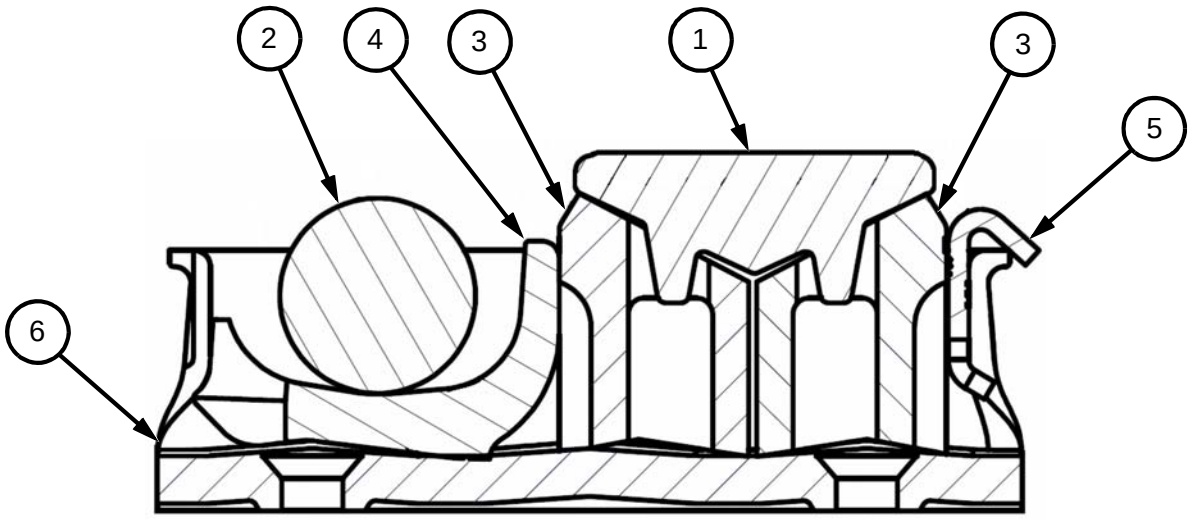
FIGURE 4
MEASURING SIDE BEARINGS



6.0 Resilient Side Bearings

6.2 Resilient Side Bearing Replacement Parts - See Figure 5

FIGURE 5
RESILIENT SIDE BEARING REPLACEMENT PARTS



ITEM	PART NO	DESCRIPTION	QTY
	350559-1	RESILIENT SIDE BEARING ASSEMBLY	1
1	171726-1	Metal Cap	1
2	171727-1	Roller	1
3	171728-1	Resilient Block	2
4	171729-1	Cradle	1
5	171730-1	End Closure	1
6	171805-1	Cage	1

7.0 Bogie

7.1 General Bogie Condition

1. Visually inspect the entire bogie for signs of worn, damaged, missing, etc. components. Repair or replace as needed.

2. On powered bogies, check the torque arm silent bushings for cracks, deformation or rubber egress yearly. If any cracks larger than 15 mm (0.6 inch) or any other damage is found, the silent bushing should be replaced. After 10 years in service the torque arm silent bushings should be replaced. Make sure all fasteners are secure and torqued to the specification tables in the Appendices Section of the Operation and Service Manual.

7.2 Inspecting Center Pivot Bowl - See Figure 6

1. Locate the rail grinder on level, tangent track. A maintenance shop location is recommended because the use of jacks is required to raise the car body and remove the bogie from under the car. Chock the rail grinder wheels.

2. In order to inspect the Pivot Bowl Liner (1) it will be necessary to remove the bogie from under the car.

3. Disconnect all electrical connections between the car body and the bogie. Make sure the wire connections are marked so they can be properly re-connected.

4. Disconnect all pneumatic lines and cap / plug the lines and connections. Make sure the pneumatic connections are marked so they can be properly re-connected.

5. Disconnect the hydraulic lines on the powered bogies and cap / plug the lines and connections. Make sure the hydraulic connections are marked so they can be properly re-connected. Do not allow hydraulic fluid to spill on the ground or floor. Make sure to catch all hydraulic fluid in a suitable container.

6. See 5.1 Checking / Adjusting Brake Shoes. Release spring applied brakes by adjusting the slack adjusters.

7. Remove the spring and pin cotter fasteners (2) that hold Retaining Clip (3) in place on Center Pin (4). Remove Retaining Clip (3).

8. See 1.0 Jacking Rail Grinding Car. Jack the rail grinding car up far enough to roll the bogie out from under the car.

9. Inspect the Pivot Bowl liner (1) for cracks, excessive wear, etc. If any damage is found or if the bowl liner is worn, replace the bowl liner. Remove the Pivot Bowl Liner (1) and install a new bowl liner.

10. Move the bogie back under the car. Align the Center Pin (4) with the hole in the center of the bowl. Slowly and carefully lower the car down on to the bogie.

11. Secure the Center Pin (4) using Retaining Clip (3) and spring and pin cotter fasteners (2).

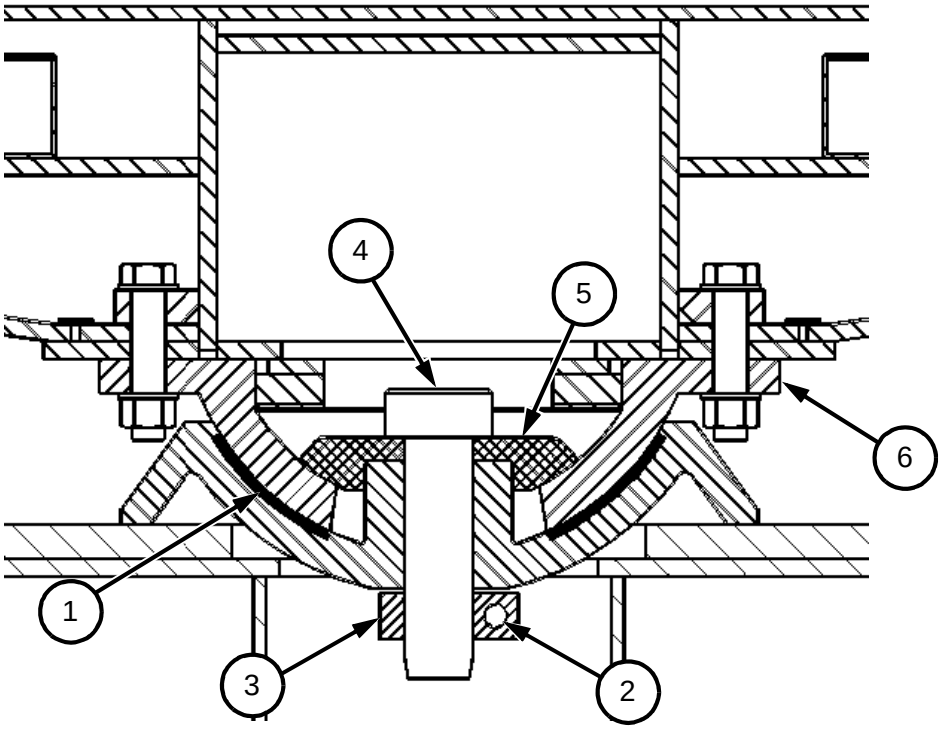
7.0 Bogie

7.2 Inspecting Center Pivot Bowl - See Figure 6

12. Re-connect all electrical, pneumatic and hydraulic connections. Before putting the rail grinder back in service, check for leaking pneumatic and hydraulic connections.

13. See 5.1 Checking / Adjusting Brake Shoes. Adjust the brakes for proper brake shoe clearance by adjusting the slack adjusters.

FIGURE 6
CENTER PIVOT BOWL



7.3 Center Pivot Replacement Parts - See Figure 6

ITEM	PART NO	DESCRIPTION	QTY
1	171785-1	Pivot Bowl Liner	1
2	171789-1	Spring and Pin Cotter	1
3	171788-1	Retaining Clip	1
4	171786-1	Center Pin	1
5	171787-1	Cap	1
6	171784	Top Casting	1

8.0 Field Inspection of Axle Bearings

The following is a brief field inspection for the axle bearings. Refer to the Attached Brenco Maintenance Guide - AAR-Class Bearings for detailed inspection procedures.

1. Continuously monitor running temperature using on board bearing temperature monitoring system.

2. While inspecting the bearing in service, extreme care must be exercised to avoid serious consequences. Bearing must be checked for the following:

    a. Abnormal Noise: When the bearing rotates try to listen for any unusual/ abnormal noise or grinding.

    b. Running Temperature: Check operating temperature of the bearing by measuring the adapter or underside of the bearing cup with temperature gauge (infrared or contact thermometer). A temperature indicating crayon may also be used. If the bearing temperature is more than 90° C (194° F), the bearing should be removed from service.

    c. Visible Damage: Visually inspect the bearing for defects like broken cup, loose or damaged grease seals, broken adapters, missing cap screws, broken / distorted end cap, broken locking plate. Check for loose backing rings, missing side frame key. Any of these conditions are reasons for bearing removal and replacement.

    d. Grease Leakage: During service, some grease leakage is normal and comes from the purging of seal pre-lube and the relieving of internal bearing pressures. This should NOT be wiped away. This will set up and stop further leakage. The apparent amount of grease may be fairly large, but this is usually only a small amount of grease mixed with contaminants. If the purging continues to the point of coating a significant amount of the surrounding areas, then bearing manufacturer should be contacted.

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INSTALLATION INSTRUCTIONS FOR STUCKI® DUAL ACTION METAL-CAPPED RESILIENT SIDE BEARINGS, MODELS ISB-8, ISB-10 AND ISB-12

I. SPECIFICATIONS AND MODEL SELECTION

A. Stucki Company manufactures three dual action metal-capped resilient side bearing models designed to control truck hunting of freight cars having conventional 3-piece trucks. The primary difference between the models is the preload compression force provided by the resilient elements at the nominal 5-1/16" operating height, and the non-interchangeability features incorporated to meet requirements of AAR Specification M-948. Selection of the appropriate model is based upon the empty weight of the car body (less trucks). Specification M-948 limits total side bearing preload to no greater than 85% of the empty car body weight. The following table provides a guide for proper model selection for stand-alone cars (consult A. Stucki Company for selection for articulated cars).

METAL-CAPPED ISB MODEL	NOMINAL PRELOAD* AT 5-1/16"	ALLOWABLE EMPTY CAR BODY WT.	APPROX. LT.WT. WITH 70-T. TRUCKS	APPROX. LT.WT. WITH 100-T. TRUCKS
ISB-8	3000#	14,100# - 21,199#	31,000# - 37,999#	35,000# - 41,999#
ISB-10	4500#	21,200# - 28,199#	38,000# - 44,999#	42,000# - 48,999#
ISB-12	5400#	28,200# or GREATER	45,000# or GREATER	49,000# or GREATER

*AFTER NORMAL BREAK-IN RELAXATION HAS OCCURRED.

II. IDENTIFICATION AND DESCRIPTION OF COMPONENTS

All Stucki metal-capped ISB models are similar in design. Each consists of a metal cap element ℵ in the form of a double wedge that rests upon a pair of sloped-top resilient polyurethane blocks ℑ. Adjacent to the resilient blocks, sitting in a metal cradle ⊕, is a 3" diameter hardened steel roller ℜ that serves as a compression travel limit. These components are contained in a rolled steel cage ℘. The end of the cage adjacent the resilient blocks is fitted with a hardened steel end-closure ⊗ to properly buttress and contain the resilient blocks.

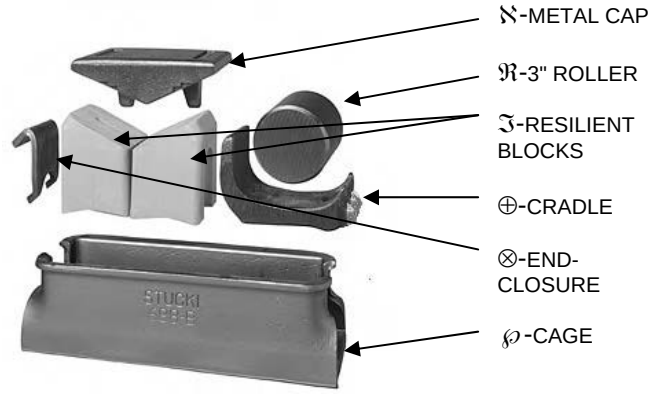

Figure 1. Stucki Dual Action Metal-Capped ISB Components

The cages for the ISB-8 and ISB-10 bear the basic model designation stamped onto one side. The ISB-12 utilizes a standard Stucki 688-B cage. The resilient blocks and metal caps are imprinted with their appropriate and matching design number. The proper, and only, block and cap design to be used in each model is:

METAL CAPPED ISB MODEL	METAL CAP DESIGN	RESILIENT BLOCK DESIGN
ISB-8	RB-24 CAP	RB-24
ISB-10	RB-34 CAP	RB-34
ISB-12	RB-27 CAP	RB-27

All models use a common design 3" diameter X 3" long steel roller and 5/16" thick cage end-closure (the latter being identical for all Stucki RSBs, whether conventional or metal-capped).

Model ISB-12 utilizes a standard 688-B double roller side bearing cage. This allows easy retrofit of the ISB-12 to 100 and 125-ton cars already equipped with such cages. The cages for models ISB-8 and ISB-10 incorporate depressions in the upper sidewalls that act as rejection features to preclude the insertion of resilient block designs of higher nominal preload than those standard for the model. The ISB-8 cage has four such depressions, two in each sidewall at the block locations. The ISB-10 cage has a single depression in each wall, diagonally opposed. The corresponding resilient blocks conform to the cage wall conditions. The RB-27 block is flat on both sides. The RB-24 block is channeled on both sides to allow fitting between the reduced width at the cage wall depressions. The RB-34 block is channeled on one side only in like fashion. Figure 2 illustrates the distinguishing features of each block.

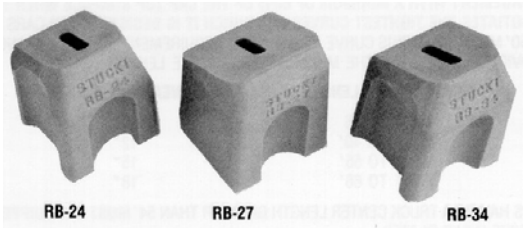

Figure 2. Metal-Capped RSB Resilient Block Designs

It is important to note that A. Stucki Company does not recommend the application of metal-capped resilient side bearings to torsionally stiff, long truck center length cars having D-3 (2-1/2" travel) truck springs. This includes, but is not necessarily limited to tank cars, boxcars, and covered hoppers with truck centers exceeding 38'.

III. INSTALLATION PROCEDURES To insure the proper life and performance of Stucki resilient side bearings, as well as the operating safety of the freight cars to which they are applied, the following instructions must be carefully adhered to:

1. Achieving Proper Vertical Setup Height

Vertical space between the car body side bearing wear plate (or wedge) and the truck bolster surface to which the side bearing cage is mounted must be 5-1/16", +/-1/16", measured as shown in Figure 3.

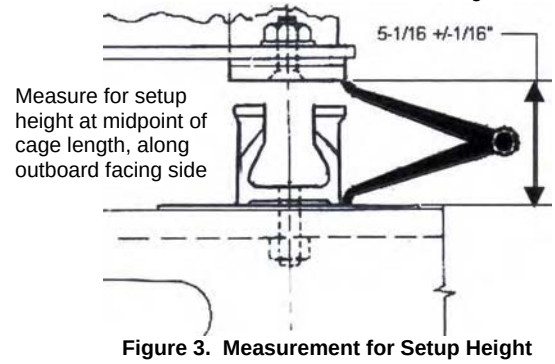

Figure 3. Measurement for Setup Height

Note that, although shimming under side bearing cages is not an acceptable procedure, this may be encountered with some older cars. In such cases the setup height measurement must be made from, or referenced to, the top of the shims.

Measurement of side bearing space must always be made with the empty car positioned on reasonably level track and before installing the resilient blocks in the cages or applying any form of solid centerplate lubrication (this is to insure metal-to-metal centerplate contact).

If any type of semi-permanent elastomeric centerplate horizontal liners are to be used, these must be in place when setup height measurement is made. Also, in such cases, A. Stucki Company recommends that setup heights be adjusted to 5-1/8" +/-1/16" to allow for early "seating-

in" and compression set of the liner material. Further, it should be noted that control of truck hunting may be diminished somewhat when low friction centerplate liners are used, or when centerplates are lubricated excessively.

In the case of retrofit applications, when body side bearing shim adjustment is required to obtain the specified setup height, it is acceptable to average the measurements for the two side bearings at a given end of the car. The sum of both measurements may be as low as 10" or as high as 10-1/4". No individual space, however, should be under 5".

2. Car Body Side Bearing Wear Plates

Body side bearing wear plates (or wedges) for use with Stucki side bearings of any style must conform to AAR Standard S-235. Surfaces must be smooth. Any weld spatter, heavy rust, or surface projections must be removed by grinding. Fastener heads must be flush with, or recessed into, the wear plate surface. Fasteners must be properly tightened and secured.

Plates and wedges with surface variations greater than 1/8" between fastener holes (roller impressions, convexity, or concavity), or greater than 1/16" over any 4" space, must be replaced. Wear plate surface must be reasonably parallel to the side bearing mounting surface of the truck bolster. Variation should not exceed 1/16" across width or 1/8" end-to-end.

Body wear plates must be of sufficient length and width to maintain engagement with a minimum of 60% of the cap top surface when the car negotiates the shortest radius curves for which it is designed. For cars having a 150' minimum radius curve negotiation requirement, the following table provides a guide for the minimum wear plate length:

TRUCK CENTER LENGTH	MIN. WEAR PLATE LENGTH
28' OR LESS	10"
28'-1" TO 40'	12"
40'-1" TO 55'	15"
55'-1" TO 66'	18"

Cars of truck center length greater than 48' must be equipped with 5" wide wear plates.

3. Truck Side Bearing

The side bearing cage must be free of flaws or cracks and must be securely fastened to the truck bolster. Refer to A. Stucki Company's *Installation Instructions for Roller Side Bearings* for cage fastener recommendations. Note that Stucki recommends, on stand-alone, single unit cars, that the ISB models be installed such that the rollers are diagonally opposed across the truck bolster. ISB-8 and ISB-10 cages should be orientated with the resilient block indents always to the installers same hand as he faces the near side frame.

The heads of the cage fasteners must not interfere with the seating of the resilient blocks to the cage floor.

The new nominal diameter of the steel roller is 3". This is the only size roller that may be used in the side bearing models covered by these instructions. Maximum allowable wear is 1/16". Rollers under 2-15/16" diameter must be replaced.

4. Resilient Blocks

New resilient blocks, when initially compressed by the car body to the nominal 5-1/16" setup height, will support loads greater than the nominal design compression preload values shown in the table in Paragraph I (above). The actual loads borne by the side bearings will diminish to approximately the design preload level after an initial break-in relaxation period, which will normally include a short time in revenue service. Depending on the ambient temperature, the temperature of the resilient blocks when installed, and the weight of the car body, the body centerplate may not achieve metal-to-metal contact until some portion of the preload relaxation has occurred. This may require as much as 24 hours. The initial relaxation period can be minimized during periods of low temperatures (below 50°F) by storing the resilient blocks at room temperature for at least 24 hours prior to installation. During the short period while the centerplates may not be contacting, the lubrication of the side bearing cap as specified in Paragraph 5.E (below) insures the car will experience no difficulty negotiating curves.

If solid lubricant discs or patties have been applied to centerplates, the anticipated side bearing heights may not be realized until after car has been moved for some distance, as some solid lubricants are capable of supporting considerable loads statically.

Resilient blocks must never be exposed to temperatures greater than 200°F, or 175°F for extended periods. If cages have been riveted, welded, or otherwise heated for any reason, the resilient blocks should not be installed until cage and fasteners have cooled to touch-safe temperatures.

When a car having Stucki RSBs is raised from the trucks and the resilient blocks are removed, measurement of their free heights will reveal them to be somewhat shorter than new blocks of the same design. During normal block life, they can take as much as 1/4" compression set (depending on block design) and still function to provide adequate hunting control. The Stucki *Yard and Shop Inspection Pocket Guide* includes tables that provide a guide for the replacement of blocks on the basis of time/mileage or free height measurement.

5. Installation of Components Into Cage (see Figure 1)

A. Insert end-closure⊗ into place on end of cage℘ where resilient blocks are to be located. ISB-8 and ISB-10 cages should be installed so that resilient blocks are diagonally opposed from one end of bolster to the other. In ISB-12 case, place end-closures on cage ends diagonally opposed across bolster.

B. Position cradle⊕ in place at opposite end of cage, tall leg to the center of the cage (to properly buttress resilient blocks).

C. Position resilient blocksℑ between cradle and end-closure, sloped tops facing toward each other.

D. Drop the 3" diameter rollerℜ in place in the cradle, cylindrical surface contacting cradle floor.

E. Place metal capℵ onto the resilient blocks, being certain that the fins on the underside of the cap engage into the slots on the sloped faces of the blocks. Seat the cap into the blocks as far as possible manually. The cap will be seated flush to the blocks when the car body is lowered onto the trucks.

F. When first installing new metal-capped resilient side bearings, after installing all components into cages, and prior to lowering the car body onto the trucks, installer must apply a "dab" (approx. 1-1/2" diameter) of lubrication to the center of the cap top surface (see Figure 4) for break-in purposes. Recommended lubricant is any lithium based grease. Do not use any lubricant containing graphite or molybdenum disulphide (MOLY). Side bearings should never be relubricated in service except in cases where resilient blocks and body side bearing wear plates are being renewed simultaneously.

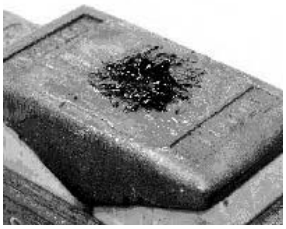

Figure 4. Lubrication of Metal Cap

After the car body has been lowered onto the trucks, a visual check should be made of the relative lateral position of the body side bearing wear plates with respect to the side bearing metal caps. This is particularly important in the case of 4" wide wedges, the lateral position of which varies with the amount of shim applied. There should be a minimum "overhang" of 1/4" to the inside of the car body (toward the centerplate) and 1/8" to the outside. 4" wide plates or wedges not meeting this requirement should be replaced with the 5" wide style.

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A.STUCKI
COMPANY

Service Bulletin

SERVICE BULLETIN RSB 8904

SUBJECT: RECOMMENDATIONS CONCERNING USEFUL LIFE OF STUCKI RESILIENT SIDE BEARING BLOCKS.

The purpose of this bulletin is to furnish an expedient guide to govern the useful service life of Stucki resilient side bearing blocks, in order to maintain assurance of adequate hunting control. The recommendations for block replacement given below were derived from the results of an extensive study of the characteristics of a large sampling of used resilient blocks of all ages.

1. Block Replacement Based Upon Time or Mileage Limits:

Block designs listed below may be considered due for routine replacement after 600,000 service miles or six service years, whichever is reached first.

RB-11 (656-CR)
RB-27 (656-CRH/ISB-12)
RB-14 (656-CRL)
RB-34 (685-RM/ISB-10)
CSB®/Compact Column Side Bearing TM/CDA TM Column
RB-42 (ISB-2LP)

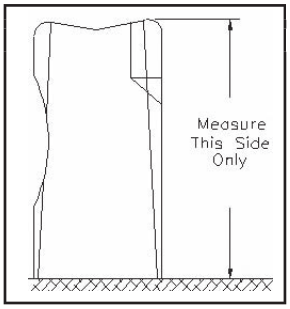
Block designs listed below may be considered due for routine replacement after 800,000 service miles or eight service years, whichever is reached first.

RB-9 (688-BR)
RB-36 (ISB-3)
RB-17 (690-RL)
RB-46 (ISB-9DR)
RB-24 (675-RL, ISB-8)
RB-52 (ISB-9DR)
RB-34 (685-RM, ISB-10)
SSB® Cap Ass'y
RB-35 (675-RXL)

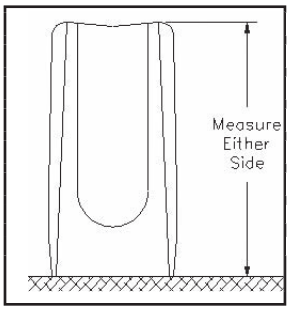
In the case of questions, or for further information, contact A. Stucki Company engineering at phone: 412-771-7300 fax: 412-771-7308

2. Block Replacement Based Upon Free Height Measurement

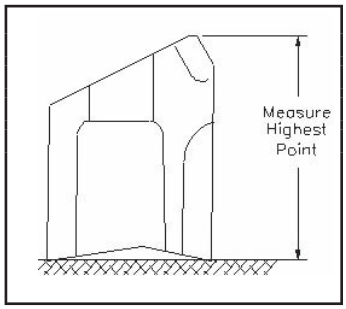
An alternative method for determining when block replacement is required is to measure block free heights. Minimum allowable free height for the various block styles, measured as illustrated in Figure 1 are:



RB-11 (656-CR) 4-5/16”
RB-14 (656-CRL) 4-1/4”



RB-9 (688-BR) 4-3/16”
RB-17 (690-RL) 4-3/16”
RB-36 (ISB-3) 4-7/16”
RB-42 (ISB-2LP) 3-7/16”
RB-46 (ISB-9DR) 4-3/16”
RB-52 (ISB-9DR) 4-7/16”
SSB® Cap Ass’y 4-15/16”
CSB®/CDA TM/Compact Column Side Bearing TM Column Element 4-1/4”



RB-24 (675-RL, ISB-8) 3-5/8”
RB-27 (656-CRH) 3-13/16”
RB-34 (685-RM) 3-3/4”
RB-35 (675-RXL) 3-17/32”

Figure 1: Block Free Height Measurement

Blocks must be allowed to relax, under no load, for at least one hour, at normal room temperature before free height measurements can be taken. A large number of cars equipped with Stucki resilient side bearings have already far exceeded the life expectancy criteria defined above and continue to display satisfactory control characteristics. This is particularly true of cars operating under 60 mph, cars not generally considered to be “troublesome” in terms of truck hunting response, and cars undergoing diligent truck maintenance programs. In such cases, based upon inspection of equipment for evidence of hunting (or lack of such evidence) owner discretion should be exercised and the block free height measurement procedure should be followed instead of time/mileage guidelines.

3. Block Age Identification

From 1988 until 1997, Stucki resilient blocks were embossed with a date indicator which would readily identify the quarter and year of manufacture, as shown in Figure 2. Block Date Code Notation Three circular impressions under the year date represent the first quarter; two impressions, second quarter; one impression, third quarter; and no impressions, fourth quarter.

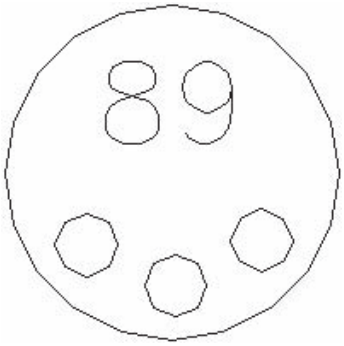


Figure 2: Block Code Dating 1988 - 1997

In 1997, the new block date code was improved to include the week of manufacture. The new code includes two indicators, one is a trianglular shaped indicator above the year of manufacture, indicating the ones unit of the week manufactured. The other indicator is a dimple above the tens unit of the week of manufacture. Two examples are shown in Figure 3.

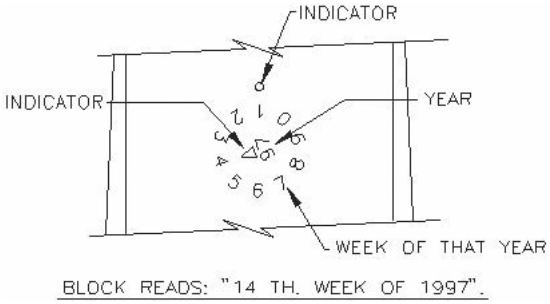


Figure 3: Block reads: "25th week of 1999"

For blocks made prior to 1988, please contact A. Stucki Company for block code matrix.

4. Truck Wear Conditions

Stucki conventional resilient side bearings have been shown by numerous hunting tests and countless miles of service experience to be capable generally of achieving a 15 to 25 mph increase in the threshold hunting speed for most ordinary freight car designs. Stucki metal-capped resilient side bearings typically achieve hunting threshold speed increases of 25 to 35 mph. The level of control that will be attained with an individual car, however, depends greatly on the condition of the trucks, and in particular, the condition of the column friction snubbing system. No design of constant contact side bearing can be expected to adequately control truck hunting if the truck squaring bias of the friction wedges has been reduced significantly by the combined wear of the wedges, bolster pockets, and column wear plates. Thus, the replacement of service worn resilient block should always be accompanied by thorough inspection, and repair when necessary, of the column snubbing system components. Also, Stucki Elastowedge™ resilient friction elements should be given serious consideration as a means for reducing future wear in this area, and maintaining better long term hunting control.

Amsted Rail

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RAILROAD BEARINGS

INSTALLATION AND MAINTENANCE GUIDE
AAR Class Bearings - Certificates 5A, 28
China Application

December, 2010

BRENCO RAILROAD BEARINGS

INSTALLATION AND MAINTENANCE GUIDE

AAR Class Bearings - Certificates 5A, 28

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DISCLAIMER

THIS GUIDE IS PROVIDED FOR REFERENCE USE ONLY.

Brenco journal roller bearings used in Association of American Railroads (AAR) applications are to be mounted and maintained in accordance with AAR standards and recommended practices. These include, but are not limited to:

1. AAR Manual of Standards and Recommended Practices, Section G, Part II,
   Wheel and Axle Manual (Wheel Shop Manual)

   Mandatory Rules Governing Wheel Shop Practices as Required by Interchange Rules
   a. Rule 1.2 - S-659 - Axles – Roller Bearing Practices
   b. Rule 1.8 - S-659 - Roller Bearing Mounting and Removal

   Recommended Wheel Shop Practices
   c. Rule 2.6 - RP-631 - Teardown (Roller Bearing and Journal Inspection)
   d. Rule 2.7 - RP-631 - MD-11 Reporting

   General Requirements and Information
   e. Rule 3.1 - RP-632 - Wheel, Axle, and Bearing Failure Reports
   f. Rule 3.2 - RP-632 - Handling, Shipment, and Storage of Wheels and Axles
   g. Rule 3.3 - RP-632 - Handling, Shipment, and Storage of Wheels and Axles
   h. Rule 4.0 - RP-633 - Figures for Segments (Rules) 1.0, 2.0, and 3.0
   i. Rule 5.0 - RP-634 - Gauges – Wheel and Axle Shop

2. Field Manual of the A.A.R. Interchange Rules (Current Year)

   a. Rule 36 - Roller Bearings
   b. Rule 37 - Roller Bearing Adapters

In addition, any internal bearing reconditioning work is to be carried out by an approved reconditioning shop in accordance with AAR standards and recommended practices. These include, but are not limited to:

3. AAR Manual of Standards and Recommended Practices Section H, Part II
   Roller Bearing Manual (Bearing Shop Manual) – All Rules (Parts)

In the case where this guideline conflicts with the current AAR specification, procedure, or instruction, the AAR version is to be followed.

GENERAL

Prior to installation, the received bearings should be properly stored to ensure protection from contamination and / or corrosion. They are to be kept in an upright position and should remain in the original shipping containers. They should be kept in a dry storage area of moderate temperature off the floor and away from direct sunlight. For information on bearing storage life, please refer to Brenco Tech Forum 98-1, *Bearing Storage Life*. Generally, bearing inventories should be rotated such that storage is limited to a maximum of two (2) years.

The bearing mounting area should be clean and free of any dirt which could contaminate the bearing and shorten its life. It should be located away from any sources of airborne particulate matter such as grinding, welding, or high-pressure air cleaning operations.

The axles or shafts and the gauging equipment should be placed in this area for a period of time and their temperatures allowed to equalize. The bearings and wheel/axle sets must be approximately the same temperature.

Bearings with the same certificate number must be mounted on both ends of each axle.

The cardboard center tube shipped with the bearing should be kept in place to keep the spacer properly positioned concentric with the cones.

JOURNAL PREPARATION

At installation, certain precautions must be taken to insure that the bearing is properly mounted and maintains the proper mounted lateral (endplay). The steps below are to ensure the proper press fit between the inner race (cone) and the axle journal.

1) **Clean the axle journal**, fillet, and shoulder areas thoroughly to insure that they are free of any dirt, filings, or chemicals used in shipping or storage.

2) **Insure that no burrs or raised metal areas are present** on the journal. A wire brush or fine grain emery cloth can be used to remove any imperfections. Limits on the allowed level of imperfections are shown in Figure 4.5 of the AAR Wheel Shop Manual.

3) **Check the journal end for an upset condition** that can occur as a result of excessive force used during wheel press operations. The oversized “mushroomed” end can adversely affect bearing performance. Figure 1 shows the potential upset location. The limit is .003” [0.076mm] above the maximum journal diameter.

4) **Measure the bearing seats**. This is necessary to insure proper interference fit between the bearing and journal and to obtain the proper mounted lateral. Figure 2 shows the bearing seat locations. Specific dimensions are located in Table 1 (AAR Fig. 4.4; gauge in AAR Fig. 5.18).

   A dial or digital snap gauge with .0001” [0.002mm] maximum graduations is to be used. It must be calibrated using the proper master disc of at least Class X tolerance.

   It is recommended that the snap gauges be of a temperature compensating type when measuring journals. Otherwise, any temperature difference between the axle journal and the gage master disc must be accounted for since warmer parts measure larger than smaller parts. The proper compensation factors are shown in Table 2.

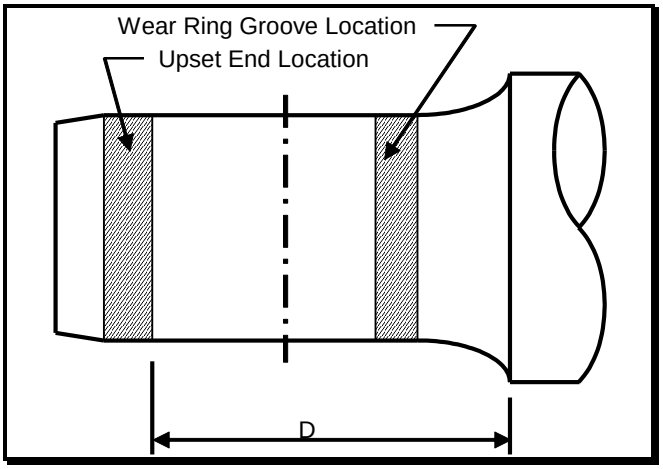

Figure 1 – Journal "Upset" Location

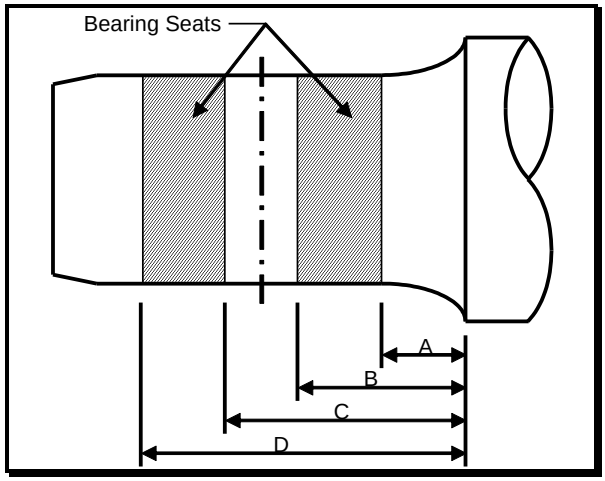

Figure 2 – Bearing Seat Areas

Table 1 – Freight Car Wagon AAR Allowed Axle Journal Dimensions
(Includes older oversized axle designs)

		Journal Diameter [inch]		Bearing Seat Locations [inch]			
Class	**Size**	**Maximum**	**Minimum**	**A**	**B**	**C**	**D**
D	5 ½ x 10	5.1920	5.1905	2 5/8	4 57/64	6	8 21/32
E	6 x 11	5.6920	5.6905	2 7/8	5 13/64	6 9/16	9 5/16
F	6 ½ x 12	6.1920	6.1905	2 15/16	5 45/64	7 1/16	10 3/8
G	7x12	7.0045	7.0030	2 3/8	5 5/16	6 1/2	9 13/16
K	6 ½ x 9	6.1920	6.1905	1 53/64	4 19/32	5	8 5/16
L	6 x 8	5.6920	5.6905	1 59/64	4 13/64	4 39/64	7 23/64
M	7 x 9	6.5045	6.5030	1 27/32	4 17/32	4 7/8	8 1/16
		Journal Diameter [mm]		**Bearing Seat Locations [mm]**			
Class	**Size**	**Maximum**	**Minimum**	**A**	**B**	**C**	**D**
D	5 ½ x 10	131.877	131.839	66.7	124.2	152.4	219.9
E	6 x 11	144.577	144.539	73.0	132.2	166.7	236.5
F	6 ½ x 12	157.277	157.239	74.6	144.9	179.4	263.5
G	7x12	177.914	177.876	60.3	134.9	165.1	249.2
K	6 ½ x 9	157.277	157.239	46.4	116.7	127.0	211.1
L	6 x 8	144.577	144.539	48.8	108.0	117.1	186.9
M	7 x 9	165.214	165.176	46.8	115.1	123.8	204.8

(Note: For new axle dimensions, refer to the "Bearing Assembly Dimensions" table.)

JOURNAL PREPARATION (Continued)

Table 2 – Compensation for Temperature Difference - Journal to Gage Master Disc

Journal Diameter Change In Inches Per Degree Fahrenheit				
Size	5½x10	6x11	6½x12	7 x 12
Diameter	5.1910	5.6910	6.1910	7.0035
Diff °F	Compensation (warmer part larger by:)			
1	0.00003	0.00004	0.00004	0.00004
2	0.00007	0.00007	0.00008	0.00009
3	0.00010	0.00011	0.00012	0.00013
4	0.00013	0.00015	0.00016	0.00018
5	0.00017	0.00018	0.00020	0.00022
6	0.00020	0.00022	0.00024	0.00027
7	0.00023	0.00025	0.00028	0.00031
8	0.00027	0.00029	0.00032	0.00036
9	0.00030	0.00033	0.00036	0.00040
10	0.00033	0.00036	0.00040	0.00045
11	0.00036	0.00040	0.00044	0.00049
12	0.00040	0.00044	0.00047	0.00054
13	0.00043	0.00047	0.00051	0.00058
14	0.00046	0.00051	0.00055	0.00063
15	0.00050	0.00055	0.00059	0.00067
16	0.00053	0.00058	0.00063	0.00072
17	0.00056	0.00062	0.00067	0.00076
18	0.00060	0.00065	0.00071	0.00081
19	0.00063	0.00069	0.00075	0.00085
20	0.00066	0.00073	0.00079	0.00089

Journal Diameter Change In mm Per Degree Centigrade				
Size	5½x10	6x11	6½x12	7 x 12
Diameter	131.851	144.551	157.251	177.889
Diff °C	Compensation (warmer part larger by:)			
1	0.0015	0.0017	0.0018	0.0020
2	0.0030	0.0033	0.0036	0.0041
3	0.0045	0.0050	0.0054	0.0061
4	0.0061	0.0066	0.0072	0.0082
5	0.0076	0.0083	0.0090	0.0102
6	0.0091	0.0100	0.0109	0.0123
7	0.0106	0.0116	0.0127	0.0143
8	0.0121	0.0133	0.0145	0.0164
9	0.0136	0.0150	0.0163	0.0184
10	0.0152	0.0166	0.0181	0.0205
11	0.0167	0.0183	0.0199	0.0225

5) **Check inboard wear ring grooves.** Any groove deeper than .002” [0.051mm] requires the use of a Brenco composite wear ring. Do not use if grooves are deeper than .010” [0.25 mm]. See AAR Rule 1.2.8 for details.

6) **Check the fillet** for excessive galling or fretting. Verify its geometry with a journal fillet gauge. See Figure 3 (AAR Figure 4.6, 5.18). A 0.005” feeler gage must not fit between the gage and the top edge of the fillet for a substantial portion of the edge circumference.

JOURNAL PREPARATION **(Continued)**

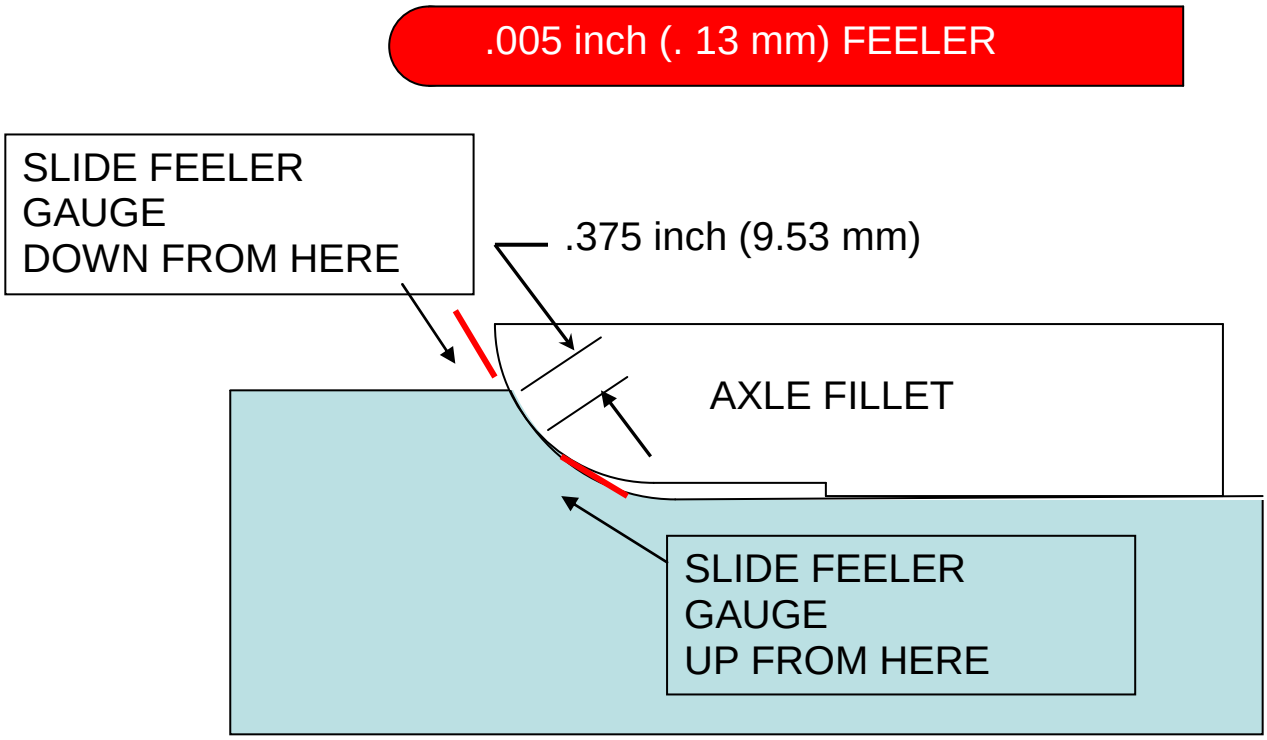

Figure 3 – Axle Fillet Gauge and Usage

7) **Check for the proper fillet position** with a "U-Dimension" gage (Prior to wheel mounting). See Figure 4 (AAR Fig. 5.24). This is especially important when the fillet has been reworked.

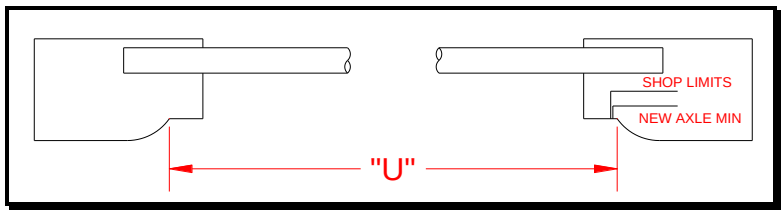

Figure 4 – Axle Fillet "U-dimension" Gage

Table 3 – "U-Dimension" Limits
Reference Figure 4.

U ± .010" [± 0.25 mm]		
Journal Size	Inches	mm
5½ x 10	66.063	1677.99
6 x 11	66.188	1681.16
6½ x 12	66.188	1681.16
7 x 12	67.183	1706.45
6½ x 9	69.356	1761.64

JOURNAL PREPARATION (Continued)

8) **Check for proper journal length** using a journal length gauge or "M" gauge. See Figure 5 (AAR Figure 5.26). This is especially important when the fillet has been reworked to ensure that the bearing will be properly clamped.

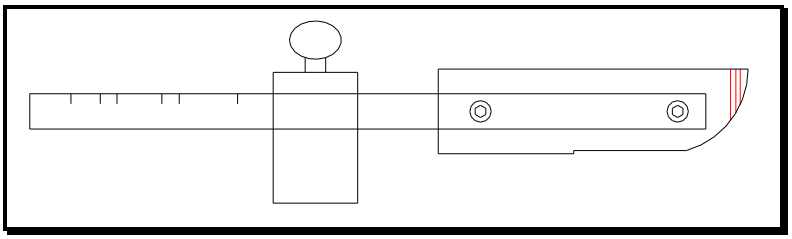

Figure 5 – Journal Length Gage

9) **Visually check the threads** in the end of the axle shaft for thread damage, dirt, and corrosion. Run a tap into the holes and blow out any debris if necessary. This is very important and is necessary to obtain the proper clamp load from torquing the cap screws.

10) **Apply a rust preventive / sealant to the dust guard area.** A moderate to heavy coating should be applied uniformly to the upper journal fillet area, and to the fillet shoulder (dust guard) area adjacent to the fillet. The coating should be one of the lead-free AAR Approved sealants. They are as follows:

- Tectyl 506 EH-WD - Daubert Chemical Company
- Texacoat 1044 - Texaco Company
- Rust Veto 342.1 - E.F. Houghton & Co.
- CN-471 - Perolin-Bird Archer, Ltd.
- Keystone Sealing Compound - Pennwalt, Inc.
- Keycote 601 - Pennwalt, Inc.
- Tectyl 517 - Ashland Petroleum Company
- RP-103 - Diversey Corporation

11) **Coat the shaft** with a moderate amount of clean, lead-free castor oil, SAE 40 to 50-weight mineral oil or light weight grease. This oil coating will lubricate the shaft or housing during mounting. A paint roller works well to evenly coat the journal surface. Note that the oil or grease supply must be kept covered and free of contaminants between applications.

BEARING PRESS

Bearings are installed by pressing them on the journal using a hydraulic bearing press.

DO NOT USE HEATERS TO EXPAND THE BEARING.

There are two basic types of hydraulic bearing press units. A portable type universal railroad bearing puller/installer is available through the Power Team Division, SPX Corporation (Was Owatonna Tool Company) or through their web site - www.powerteam.com.

A fixed hydraulic press, such as a wheel press, can also be used.

- The bearing press must include a gage that indicates press force. This gauge should be calibrated every 6-months of use.
- The bearing press must be capable of holding a specified pressure for a short period of time. A relief valve may be required to accomplish this.
- The bearing press must utilize a fixed pilot sleeve and mounting sleeve, or a telescoping pilot to guide the bearing onto the journal.

Refer to the equipment instructions for the proper use of the bearing press.

BEARING INSTALLATION

1) **The entire cartridge bearing unit, less end cap, is mounted all at one time.**

   DO NOT DISASSEMBLE THE BEARING. DAMAGE CAN RESULT.

2) **Install the bearing pilot sleeve** (for fixed pilot sleeve type presses) onto the end of the axle using the bolts supplied. They should be left slightly loose to allow the sleeve to align itself as the bearing is mounted.
3) Check that the cardboard center tube is still in place keeping the spacer properly positioned concentric to the cones.
4) **Slide the bearing over the pilot sleeve**. Allow the cardboard center tube to slide out.
5) **Align the bearing, pilot sleeve, journal, and mounting press** all on the same centerline. Failure to do this could result in damage to the bearing, shaft, or housing.

BEARING INSTALLATION (Continued)

6) **Press the bearing on** by pushing against the wear ring face. It may be helpful to rotate the bearing as it is being mounted, if this can be done safely. Do not press on the outer ring, seals, or other parts of the bearing as damage will result.

WARNING - FAILURE TO PUSH ON THE APPROPRIATE COMPONENT WILL RESULT IN INTERNAL BEARING DAMAGE.

7) Visually monitor the engagement of the backing ring to the fillet area to ensure that the backing ring fitted flange overlaps the shoulder and the bearing fully seats.

NOTE: The use of a fitted backing ring on a fitted axle is strongly recommended.

On fitted axles: The use of fitted backing rings is recommended for the best performance. Alternatively, the *Brenco True-Fit*™ backing ring is acceptable.

On non-fitted axles: The use of *Brenco's True-Fit*™ is recommended.

The use of the *Timken Sure-Fit*™ backing ring is NOT recommended!

8) **Seat the bearing and hold for 5 seconds**. After bearing movement has stopped, allow the press force to climb to the value listed in Table 4 (AAR Figure 4.64). Hold this pressure for a minimum of 5 seconds. This "spike" force ensures that the bearing is fully seated against the journal fillet and that the sealant has been fully displaced.

Table 4 – Seating Pressures (AAR Fig. 4.63)

Journal		Seating Pressure		
Class	Size	Tons	Metric Tonnes	Kilonewtons (kN)
D E F K L	5½ x 10 6 x 11 6½ x 12 6½ x 9 6 x 8	50 ± 5	45.4 ±4.5	445 ± 45
G	7 x 12	65 ± 5	59.0 ±4.5	580 ± 45
M	7 x 9			

9) **Rotate the bearing by hand** after mounting to insure freedom of movement. The bearing should be rotated three (3) times before checking mounted lateral due to grease stiffness and interference between the grease seal and grease seal wear ring. If the bearing fails to rotate by hand, then it is to be removed.

10) **Observe the sealant or grease** at the journal shoulder or "dust guard" area. The backing ring should have pushed up and formed a bead of sealant or grease completely around the juncture. Any gaps remaining should be filled in by brushing on additional sealant or grease at this time.

END CAP INSTALLATION

1) **Stamp the locking plate** as shown in Figure 8 (AAR Figure 4.76). Brenco locking plates come pre-stamped with a part number code, an "N" to indicate a new bearing, and the cup's date code. Optionally, the mounting shop code may also be present.
   - The wheel shop that mounts the bearing may stamp additional information as required. This will in no way effect the strength or function of the locking plate.

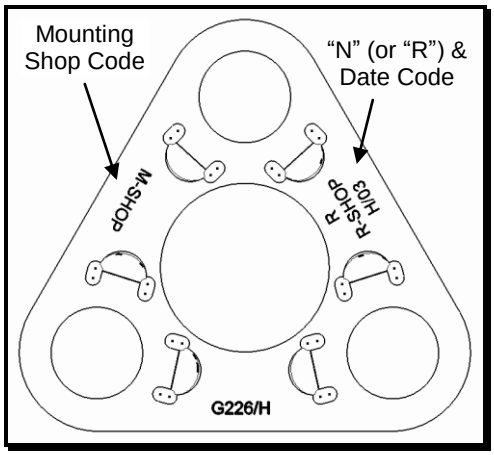

Figure 8 – Locking Plate Stamps

2) **Visually inspect the new cap screws** supplied with the bearing for a lubricant coating on the threads. If no lubricant coating can be detected, dip the threads in SAE 30W mineral oil or light weight grease may also be applied and will serve the same function.

3) **Place the end cap** and locking plate onto the outboard wear ring aligning the holes. Hand-start the cap screws into the axle holes. The cap screws should rotate freely in the end cap and axle holes. Running a tap through the threads may be necessary to clean or make minor repairs to the threads. In cases where a pipe plug is threaded into a threaded center hole in the end cap, the pipe plug should only be tightened by hand (10 lb*ft [14 N*m] max) prior to torquing the three (3) cap screws used for bearing retention.

4) **Run-up the cap screws** to a torque less than the final torque.

   Torque the cap screws using a properly calibrated click-type torque wrench. Tighten each cap screw with a slow and steady motion for a comfortable rotation angle. Moving screw to screw, continue increasing the torque until the proper torque value is reached on each screw as listed in Table 5 (AAR Figure 4.65).

Table 5 – Cap Screw Torque Values

Journal		Cap Screw		
Class	Size	Size	Torque (lb*ft)	Torque (N*m)
D	5½ x 10	7/8-9	160 ± 6.4	220 ± 8.8
E	6 x 11	1-8	290 ± 11.6	390 ± 15.6
F	6½ x 12	1 1/8-7	420 ± 16.8	570 ± 22.8
G	7 x 12	1 1/4-7	490 ± 19.6	660 ± 26.4
K	6½ x 9	1 1/8-7	420 ± 16.8	570 ± 22.8
L	6 x 8	1-8	290 ± 11.6	390 ± 15.6
M	7 x 9	1 1/8-7	420 ± 16.8	570 ± 22.8

Continue torquing for a minimum of two additional passes. Since tightening one screw will relieve the force on the others, the torque wrench passes must be repeated several times until no further screw movement is detected on any screw. A multi-spindle automated torque tool is also acceptable for use.

Torque wrench calibration should be checked weekly or, preferably, daily.

END CAP INSTALLATION (Continued)

5) **Bend the locking plate tabs** against the sides of the bolt heads. All tabs must be bent and each must rest flat against one of the cap screw hexagonal flats (AAR Figure 4.66).

6) **Check for proper mounted lateral (endplay).** The use of a magnetic base dial indicator or other similar type device are the recommended methods. See Figure 9 as an example of one method.

   a. Rotate the bearing several times by hand to distribute the grease in the bearing and to assure free rotation.

   b. Locate the magnetic base of the dial indicator on the cup OD with the indicator tip against the flat end of the wheel hub. Alternatively, the tip can be set against the head of a cap screw.

   c. Push the bearing outer ring or cup towards the wheel while rotating it slightly back and forth. Zero the dial indicator. Pull the bearing cup away from the wheel and read the lateral from the dial gage. The reading is not to exceed 0.015" [0.38 mm]. A reading of "0" is acceptable as long as the bearing can be rotated freely by hand.

Figure 9 – Checking Mounted Lateral (End-Play)

   d. Push the bearing cup back towards the wheel to verify the dial indicator returns to zero.

7) **Torque the center pipe plug (if the bearing is provided with this feature**). 1-3/4" [44.45 mm] pipe plugs are to be torqued to 122 +/-12 ft*lb (165 N*m +/-16 N*m). These pipe plugs are re-usable and can be removed for bearing / wheelset maintenance, but must be re-installed prior to operation.

BEARING REMOVAL

Bearings are removed using the bearing press. Refer to the equipment instructions for its proper use. Generally, it is set up with a collar to pull on the backing ring of the bearing and press on the end of the axle or pilot.

1) Remove the cap screws and locking plate.
2) Remove the end cap.
3) Remove the entire bearing from the axle by pulling on the backing ring face. Do not pull on the outer ring, seals, or other parts of the bearing as damage will result.

NOTE: The OEM bearing may be pressed three (3) times onto the journal and removed two (2) times without voiding the product warranty.

WARNING - FAILURE TO PULL (PUSH) ON THE APPROPRIATE COMPONENT WILL RESULT IN INTERNAL BEARING DAMAGE.

LUBRICATION

The Brenco bearing is designed with a seal that with proper handling and care will run for years without any substantial grease loss. Therefore, the bearing is not to be lubricated while in service. While grease life can vary with different service conditions such as load, speed, temperature, and environment, the grease in a freight application will normally survive a minimum of 10 years or 750k miles [1.2 M km].

MAINTENANCE

While in use, the bearings require no specific service or maintenance. However, care should be taken when performing maintenance in the area of the bearing to avoid damage to the seal or bearing itself. Extreme care must be exercised in the area of the bearing to insure that it does not become overheated. No welding is to be done on any bearing component and proper grounding of a wagon is necessary to insure no current can flow through the bearing.

During wagon or bogie maintenance inspections, bearings should be inspected for excessive grease leakage, physical damage, or any unusual conditions.

1) Some grease leakage is normal and comes from the purging of the seal pre-lube and the relieving of internal bearing pressures. This should NOT be wiped away. It will "set-up" and stop further leakage. The apparent amount of grease may be fairly large but this is usually only a small amount of grease mixed with contaminates. If the purging continues to the point of coating a significant amount of the surrounding areas, then Brenco's Service Engineering should be contacted.

MAINTENANCE (Continued)

2) Visually inspect the bearing for loose or damaged grease seals. Check for cracked or broken parts. Check for loose backing rings. Check for proper lateral. While rotating the bearing, check for noise or grinding. Any of these conditions is reason for bearing removal.

For more information on field inspection of bearings, please refer to Brenco Tech Forum 89-2, *Inspecting Installed Roller Bearings for Indications of Damage or Distress*.

OTHER

Bearings are removed and replaced in pairs using bearings of the same certificate number.

AAR Field Manual Rule 36, Section E states that an MD-11 (inspection) form must be initiated for bearings removed by a Hot Box Detector (HBD) for being suspected or confirmed as overheated, or for bearings removed by Acoustic Bearing Detectors (ABD). The MD-11 form is in the AAR Manual of Standards, Section G-II Figure 4.75. Mate bearings are inspected as well.

If any additional information is needed, please contact Amsted Rail Service Engineering.

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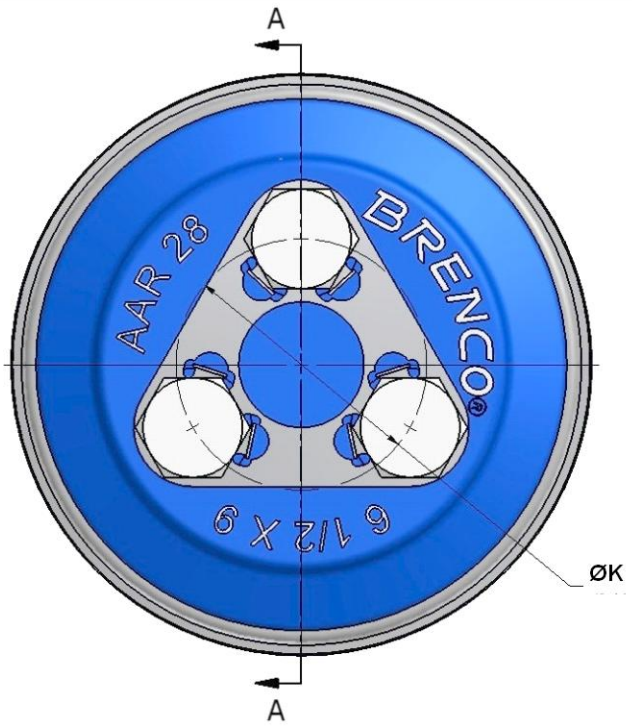
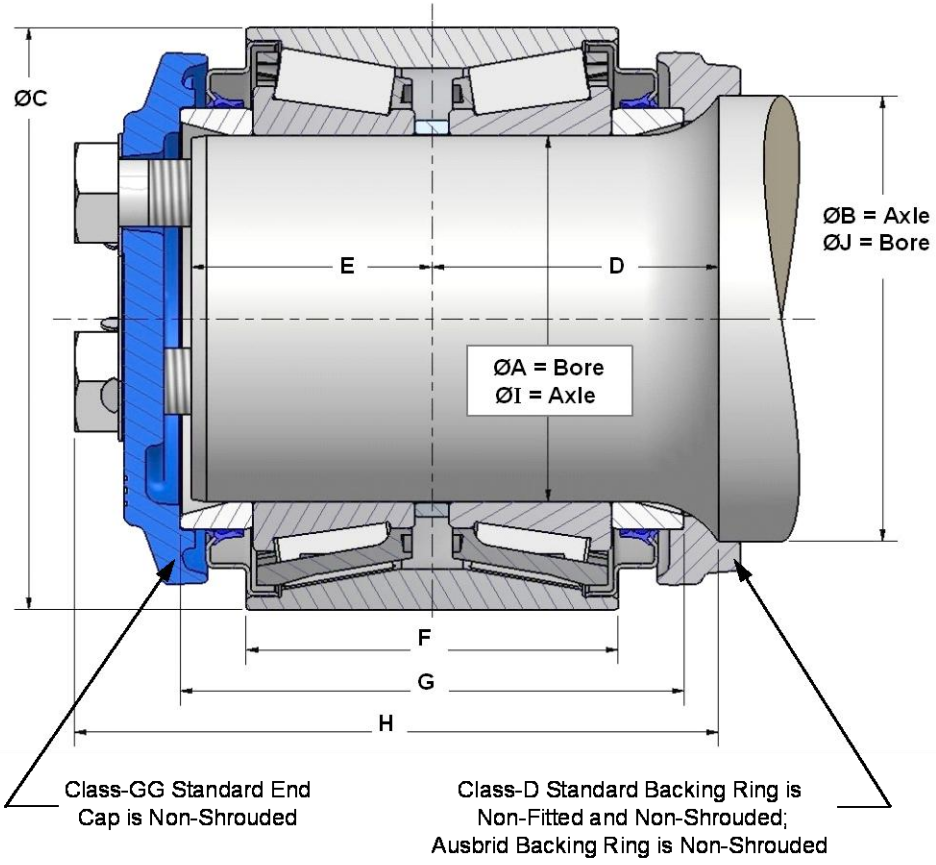
AMSTED RAIL – BRENCO
BEARINGS FOR AAR STYLE APPLICATIONS





Part Numbers For Standard Bearing Assemblies and Components:

CLASS/SIZE	AAR APPROVAL	ASSEMBLY NUMBER*	CONE	CUP	SPACER	WEAR RING	GREASE SEAL	END CAP ASSEMBLY			BACKING RING
								END CAP	CAP SCREW	LOCKING PLATE	
D - 5½ X 10	5A	1022ST	HM127446	HM127415XD	HM127446XA	1006Z	1007ST	1011	1012	1013	1015NZ
E - 6 X 11	5A	1122FSTP	HM129848	HM129814XD	HM129848XA	1106Z	1107ST	1111	1112	1113	1115FZ
F - 6½ X 12	5A	1222FSTP	HM133444	HM133416XD	HM133444XA	1206Z	1207ST	1211	1212	1213	1215FZ
G - 7 X 12	5A	1322STP	HM136948	HM136916XD	HM136948XA	1306Z	1307ST	1311	1312	1313	1315FZ
GG - 6½	n/a	1522AP	H337840	H337816XD	H337840XA	1506Z	1507ST	1511A	15125	1513	1515FZ
GG - 6 7/8	n/a	1622AP	H337844	H337816XD	H337844XA	1606Z	1507ST	1511A	15125	1513	1615FZ
K - 6½ X 9	28	G222P	HM133444	G202	G205	G206	G207B	G211	1212	1213	G215
M - 7 X 9	28	G322GP	G303A	G302	G305	G306	G307GA	G311	1212	1213	G315
7¼x9 Ausbrid®	n/a	AUG4H22P	HM136948	HM136916XD	HM136948XA	G406	G407B	AUG400	1312	1313	G415A

* Part numbers are for standard assemblies only. Contact Amsted Rail Customer Service for available options.

Inch Dimensions:

CLASS/SIZE	A	B	C	D	E	F	G	H	I	J	K	CAP SCREW	Basic Load Rating 3000 HRS. @ 500 RPM	
													C_{90} (lbf)	$C_{A\,90}$ (lbf)
D - 5½ X 10	5.1870	6.375	8.1875	5.50	4.56	6.000	8.93	11.71	5.1915	n/a	3.50	7/8-9 x 2	42,200	9,500
E - 6 X 11	5.6870	7.030 / 7.032	8.6875	5.94	5.00	6.437	9.50	12.66	5.6915	7.023 / 7.028	3.88	1-8 x 2 1/4	45,100	10,200
F - 6½ X 12	6.1870	7.530 / 7.532	9.9375	6.44	5.31	7.250	10.75	13.86	6.1915	7.523 / 7.528	4.25	1 1/8-7 x 2 1/2	61,300	13,800
G - 7 X 12	6.9995	8.000 / 8.002	10.875	5.94	5.13	7.312	10.63	13.15	7.0040	7.992 / 7.997	4.62	1 1/4-7 x 2 3/4	70,700	16,000
GG - 6½	6.4995	7.905 / 7.906	11.878	5.94	5.87	7.750	11.00	13.67	6.5040	7.896 / 7.901	5.00	7/8-9 x 2*	90,000	26,700
GG - 6 7/8	6.8745	7.870 / 7.873	11.878	5.94	5.81	7.750	11.00	13.67	6.8790	7.862 / 7.867	5.00	7/8-9 x 2*	90,000	26,700
K - 6½ X 9	6.1870	7.530 / 7.532	9.8375	4.85	4.09	6.299	8.53	11.91	6.1915	7.523 / 7.528	4.25	1 1/8-7 x 2 1/2	61,300	13,800
M - 7 X 9	6.4995	7.530 / 7.532	10.375	4.75	4.25	6.562	8.73	11.1	6.5040	7.523 / 7.528	4.25	1 1/8-7 x 2 1/2	69,000	14,800
7¼x9 Ausbrid®	6.9995	8.000 / 8.002	10.875	5.30	4.55	7.312	9.49	11.92	7.0040	7.992 / 7.997	4.62	1 1/4-7 x 2 3/4	70,700	16,000
PLUS/MINUS	+0.0010/-0.0000		+0.005/-0.000	NOM.	NOM.	NOM.	NOM.	MAX.	+0.0000/-0.0010			Special Grade 2 * Grade-5	(Radial)	(Thrust)

Metric Dimensions:

CLASS/SIZE	A	B	C	D	E	F	G	H	I	J	K	CAP SCREW	Basic Load Rating 3000 HRS. @ 500 RPM	
													C_{90} (kN)	$C_{A\,90}$ (kN)
D - 5½ X 10	131.750	161.93	207.96	139.7	115.9	152.40	226.8	297.4	131.864	n/a	88.9	7/8-9 x 2	188.0	42.5
E - 6 X 11	144.450	178.562 / 178.613	220.66	150.8	127.0	163.51	241.3	321.5	144.564	178.38 / 178.51	98.6	1-8 x 2 1/4	200.0	45.0
F - 6½ X 12	157.150	191.262 / 191.313	252.41	163.5	134.9	184.15	273.1	352.0	157.264	191.08 / 191.21	108.0	1 1/8-7 x 2 1/2	273.0	61.5
G - 7 X 12	177.787	203.200 / 203.251	276.23	150.8	130.2	185.72	269.9	334.1	177.902	203.00 / 203.12	117.3	1 1/4-7 x 2 3/4	314.5	71.0
GG - 6½	165.087	200.787 / 200.812	301.70	150.8	149.1	196.85	279.4	347.2	165.201	200.56 / 200.69	127.0	7/8-9 x 2*	400.5	119
GG - 6 7/8	174.612	199.898 / 199.974	301.70	150.8	147.6	196.85	279.4	347.2	174.727	199.69 / 199.82	127.0	7/8-9 x 2*	400.5	119
K - 6½ X 9	157.150	191.262 / 191.313	249.87	123.3	103.8	160.00	216.7	302.4	157.264	191.08 / 191.21	108.0	1 1/8-7 x 2 1/2	273.0	61.5
M - 7 X 9	165.087	191.262 / 191.313	263.52	120.6	108.0	166.67	221.8	281.9	165.201	191.08 / 191.21	108.0	1 1/8-7 x 2 1/2	307.0	65.8
7¼x9 Ausbrid®	177.787	203.200 / 203.251	276.23	134.5	115.5	185.72	240.9	302.8	177.902	203.00 / 203.12	117.3	1 1/4-7 x 2 3/4	314.5	71.0
PLUS/MINUS	+0.025/-0.000		+0.13/-0.00	NOM.	NOM.	NOM.	NOM.	MAX.	+0.000/-0.025			Special Grade 2 * Grade-5	(Radial)	(Thrust)