



OPERATION & MAINTENANCE

# SAF BEARING & HOUSING INSTALLATION INSTRUCTIONS

These instructions are provided to aid in the proper installation, operation and maintenance of PPI SAF spherical roller bearing units. They should be carefully read and followed. Failure to do so may result in unsatisfactory service as well as serious personal injury or property damage.

**CAUTION:** The reliability built in all PPI bearings can be realized in service only when they are correctly selected, properly installed, protected and maintained. The correct selection of bearings or mounted units requires that the magnitude and nature of all loads, speeds, alignment, mounting, operating requirements and maintenance be adequately considered. The selection of materials for and design of housing, shafting, fasteners, seals and accessories as well as provisions for installation and maintenance must follow good engineering principles.

Housings must be selected and installed with regard to the degree and direction of the forces that will be applied. Housings should not be used under tension loads except with adequate safety factors. For this reason pillow blocks are best suited to withstand radial loads passing through the base. When this cannot be done, PPI Engineering should be consulted.

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## IMPORTANT: BEFORE YOU BEGIN

- A. **CLEANLINESS** – Keep dirt, water, and metal chips off all parts. If cleaning the bearing is necessary, use only the following solvents: benzene, chloroethane, kerosene, trichloroethane, mineral spirits, naphtha
- B. **CAREFUL HANDLING** – Hammer blows, overheating, or improper use of force can damage precision parts.
- C. **ADAPTER SLEEVE TIGHTENING** – Bearings must be correctly forced up their tapered adapter sleeves to obtain the recommended clearance removal. When mounting bearings on a used or worn shaft, care must be taken to clean up the shaft journal and rebuild as necessary, to the required tolerances. Never replace bearings on a shaft which is bent or which has been damaged or softened by a torch.
- D. **BOLTS** – Housing mounting bolts and cap bolt tightness is important to adequately support loads.
- E. **FREE ROTATION AND ALIGNMENT** – Check for free rotation before startup to assure that final alignment is proper.
- F. **LUBRICATION** – Units must be adequately lubricated. A bearing that is not properly lubricated will fail and possibly cause damage to other components.

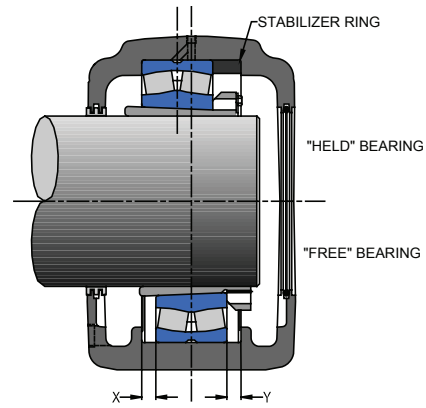
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## INSTALLATION

1. **PREPARATION** – Remove parts from carton but do not remove parts from individual wrapping until ready to use. The preservative on the bearing is compatible with most petroleum lubricants and does not need to be removed. Cap and base are machined as matched units and are not interchangeable. Mark each before taking apart to prevent mixing with other bases or caps.
2. **MOUNT HOUSING BASES** – Be sure housing support plate is flat and free from distortion. Bolt base to support square with the shaft. Draw up base mounting bolts snugly, but not to final tightness.
3. **CHECK SHAFT** – Inspect shaft. Insure that the shaft is smooth, straight, and within commercial tolerances.
4. Clean shaft & adapter sleeve ID, removing any oil or rust-preventative.
5. Measure the internal clearance of the bearing before mounting. Do this by sliding the largest possible feeler gage across the top of the rollers, between the rollers and outer ring raceway. A snug or hard feel is recommended. It must be possible to remove the shim by pulling it straight out.

6. **ASSEMBLE ON SHAFT** – Slide the bearing parts onto the shaft in the following sequence
  - a. Seal Ring
  - b. Adapter Sleeve
  - c. Bearing
  - d. Lockwasher & nut
  - e. Seal Ring

Apply oil or a powdered dry lubricant to tapered surface and threads of adapter sleeve. Also apply to the inside face of the locknut.



7. **POSITION ON SHAFT** – Locate the bearing and sleeve snugly on the shaft in the desired position. Fixed bearings are located with the bearing face opposite the locknut up against the housing shoulder. Expansion bearings are normally centered in the housing seal between the shoulders to allow for shaft expansion. A shaft with more than one bearing will have only one fixed pillow block. The fixed unit is usually located adjacent to the drive. The fixed bearing takes any thrust loads. In locating, take into account that tightening correctly will move the bearing further up the tapered sleeve.

8. **TIGHTEN BEARINGS** – Tighten the locknut forcing the bearing up the tapered OD of the sleeve until the bearing measured clearance is reduced by the amount shown in the table to the right. Follow the tightening procedures in step 7.

**EXAMPLE:**

22228 bearing

Measured unmounted clearance = 0.0070"

Bearing clearance reduction = 0.0026" to 0.0035" (from Table 1)

Bearing maximum final clearance = 0.0070" - 0.0026" = 0.0044"

Bearing minimum final clearance = 0.0070" - 0.0035" = 0.0035"

9. Using a spanner wrench, tighten the locknut until snug. Hold the adapter sleeve from turning until firmly seated. Use a heavy-duty spanner wrench and strike on its handle with a hammer so as to tighten the unit. Retighten the locknut and repeat until the correct adjustment as specified in the table above.

10. **SECURE LOCKNUT** – Bend a tang of the lockwasher down into one of the locknut slots. Use the slot, which is most nearly lined up with a tang. On larger units with a lockplate, engage the key of the lockplate in the adapter slot and bolt to the locknut. Use wire to lock bolts. Insert stabilizer ring in fixed bearing housing, on the locknut side.

11. **INSTALL SHAFT ASSEMBLY** – Lower slowly and position bearings and seals to engage housing base. If bearing outer rings become misaligned do not force back into position. Instead, carefully work back by turning and sliding. Be sure that the inside of the housing is clean.

12. **LUBRICATE** – Lubricate before operation. Consult the section on lubrication.

13. **INSTALL HOUSING CAP** – Grease the bearing seal grooves in the housing cap and place over the bearing after wiping the mating surfaces. The two dowel pins will align the cap with the lower housing half. Each cap must be matched with its mating lower half, as these parts are not interchangeable. Bolts should be fully tightened with a torque wrench to values in Table 2. Use oil only on the bolt threads.

**TABLE 1**

Size*	Bearing Clearance Reduction			
	min (in)	MAX (in)	min (mm)	MAX (mm)
09	0.0010	0.0012	0,025	0,030
10-13	0.0012	0.0016	0,030	0,040
15-16	0.0016	0.0020	0,040	0,050
17-20	0.0018	0.0024	0,045	0,060
22-24	0.0020	0.0028	0,050	0,070
26-28	0.0026	0.0035	0,065	0,090
30-32	0.0030	0.0039	0,075	0,100
34-36	0.0031	0.0043	0,080	0,110
38-40	0.0035	0.0051	0,090	0,130
44	0.0039	0.0055	0,100	0,140
48	0.0043	0.0059	0,110	0,150
52-56	0.0047	0.0067	0,120	0,170
60	0.0051	0.0075	0,130	0,190
64-68	0.0059	0.0083	0,150	0,210
72-80	0.0067	0.0091	0,170	0,230

\*Size represents the last two numbers on the pillow block housing being installed.

**TABLE 2**

**Housing Cap Bolt Tightening Torque**

Pillow Blocks	Bolt Size	Torque (ft-lb)	Torque (N-m)
SAF509-510	M10	30	40
SAF511-513	M12	60	81
SAF515	M12	60	81
SAF516	M12	60	81
SAF517	M16	125	170
SAF518	M12	60	81
SAF520 - 522	M16	125	170
SAF524	M16	125	170
SAF526-528	M20	250	339
SAF530	M20	250	339
SAF532	M20	250	339
SAF534	M24	500	678
SAF536-538	M24	500	678
SAF540	M24	500	678
SAF544	M24	500	678
SAF048	M24	500	678
SAF052	M24	500	678
SAF056	M30	750	1,017
SDAF152	M30	750	1,017
SDAF156 - 160	M30	750	1,017
SDAF164	M42	2,000	2,712
SDAF168 - 180	M42	2,000	2,712
SDAF-184	M42	2,000	2,712
SDAF 232/500	M48	2,860	3,878

## GREASE LUBRICATION

Grease lubrication is recommended wherever conditions in Table 3 exist. For conditions, which are not completely covered In Table 3 consult PPI. The greases listed are for a general guide. Don't use lubricants of dibasic ester types in bearings having polymeric roller cages without consulting PPI. A reputable lubricant manufacturer should be consulted to confirm the lubricant selection and application.

PPI recommends a high-quality, #2 Lithium Complex based mineral oil grease with a viscosity of 200 to 250. Mobilgrease XHP222 is suggested to be used on conveyor pulley applications, including the SSP. When used with an automatic greasing system, a #1 Lithium Complex grease is recommended, such as Mobilgrease XHP221 This is compatible with the initial grease fill. For ambient temperatures from -40°F to 0°F (-40°C to -18°C), it is recommended that a Lithium Complex based synthetic oil grease is used, such as Mobilith SHC220. Suggested greasing intervals during initial use are as follows:

**TABLE 3**  
**SUGGESTED GREASING INTERVALS**

Conditions	up to 120°F (up to 50°C)	120° to 200°F (50° to 90° C)
Clean	2 to 6 months	1 to 2 months
Moderate	Monthly	1 to 4 weeks
Dirty	Weekly	1 to 7 days
Extremely Dirty	Daily	Every Shift
Turnover Pulleys	Daily to Weekly	Every Shift

Check the grease condition for excessive oiliness or dirt, and adjust greasing frequency accordingly. For conditions and/or temperatures outside of this range, consult with a reputable lubricant supplier.

Standard manufacturing practice is to 100% grease fill conveyor pulley SAF pillow block bearings at the factory. This reduces the possibility of condensation in the housing. This is the preferred method for larger, slower speed bearings, such as those used on pulleys. Therefore, some grease may be purged out during the first "running" of the pulley. This is considered normal.

PPI cannot be held responsible for performance of individual batches or grease. Changes In lubricant specifications, performance, and lubricant guarantees are the responsibility of the lubricant manufacturer.

**HOW TO GREASE** - Grease these units by packing the bearing full and filling the reservoir on both sides of the bearing up to the bottom of the shaft. Grease should be forced in one side of the bearing until it comes out the other side all the way around. For slow speed applications bearings and housings can be 100% filled. This is good practice for lubrication under heavy loads, moisture or dirt. To assure 100% fill, add final grease through the fitting after final assembly - until it comes out the seals

**RE-LUBRICATION AFTER RUNNING** - Re-lubrication of units in service should be through the fitting in the center of the unit. The amount of grease used should be enough to purge old grease from the bearing only (not the entire pillow block) and form a cushion of grease adjacent to the bearing face

**COMPLETE ASSEMBLY** - With the mounting bolts snug, check the alignment and freedom of rotation. Visually check the clearance between the shaft and the bore of the seal. Measure the distance between the outside diameter of the seal and the diameter of the housing counter-bore in three places. Be sure that each measurement is taken 90 degrees from the previous measurement. All three measurements should be uniform to insure proper alignment.

Align by shimming or shifting as necessary. Use large area shims to avoid distorting the housing and pinching the bearing. Appropriate use of stop bars against faces or ends of feet opposite the direction of load or vibration to avoid shifting of the housing is recommended. Finally, tighten or torque mounting bolts securely. Up to SAE Grade 5 UNC (DIN 912 - 8.8) mounting bolts can be used, properly torque, to mount cast iron housing.

HOUSING	BORE	BEARING	ADAPTER	LOCATING RING	TRIPLE LABYRINTH SEAL	"TAC" SEAL	END COVER	SHAFT EXTENSION FOR ENDCAP
Part #	Dia. (in)	Part #	Part #	Part #	Part #	Part #	Part #	"X"
SAF509	1 7/16	22209K	HA309	FR85X8	TS09	-	601001C	1
SAF510	1 11/16	22210K	HA310	FR90X10	TS10	-	601112C	1 1/16
SAF511	1 15/16	22211K	HA311	FR100X8	TS11	602250	601003C	1 1/16
FSAF513	2 3/16	22213K	HA313	FR130X10	TS13	-	601004C	1 1/4
SAF513								
FSAF515	2 7/16	22215K	HA315	FR130X10	TS15	602176	601005C	1 5/16
SAF515								
FSAF516	2 11/16	22216K	HA316	FR140X10	TS16	-	601006C	1 7/16
SAF516								
FSAF517	2 15/16	22217K	HA317	FR150X10	TS17	602014	601007C	1 9/16
SAF517								
FSAF518	3 3/16	22218K	HA318	FR160X10	TS18	-	601008C	1 5/8
SAF518								
FSAF520	3 7/16	22220K	HA320	FR180X10	TS20	602018	601010C	1 7/8
SAF520								
SAF522	3 15/16	22222K	HA322	FR200X10	TS22	602019	601011C	2 1/16
SAF524	4 3/16	22224K	HA3214	FR215X10	TS24	602251	601012C	2 3/16
SAF526	4 7/16	22226K	HA3126	FR230X10	TS26	602022	601013C	2 3/8
SAF528	4 15/16	22228K	HA3128	FR250X10	TS28	602023	601015C	2 1/2
SAF530	5 3/16	22230K	HA3130	FR270X10	TS30	602252	601016C	2 11/16
SAF532	5 7/16	22232K	HA3132	FR290X10	TS32	602206	601025C	2 7/8
SAF534	5 15/16	22234K	HA3134	FR310X10	TS34	602030	601028C	3 1/16
SAF536	6 7/16	22236K	HA3136	FR320X10	TS36	602035	601030C	3 1/8
SAF538	6 15/16	22238K	HA3138	FR340X10	TS38	601181	601032C	3 1/4
SAF544	7 15/16	22244K	HA3144	FR400X10	TS44	602047	601033C	3 3/4
SAF048	8 7/16	23048K	HA3048X807	FR340X10	TS48X807	-	-	3 9/16
	8 15/16		HA3048X815		TS48X815	-		
SAF052	9 7/16	23052K	HA3052X907	FR400X10	TS52X907	-	-	4
SAF056	9 15/16	23056K	HA3056X915	FR420X10	TS56X915	-	-	4
	10 7/16		HA3056X1007		TS56X1007	-		
SDAF152	9 7/16	23152K	HA3052X907	FR440X10	TS152X907	-	-	4.625
SDAF156	9 15/16	23156K	HA3056X915	FR460X10	TS156X915	-	-	4.75
	10 7/16		HA3056X1007		TS156X1007	-		
SDAF160	10 15/16	23160K	HA3160X1015	FR500X10	TS160X1015	-	-	5.25
	11	23160K	HA3160X1100	FR500X10	TS160X1100	-		
SDAF164	12	23164K	HA3164X1200	FR540X10	TS164X1200	-	-	5.5
SDAF168	12 7/16	23168K	HA3168X1207	FR580X10	TS168X1207	-	-	6
SDAF172	13 1/2	23172K	HA3172X1308	FR600X10	TS172X1308	-	-	6
SDAF176	14	23176K	HA3176X1400	FR620X10	TS176X1400	-	-	6
SDAF180	15	23180K	HA3180X1500	FR650X10	TS180X1500	-	-	6.5



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