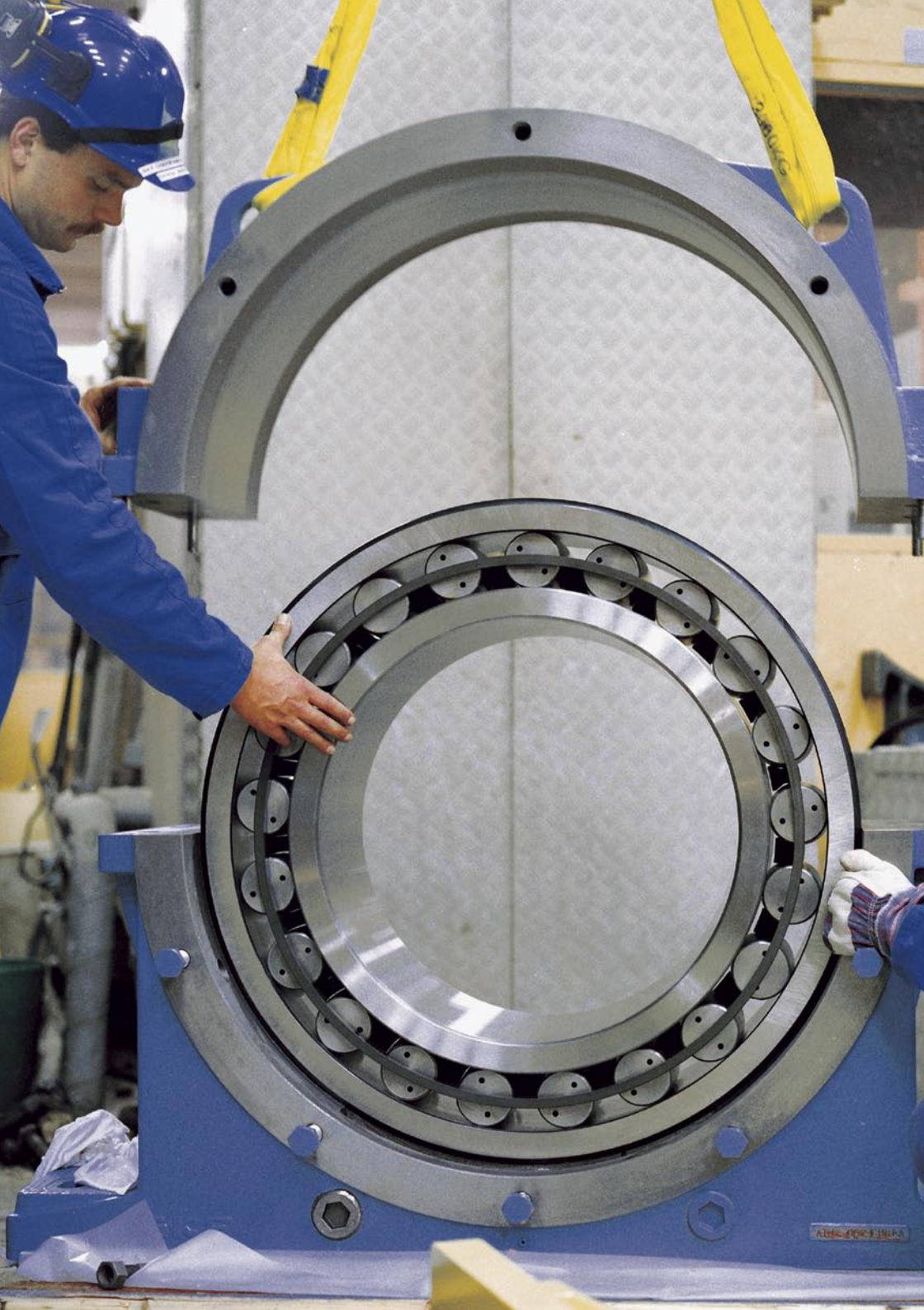


Mounting bearing housings

Introduction

The SKF standard assortment of bearing housings includes:

- split plummer (pillow) block housings
- one-piece plummer (pillow) block housings
- flanged housings
- take-up housings

SKF bearing housings are generally made of grey cast iron. The most popular plummer (pillow) block housings are also available in spheroidal graphite cast iron or cast steel for applications where extra strength is required. The bearing housings are intended primarily for self-aligning ball bearings, spherical roller bearings and CARB toroidal roller bearings.

Most SKF bearing housings are supplied together with mounting instructions. Information about how to mount and assemble split plummer (pillow) block housings is also included in this chapter. Contact the SKF application engineering service for information about mounting special SKF housings for specific applications such as:

- conveyors and drums
- converters
- tube mills and rotary furnaces
- paper machines
- wind turbines
- pinions of open gears

For additional information about SKF maintenance and lubrication products and tools, visit www.skf.com and www.mapro.skf.com.

For detailed mounting instructions for specific bearing housings, visit www.skf.com/mount.

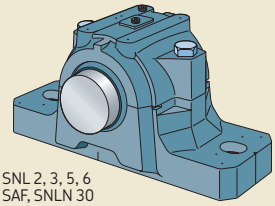
The SKF Reliability Maintenance Institute (RMI) offers a comprehensive range of training courses (→ *Training*, starting on **page 326**). Contact your local SKF representative for additional information, or visit www.skf.com/services.

Selecting replacement parts

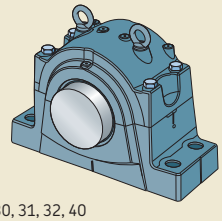
SKF bearing housings are available in a wide range of styles. They can be used with various seals and for different bearing arrangements. Consequently, care should be taken when selecting a replacement housing. A new housing should match the original part with regard to:

- the housing style (→ **fig. 1** and **table 1**, **page 126**)
- the housing variant (→ **table 2**, **page 127**)
- the bearing arrangement (→ **fig. 2**, **page 127**)
- the sealing solution and configuration (→ **table 3**, **page 128** and **fig. 3**, **page 129**)

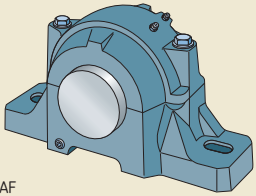
Fig. 1



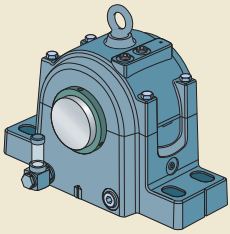
SNL 2, 3, 5, 6
SAF, SNLN 30



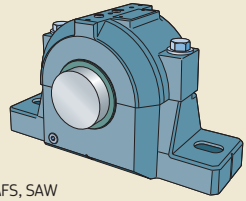
SNL 30, 31, 32, 40



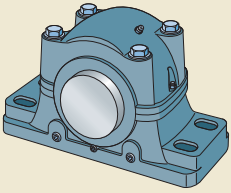
SAF



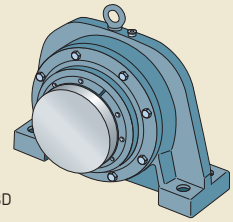
SONL



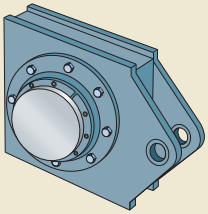
SAFS, SAW



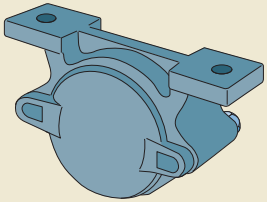
SDAF



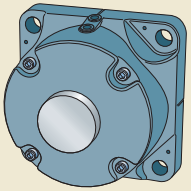
SBD



THD



TVN



FNL

Table 1

SKF standard bearing housings

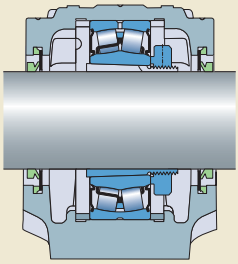
Housings Style/series	Replaced by	Description
FNL		Cast iron flanged housing, having a triangular or square form, with double-lip seals
FSNL		Cast iron split plummer (pillow) block housing with four bolt holes in the base
SAF		Cast iron split plummer (pillow) block housing
SAFS		Cast steel split plummer (pillow) block housing
SAW		Cast iron split plummer (pillow) block housing
SBD		Cast iron one-piece plummer (pillow) block housing with labyrinth seals
SD 31	**SNL 31**	Cast iron split plummer (pillow) block housing
SDAF		Cast iron split plummer (pillow) block housing
SDG	**SNL 32, 40**	Cast iron split plummer (pillow) block housing
SDJC 31	**SNL 31**	Cast iron split plummer (pillow) block housing
SN 2, 3, 5, 6	**SNL 2, 3, 5, 6**	Cast iron split plummer (pillow) block housing
SN 30	**SNLN 30**	Cast iron split plummer (pillow) block housing
SNA 2, 3, 5, 6	**SNL 2, 3, 5, 6**	Cast iron split plummer (pillow) block housing
SNH 2, 3, 5, 6	**SNL 2, 3, 5, 6**	Cast iron split plummer (pillow) block housing
SNL 2, 3, 5, 6		Cast iron split plummer (pillow) block housing
SNLN 30		Cast iron split plummer (pillow) block housing
SNL 30		Cast iron split plummer (pillow) block housing
SNL 31		Cast iron split plummer (pillow) block housing
SNL 32		Cast iron split plummer (pillow) block housing
SNL 40		Cast iron split plummer (pillow) block housing
SNLD		Spheroidal graphite cast iron split plummer (pillow) block housing
SNT		Cast steel split plummer (pillow) block housing with felt seals
SOFN	**SONL**	Cast iron split plummer (pillow) block housing for oil lubrication, with labyrinth seals
SONL		Cast iron split plummer (pillow) block housing for oil lubrication, with labyrinth seals
SSNHD	**SSNLD**	Spheroidal graphite cast iron split plummer (pillow) block housing with a solid base
SSNLD		Spheroidal graphite cast iron split plummer (pillow) block housing with a solid base
THD		Cast iron take-up housing
TVN		One-piece cast iron plummer (pillow) block housing with felt seals
7225	**FNL**	Cast iron flanged housing, having a triangular or square form, with felt seals

Table 2

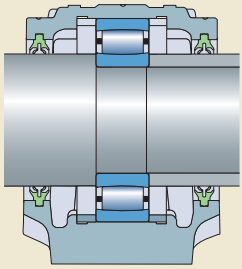
SKF standard bearing housing variants

Designation Suffix	Description
A	Housing for a shaft end
B	Housing for a through shaft
F	Housing for a locating bearing arrangement
G	Housing for a bearing with a cylindrical bore on a stepped shaft
K7	Housing with a seat diameter to K7 tolerance class
L	Housing for non-locating bearing arrangement
/MS1	Two drilled holes in the base for attachment bolts
/MS2	Four drilled holes in the base for attachment bolts
SN	Housing with a drilled and tapped hole for a sensor
TURA	Housing prepared for oil lubrication, with labyrinth seals
TURT	Housing prepared for oil lubrication, with labyrinth seals
TURU	Housing prepared for oil lubrication, with labyrinth seals
V	Housing with a grease escape hole in the base

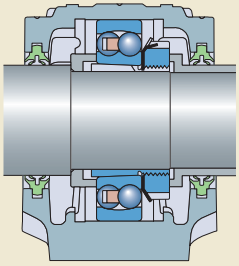
Fig. 2



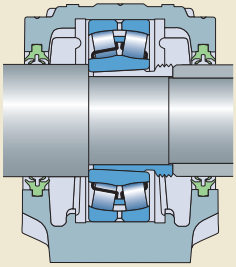
Bearing on an adapter sleeve on a plain shaft



Bearing on a cylindrical seat on a stepped shaft



Bearing on an adapter sleeve on a stepped shaft



Bearing on a withdrawal sleeve on a stepped shaft

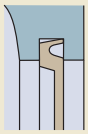
Table 3

Standard sealing solutions for SKF bearing housings

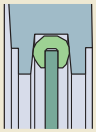
Series designation	Description
Seals for metric series housings	
ASNH	End cover for SNL housings
ETS	End cover for large SNL housings
FS	Felt strip (split)
TS	Labyrinth seal for large SNL housings (solid)
TFL	Double-lip seal for flanged housings (solid)
TNF	Taconite heavy-duty seal with radial labyrinth for large SNL housings (solid)
TSD .. U	U-design labyrinth oil seal[1)]
TSN .. A	V-ring seals (solid)
TSN .. C	Felt ring seals (split)
TSN .. CB	Graphited felt ring seals (split)
TSN .. L	Four-lip seals (split)
TSN .. NC	Taconite heavy-duty seal with axial labyrinth (solid)
TSN .. ND	Taconite heavy-duty seal with radial labyrinth (solid)
TSN .. S	Labyrinth ring (solid)
TSN .. TURU	U-design labyrinth oil seal[1)]
Seals for inch series housings	
B-17024-	Nitrile rubber contact element for a PosiTrac Plus seal (solid)
EPR	End cover (plug)
LER	Labyrinth ring (solid)
LOR	PosiTrac seal: labyrinth ring with an O-ring inside the bore (solid)
TER	Taconite seal with an inboard felt seal and outboard contact seal (solid)
TER-V	Taconite seal with an inboard felt seal and outboard V-ring (solid)

[1)] Delivered as a complete unit only, i.e. modified housing with seals.

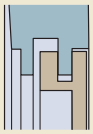
Fig. 3



ASNH

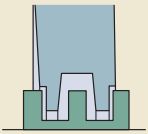


EPR

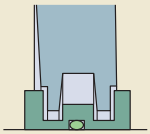


ETS

FS

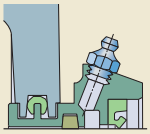


LER

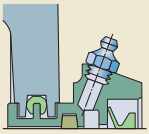


LOR

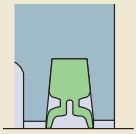
LOR + B-17024-



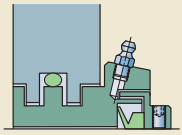
TER



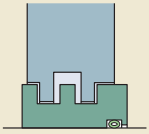
TER-V



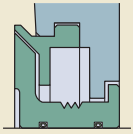
TFL



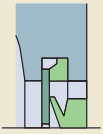
TNF



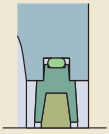
TS



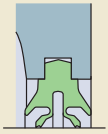
TSD .. U



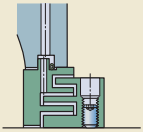
TSN .. A



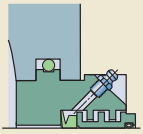
TSN .. C



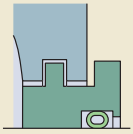
TSN .. L



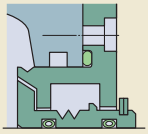
TSN .. NC



TSN .. ND



TSN .. S



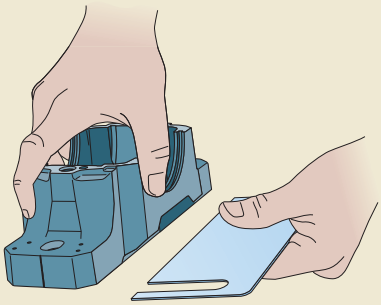
TSN .. TURU

Preparations prior to mounting

Prior to mounting, do the following:

- Make sure that the work area is clean.
- Study any drawings or instructions to determine the correct order in which to assemble the various components.
- Make sure that all the necessary parts and tools are at hand.
- Check that the support surface of the housing is clean. The support surface should not be painted.
- Check that the support surface conforms to the requirements for flatness and rigidity. To prevent deformation to the housing bore, SKF recommends that the flatness of the surface is within IT7 tolerance grade (→ **Appendix C**, **page 385**). The surface should be finished to $R_a \leq 12{,}5$ µm.
- Before reusing a housing, clean the housing thoroughly and replace all wear parts, e.g. contact seals, O-rings or rubber cords.

Fig. 4



Using shims

The elevation of the centre height of plummer (pillow) block housings can be adjusted with shims. When using a shim, make sure that the shim covers the complete contact surface between the housing base and the support surface (→ **fig. 4**).

Bolts

If recommendations about the attachment bolts or nuts are not available, SKF recommends using the following to attach the housing to the support surface (→ **fig. 5**):

- hexagon head bolts in accordance with EN ISO 4014:2000
- hexagon socket head cap bolts in accordance with EN ISO 4762:1998
- hexagon nuts in accordance with EN ISO 4032:2000
- flat washers in accordance with EN ISO 7089

If the load acts vertically to the support surface, 8.8 class bolts or nuts can be used. If the load does not act vertically, 10.9 class bolts or nuts should be used.

Tighten all cap bolts and attachment bolts using the recommended torque values listed in **table 4**. Inch series housings use cap bolts from various classes. Tighten the cap bolts on these housings using the torque values listed in the mounting instructions supplied with the housings.

Fig. 5

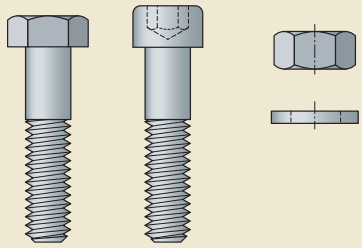


Table 4

Recommended tightening torque values for attachment bolts and cap bolts, class 8.8

Bolt size	Tightening torque Attachment bolts		Cap bolts[1]	
mm/inch	Nm	ft.lbf	Nm	ft.lbf
10	45	34	50	37
12	80	60	80	60
16	200	150	150	110
20	385	285	200	150
24	665	485	350	260
30	1 310	970	400	300
36	2 280	1 690	600	445
42	3 640	2 700	850	630
48	5 450	4 030	1 250	920
56	8 710	6 420	–	–
64	13 100	9 660	–	–
72	18 800	13 900	–	–
1/2	95	70	–	–
5/8	185	135	–	–
3/4	320	235	–	–
7/8	515	380	–	–
1	770	570	–	–
1 1/8	1 090	800	–	–
1 1/4	1 530	1 130	–	–
1 3/8	2 020	1 490	–	–
1 1/2	2 650	1 950	–	–

[1] For inch series housings, the recommended tightening torque is supplied with the housing.

Using locating (stabilizing) rings

The width of the bearing seat in most SKF standard bearing housings is sufficiently wide to enable axial displacement "s" of the widest bearing that fits the housing (→ **fig. 6**). For locating bearing arrangements, which have to provide axial location of the shaft in both directions, locating rings must be used to locate the outer ring of the bearing in the housing seat (→ **fig. 7**). SKF locating rings are identified by the prefix FRB followed by the size (width/outside diameter) in millimetres uncoded, e.g. FRB 11.5/100 (→ **fig. 8**).

CARB toroidal roller bearings are an exception. These non-locating bearings cannot accommodate axial loads, but can accommodate axial displacement within the bearing. Therefore, the outer ring must be located axially in its seat by a locating ring on each side.

Typically, two locating rings are required for one housing. One ring should be placed on each side of the bearing. If only one locating ring is required, it should be inserted on the same side as the lock nut. When placing a locating ring in position, make sure that the open end of the locating ring is positioned upwards (→ **fig. 12**, **page 134**).

Very large SNL housings, starting from sizes 3076, 3168, 3264 and 4076 are available in two variants depending on the bearing position. The housing seat is machined to suit: Housings for the locating bearing position are identified by the designation suffix F and do not require locating rings. Housings for the non-locating bearing position are identified by the designation suffix L.

CAUTION: When mounting a CARB toroidal roller bearing, a locating housing (designation suffix F) must be used.

Fig. 6

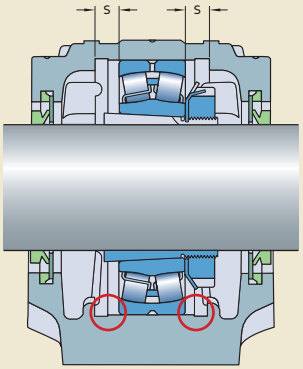


Fig. 7

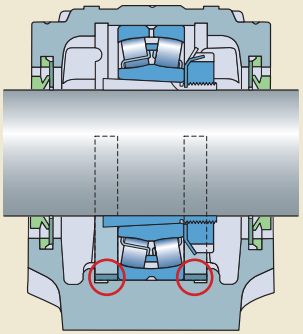
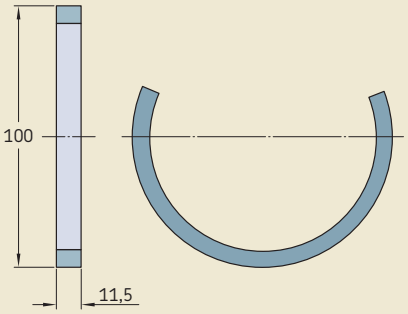


Fig. 8

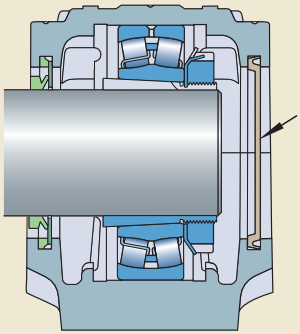


FRB 11.5/100

Using end covers

SKF bearing housings at the end of a shaft should be fitted with an end cover (plug). End covers typically fit into the seal groove (→ **fig. 9**).

Fig. 9



Installing split or solid seals

Split plummer (pillow) block housings are available with either split or solid seals. Split seals are easy to mount: the seal halves fit into the seal grooves in the housing base and cap. Solid seals have to be slid onto the shaft. Be sure that the seal is oriented correctly, as many solid seals are not symmetrical.

Mounting standard split plummer (pillow) block housings

When mounting plummer (pillow) block housings, carefully follow the guidelines provided under *Preparations prior to mounting* on **page 130** as well as the additional guidelines below:

NOTE: Seals suitable for plummer (pillow) block housings are typically supplied with mounting instructions.

1 Prepare the shaft:
- Mount any components that are on the shaft between the two bearing positions. If solid seals are used, this includes the inboard seals.
- Mount the bearings on each side of the shaft. For grease lubrication, completely fill the bearings with grease.
- If the shaft is stepped, mount distance rings, if necessary.

NOTE: Distance rings are not supplied with the housings.

- If solid seals are used, mount the outboard seals on each end of the shaft. If a housing is to be used at the end of the shaft, omit the seal. An end cover will be used in the housing instead.

2 Determine the position of the housings:
- If the housing is used for a stepped shaft and the housing bore has different diameters, the position is fixed by the housing bore diameters.
- If the housing has the same bore diameter on both sides, consider the position of the grease fitting in the cap. When relubricating self-aligning ball bearings and CARB toroidal roller bearings from the side, the housing must be positioned so that the grease fitting is on the opposite side of the lock nut.
- When a housing is located at the end of a shaft, the grease fitting on the cap must be positioned at the cover side.

Fig. 10

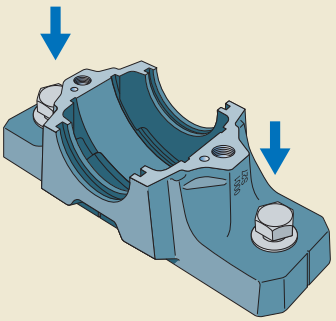


Fig. 11

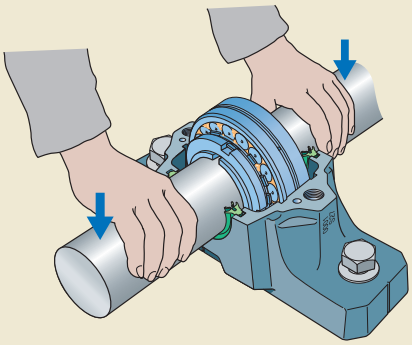
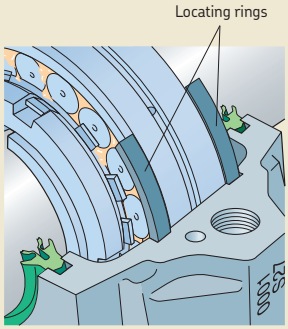


Fig. 12



3 Position the housing bases on the support surface. Fit the attachment bolts (→ **fig. 10**), but do not tighten them. If split seals are used, insert a seal half in each housing base groove, where applicable.
4 Place the prepared shaft in the housing base(s) (→ **fig. 11**). Be careful not to damage the already installed seals.
5 If required, put a locating ring on each side of the locating bearing (→ *Using locating (stabilizing) rings*, **page 132**). Make sure that the open end of the locating ring is positioned upwards (→ **fig. 12**).

NOTE: Non-locating CARB toroidal roller bearings always require a locating ring on both sides.

6 Carefully align the housing bases. Then lightly tighten the attachment bolts.

NOTE: SNL housings and many other SKF housings have vertical markings on the housing base ends and side faces, indicating the bearing seat centre (→ **fig. 13**).

7 Fill the housing bases with the recommended quantity of grease. SKF recommends filling the free space at both sides of the bearing seat up to
– 40%, when relubricating from the side of the bearing.
– 20%, when relubricating through the annular groove and the lubrication holes in the outer ring.

NOTE: Several housings have a marking indicating a 40% filling grade level (→ **fig. 14**).

8 If required, put the end cover into the seal groove of the housing base.
9 If split seals are used, insert the remaining seal halves in the seal grooves of the two housing caps (→ **fig. 15**). If applicable, fill the space between the inner seal lips with grease.

Fig. 13

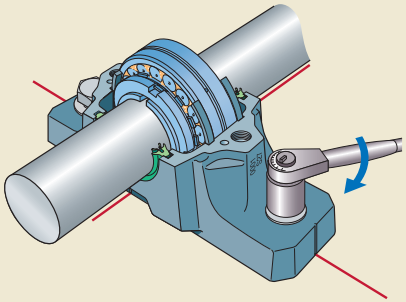


Fig. 14

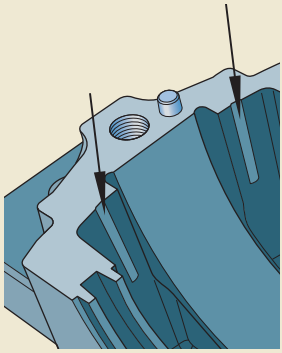
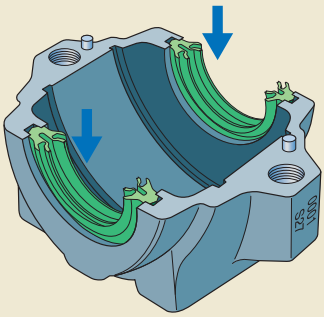


Fig. 15



10 Place a housing cap over each base (→ **fig. 16**) and tighten the cap bolts to the recommended tightening torque (→ **table 4** on **page 131**).

CAUTION: Caps and bases are not interchangeable. Make sure that the cap and base have the same serial number.

11 Check alignment again, and fully tighten the attachment bolts (→ **fig. 17**) using the recommended torque values listed in **table 4** on **page 131**.

12 If necessary, complete the seal assembly. This can include:
- For V-ring seals: coat the V-ring counterface with grease. Then push the V-ring into position.
- For labyrinth rings: lengthen and insert the hollow silicone tube in the inboard groove of each labyrinth ring with a screwdriver while turning the shaft.
- For grease purged seals: supply grease via the grease fitting in the seal cavity while turning the shaft.

13 SKF recommends re-tightening the cap and attachment bolts one or two days later to make sure the appropriate torque is maintained.

Fig. 16

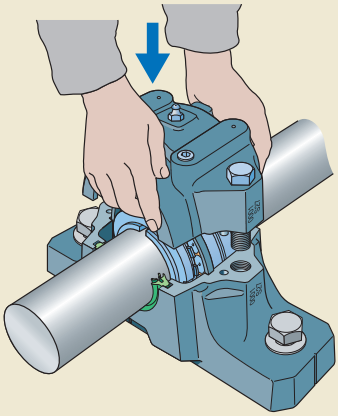
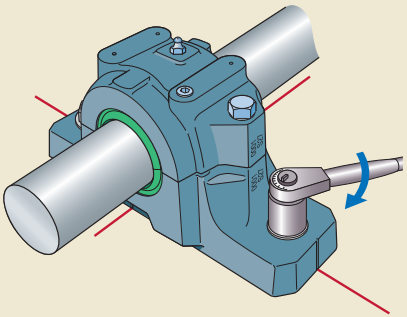


Fig. 17



Mounting SONL plummer (pillow) block housings

When mounting SONL plummer (pillow) block housings, carefully follow the guidelines provided under *Preparations prior to mounting* on **page 130** as well as the additional guidelines below:

NOTE: Seals suitable for plummer (pillow) block housings are typically supplied with mounting instructions.

1 Mount any components that are on the shaft between the two bearing positions.
2 Determine the position of the bearings or sleeves on the shaft and mark it.
3 (→ **fig. 18**) Slide the inner spacer sleeves with the labyrinth flange (**a**) together with the seal rings (**b**) and O-rings (**c**) on each side of the shaft and place the oil pick-up rings (**d**) in position on the spacer sleeves with the labyrinth flange.

   NOTE: Don't ever mount the oil pick-up ring (**d**) for circulating oil lubrication systems!

4 Mount the bearings on the shaft or adapter sleeves (→ **fig. 19**).
5 Slide the outer spacer sleeves with the labyrinth flange on each side of the shaft and place the seal rings and O-rings in position on the spacer sleeves. If the housing is at the end of the shaft, omit the second seal and insert the end cover together with the two O-rings in the housing base.
6 Position the housing bases on the support surface. The side with the oil-collecting trough at the bearing seat must be positioned on the inner side of the bearing arrangement (→ **fig. 20**). Fit the attachment bolts, but do not tighten them.
7 Install the oil level gauge and the magnetic plug on each housing base, if an oil pick-up ring is used. Whenever possible, install the oil level gauge on the side opposite the oil pick-up ring so that the reading is not affected by eddies caused by the ring. If an oil-cooling cartridge is used, install it now, following the instructions supplied with the cartridge.

   NOTE: To avoid oil leakage, apply an oil-resistant sealant on the threads of all

Fig. 18

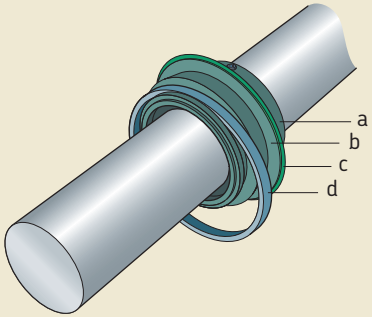


Fig. 19

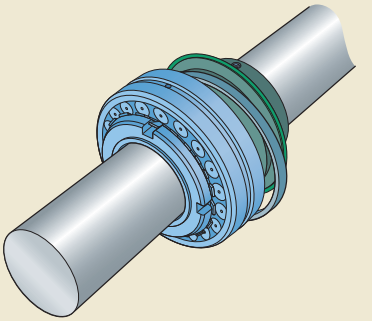
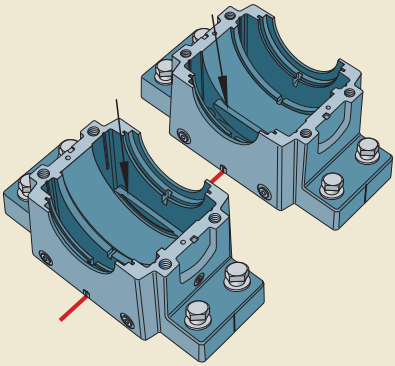


Fig. 20



attached components such as the oil level gauge and pipes.

8 Arrange the seals against the bearing. If an adapter sleeve is used, tighten the grub (set) screws in the sleeves that have the labyrinth flange. Recommended tightening torques:

- sizes 17 to 26 8 Nm *(6 ft.lbf)*
- sizes 28 to 32 18 Nm *(13 ft.lbf)*
- sizes 34 to 48 35 Nm *(26 ft.lbf)*

9 Place the shaft assembly in the two housing bases (→ **fig. 21**).

NOTE: Be sure the oil pick-up rings reach into the oil collecting troughs and hang loosely.

10 If required, put a locating ring on each side of the locating bearing (→ *Using locating (stabilizing) rings*, **page 132**). Make sure that the open end of the locating ring is positioned upwards (→ **fig. 22**).

NOTE: Non-locating CARB toroidal roller bearings always require a locating ring on both sides.

11 Carefully align the housing bases. Then lightly tighten the attachment bolts.

NOTE: SONL housings have vertical markings on the housing base ends and side

Fig. 22

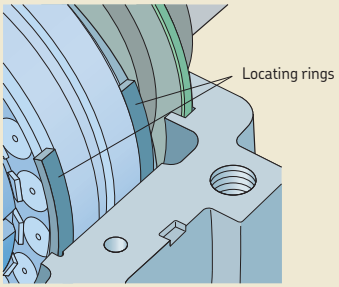


Fig. 23

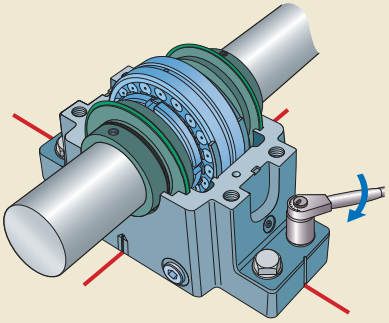


Fig. 21

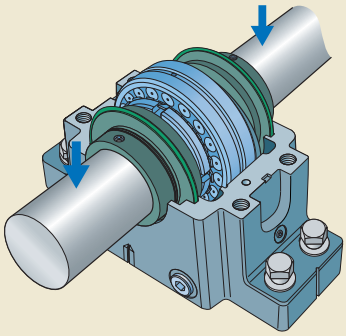
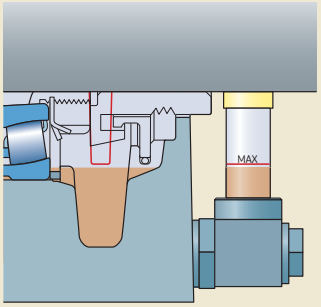


Fig. 24



faces, indicating the bearing seat centre (→ **fig. 23**).

12 If a circulating oil lubrication system will be used, connect the oil outlet pipes to the housing.

CAUTION: The outlet pipe(s) must drain properly or the housing may overfill.

13 If oil pick-up rings are used, fill the housings with oil up to the indicated maximum level. The oil level gauge and cast markings inside the housing base indicate the maximum level (→ **fig. 24**).

CAUTION: Oil level may drop during operation. Do not overfill the housing or leakage may result.

14 Cover the mating surfaces of the housing with an oil-resistant sealant.

15 Place a housing cap over each base (→ **fig. 25**) and tighten the cap bolts (to join the cap and base) using the recommended torque values listed in **table 4** on **page 131**. The cap and base of one housing are not interchangeable with those of other housings. Make sure that they bear the same serial number.

NOTE: Place the housing cap on the base carefully to prevent damage to the O-rings.

16 If a circulating oil lubrication system will be used, connect the inlet pipe to the housing cap.

17 Check alignment again, and fully tighten the attachment bolts in the housing base (→ **fig. 26**) using the recommended torque values listed in **table 4** on **page 131**.

18 SKF recommends re-tightening the cap and attachment bolts one or two days later to make sure the appropriate torque is maintained.

Fig. 25

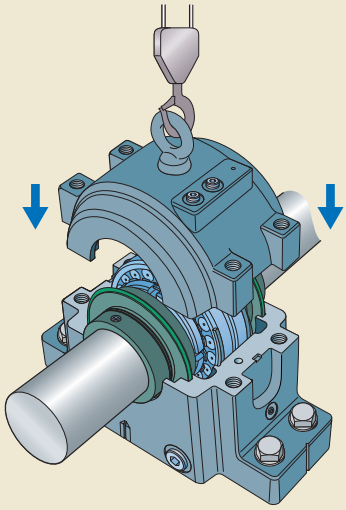


Fig. 26