
The SKF Supergrip bolt

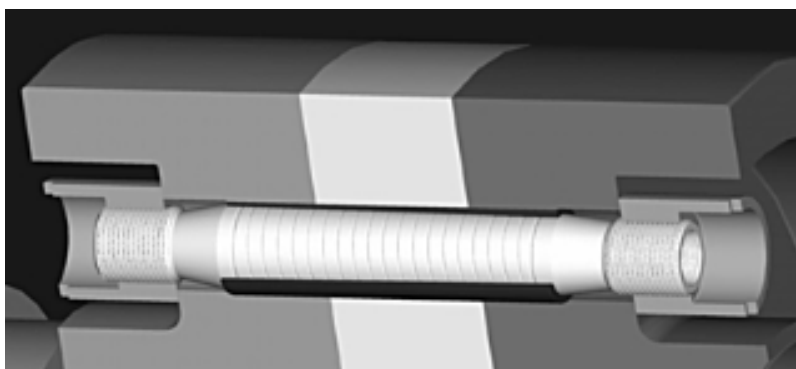
Fitting and removal

instructions

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1 CAUTIONS AND PERSONAL SAFETY

- When using the hydraulic pump, always wear eye protection and gloves.
- Ensure that the hydraulic tensioner is bled of air before the first operation and that the piston is bottomed before each operation.
- Use the correct oil as shown in Section 7 of the instructions.
- Read this instruction completely prior to using the product. Never exceed the specified oil pressure or the maximum stroke stamped on the tensioner.
- All parts are marked with part numbers. It is imperative that the correct tool and accessories for each coupling is used. Tools to be used for each coupling can be found on the assembly drawings.
- Inspect all equipment for damage before use. If there are signs of damage do not use, contact SKF for further instructions.
- When using a tapered thread adaptor, the fitting of the adaptor is a critical operation. Proper seating of the adapter is imperative
- Ensure the adapter to be used is the correct adapter corresponding to the bolt to be fitted. This can be determined by referring to the assembly drawing for each coupling.
- Inspect the adapter for signs of damage; rough handling can cause this. If damaged do not use, contact SKF Coupling Systems for further instructions.
- Ensure that the adapter and the tapered thread insert in the bolt are thoroughly cleaned and free from all foreign bodies, e.g. particles of paint etc. Lightly oil the internal tapered thread on the bolt.
- Firmly tighten the adapter into the tapered thread insert in the bolt, using the wrench provided for this purpose. Ensure that the adapter has seated correctly by trying to displace the adapter by hand. If the adapter moves then it should be removed, inspected for damage, and refitted if the inspection proves satisfactory.
- **Warning**
- **When releasing the sleeve expansion by oil injection, the nuts must not be removed.**
- **As a further precaution, when mounting/dismounting the bolts, the area in front of and behind the bolt must be kept clear of all personnel.**

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2 INTRODUCTION

The Supergrip bolt (OKBC) is a hydraulically expanded and tensioned fitted bolt, which creates a stable and rigid link between the coupling flanges and simplifies assembling and disassembling.

The bolt is threaded at both ends and has a tapered shank. An expansion sleeve with a corresponding tapered bore fits over the shank. Two nuts complete the unit.

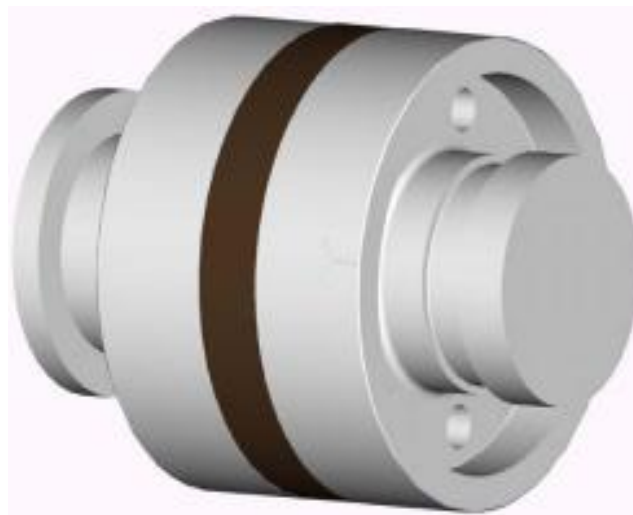
The outside of the sleeve is cylindrical and dimensioned for an initial clearance fit in the hole.



2.1 FLANGE DESIGN

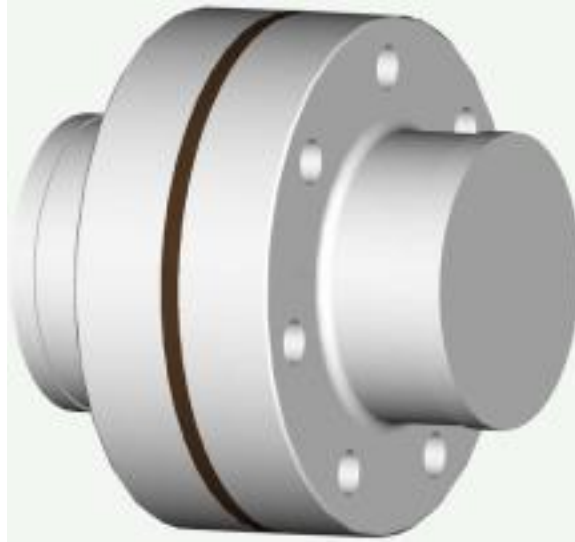
The flanges for installation of the bolts can have different designs, with or without a spacer between the flanges. See assembly drawing for actually design.

Counter bored flange with spacer:



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Straight flange with spacer:



3 FUNCTION

The Supergrip bolt is inserted in to the hole by hand and expanded to a radial interference fit by drawing the tapered bolt shank into the tapered bore of the sleeve. It is then tensioned against one nut to a high axial preload, and the other nut is hand tightened with the pinwrench.

Both expansion and Preloading of the bolt is performed in a controlled way by means of a hydraulic tensioner included in the tool set.

When removing the bolt the tensioner is used to release the bolt tension, and then the sleeve expansion is released by means of oil injection.

A hydraulic pump with a pressure gauge, hose and quick connection coupling is needed for pressurizing the tensioner and releasing the sleeve expansion.

NOTE The "Expansion oil pressure" is always lower than the "Preloading oil pressure".

For the correct pressure, see assembly drawing.

The bolt carries the major part of the torque by its shear strength. Torque is also transmitted by friction force between the flange faces, created by the high bolt preload. The bolt also takes up bending and axial forces.

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4 SLEEVE TOLERANCES

For retrofit installations, or where recommended hole tolerances cannot be achieved, the sleeves *can be* delivered with oversize on the outer diameter. Detailed information about oversize and tolerance is found on assembly drawing.

After machining or honing the bolt holes in the correctly aligned coupling, the diameter of each hole should be measured and recorded, and the outer diameter of each sleeve machined to suit the hole in which it is to be used. For machining instruction, see section 16.

5 SHAFT AND FLANGE ADJUSTMENT

The shafts must be aligned, prior to fitting the bolts, pull the flanges together to be in metallic contact, preferably with slave bolts and jacking oil on.

As an option SKF Coupling System can offer an alignment tool set for this purpose.

6 CLEANING INSTRUCTIONS

On delivery, all bolts and tools are protected against rust by an anti corrosive coating. Clean all parts of the bolt with solvent so that the anti corrosive coating is removed. Oil all parts, including the inner surface of the sleeve with thin motor oil and wipe dry. Check that the bolt holes in the flanges (and spacer, if any) are free from sharp edges and any burrs. The holes and flange faces must be cleaned and wiped dry before fitting.

Before removing, ensure that the threaded parts are free from paint and rust, cleaned and oiled. After removing, ensure that the tapered surfaces of bolt and sleeve are well protected. Any scratches or surface damages can affect the use of the oil injection method.

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7 OIL RECOMMENDATION

A motor oil with a viscosity of 300 mm²/s (300 cSt) at the temperature of the coupling is to be used for the hydraulic pump. This recommendation is of special importance for the proper function of the oil injection method. The viscosity will generally be obtained if the oil is chosen as following table

Temperature range		Viscosity in SAE	
0-8 °C	32-46 °F	Motor oil	SAE 10W
8-18 °C	46-65 °F	Motor oil	SAE 20W
18-27 °C	65-81 °F	Motor oil	SAE 30
24-32 °C	81-90 °F	Motor oil	SAE 40
32-38 °C	90-100 °F	Motor oil	SAE 50

WARNING! DO NOT USE TURBINE OIL

Follow the oil suppliers and/or your internal recommendations for handling and disposal of the oil.

8 DESIGNATION OF THE BOLT

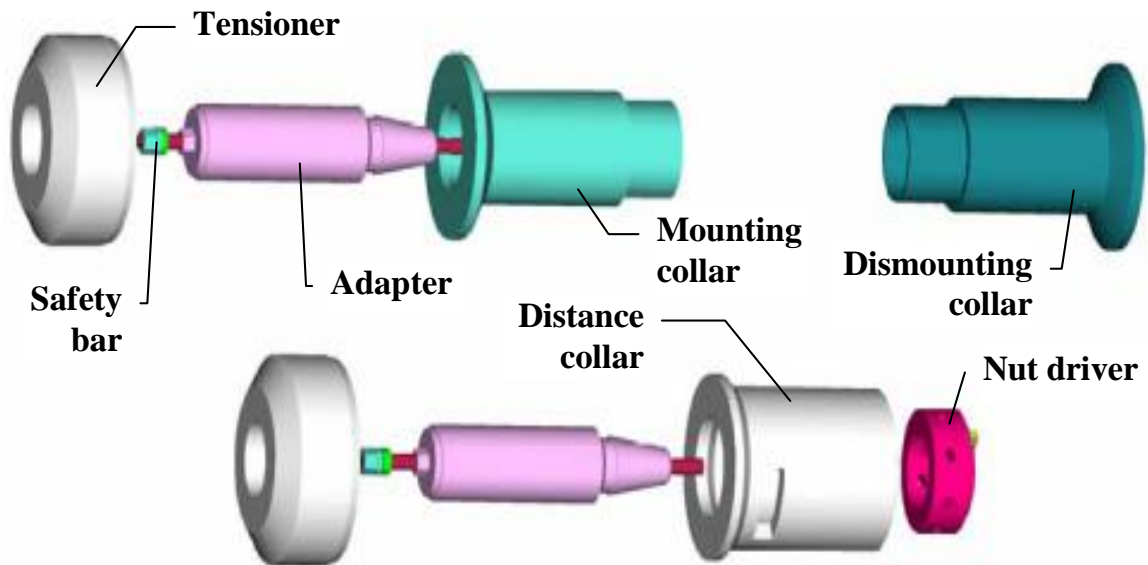
The hydraulic bolt system is designated as "Type OKBC". Bolt sizes are specified using the following system:

OKBC bore diameter x clamping length / drawing number.

For example: OKBC 90 x 240/21611.

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9 TOOL SET



Not shown: Extension pipe, Hexagon wrench and Tommy bar

The tensioner is operated and the oil injection achieved by a hydraulic hand pump or an air driven hydraulic pump with a pressure gauge and a return valve. The working pressure of the pump used should not be below 21,750 psi (150 MPa). The operating pressure of the tensioner is given on the assembly drawing.

Before operating the tensioner for the first time, loosen the tensioner bleed screw, connect the pump, and fill up the system with oil until all air is expelled and oil flows freely from the bleed vent. Retighten the bleed screw.

In order to prevent damaging the sealing rings in the tensioner the max stroke of the piston, stamped on the tensioner, must not be exceeded. Before expansion and preloading, ensure that the piston is at its bottom position by opening the return valve on the pump and turning the tensioner down the adapter thread with the Tommy bar.

WARNING! WHEN USING THE HYDRAULIC TENSIONER, WEAR EYE PROTECTION!

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CAUTION - Never exceed the "Expansion and Preloading oil pressures" given on assembly drawing.

10 PRIOR TO FITTING, ENSURE THE FOLLOWING:

Turbine manufacturer's instructions are available and followed.

Bolt assemblies and tools are marked up for identification.

Orientation of the bolts is correct, consult assembly drawing.

Air is expelled from the tensioner and the piston is at its bottom position before the first operation, see also Section 11 Tensioner handling.

11 TENSIONER HANDLING

After each pressurize of the tensioner the internal piston has to be retracted by turning down the tensioner the adapter thread with the pin wrench and drain the oil back into the pump through the opened return valve. (fig 11)

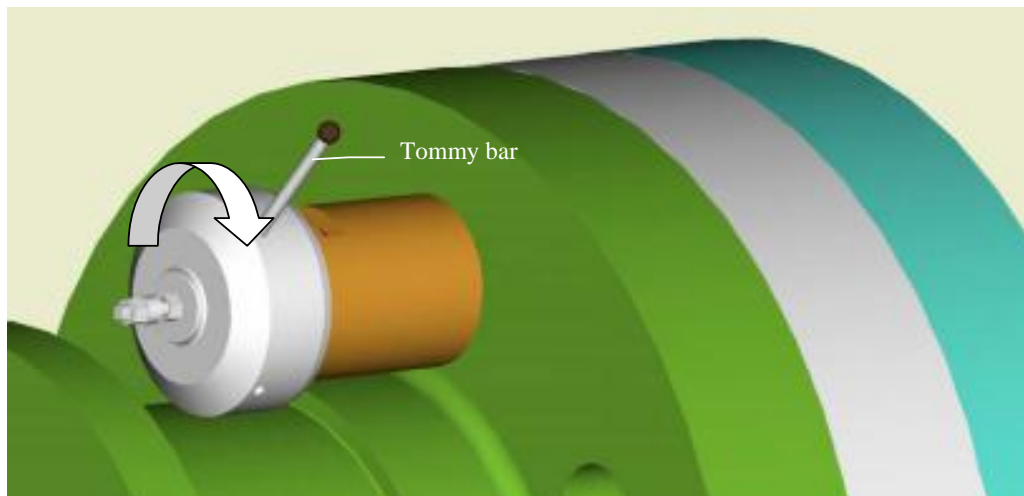
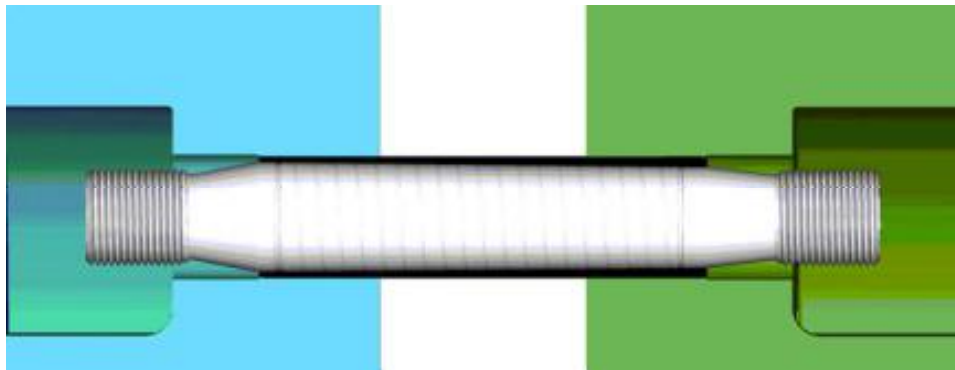


Fig. 11

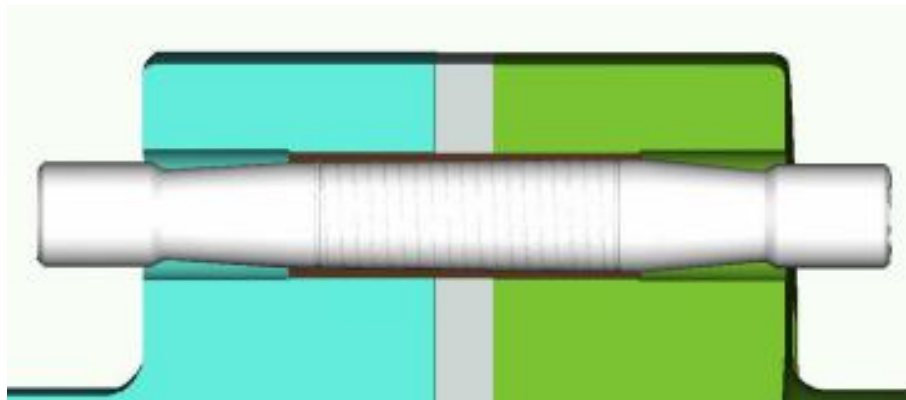
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12 MOUNTING

Insert two bolts with their sleeves into diametrically opposed holes, as shown in step 1, positioned 9 and 3 o' clock.



Step 1. Counter bored flange



Step 1. Straight flange

NOTE Following expressions are used :

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"Thick end of the sleeve" ⇒ mounting side of the bolt.

"Thin end of the sleeve" ⇒ dismounting side of the bolt.

12.1 Mounting of the adapter

With bolt and sleeve in place, screw the adapter, beginning with the safety bar, into the bolt end which has the thick end of the tapered sleeve. Screw the adapter firmly into the bolt end, using the hexagon wrench and screw the safety bar into the bottom of the injection hole in the bolt.

On safety adapters delivered from year 2001, the safety bar has a red marking. When correctly mounted, the red marking will disappear into the adapter. (fig.12.1)

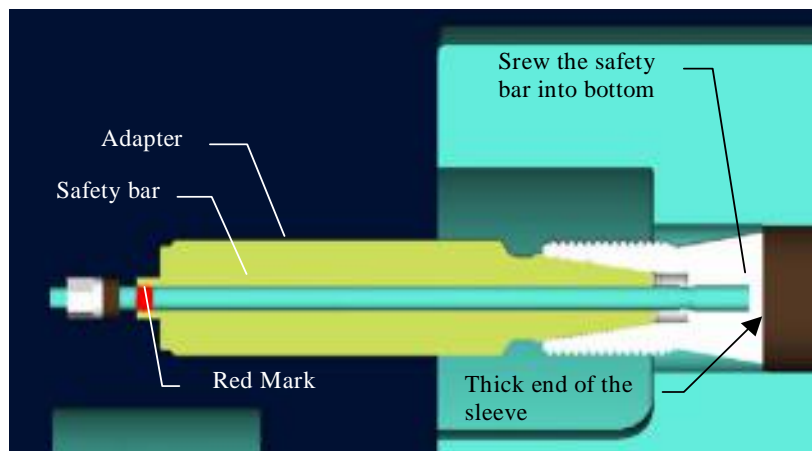


Fig 12.1

12.2 Sleeve expansion

Place the mounting collar over the adapter and bolt end into the flange. (If space is limit do this step before installing the adapter.) Screw the tensioner on to the adapter so that the collar meets the face of the sleeve and has a metallic contact to the flange. Pressurize the tensioner to the “**Expansion oil pressure**” given on assembly drawing. (fig. 12.2)

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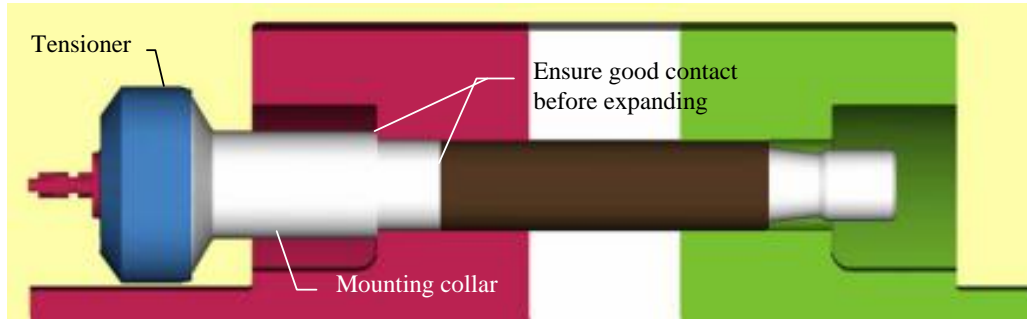


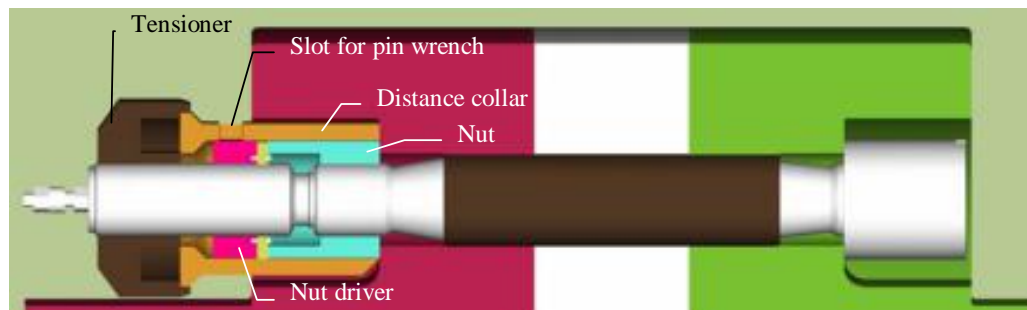
Fig 12.2

WARNING! BE CAREFUL NOT TO EXCEED THE MAXIMUM STROKE OF THE TENSIONER!!

12.2.1 Open the return valve on the pump, retract the piston and drain the oil back from the tensioner by turning the tensioner down the thread with the pinwrench. Remove the tensioner, adapter and collar.

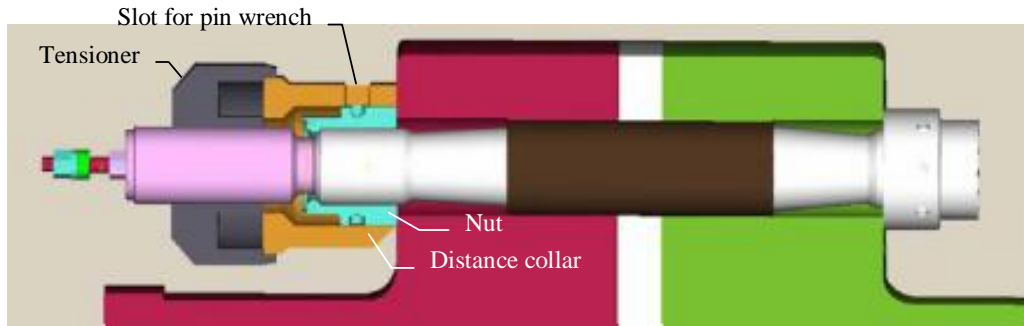
12.3 Bolt Preloading

12.3.1 Mount the nuts on the bolt and hand tighten them against the face of the flange. Screw the adapter firmly into the bolt end, with the thick end of the tapered sleeve, using the hexagon wrench. For counter bored flange, place the nut driver against the nut with the key steel in the slots of the nut. Place the distance ring over the nut and against the flange. Screw the tensioner on the adapter thread against the distance collar.



Counter bored flange

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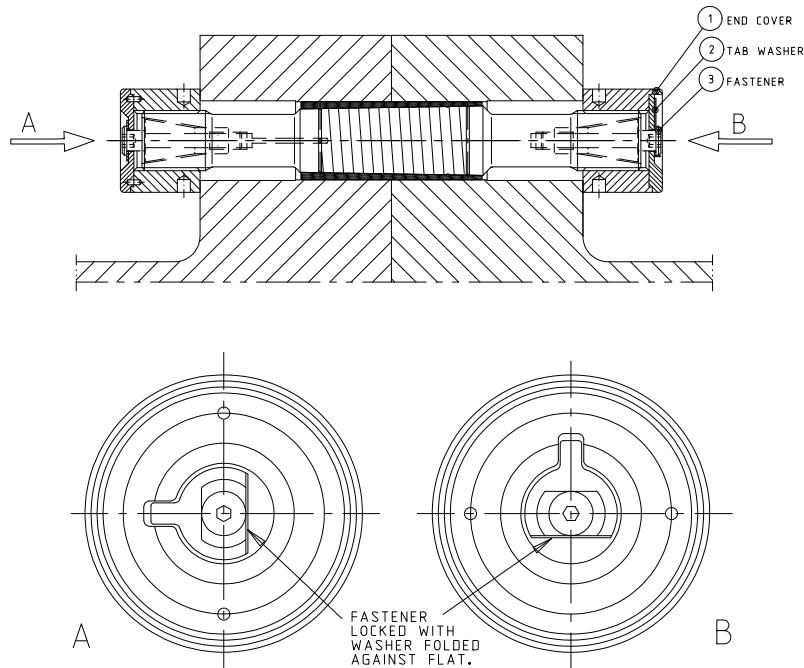


Straight flange

12.3.2 Pressurize the tensioner to the required "Preloading Oil Pressure" given on the assembly drawing. Hand tighten the nut with the pinwrench through the slot in the distance collar. Continue to fit the bolts alternately across the coupling.

Repeat the operation "12.3.2" on the opposite end of the bolts to ensure the requisite tightness of both nuts.

13 FITTING AND REMOVAL OF SKF END COVERS



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Mount the end cover at the end of the nut. Position the two pins in line with the axial holes in the nut



Position the Bix washer in the end cover cavity, with the tab in line with the radial groove in the end cover.

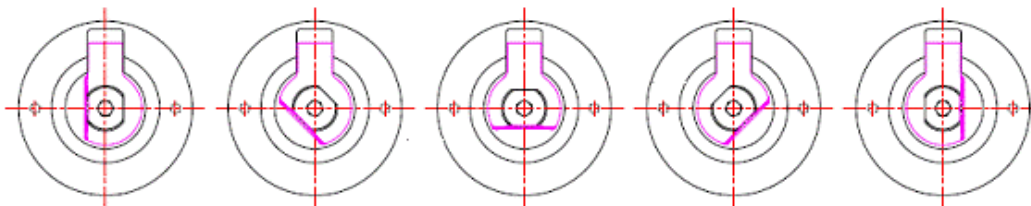


Connect the fastener through the washer and end cover. Tighten the fastener with a torque of 45 Nm if not otherwise specified on the drawing or by the OEM.

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Fold the washer against one of the flats on the head of the fastener using a screw driver and a hammer. Make sure that the folded part is in good contact with the flat on the fastener.



When removing the end cover, the washer must first be folded down from the flat on the head of the fastener.

14 REMOVAL INSTRUCTIONS

The removal is done in principal the opposite way as mounting.

Prior to removal ensure the following:

Threaded parts of the bolt ends, particularly the internal threads, cleaned and oiled.

14.1 Nut release

14.1.1 See chapter 11.as a reference. Screw the adapter firmly into the bolt end with the thick end of the tapered sleeve using the hexagon wrench. Place the distance ring over the nut (and the nut driver). Screw the tensioner fully onto the adapter thread. Turn it back a quarter of a turn to ensure a clearance between the tensioner piston and the distance ring.

Pressurize the tensioner to the required”Preloading Oil Pressure” or max 5% over the pressure given on the assembly drawing. Loosen the nut one half turn with the pinwrench through the slot in the distance collar.

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Open the return valve on the pump, retract the piston and drain the oil back from the tensioner by turning the tensioner down on the adapter thread with the pin wrench. See chapter 11. Remove the tools.

WARNING! DO NOT REMOVE THE NUTS!

14.2 Bolt release by Oil Injection Method - Method 1

This method of releasing the expanded bolt sleeve incorporates the use of the "Oil injection method"; oil is injected between the mating tapered surfaces of the bolt shank and the sleeve.

14.2.1 Loosen the nut to a clearance of 1/2 inch (12 mm) between the nut and the flange. (fig 13.2)

WARNING! DO NOT REMOVE THE NUT FROM THE BOLT AS THE NUT PREVENTS THE BOLT FROM BEING EJECTED WITH CONSIDERABLE FORCE DURING THE FOLLOWING OPERATION.

14.2.2 Screw the extension pipe, with the quick connection coupling, into its location and attach the pump. Pressurize the pump until the bolt is pressed out of the sleeve. (Max pressure 21,750 psi = 150 MPa)

To allow for removal of the extension pipe, retighten the two nuts by hand to prevent the bolt from turning while unscrewing the extension pipe, remove nuts, bolt, and sleeve.

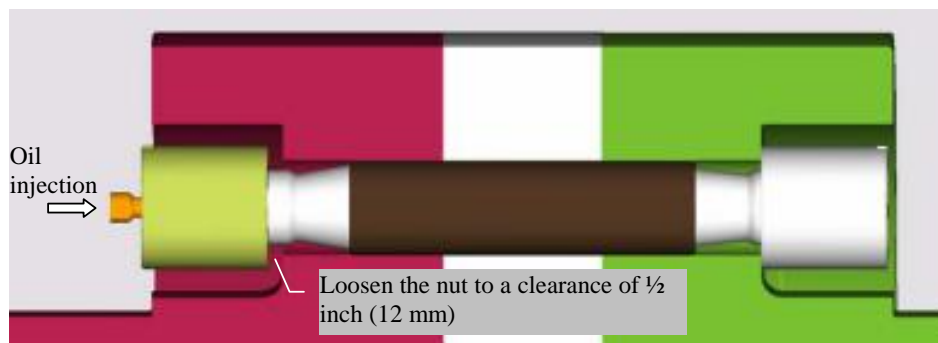


fig. 13.2

14.3 Bolt release using the dismantling collar - Method 2

(If the sleeve length exceeds 3 times the sleeve diameter go to 13.4)

This method of releasing the expansion of the bolt sleeve incorporates the use of the dismantling collar, which is used to pull the bolt out of the sleeve in reverse to operation 12.2.

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- 14.3.1 Repeat the nut release sequence in step 14.1.1 on the opposite nut. Remove tools and nut, but retain the nut at the bolt end with the thick end of the tapered sleeve loosened only to give a clearance of 1/2 inch (12 mm).
- 14.3.2 Screw the adapter into the bolt end opposite from the thick end of the tapered sleeve. Insert the dismantling collar and screw the tensioner onto the adapter thread against the dismantling collar. Pressurize the tensioner and the bolt will be pulled out of the sleeve. The tools bolt and sleeve can now be removed. (fig.13.3)

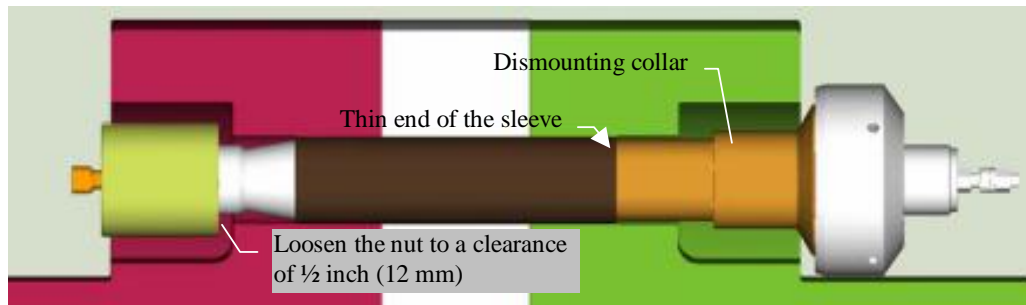


fig 13.3

14.4 Bolt release using dismantling collar and oil injection.

In the case the length of the sleeve exceeds 3 times the sleeve diameter (e.g. coupling with spacer); Oil injection method (14.2.2) should be used together with dismantling collar described in this chapter. Note! Two pumps are needed! (fig. 13.4)

Continuously work the pump connected to the extension pipe for 3 min. before pressurizing the tensioner to pull the bolt out of the sleeve.

Open the return valves to release the pressure in both pumps as soon as the bolt becomes loose in the hole.

Retighten the nut on the side of the extension pipe by hand; retract the piston in the tensioner by turning the tensioner down on the adapter thread. To allow for removal of the extension pipe, tighten the tensioner and nut by hand, disconnect extension pipe and then remove tools and bolt.

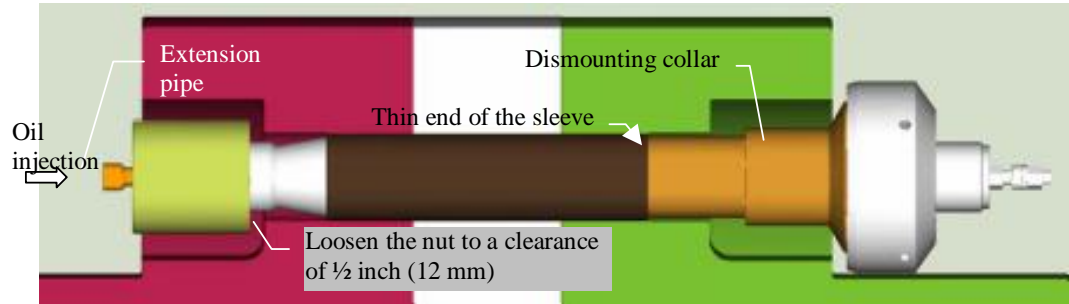


fig. 13.4

15 REPLACING THE SEALING RINGS IN THE HYDRAULIC TENSIONER

Should the sealing rings in the tensioner become defective, first take the tensioner apart. This is best carried out by taking out the bleed screw and pressing the piston out with compressed air. Make sure that there is no damage on the sliding surfaces of the piston and the cylinder. If metal particles are present, they will damage the sealing rings.

There are two sealing rings in the tensioner, each consisting of an O-ring and backup ring, see Fig. 15-A. Heat the backup ring, which is made of synthetic material, in warm oil (140°F/60°C) before mounting, so that it can easily be pressed into position.

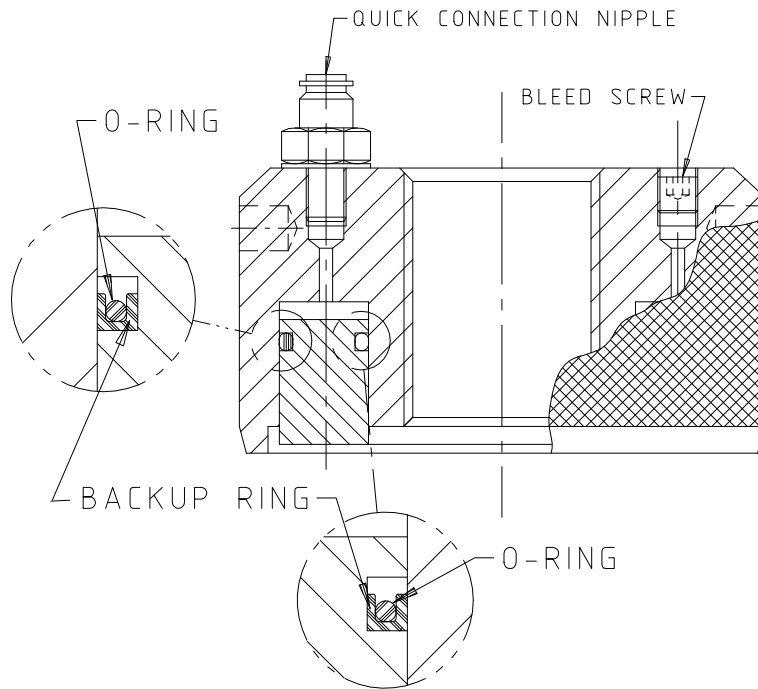


Fig. 15-A

Coat the sliding surfaces with molybdenum disulphide (molycote) before assembling.

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16 INSTRUCTION FOR MACHINING OF SLEEVES

When the bolt system is delivered with oversized sleeves they have to be machined to mating flange hole diameter. See note on assembly drawing!

For machining, follow the steps described below:

1. Clean the mandrel and sleeve, making sure that they are both free from burrs and nicks.
2. Oil the tapered part of the mandrel with light motor oil and wipe dry.
3. Push the sleeve on to the mandrel with some light taps from a plastic hammer. Make sure the sleeve is in good metallic contact with the mandrel. Mount the end washer and the nut. Tighten the nut by hand and an extra quarter of a turn with a spanner.
4. Chuck the mandrel with the mounted sleeve in the machine.
5. Align the mandrel by indicating on the outer diameter of the sleeve. Max run out reading on the dial indicator = 0.02 mm. Machine the outer diameter of the sleeve so it will give a clearance to the mating hole as given on the assembly drawing. Surface roughness after machining: Ra <1.6
6. After machining to the right dimension, round the sharp edge with a file at both ends.
7. To remove the sleeve from the mandrel, use the dismantling collar and a plastic hammer.



17 ASSEMBLY DRAWING

For further particulars, please contact us directly or our local representative in your area.

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