The SKF Supergrip bolt
Fitting and removal instructions

Instruction No.:	80342	**Edition:**	D
Edition Date:	2011-10-20	**Recised by**	ME

S-813 82 Hofors, Sweden. Tel +46 (290) 284 00. Telefax +46 (290) 282 70

CONTENTS

1 CAUTIONS AND PERSONAL SAFETY

- When using the hydraulic pump, always wear eye protection and gloves.
- Make sure that the hydraulic tensioner is bled of air before the first operation and that the piston is in its bottom position before each operation.
- Use the correct oil as shown in Section 7 of the instructions.
- Use all equipment strictly in accordance with the instructions, or the instructions supplied by the equipment manufacturer.
- Never exceed the specified oil pressure or the maximum stroke and oil pressure stamped on the tensioner.
- All parts are marked with part numbers. It is imperative that the correct tool accessories for each coupling is used. What tools to be used for each coupling can be found on the assembly drawings.
- Inspect all equipment for damage before use.
- 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.

2 INTRODUCTION

The Supergrip bolt (OKBS) 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, see fig. 2-a.The outside of the sleeve is cylindrical and dimensioned for an initial clearance fit in the hole.

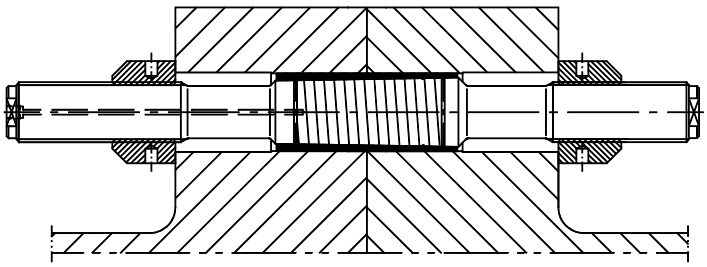


Fig. 2-A

3 FUNCTION

The Supergrip bolt is inserted in 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 pin wrench.

Both expansion and tensioning 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 hand 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.

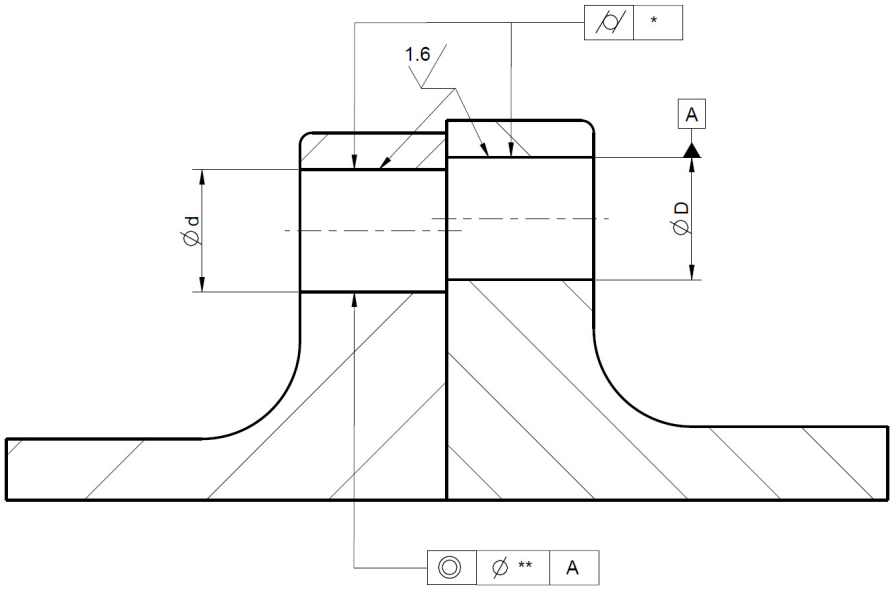
The bolt carries the major part of the torque by its shear strength. Torque is also transmitted by friction force between the flange faces, created by the high bolt preload. The bolt also takes up bending and axial forces.

4 TOLERANCES

4.1 Bolt hole tolerances

The diametrical bolt hole tolerance must be within ISO H8, H7 depending on size, see fig. 4-a.

After machining the surface finish of the bore must be within 1.6µm (63 µin). The cylindricity and coaxiality of the bolt holes must be within the tolerance class of ISO IT7 or IT8 see fig. 4-a.



NOMINAL DIAMETER D, d		HOLE TOLERANCE		CYLINDRICITY (*) ISO IT7/2 or IT8/2		COAXIALITY (**) ISO IT7 or IT8	
mm	inch	mm	inch	mm	inch	mm	inch
40-(50)	1.57-(1.97)	H7 +0.025 0.0	H7 +0.001 0.0	0.013	0.0005	0.025	0.001
50-(58)	1.97-(2.28)	H7 +0.030 0.0	H7 +0.0012 0.0	0.015	0.0006	0.030	0.0012
58-(80)	2.28-(3.15)	H8 +0.046 0.0	H8 +0.0018 0.0	0.023	0.0009	0.046	0.0018
80-(120)	3.15-(4.72)	H8 +0.054 0.0	H8 +0.0021 0.0	0.027	0.0011	0.054	0.0021
120-180	4.72-7.07	H8 +0.063 0.0	H8 +0.0025 0.0	0.032	0.0013	0.063	0.0025

Fig. 4-A

Where recommended hole tolerances cannot be achieved, the sleeves are delivered with a 4% oversize on the outer diameter.

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. The sleeves must be turned or ground between centers having 60° cone angle (or fitted on the bolt shank) to a diameter within the recorded hole diameter with tolerance given on the assembly drawing.

After machining the surface finish of the bore and the sleeve must be within 1.6µm (63 µin).

The straightness and ovality of the sleeves must be within the 0.01 mm (0.0004”)

5 SHAFT AND FLANGE ADJUSTMENT

The shafts must be aligned. prior to fitting the bolts, pull the flanges together to be in metallic contact.

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 mineral oil, see fig. 7-a, and wipe dry. Check that the bolt holes in the flanges (and spacer, if any) are free from sharp edges and 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.

7 OIL RECOMMENDATION

A mineral oil with a viscosity of 300 mm^2/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 follows:

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 30W
24-32 °C	81-90 °F	Motor oil	SAE 40W
32-38 °C	90-100 °F	Motor oil	SAE 50W

Fig. 7-A

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 OKB”. Bolt sizes are specified using the following system:OKBS bore diameter x clamping length / drawing number. (example: OKBS 90 x 240/21611.)

9 TOOL SET

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

fig. 9-a shows the tool set which comprises:

1. Hydraulic tensioner set
2. Distance ring
3. Mounting collar,
4. Dismounting collar (not shown)
5. Hexagon wrench (not shown)
6. Pin wrench

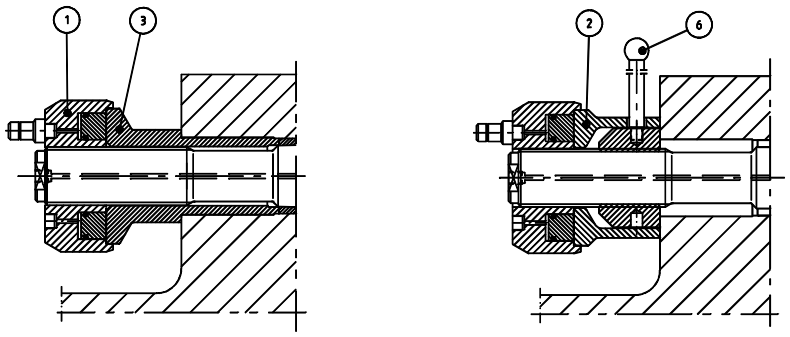


Fig. 9-A

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 tensioning, ensure that the piston is at its bottom position by opening the return valve on the pump and turning the tensioner down the adaptor thread with the pin wrench.

NOTE Never exceed the ”Expansion and Preloading oil pressures” given on the assembly drawing.

10 FITTING INSTRUCTIONS

Prior to fitting, ensure the following:

- Bolt assemblies and tools are marked up for identification.
- Orientation of the bolts is correct, advised on assembly drawing when necessary.
- Air is expelled from the tensioner and the piston is at its bottom position before the first operation, see Section 9.
- Grease the thread of the bolt and the tensioner with molybden disulphide Molycote before connecting the tensioner to avoid seizure of the threads. Do not apply the grease anywhere else than on the threaded parts.
-

10.1 Sleeve Expansion

10.1.1 Insert two bolts with their sleeves into diametrically opposed holes positioned 9 and 3 o’ clock. Both sleeves should first be expanded, as in step 10.1.2, before bolt tensioning as in step 10.2.2.

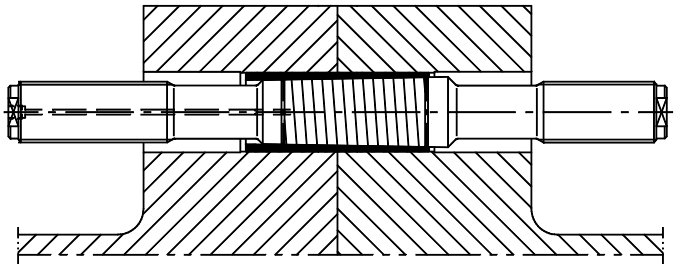


Fig. 10-A

10.1.2 With bolt and sleeve in place, insert the mounting collar at the bolt end with the thick end of the tapered sleeve. Screw the tensioner on to the bolt, so that the collar presses against the sleeve. Ensuring that metallic contact is maintained between the collar and the flange, pressurize the tensioner to the ”Expansion Oil Pressure” given on the assembly drawing.

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

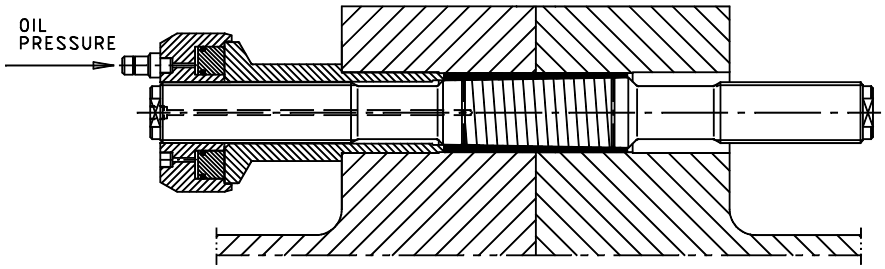


Fig. 10-B

10.1.3 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 pin wrench. Remove the tensioner and collar.

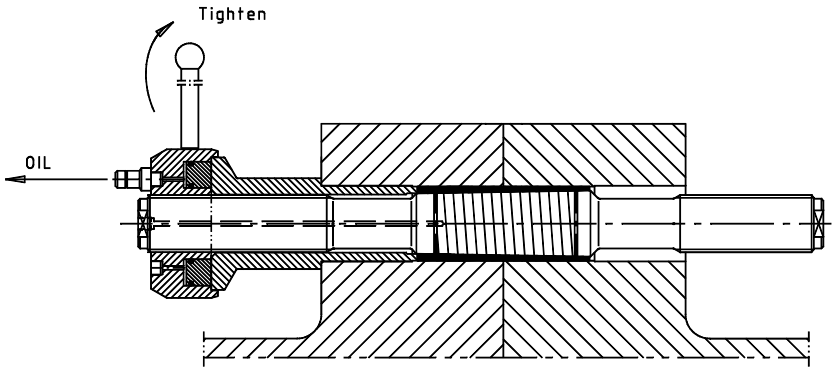


Fig. 10-C

10.2 Bolt tensioning

10.2.1 Mount the nuts and hand tighten them against the flange. Place the distance ring over the nut. Screw the tensioner on the bolt thread against the distance ring

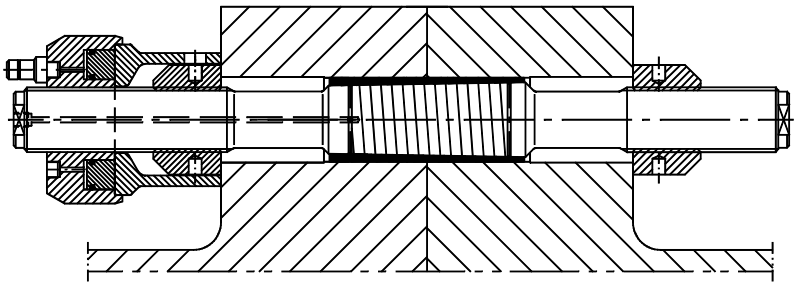


Fig. 10-D

10.2.2 Pressurize the tensioner to the required ”Preloading Oil Pressure” given on the assembly drawing. Hand tighten the nut with the pin wrench through the slot in the distance ring. Open the return valve on the pump. Repeat this operation once more

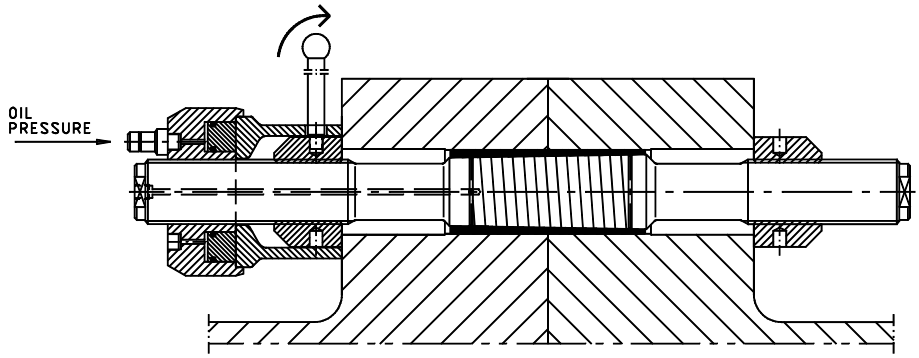


Fig. 10-E

10.2.3 Retract the piston and drain oil back from the tensioner by turning the tensioner down the bolt thread with the pin wrench. Remove the tools.

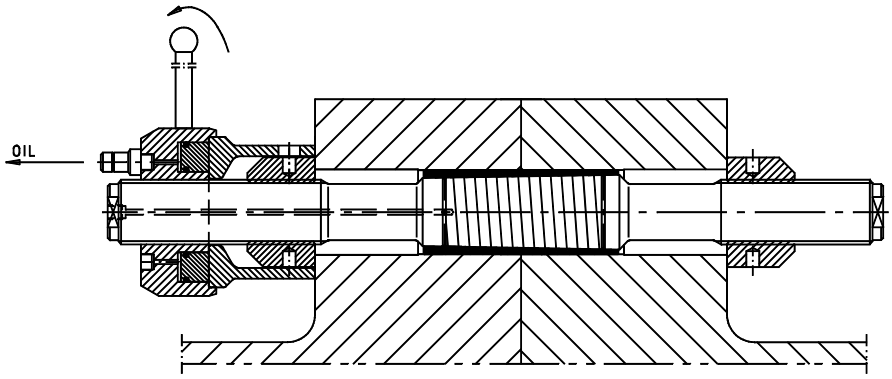


Fig. 10-F

Continue to fit the bolts alternately across the coupling.

11 REMOVAL INSTRUCTIONS

Prior to removal ensure the following:Threaded parts of the bolt ends, cleaned and oiled

11.1 Nut release

11.1.1 Place the distance ring over the nut. Screw the tensioner fully onto the bolt thread. Turn it back a quarter of a turn to ensure a clearance between the tensioner piston and the distance ring.

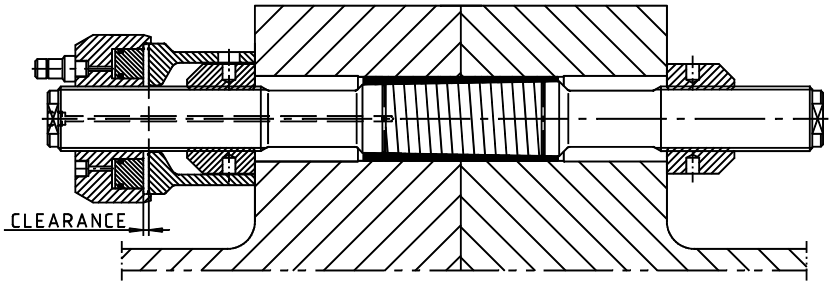


Fig. 11-A

11.1.2 Pressurize the tensioner to the required ”Preloading Oil Pressure” given on the assembly drawing. Loosen the nut one half turn with the pin wrench through the slot in the distance ring.

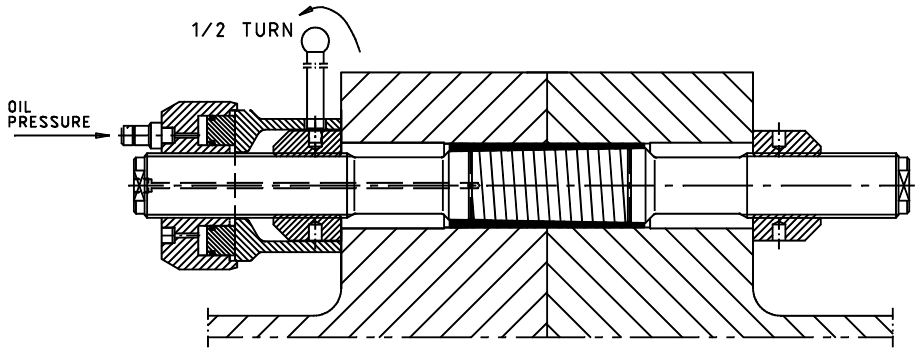


Fig. 11-B

11.1.3 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 pin wrench. Remove the tools.

WARNING! DO NOT REMOVE THE NUTS!

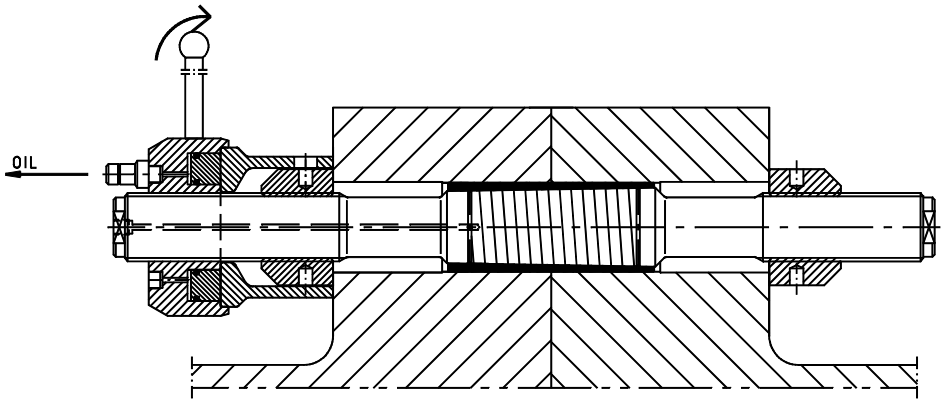


Fig. 11-C

11.2 Bolt release by Oil Injection Method - Method 1

This method of releasing the expansion of the 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.

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

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.

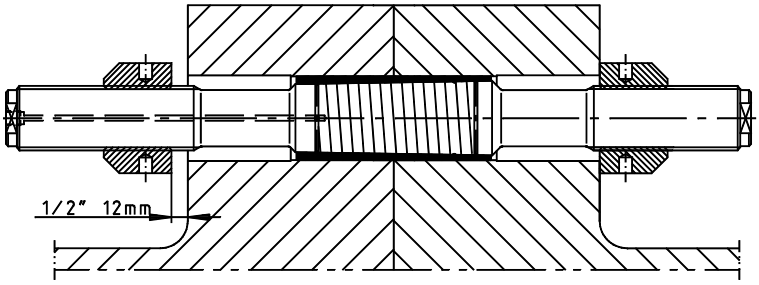


Fig. 11-D

11.2.2 Screw the nipple, 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)

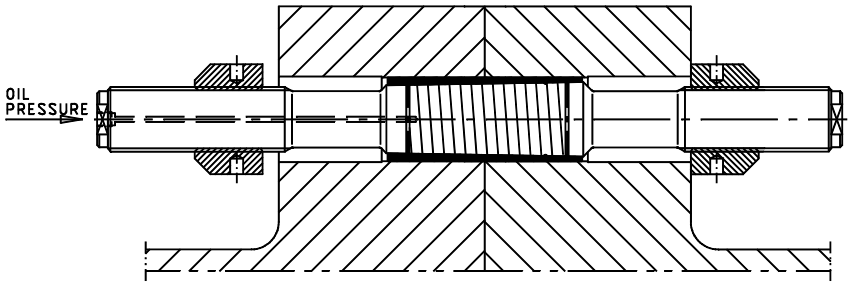


Fig. 11-E

The bolt can now be removed

11.3 Bolt release using the dismounting collar - Method 2

This method of releasing the expansion of the bolt sleeve incorporates the use of the dismounting collar, which is used to pull the bolt out of the sleeve in reverse to operation 10.1.2.

11.3.1 Insert the dismounting collar from the thin end of the tapered sleeve and screw the tensioner onto the bolt thread against the dismounting collar. Pressurize the tensioner and the bolt will be pulled out of the sleeve. The tools, bolt and sleeve can now be removed.

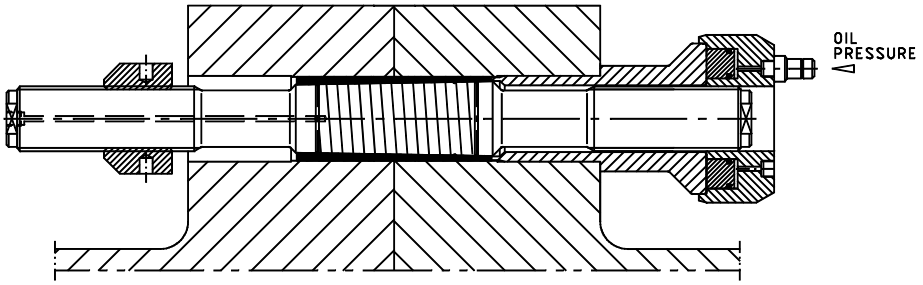


Fig. 11-F

11.3.2 In the case the length of the sleeve exceeds 3 times the sleeve diameter (e.g. coupling with spacer), Oil injection method section 11.2.2 and Dismounting Collar method section 11.3.1 shall be used in combination.

NOTE 2 hydraulic pumps are needed.

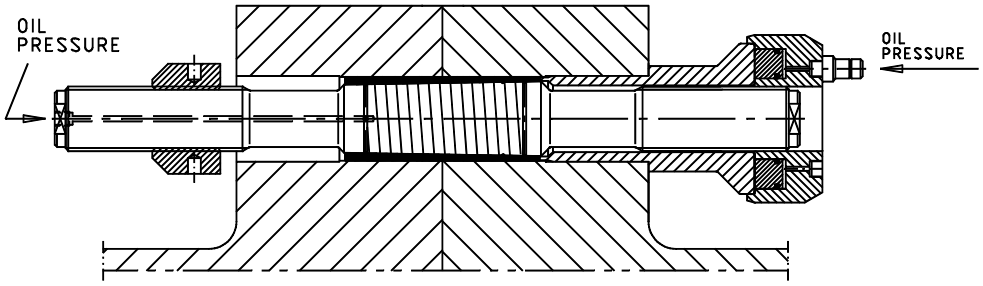


Fig. 11-G

12 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. 12-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.

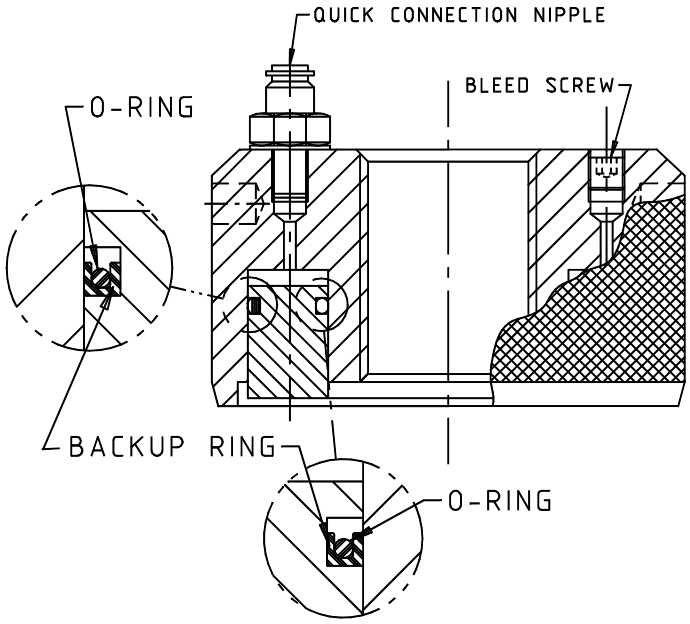


Fig. 12-A

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

Encl.

13 ASSEMBLY DRAWING