

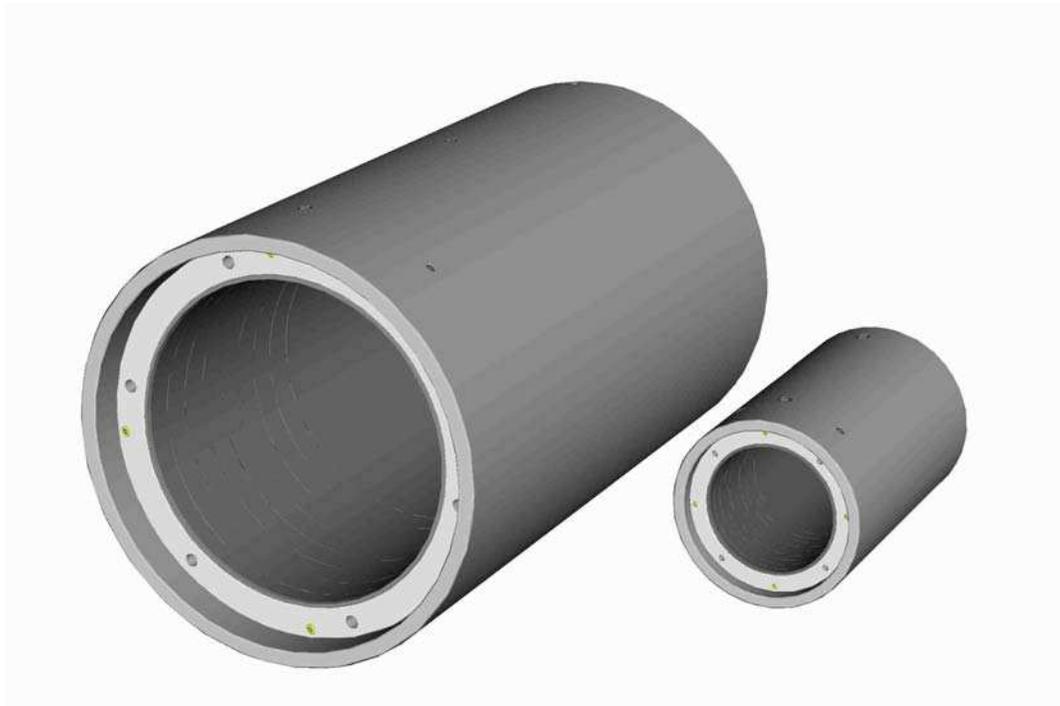
The SKF OKCX coupling for shafts 100-900 mounting and dismounting instruction

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CONTENTS

1	CAUTIONS AND PERSONAL SAFETY	3
2	THE PRINCIPLE OF THE COUPLING	4
3	OIL RECOMMENDATION	5
4	DESIGNATION OF THE COUPLING	5
5	COUPLING DETAILS	6
6	EQUIPMENT FOR MOUNTING AND DISMOUNTING	7
7	MOUNTING INSTRUCTIONS	10
8	DISMOUNTING INSTRUCTIONS	17
9	REPLACING THE OIL CHAMBER SEALING	18
10	ASSEMBLY DRAWING	18

1 CAUTIONS AND PERSONAL SAFETY

- When using the hydraulic equipment and injectors, always wear eye protection and gloves.
- When handling the coupling with crane, make sure that the lifting device is adapted to the weight of the coupling.
- Use the correct oil as shown in the instructions.
- Use all equipment strictly in accordance with the instructions, or the instructions supplied by the equipment manufacturer.
- Inspect all equipment for damage before use.
- As a precaution, when mounting/dismounting the coupling, the area in front of and behind the coupling must be kept clear of all personnel.
- Before mounting and dismounting the coupling. The user must have read and understood the following instructions.

2 THE PRINCIPLE OF THE COUPLING

The OKCX type coupling consists basically of two sleeves of high quality steel, a thin inner sleeve and a thick outer sleeve.

The outer surface of the inner sleeve is slightly tapered and the bore of the outer sleeve has a corresponding taper.

The inner sleeve bore is somewhat larger than the diameter of the shafts, so that the sleeve can be passed over them with ease.

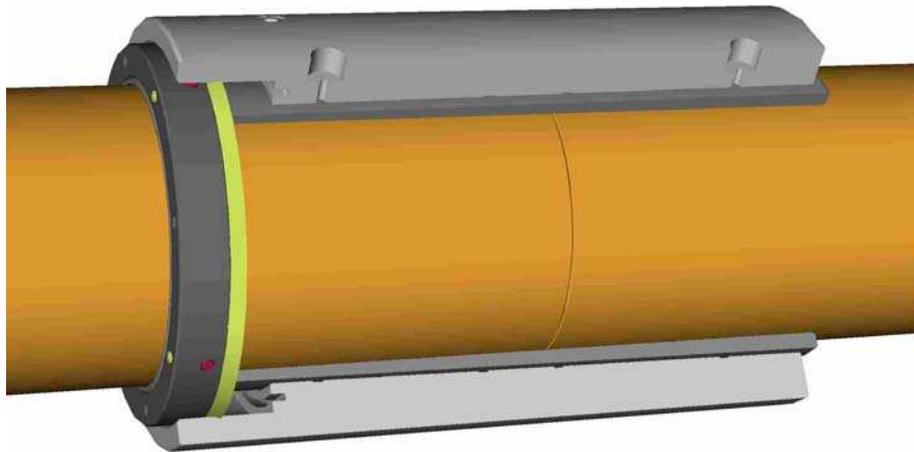
The coupling is mounted by driving the outer sleeve up on the taper of the inner sleeve using the hydraulic unit incorporated in the coupling.

This action compresses the inner sleeve onto shaft creating a powerful interference fit.

To allow this drive-up, the friction of the matching tapered surfaces is overcome by injecting oil at high pressure between them, where it forms a load-carrying film separating the two components.

When the outer sleeve has reached the correct drive up position, the injection pressure is released and the oil is drained off between the mating tapered surfaces, restoring normal friction between the sleeves.

Dismounting the coupling is equally simple. Oil is injected between the coupling sleeves to overcome the friction. As a result of the taper, the compressive force has an axial component which causes the outer sleeve to slide down the taper, forcing the oil out of the hydraulic unit.



3 OIL RECOMMENDATION

The oil to be used for the injector should have a viscosity of 300 mm²/s (300cS) at the temperature of the coupling. If the oil used for mounting is too thick, there is a risk that it will remain between the sleeves, resulting in a considerably deteriorated grip. The adequate viscosity will generally be obtained with sufficient accuracy if the oil is chosen as follows:

<i>Temperature range</i>		<i>Viscosity in SAE</i>	
0	- 8°C	Motor Oil	SAE 10 W
8	- 18°C	Motor Oil	SAE 20 W
18	- 27°C	Motor Oil	SAE 30
24	- 32°C	Motor Oil	SAE 40
32	- 38°C	Motor Oil	SAE 50

Alternative usable oil:

-10	- +20 °C	Motor oil	0W – 40 (Synthetic)
+15	- +25 °C	Motor oil	5W – 40 (Synthetic)

4 DESIGNATION OF THE COUPLING

The coupling is designated as "Type "OKCX", "OKCEX", "OKCAX" or "OKCKX". OKCEX and OKCAX are elongated and OKCKX is shortened compared with standard OKCX.

Coupling sizes are specified using the following system:

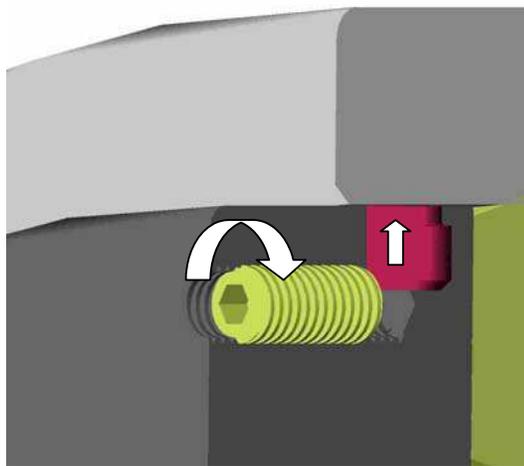
OKCX (EX, AX, KX), shaft diameter / drawing number.

For example: OKCX 280/xxxxx

5 COUPLING DETAILS

5.1 Locking device

The couplings are provided with a locking device which prevents the outer sleeve from being driven up unintentionally on the inner sleeve during transport and when the coupling is positioned on the shaft. After the coupling has been installed it prevents the nut from turning due to centrifugal force. The locking device is located in the nut and consists of four S6SS screws and four plugs. When tightening the screws in an axial direction the plugs are vertically pressed against the internal diameter of the hydraulic chamber creating a lock function.



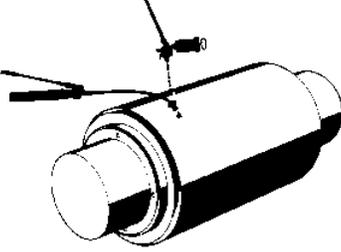
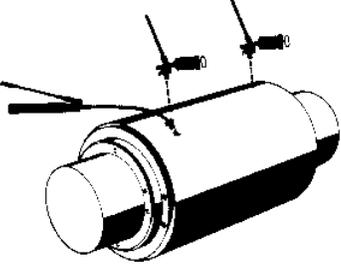
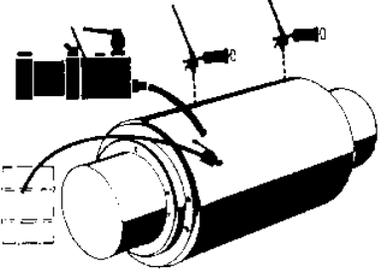
5.2 Handling the locking device

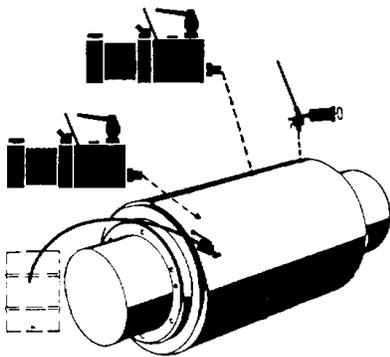
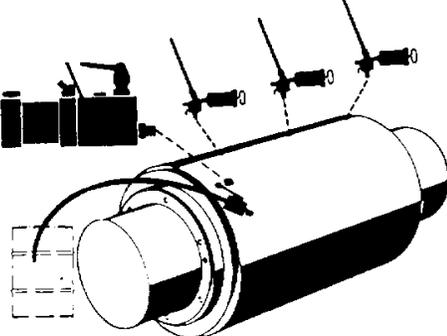
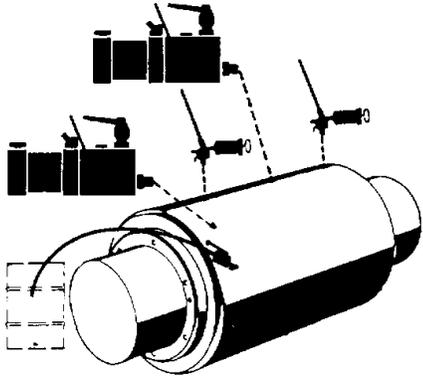
The locking devices should be released by unscrewing the screws 1/2 turn before starting the mounting procedure. When the coupling is finally mounted, the locking devices should be tightened once again. When tightening, tighten the screws crosswise (see table below for tightening torque). The gap between the nut and the hydraulic chamber can be inspected with a feeler gauge to make sure that the locking devices are activated. When moving the coupling on the shaft, the locking device must be tightened.

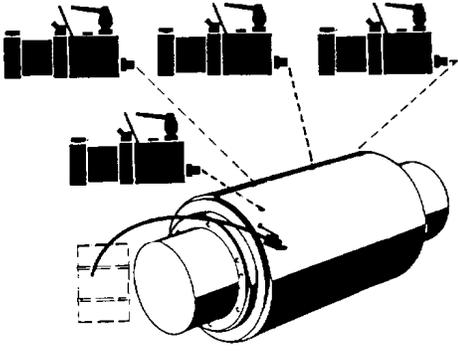
Coupling size	Tightening torque
100-190	5 Nm
200-290	7 Nm
300-490	12 Nm
500-690	20 Nm
700-900	30 Nm

6 EQUIPMENT FOR MOUNTING AND DISMOUNTING

For mounting and dismounting of the coupling, a number of tool kits has been assembled. The kit to be used is selected with reference to the coupling size.

Coupling size	Description	SKF set no.
<p>OKCX / OKCAX / OKCEX 100-170</p>	<p>1 Tool case 728245-3 1 Oil injector 226400 1 Hand operated pump TMJL 50 1 Set of hex keys 1 Spare parts for injector 226400 Mass: 19 kg.</p>	<p>TMHK 36</p> 
<p>OKCX / OKCAX / OKCEX 180- 250</p>	<p>1 Tool case 728245-3 2 Oil injector 226400 1 Hand operated pump TMJL 50 1 Pipe 227958A 1 Adapter block 226402 1 Set of hex keys 1 Spare parts for injector 226400 Mass: 28.1 kg. Set TMHK 38 can also be used for these coupling sizes. The set contains a hydraulic pump driven by compressed air which enables the coupling to be mounted more quickly.</p>	<p>TMHK 37</p> 
<p>OKCX / OKCAX / OKCEX 180- 490</p>	<p>1 Air driven pump set: THAP 030/SET 1 Return hose 729147A 2 Oil injectors 226400 1 Set of hex keys 1 Spare parts for injector 226400 Mass: 32.1 kg</p>	<p>TMHK 38</p> 

<p>OKCX / OKCAX / OKCEX 180- 490</p>	<p>1 Air driven pump set: THAP 030/SET 1 Return hose 729147A 1 Air-driven pump THAP 300E 1 Oil injector 226400 1 Set of hex keys 1 Spare parts for injector 226400 Mass: 76.2 kg including weight of pallet</p>	<p>TMHK 38S</p> 
<p>OKCX / OKCAX / OKCEX ≥500</p>	<p>1 Air driven pump set: THAP 030/SET 1 Return hose 729147A 3 Oil injectors 226400 1 Set of hex keys 1 Spare parts for injector 226400 Mass: 35.1 kg. This set is intended for use on board ship where dismantling and mounting is only carried out infrequently. For shipyards and workshops TMHK 40 or TMHK 41 is recommended.</p>	<p>TMHK 39</p> 
<p>OKCX / OKCAX / OKCEX ≥500</p>	<p>1 Air driven pump set: THAP 030/SET 1 Return hose 729147A 1 Air-driven pump THAP 300E 2 Oil injectors 226400 1 Set of hex keys 1 Spare parts for injector 226400 Mass: 78.2 kg including weight of pallet This set or also set TMHK 41 are recommended for shipyards and workshops. The air-driven high pressure pump simplifies works considerably.</p>	<p>TMHK 40</p> 

<p>OKCX / OKCAX / OKCEX ≥500</p>	<p>1 Air driven pump set: THAP 030/SET 1 Return hose 729147A 3 Air-driven pump THAP 300E 1 Set of hex keys Mass 126.7 kg including weight of pallet. This set is recommended for shipyards and workshops.</p>	<p>TMHK 41</p> 
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7 MOUNTING INSTRUCTIONS

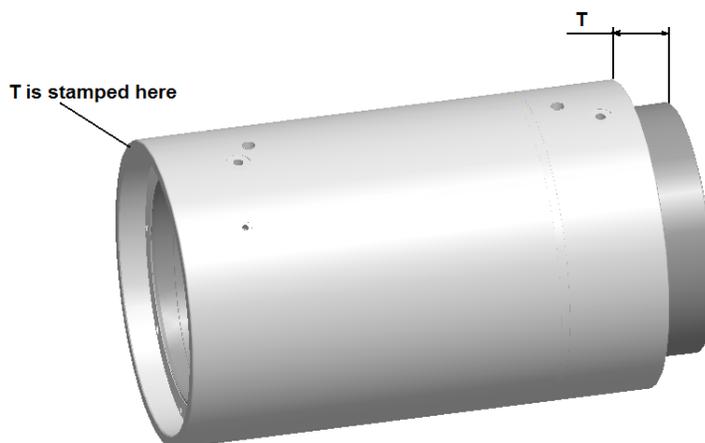
See enclosed assembly drawing for references.

Remove any burrs on the coupling seating on the shaft. **Clean and wash the inner sleeve bore and the coupling seating with white spirit, so that the anticorrosive agent is removed.**

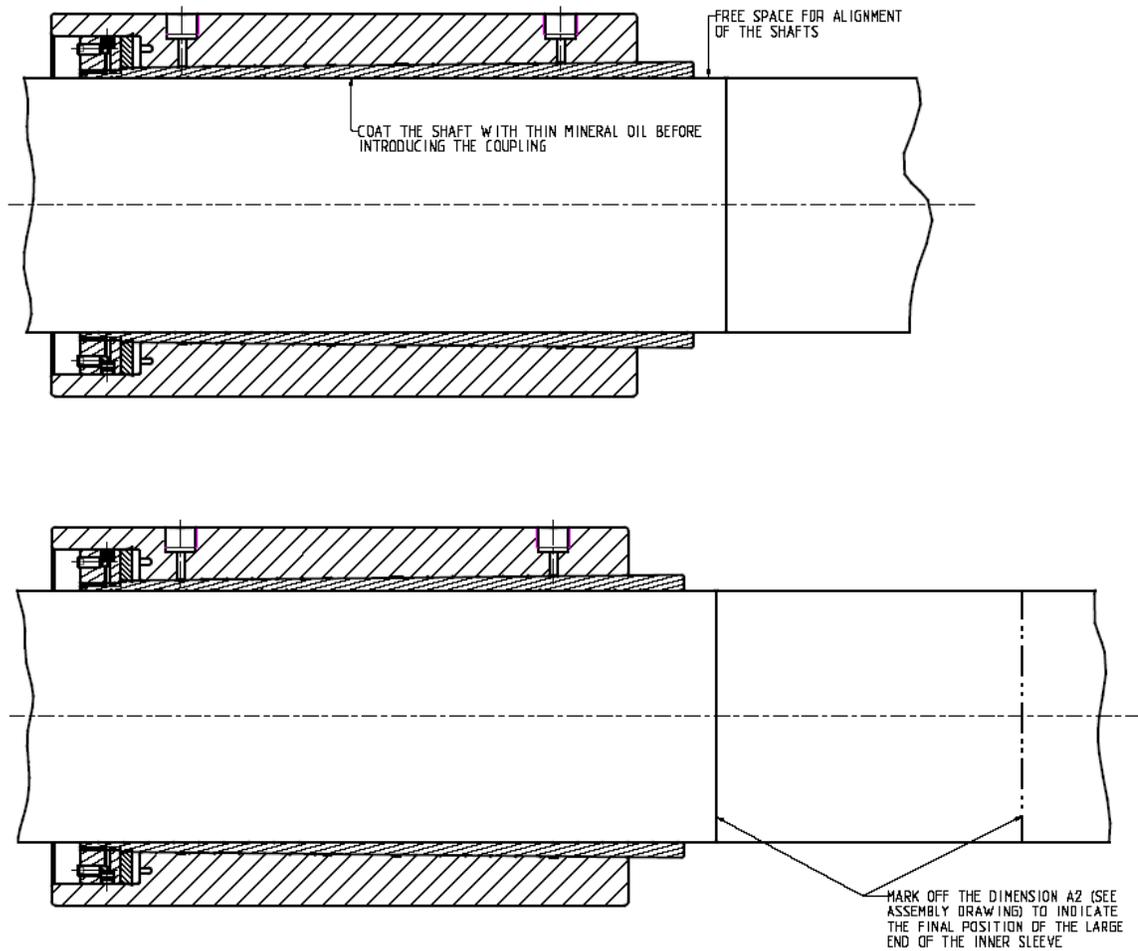
7.1 Positioning of the Coupling on shaft.

Suspend the coupling opposite the shaft on which dimension A_2 (A_2 is given in the assembly drawing) has been marked off, ensuring that the large end of the inner sleeve faces this shaft and that the connection holes are at the top of the coupling. Coat the shaft with thin oil before introducing the coupling. Slide the coupling on, guiding it carefully to prevent it from damaging the shaft. Push the coupling on until so much of the seating emerges that the shafts can be aligned accurately.

Before sliding the coupling on to the shaft check that the T-distance has not been unintentionally changed during transportation. Measure it and compare it with the value stamped on the coupling. If needed adjust it to the stamped value. Before adjusting the T-distance remember to unscrew locking device $\frac{1}{2}$ turn.



NOTE The locking devices should be kept tightened while positioning the coupling on the shaft.

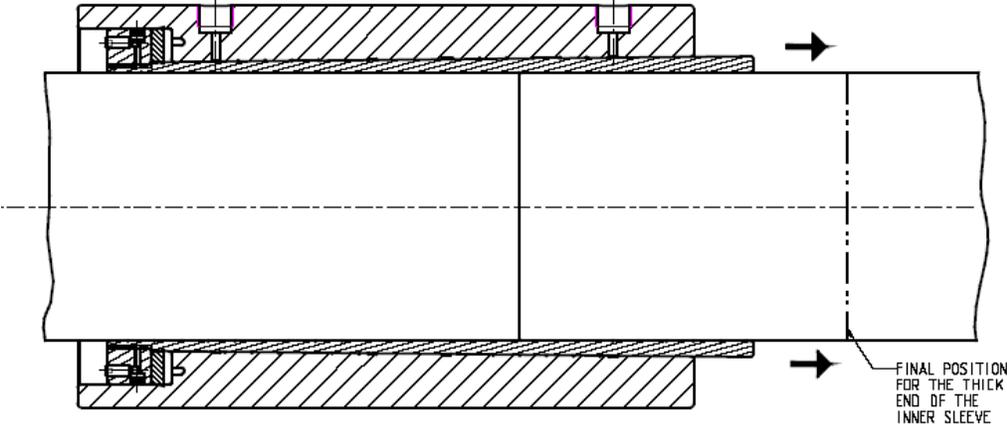


7.2 Positioning the coupling on the shaft

Align the shafts with precision, vertically and horizontally and ensure that the gap between the shaft ends is not more than 1% of the shaft diameter. Support the shafts and the coupling during the mounting process so that no misalignment appears. Coat the seating on the shaft with thin oil to prevent scraps on the shafts when sliding the coupling in position.

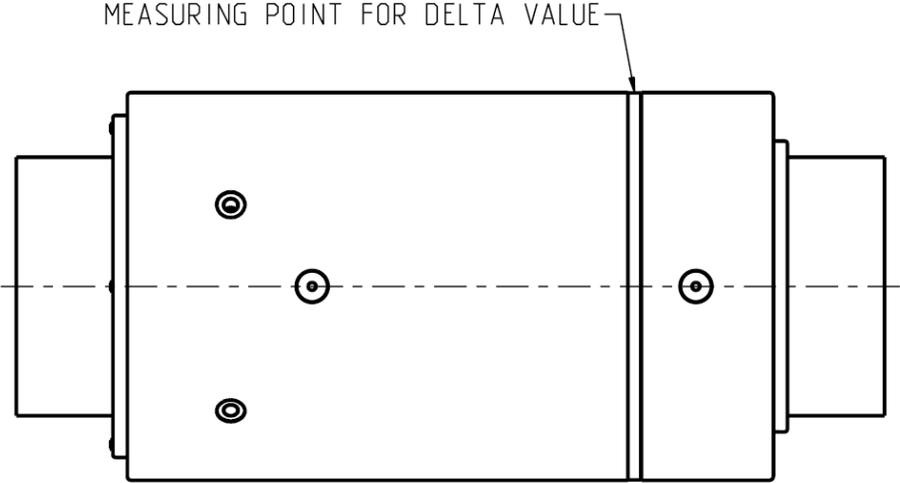
Slide the coupling back along the shafts until the large end face of the inner sleeve coincides with the A2 mark on the shaft.

NOTE The coupling must not weigh upon the shafts



7.3 Measuring the couplings diameter

When the coupling is in correct position and before mounting, measure the outside diameter of coupling and record it. The place for measuring is marked on the outside of the coupling with a shallow groove. (see assembly drawing for Δ value and position of the groove).



7.4 Drive up procedure

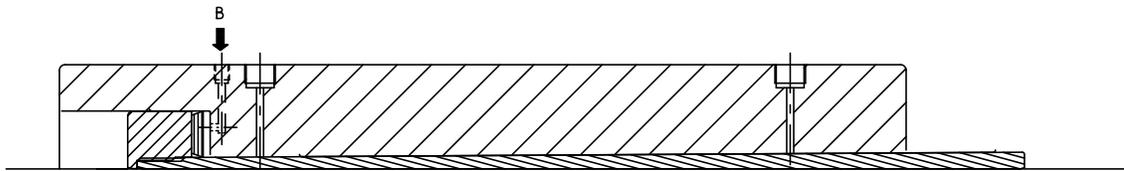
Position the coupling so that one of the two $\frac{1}{4}$ " plugs connected to the oil chamber is in top position (12⁰⁰ a clock). Couplings ≥ 700 has one $\frac{1}{2}$ " and one $\frac{1}{4}$ " hole and the $\frac{1}{2}$ " hole should be in top position. Unscrew the plugs and connect the low pressure pump to the lower $\frac{1}{4}$ " hole. Connect the high pressure injectors to the $\frac{3}{4}$ " holes on the coupling hub.

Note: Remember to unscrew the locking device $\frac{1}{2}$ turn before mounting (see chapter 5).

Calculate the final diameter of the coupling after drive up. Use the measured outside diameter + Δ value stamped on the coupling or see the assembly drawing for the Δ value.

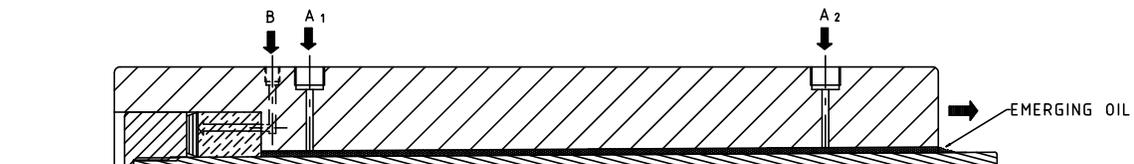
7.4.1 Couplings using 1 or 2 high pressure injectors (size 100 - 490)

Start pumping oil into the hydraulic chamber (B) until oil free from air bubbles escapes through the open $\frac{1}{4}$ " hole. Then close that hole with the plug.

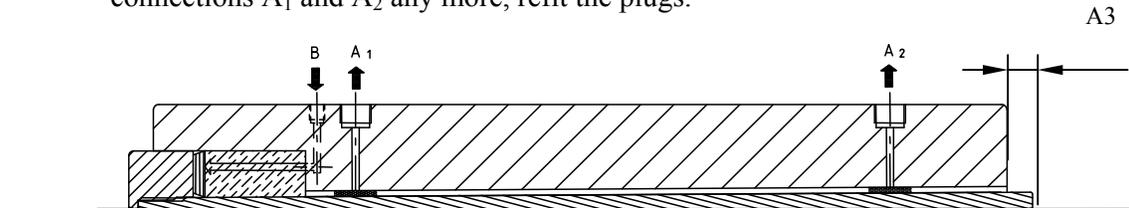


Begin working the high pressure injector connected to the $\frac{3}{4}$ " hole A₁ and after 5 minutes (if there is more than one injector) start working the high pressure injector connected to A₂. Work the high pressure pumps with even strokes until oil emerges around the periphery at the large end of the inner sleeve. Continue pumping for a couple of minutes.

Start the pump connected to the oil chamber (B) to begin the drive up of the outer sleeve. **It is important to continue working the high pressure injectors with even strokes during the entire drive up operation.** If it is necessary to refill the container of injector 226400 during the drive up procedure, always stop the pump connected to the oil chamber first. After refilling, work the injectors first until oil emerges again around the periphery at the large end of the inner sleeve. Continue the drive up procedure until the diameter of the outer sleeve has increased by the dimension Δ see 7.4. As the Δ value should be confirmed after the oil is drained out, the value measured before draining should be 5% higher.

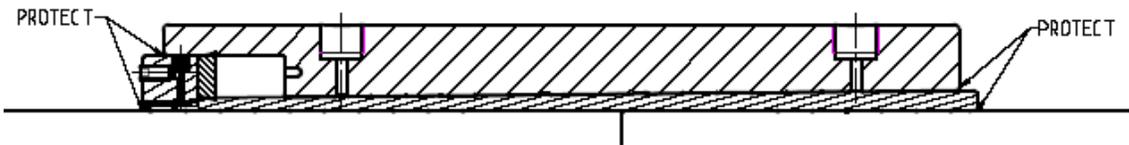


Stop the pump connected to the hydraulic chamber B, but keep the pressure. Open the return valves on the injectors A₁ and A₂. Keep the pressure (B) in the hydraulic chamber. After 10 minutes, measure the Δ value again, to confirm the correct diameter increase according to 7.4. Open the return valve on the pump connected to the oil chamber (B) slowly to release the pressure, make sure the outer sleeve not is moving. Remove the injectors connected to the $\frac{3}{4}$ " holes A₁ and A₂. Disconnect the pump connected to the oil chamber (B) and refit the plug. When oil is not draining out from connections A₁ and A₂ any more, refit the plugs.



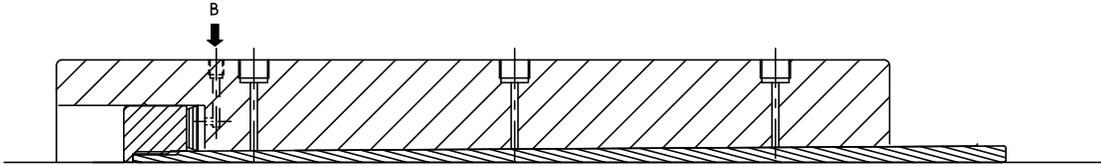
After this first mounting of the coupling the distance A3 (distance from the end of the inner sleeve to the end of the outer sleeve) should be measured and recorded, this can be used as a confirmation at the next mounting of the coupling instead of measuring the Δ value increase. Tighten the locking device as described in chapter 5.2.

Protect the ends of the coupling at the shaft and the clearance between the nut and the outer sleeve using silicon or similar protective. This will prevent moisture from penetrating the coupling parts.



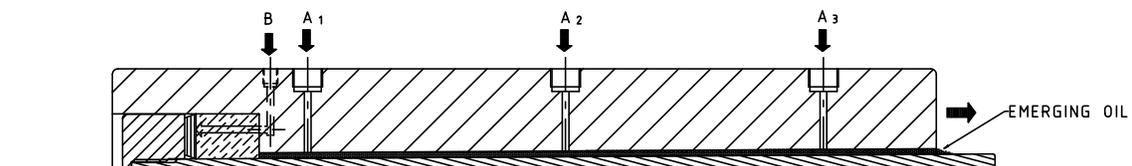
7.4.2 Couplings using 3 high pressure injectors (size >500).

Start pumping oil into the hydraulic chamber (B) until oil free from air bubbles escapes through the open $\frac{1}{4}$ " hole, or from the open $\frac{1}{2}$ " hole on coupling ≥ 700 . Then close that hole with the plug.

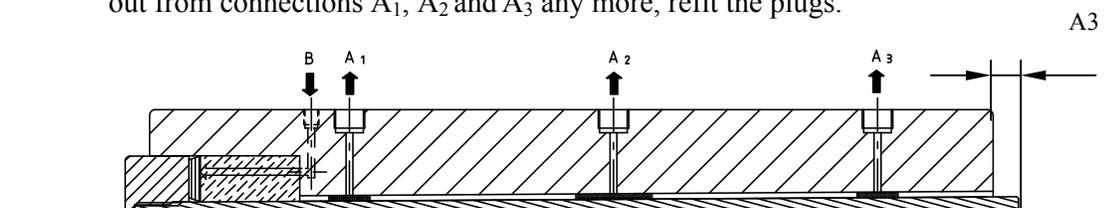


Begin working the high pressure injector connected to the $\frac{3}{4}$ " hole A_2 located in the middle of the coupling. When oil emerges around the periphery at the large end of the inner sleeve, start injection also with the other two injectors A_1 and A_3 . Work all injectors for a couple of minutes.

Start the pump connected to the oil chamber to begin the drive up of the outer sleeve. **It is important to continue working the high pressure injectors with even strokes during the entire drive up operation.** If it is necessary to refill the container of injector 226400 during the drive up procedure, always stop the pump connected to the oil chamber first. After refilling, work the injectors first until oil emerges again around the periphery at the large end of the inner sleeve. Continue the drive up procedure until the outer sleeve has increased by the dimension Δ see 7.4. As the Δ value should be confirmed after the oil is drained out, the value measured before draining should be 5% higher.



Stop the pump connected to the hydraulic chamber B, but keep the pressure. Open the return valves on the injectors A_1 , A_2 and A_3 . Keep the pressure (B) in the hydraulic chamber. After 10 minutes, measure the Δ value again, to confirm the correct diameter increase according to 7.4. Open the return valve on the pump connected to the oil chamber (B) slowly to release the pressure, make sure that the outersleeve not is moving. Remove the injectors connected to the $\frac{3}{4}$ " holes A_1 , A_2 and A_3 . Disconnect the pump connected to the oil chamber (B) and refit the plug. When oil is not draining out from connections A_1 , A_2 and A_3 any more, refit the plugs.



After this first mounting of the coupling the distance A3 (distance from the end of the inner sleeve to the end of the outer sleeve) should be measured and recorded, this can be used as a confirmation at the next mounting of the coupling instead of measuring the Δ value increase. Tighten the locking device as described in chapter 5.2.

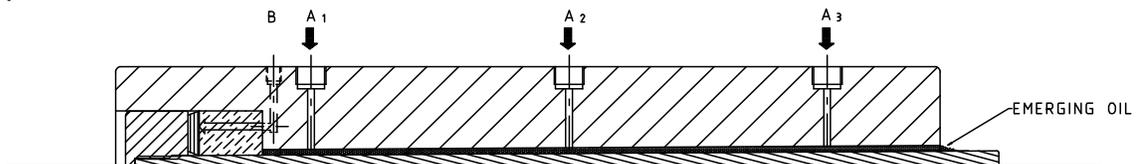
Protect the ends of the coupling at the shaft and the clearance between the nut and the outer sleeve using silicon or similar protective. This will prevent moisture from penetrating the coupling parts.



8 DISMOUNTING INSTRUCTIONS

- 1 Support the shafts on both sides of the coupling. Release the locking devices on the coupling, see chapter 5.2.
- 2 Connect the pump and injectors as for mounting and fill up the oil chamber with oil as the procedure for mounting, see chapter 7.4. Connect also the extra return pipe to the ½" or the other ¼" vent hole at the hydraulic chamber.
- 3 Pressurise the oil chamber to ~ 10 MPa and start the high pressure injectors (A) following the procedure for mounting. See 7.4.
- 4 Continue to work the high pressure injectors (A) until oil emerges around the periphery at the large end of the inner sleeve. If the outer sleeve moves relatively the inner sleeve taper while the pressure in the oil chamber increases also indicates that there is a satisfying oil film. Open the return valve on the pump (B) connected to the hydraulic chamber and at the same time the valve on the extra return pipe, this while the injectors are working, and the outer sleeve will slide down on the inner sleeve. **Work the high pressure injectors(A) until a fully dismantled position is obtained in order to maintain a good oil film between the sleeves**
- 5 To ensure that the coupling is fully dismantled check the T-distance. When the T-distance is at least the same value or larger as the stamped value on the coupling(see chapter 7.1), Then the coupling is free and could be removed from the shaft.

NOTE Make sure that the A3 dimension is not decreasing while dismantling the coupling



9 REPLACING THE OIL CHAMBER SEALING

The OKCX coupling is a unit, which normally should not be disassembled. If it however is necessary because of a damaged sealing, the nut must be removed first.

9.1 Coupling removed from the shafts

Release the locking device in the nut as described in chapter 5.2.

Unscrew the nut and remove the sealing using a tool with rounded edges to avoid damaging the surfaces. Replace it with the new sealing and guide it carefully over the inner sleeve threads not to destroy the sealing edge. Push it against the bottom of the chamber. Correct mounted the sealing outer edge and inner edge will have good contact against the bottom and the face will have a convex form.

Remount the nut and tighten it properly. With a blast of compressed air in one ¼ " hole, the sealing will be forced in position. Tighten the locking device (see 5.2).

9.2 Coupling mounted on the shaft.

If there is a leakage from the oil chamber when preparing for dismounting procedure, it is necessary to replace the sealing.

Follow the above mentioned procedure for removing the coupling nut and removal of the sealing. Place the nut on the shaft to get good access to the chamber. The new sealing must be cut to get it around the shaft. Do this with a long knife so that it will be a straight and smooth cut. Place the sealing around the shaft with the smallest outer diameter facing the nut. The flat surface of the nut can be used as a template. Use cyanoacrylat glue for rubber to glue the divided surfaces together. Place the sealing in the chamber guiding it carefully over the threads and 10mm up on the taper of the inner sleeve. Try to get the sealing as straight and flat as possible. Remount the nut and position the sealing with a blast of compressed air in one of the ¼ " hole.

WARNING! NEVER USE HIGH PRESSURE INJECTORS (A₁-A₃) IF THE NUT HAS BEEN REMOVED

10 ASSEMBLY DRAWING