INSTRUCTION SHEET FOR HYDRAULIC TENSIONERS

To require Repair Parts Sheets for hydraulic Tensioners, please contact with your nearest authorized BELIUM Service Center or BELIUM Sales office.

NOTE

PLEASE READ AND FOLLOW THIS INSTRUCTION BEFORE YOU USE BELIUM TENSIONERS.

Carefully inspect all components for shipping damage, if shipping damage is found. Please notify carrier at once. The carrier is responsible for any damage resulting from shipment.

1. SAFETY

To avoid personal injury or property damage, please follow all safety precautions. BELIUM cannot be responsible for injury or damage resulting from unsafe and incorrect products use or system operation, or lack of maintenance.

DANGER is only used when your action or lack of action may cause serious injury or even death.

WARNING indicates a potential danger that requires correct action to avoid personal injury.

IMPORTANT indicates correct action to prevent damage or equipment failure.

DANGER

The hydraulic equipment operator must be a qualified operator familiar with correct training and work experience of hydraulic equipment. Lack of knowledge in any of these areas can lead to equipment damage or personal injury.

- Please carefully inspect all components before use hydraulic equipment; if you find any damage on the components, please stop using your equipment and contact with your nearest Authorized BELIUM Service Center or Sales office. These damages may cause equipment failure and possible personal injury.
- To avoid personal injury, please do not modify or weld hydraulic equipment without approbated by BELIUM.
- Please never tension a bolt more than the capacity of the tensioners, overloading will cause equipment failure and possible personal injury.
- The operating pressure of cylinder(s) are designed for a max pressure of 700 bar (10,000 psi), please do not use a pump or relief valve with a higher pressure rate

to connect the cylinder(s). Higher pressure pump or relief valve may cause equipment failure and possible personal injury.

- To avoid personal injury, please keep hands and feet away from tensioners and workplace during operation.

WARNING

- Please wear safety glasses, helmet and other necessary personal protective equipment when operating hydraulic equipment.
- Please install pressure gauge in the system to monitor the operating pressure. The gauge must have same pressure rating as the pump and tensioners in the system. The wrong gauge may cause equipment failure and possible personal injury.
- To prevent dust or other debris into tensioner body or tube, please shift coupler(s) in a clean place. Dirt or other debris will damage the cylinder's seals and result in equipment failure and possible personal injury.
- Before removing or tightening hose(s) or coupler(s), please release hydraulic pressure in system.
- Never handle pressurized hoses; escaping oil under high pressure can penetrate the skin, causing serious injury. Seek medical aid immediately if injured.
- Please use BELIUM oil or other approved hydraulic oil.
- For hydraulic technical help or repair service. Please contact the authorized BELIUM Service Center in your area. BELIUM has no obligations under any warranty with respect to products that have been repaired by unauthorized personnel, modified, or damaged through misuse, abuse, accident, neglect, or mishandling.

IMPORTANT

- Please keep the equipment clean all the time.
- When the equipment is not in use, fully release the pressure, remove hose and use rubber cap(s) to recover the coupler.
- Do not drop objects on hose.
- Please do not lift and carry hydraulic equipment by the hose or coupler, use the handle or other safe way.
- Use hydraulic equipment in normal operating temperatures. Do not use equipment in temperatures of 65 ℃(150℉) or higher. Overheating will soften seals and weakens hose materials, resulting in oil leaking or other equipment failure.

2. HYDRAULIC TENSIONER SAFETY PRECAUTIONS

Hydraulic tensioners must be installed, operated and maintained only by a qualified operator familiar with correct training and work experience of high pressure tensioning devices and related equipment. All calculations must be performed by a qualified engineer with appropriate training and working experience.

- Please wear safety glasses, safety helmet and other necessary personal protective equipment when operating hydraulic equipment. The work area should be roped-off and all non essential personnel not involved with the site operation should be kept clear of the working area.
- Before work, inspect all bolts to be sure all threads are completed.
- Before starting tensioning work, be sure all operators know that the tensioning work will be started immediately.
- Never exceed the maximum working pressure of the hydraulic tensioner, maximum working pressure is stamped on the tensioner body.

- Never stand in-line with the bolt axis while tensioning or detensioning is in progress. If the bolt should fail, serious personal injury or death could result if loose or broken parts become projectiles. All personnel must be aware of this potential hazard at all times.
- Hoses should not be twisted or bent too sharply.
- Do not exceed the maximum allowable stroke of the hydraulic tensioner
- Never leave a pressurized system unattended. If you must leave the area, please stop the pump, fully release the pressure and ensure that hydraulic pressure gauge indicates zero (0) psi/bar.
- All tensioning or detensioning work must be started after the pressure gauge indicates stable.
- The total protruding length of the stud (from joint surface to end of stud) must be at least twice the length of the exposed portion of the stud (see figure 2). Do not operate the pump before the connection is not completed. (See figure 1) Never attempt to disconnect a hydraulic coupler while it is under pressure

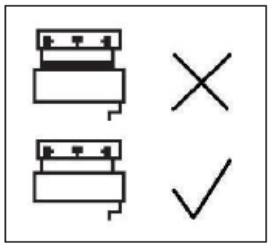

Figure 1

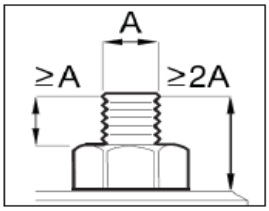

Figure 2

- Fully release the pressure in the system before install, remove or repair the tensioners.

3. CONNECTION

3.1 Hydraulic pump

- Hydraulic pump must be rated at or above the maximum working pressure of the tensioner.
- Be sure the hydraulic oil in pump is enough.
- Use only BELIUM hydraulic oil, failure to use genuine BELIUM hydraulic oil may void warranty.

a) Hydraulic hoses and fittings

- All hydraulic hoses and fittings used in the circuit must be rated at or above the maximum working pressure of the tensioner.

4. TENSIONER INSTALLATION

Please Refer figure 3, install the tensioners on the bolts:

4.1 Position the socket over the nut. Ensure that the socket fits over the nut without force (see A). The total protruding length of the stud (from joint surface to end of stud) must be at least twice the length of the exposed portion of the stud (see figure 2). For round nut, do not need the socket.
4.2 Position the tensioner body on the bolts (see B)
4.3 Install the threaded puller. Using a bar, screw down the threaded puller on the stud until the puller shoulder seats firmly against the piston (See C).
4.4 Connect the hose to the tensioner (see D), be sure the release valve is open.

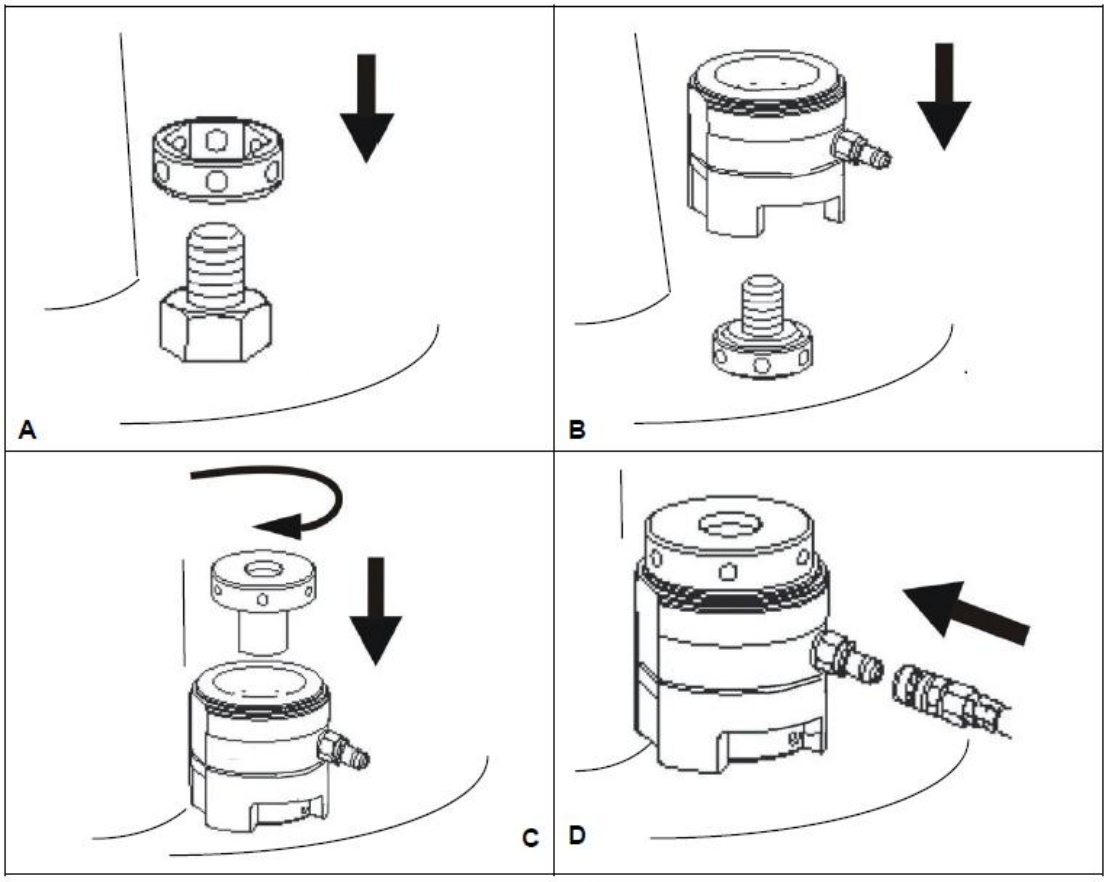

Figure 3

5. TENSIONING INSTRUCTIONS

WARNING: Never stand in-line with the bolt axis while the system is pressurized. If the bolt should fail, serious personal injury or death could result if loose or broken parts become projectiles. All personnel must be aware of this potential hazard at all times.

WARNING: Ensure that the maximum working pressure and maximum stroke are not exceeded. Refer to the specifications stamped on the tensioner body.

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IMPORTANT: If the maximum stroke indicator appears at any time during the following procedures, immediately STOP the pump, tighten nut(s) at the tensioner(s) and release hydraulic pressure. Then, turn down the threaded puller(s) to return the piston(s) back into the tensioner(s) before continuing.
IMPORTANT: If any leaks occur, immediately stop the pump and open the pressure release (return-to-tank) valve. Be sure that the oil pressure gauge indicates zero (0) psi/bar. Make repairs as required before continuing with tensioning procedures.

5.1 Assemble the tensioner(s) to the stud(s) and connect hydraulic hoses. Ensure that the joint is correctly aligned.
5.2 Determine the required hydraulic tensioning pressure. This value must be calculated by a qualified engineer with bolting experience.
5.3 Operate the pump and pressurize the tensioners up to approximately 1000 PSI [70 bar]. Check for oil leaks.
5.4 If no leaks are found, continue pressurizing the tensioners to the calculated value determined in step 3. Continually observe the tensioner stroke and hydraulic pressure at all times during pressurization.

5.5 When the calculated hydraulic pressure is reached, stop the pump. Recheck the oil pressure gauge after pump has stopped. Be sure the pressure is stable (not increasing or decreasing). Threads may be visible between the nut and the joint surface at each tensioner.

5.6 Use stick screw the nut clockwise one by one.

5.7 Release the hydraulic pressure by slowly opening the pump pressure release (return to tank) valve. Verify that the oil pressure gauge indicates zero (0) psi/bar.

5.8 Repeat step 5.3-5.7

5.9 And repeat step 5.3-5.7 again

5.10 Turn down the threaded pullers until the pistons are fully retracted. Disconnect hydraulic hoses and install a dust cap (not shown) over each disconnected coupler. Remove tensioners from the studs.

6. DE-TENSIONING INSTRUCTIONGS

IMPORTANT: Read precautions and instructions at beginning of Section 5.0 before beginning the following steps.

6.1 Assemble the tensioner(s) to the stud(s) to be de-tensioned and connect the hydraulic hoses.

6.2 BEFORE applying any hydraulic pressure, turn up the threaded puller at each stud as required, so that approximately a 3/16 inch [5 mm] gap appears between the fully retracted piston and the threaded puller.

6.3 Operate the pump to pressurize the tensioners up to approximately 1000 PSI [70 bar]. Check for oil leaks.

WARNING: In the following de-tensioning steps, be certain that the hydraulic pressure remains below the maximum allowable hydraulic pressure, and that the load applied does not exceed the tensile strength of the stud.

6.4 If no leaks are found, continue operating the pump. Slowly raise the pressure until the “break loose” hydraulic pressure value is reached. This is the pressure at which a nut on one of the tensioners just begins to loosen and can be turned by hand with the bar. Record this pressure for reference.

6.5 Increase the hydraulic pressure approximately 5 percent above the “break loose” pressure recorded in step 4. Then, stop the pump.

6.6 While holding the pressure constant, turn up (loosen) the nut at the first tensioner, so that there is approximately a 1/8 inch [3-4 mm] gap between the nut and the joint surface.

Note: Dimension of gap in step 6 must not exceed the dimension of gap in step 2

6.7 Repeat step 6 at all remaining studs.

CAUTION: If nuts are difficult to turn, hydraulic pressure may be increased in additional 5 percent increments. However, NEVER raise hydraulic pressure above the Max. Pressure. Ensure that the load applied does not exceed the tensile strength of the stud.

6.8 Release the hydraulic pressure by SLOWLY opening the pump pressure release (return to tank) valve. Verify that the oil pressure gauge indicates zero (0) psi/bar.

6.9 Turn down the threaded pullers until the pistons are fully retracted. Disconnect hydraulic hoses and install a dust cap (not shown) over each disconnected coupler. Remove tensioners from the studs.

7. STORAGE

The tensioner’s black oxide finish will help protect it from rust and corrosion. However, for added protection, a light coating of oil or rust inhibitor should be applied to all metal surfaces. Cover the internal threads of the threaded puller with oil or a suitable rust inhibitor. Store the tensioner upright, with the piston fully retracted inside the body. Always keep dust caps installed on couplers when the tensioner is not being used. Wipe all hoses clean and apply a light coating of oil or suitable rust inhibitor to all couplers.