HYDRAULIC CYLINDER USER MANUAL

Contents

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1. Symbols

Wear a safety helmet

Wear ear protectors

Wear eye protection

Wear safety footwear

Wear safety clothing

Wear safety gloves

Danger zone

No open flames, no smoking

Corrosive

2. Preparations

2.1. *Prior to handling*

Read this manual before installing, handling, removing, or commissioning the unit equipped with the hydraulic cylinder. Make sure personal protective equipment (PPE) is used at all times. Only qualified personnel are allowed to carry out hydraulic cylinder installation works.

ATT! AS BHC cannot be held liable for property damage, injuries or any other damages caused by third parties during hydraulic cylinder installation.

2.2. *Conditions*

Make sure the hydraulic cylinders are used under appropriate environmental conditions (-10°C...+ 40°C, relative humidity 70%). AS BHC cannot guarantee the hydraulic cylinders will function under conditions differing from the regular, unless otherwise agreed upon at the time of cylinder ordering and design. Use under extreme environmental conditions will shorten the hydraulic cylinders' service life.

2.3. *Safety requirements for hydraulic systems*

The hydraulic cylinders connected to a hydraulic system must comply with ISO 4413:2010.

Warnings

Never install hydraulic cylinders or cylinder components near open flames!

Never install hydraulic cylinders or cylinder components at temperatures above 80°C.

Some hydraulic oil grades contain corrosive substances!

Do not drill holes into hydraulic cylinders!

Never use welding when installing hydraulic cylinders.

3. Installation

3.1. *PPE required*

3.2. *Unpacking*

Before unpacking the hydraulic cylinder, carefully check for any external transport damages.

3.3. *Installation instructions*

- Make sure all components have been cleared of dust, other hazardous materials, and water. Before connecting hoses or pipes to the hydraulic cylinder, make sure that the hoses, pipes and hydraulic components are clean and contain no inappropriate liquids (liquids not intended for hydraulics), abrasive particles or other impurities. Make sure all hoses, pipes and/or valves are correctly connected.
- Before hydraulic cylinder installation, make sure all bearings and pins are lubricated.
- Make sure there are no lateral loads working on the hydraulic cylinder's middle part. Any loads must be 100% parallel to the hydraulic cylinder's axis. Lateral or radial loads can cause irreparable damage to hydraulic cylinders.
- Connect the hydraulic cylinder to your hydraulic system.
- Pressurize the cylinder slowly until the piston rod is extended.
- Visually check for possible hydraulic cylinder leaks.
- If there are no leaks, test the hydraulic cylinder at low pressure (up to 25% of nominal).

- Test the hydraulic cylinder once in the extended and once in the retracted position. Maintain the positions for 5 minutes and check whether the pressure remains at the initial level.
- Test the hydraulic cylinder under high pressure (design pressure). Test the hydraulic cylinder once in the extended and once in the retracted position. Maintain the positions for 5 minutes and check whether the pressure remains at the specified level.
- After completion of the tests and if no failures have been discovered, the hydraulic cylinder is ready for operation.
- Make sure the hydraulic cylinder activated hydraulic system employed (pump device) complies with the standard ISO 4413:2010.

Stay clear of the piston rod path and be careful when attaching the hose couplings!

3.4. *Filling the hydraulic cylinder with oil*

Make sure the hydraulic system used complies with the hydraulic cylinder design conditions. Wrong oils can damage the hydraulic cylinder gaskets and cause hydraulic cylinder leaks.

4. Operating instructions

4.1. *Warnings*

The temperature of standard hydraulic mineral oil may not exceed 70°C during operation, to avoid damages to the hydraulic system operated. The maximum temperature of water/glycol mixture is 50°C.

Do not exceed the maximum working pressure specified by the manufacturer. If the system is capable of operating at higher pressures, install an additional pressure-regulating valve.

4.2. *User qualification*

Only specialists with the required training and qualification may operate hydraulic systems. AS BHC cannot be held responsible for possible accidents, injuries or damages upon use of hydraulic cylinders or hydraulic systems by the operator.

4.3. *Mandatory PPE for hydraulic cylinder operators*

4.4. *Hydraulic system operators*

As an operator, keep unauthorised persons away from the unit. Before using the hydraulic cylinder, make sure all persons accessing the hydraulic cylinder or hydraulic system operation area wear personal protective equipment. Make sure the system has been checked and is functional.

4.5. *Storage*

If the hydraulic cylinder will not be commissioned right away, protect it as follows:

- During transport and lifting of the hydraulic cylinder, the piston rod must always be in the fully retracted position.

- If the cylinder has been stored in the horizontal position for more than 4 months, pressure drops and/or oil leaks from between the chromium plated rod and front cover can occur. The reason for this is that in the horizontal position, the cylinder piston exerts pressure on the piston gasket and the chromium-plated rod exerts pressure on the front cover packing. The original shape of the seals is restored after the cylinder is pressurized to full stroke approx. 10 times.

- When operating the cylinder for the first time, an apparent oil leak is possible from between the front cover and chromium-plated rod. Check by clean white paper. It is highly likely that the oil residues are of red colour and consist of cylinder assembly oil. Such minor oil leaks will cease after a few work cycles.

- If your product is stored/packaged during transport and/or storage so that the chromium-plated cylinder rod is extended (i.e., the cylinder is in the open position), the chromium-

plated rod must be protected with anti-corrosion grease. All application methods (mechanical application by soft fabric, spray, etc.) are acceptable. The chromium-plated rod has been tested by the rod manufacturer; based on the 200 h salt test results, the warrantied safe storage period is 200 hours of unprotected (oil film, protective spray or the like) exposure to outdoor atmosphere.

- An important reminder for resellers – even in case of inoperative units, the hydraulic cylinders need pressurization/activation from time to time (approx. every 3-4 months). This ensures elasticity of the cylinder gaskets and packings for the required compressive strength and leakproofness during further service. Also, keep in mind that after the hydraulic cylinders have passed the required operation cycles and are prepared for continued outdoor storage, the extended chromium-plated cylinder rods must be protected again. In any case, make sure the extended chromium-plated rods cannot be damaged mechanically. Mechanical damages are not included under the warranty of the hydraulic cylinder manufacturer.
- Keep hydraulic cylinders in the horizontal position, without tensions and/or loads.
- Hydraulic cylinders should be stored indoors at -10°C...+40°C. The hydraulic cylinder storage environment should be dry and protected against direct sunlight. Relative humidity at the storage site should preferably not exceed 70%.

5. Maintenance instructions

5.1. *Checklist*

Check the condition of hydraulic cylinder parts/components on monthly basis. Look for damaged, corroded or worn parts.
If possible, keep the hydraulic system and components safe against any environmental hazards.
Check if the joints and connectors are properly secured. Loose connections may cause oil leaks, which lead to equipment damages and environmental pollution.
Regularly check the oil temperature and oil cleanness. The oil temperature may not exceed 70°C, to prevent damage to hydraulic cylinder gaskets.
Using high-pressure jet nozzles for cylinder cleaning is not allowed. To prevent damages to paint, gasket, bearings, etc., DO NOT dismantle the hydraulic cylinder! If a component needs to be replaced, contact the hydraulic cylinder manufacturer. Dismantling by third parties annuls the warranty.

5.2. *Maintenance of main components*

Piston rod

- Apply grease on the piston rod at least once a month (if the hydraulic cylinder is exposed to salts, it must be pressurized at least twice a week). This prolongs the service life of the hydraulic cylinders.
- Monthly check the piston rod surface for any damages. The oil contained in the hydraulic cylinder usually protects the piston rod.
- Always protect the protruding length of the piston rod (the length that is not in contact with the oil).

Cylinder body

- Monthly check for paint damage and any cracks. All paint damages must be repaired immediately.

Bearings

- If the hydraulic cylinder is equipped with bearings, the bearings must be greased or checked once a month. The service life of ungreased bearings is reduced dramatically.
- Maintenance-free bearings may not be greased!

5.3. *Oil*

- Qualified hydraulic system operators can carry out oil cleanness inspections. Oil cleanness must comply with NAS maximum value 7 (according to standard ISO 4406).

5.4. Disposal in the Republic of Estonia

After the hydraulic cylinder breaks or becomes unusable in the Republic of Estonia as a result of natural mechanical wear and tear, the product must be disposed of in accordance with the current Estonian Waste Act (28.01.2004).
The oil contained in the hydraulic cylinder must be separated and handled in accordance with the current EV Regulation No 23 Old Oil Handling Requirements (21.04.2004)

5.5. Disposal in a foreign country

After a hydraulic cylinder breaks or becomes unusable as a result of natural mechanical wear in a foreign country, the product must be disposed of in accordance with the waste legislation in force in the country of destination.

DO NOT open or disconnect the components of a pressurized hydraulic system!

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