Round profile cylinders

Tie rod cylinders

Use and maintenance manual STC 0001-2.2013 REV.00

<table>
<thead>
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<th>Revisione</th>
<th>Data Emissione</th>
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<td>13/02/2013</td>
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</tbody>
</table>

Stocchetta Cilindri s.r.l. – Via Capretti n°14 , 25136 Brescia – Italia –
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1 Information

1.1 Validity of document

This manual refers to round profile hydraulic cylinders and bolted, square profile cylinders.

The handbook provides important information for the safe and proper transport of cylinders, their storage, installation, commissioning, use, disassembly, maintenance and disposal.

The handbook contains 29 pages.
2 Safety directions

2.1 Safety symbols

<table>
<thead>
<tr>
<th>Icon</th>
<th>DANGER</th>
<th>Identifies a dangerous situation which, if not avoided, may cause death or serious body injuries.</th>
</tr>
</thead>
<tbody>
<tr>
<td>!</td>
<td>CAUTION</td>
<td>Identifies a dangerous situation which, if not avoided, may cause slight up to medium-serious body injuries.</td>
</tr>
<tr>
<td>☰️</td>
<td>NOTICE</td>
<td>Information which, if used, protects the product and/or the environment from material damages.</td>
</tr>
</tbody>
</table>

2.2 Importance of this chapter

In this manual, safety warnings precede all operations representing a possible risk of damage to people or things. Safety measures described in this manual to avoid any danger must be strictly observed.

The product has been manufactured in compliance with generally acknowledged technical regulations but, since the risk of damage to people and things persists, the prescriptions and indications stated in this chapter must be observed. You must therefore

- Before using the product, carefully read the manual in all its parts.
- Preserve this document in an easily reachable site for all users. Deliver the product always provided with the enclosed necessary documents.
2.3 Intended use

According to EU Directive 2006/42/EC, the hydraulic cylinder has not been conceived for direct use but exclusively to be installed in a machine or in a system. Therefore, hydraulic cylinders do not fall within the scope of the Machinery Directive.

According to the pressure equipment directive, hydraulic cylinders are not classified as pressure vessels but as hydraulic actuators since the essential requirement for the structure is not pressure but resistance, internal stability and resistance to operating static and dynamic stresses.

The product is to be used only for industrial purposes, and not by private individuals.

Compliance with the provisions also includes the careful reading and understanding of this manual, in particular chapter 2 “Safety warnings”.

2.4 Misuse

Any use differing from that stated in par. 3.2 is to be considered as non-compliant and, therefore, not allowed.

**Stocchetta Cilindri S.r.l. disclaims all liability for damages due to misuse. Risks due to misuse are to be ascribed exclusively to the user’s responsibility.**

Misuse of the product also means the use of hydraulic cylinders:

- with operating pressures higher than those prescribed in the technical specifications or in the installation diagrams;
- with hydraulic fluid not in compliance with the technical specifications;
- with different operating ambient conditions;
- as drive component in the installation.
2.5 Staff qualifications

The activities mentioned in this manual require basic notions in the mechanical, electrical and hydraulic field, besides knowledge of the corresponding technical terms.

To guarantee safe use, these activities must therefore be carried out only by skilled or duly instructed staff under the direction of a competent technician.

A competent technician shall observe the technical standards and specifications in force and, in the works he/she has been entrusted with, be capable of identifying any possible hazard in order to take the necessary safety measures.

The product is therefore to be used exclusively by qualified and trained personnel:

- To carry out the transport
- To carry out the assembly and disassembly of hydraulic and mechanical parts
- To operate hydraulic systems

2.6 General safety warnings

- Observe the accident prevention standards in force
- Observe the environment protection standards in force
- Observe the safety standards of the country where the product is to be used
- Observe the technical and environmental specifications stated on the product and in the pertaining documents
- The staff in charge of assembly, use, disassembly and maintenance of the products Stocchetta Cilindri S.r.l. shall not operate under the influence of alcohol, drugs or medicines that may affect their capacity of reaction and judgment.
- Use accessories and/or spare parts authorized by the manufacturer
- Operate the cylinders only if it has been ascertained that the machine/s in which the Stocchetta Cilindri S.r.l. products have been installed are in compliance with the directives and safety regulations of the country of destination.
2.7 Specific safety warnings for product and technology

When the hydraulic cylinders are installed in the machine, there could be the risk of interaction between cylinders and machine; in particular, the effect of hydraulic and electrical controls on the actuators that produce mechanical movements requires an analysis of possible risks and the presence of the user’s manual is compulsory.

<table>
<thead>
<tr>
<th>DANGER</th>
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<tbody>
<tr>
<td>INSTALLATION UNDER PRESSURE!</td>
</tr>
<tr>
<td>Death hazard; danger of serious personal injuries in case of intervention on working installation!</td>
</tr>
<tr>
<td>Damages to property!</td>
</tr>
<tr>
<td>• Make sure that the hydraulic cylinder is not pressurized</td>
</tr>
<tr>
<td>• Do not loosen the connections of the pipes, attachments and components until the cylinder is pressurized.</td>
</tr>
<tr>
<td>• Disable all the power transmission components and all the connections (electrical, hydraulic, pneumatic) according to the manufacturer’s indications; secure the installation against restart and, if possible, remove the main safety element of the installation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DANGER</th>
</tr>
</thead>
<tbody>
<tr>
<td>OIL MIST LEAKAGE DUE TO DEFECTIVE OR NOT CORRECTLY ASSEMBLED SEALS!</td>
</tr>
<tr>
<td>Fire, explosion, allergic reactions, environmental pollution hazard!</td>
</tr>
<tr>
<td>• Carry out all welding operations only when the hydraulic cylinder is depressurized</td>
</tr>
<tr>
<td>• Keep the cylinder out of reach of open flames and ignition sources</td>
</tr>
<tr>
<td>• Upon welding, make sure that earthing is carried out by means of the suitable cable and not through the hydraulic cylinder.</td>
</tr>
</tbody>
</table>
### DANGER

**BURNING SURFACES ON HYDRAULIC CYLINDERS!**

Danger of injury! Burns hazard!

- It is advisable not to work with still hot surfaces. If waiting is not possible, use protective gloves. Temperatures during or after the operation may exceed 60°C (140°F)
- Before touching the hydraulic cylinder, let it cool off properly
- Observe the safety measures of the final machine manufacturer

### DANGER

**HYDRAULIC FLUID LEAKS UNCONTROLLED FROM THE CYLINDER!**

Fire hazard! Danger of injury!

- Immediately disable the system by pressing the emergency push button
- Find out and remove the cause of the failure
- Never try to stop the oil spray by making use of a cloth
- Avoid any direct contact with the flow that may be released at high pressure
- At regular intervals, carry out visual checks in order to verify the tightness of the hydraulic cylinder and the oil containing components

### DANGER

**DANGER: SLIPPERY SOILS DUE TO OIL SUBSTANCES!**

Danger of injury!

- Secure and identify the dangerous area
- Immediately remove the leaked oil
- Use bonding agents to remove the leaked fluid
- Remove and dispose the bonding agent used for removing the leaked hydraulic oil in compliance with the regulations in force
- Wear the compulsory protection devices (e.g. safety shoes)
### 3 General directions to avoid damages to product and things

<table>
<thead>
<tr>
<th>NOTICE</th>
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<tbody>
<tr>
<td><strong>DANGER DUE TO INCORRECT HANDLING!</strong></td>
</tr>
<tr>
<td>Damages to property!</td>
</tr>
</tbody>
</table>

- The product shall be used according to directions stated in par. 2.3 “Intended use”
- Do not run into and damage high functional surfaces (e.g. rod surface) and components (e.g. limit switches).

<table>
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<tr>
<th>NOTICE</th>
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<tbody>
<tr>
<td><strong>HYDRAULIC FLUIDS MIXTURE!</strong></td>
</tr>
<tr>
<td>Damages to property!</td>
</tr>
</tbody>
</table>

- Mixture of hydraulic fluids from different producers or different types of hydraulic fluids of the same producer is usually not admitted.

<table>
<thead>
<tr>
<th>NOTICE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CONTAMINATION DUE TO FLUIDS AND/OR FOREIGN BODIES!</strong></td>
</tr>
<tr>
<td>Early wearing and failures!</td>
</tr>
</tbody>
</table>

- Upon assembly, provide for the cleaning of all parts in order to avoid that impurities originating from the hydraulic lines may cause wearing and failures to the product
- To remove lubricants and other contaminants use residue-free industrial cloths
- Carry out the external cleaning of the hydraulic cylinder only when the oil connections are closed.
- Before the commissioning, make sure that all hydraulic and mechanical connections have been carried out properly.
NOTICE

INCORRECT CLEANING!

Property damages!

- Close all the openings by making use of suitable protections in order that no detergent may penetrate
- Check that all seals and closing-devices of the plug-in electrical connections are correctly positioned, in order that no detergent may penetrate
- Use a suitable liquid product to clean the hydraulic cylinder. Never use any aggressive detergent.
- Never use any high-pressure cleansing agent
- Never use compressed air on the functional interfaces, such as ball-joints, sealing areas, etc.

NOTICE

OPERATION WITH INSUFFICIENT OR CONTAMINATED HYDRAULIC FLUID

Damages to property!

- Follow the indications of the installation manufacturer as concerns the checks of the hydraulic fluid and the remedies prescribed according to the results of carried out checks

NOTICE

HYDRAULIC FLUID LEAKAGE OR SPILLING!

Environmental pollution and contamination of groundwater!

- Use fluid bonding agents to remove the leaked hydraulic oil
- To discharge the hydraulic fluid, always position a collection tank under the hydraulic cylinder.
4 Equipment provided

The delivered hydraulic cylinder complies with the codes required by the Customer and stated in the work-order confirmation.

The cylinder will be delivered with the connections closed by suitable plugs (Fig. 1) or cover plates (Fig. 2). The plastic plug have been conceived exclusively to protect the hydraulic cylinder from external contamination during transportation.
5 Product identification

The product is clearly identified by means of:

- Identification plate
- Specific product documentation
- Delivery note

5.1 Identification plate

Fig. 3
1 – Stocchetta Cilindri’s S.r.l. logo
2 – Product code
3 – Manufacturer’s work-order
4 – Data of the manufacturing company

Fig. 4
1 – Stocchetta Cilindri’s S.r.l. logo
2 – Data of the manufacturing company
3 – Cylinder bore dimensions
4 – Cylinder rod dimensions
5 – Cylinder stroke
6 – Cylinder nominal operating pressure
7 – Drawing no.
8 – Manufacturer’s work-order
9 – Date of production

Fig. 5
1 – Cylinder code
2 – Date of production
3 – Manufacturer’s work-order
4 – Cylinder data: bore/rod/stroke
5 – Drawing no.
6 Handling

6.1 Hydraulic cylinder transportation

⚠️ DANGER

| UNCONTROLLED EXTENSION OF THE ROD AND CYLINDER LIFTING BY MEANS OF ACCESSORIES |
| (FIXING PLATES, PIPING, ETC.)! |
| Danger of injury or material damage! |

- Hydraulic cylinders must be transported exclusively as described in this paragraph
- During transportation do not remove the protections to the oil connections

According to the dimensions and environmental conditions, hydraulic cylinders can be transported by means of fork lift trucks, cranes or lifting devices.

The directions to be observed for hydraulic cylinders hoisting and transportation are:

- Hydraulic cylinders must be transported exclusively in horizontal position; if possible in their original packaging, or on wooden blocks to secure their position.
- Make sure that, during transportation on wooden blocks, cylinder components are free from pressure forces
- Use soft belts to lift the cylinders in order not to damage the painting or the protections.

Before any lifting/ transportation it is advisable to consult the net weight of the cylinder stated on the delivery notes.
6.2 Transport using a fork lift truck

If the hydraulic cylinder shall be transported by means of a fork lift truck, operate as follows:

- Position the forks under the cylinder packaging or under the cylinder if it has been secured for transportation.
- Carefully lift the cylinder in order to check the centre of gravity (G). Make sure that the centre of gravity is stable and that the cylinder cannot move from the foreseen position.
- Fasten the hydraulic cylinder in order to oppose the acceleration and deceleration forces during transportation.
- Lift the hydraulic cylinder from the ground as much as necessary for transportation.
### NOTICE

<table>
<thead>
<tr>
<th>PRESSURE FORCE DUE TO BELT PRESSING ON THE ACCESSORIES (FIXING PLATES, PIPING, ETC.)!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Damages to property!</td>
</tr>
</tbody>
</table>

- Fasten the hoisting device to the hydraulic cylinder in a way that the extraction belt remains free during lifting, i.e. it does not rest on the accessories.
A. Lifting with threaded holes for eyebolts on hydraulic cylinder

![DANGER]

**BREAKING OF EYEBOLTS AND/OR THREADED HOLES FOR LIFTING RING DUE TO OVERLOAD!**

Death hazard! Danger of serious injuries!

Damages to property!

- Follow the lifting procedure described in this paragraph

Directions to be observed to lift hydraulic cylinders by means of threaded holes for eyebolts:

- For hydraulic cylinders provided with threaded holes and eyebolts, make use of suitable lifting devices. The cylinder may be lifted and transported in this way only in delivery condition.

- Carefully lift the hydraulic cylinder in order to check the centre of gravity (G); make sure that the centre of gravity is stable and that the cylinder cannot move from the foreseen position.

- Lift the hydraulic cylinder from the ground only as much as necessary for transportation

Fig. 7
B. Hoisting by means of lifting belts

Directions to be observed to lift hydraulic cylinders by means of lifting belts:

- Fasten two lifting belts of same length - by forming some eyelets - to both ends of the tube in the hydraulic cylinder (Fig. 8)
- Observe the tractive force allowed for the lifting belt
- Carefully lift the load in order to check the centre of gravity position (G) and make sure that it is stable
- Make sure that the lifting belt does not slide upon lifting
- Lift the hydraulic cylinder from the ground only as much as necessary for transportation

Fig. 8

6.4 Manual transport

According to possibilities, make use of suitable ancillary means such as, for example, transportation belts.
7 Storage

7.1 Corrosion protection provided in the factory

As a standard, Stocchetta Cilindri’s Srl products are coated with a single-component priming paint, black colour RAL 9005 (40my), if no other specific painting request (method and colour) has been submitted by the customer.

No painting is applied to following parts of the hydraulic cylinders and components:

- Customers’ coupling diameters and connection surfaces
- Sealing surfaces of pipe connection or flanged connection
- Surfaces for valves assembly
- Inductive proximity switches and position monitoring systems
- Pressure couplings (minimess)
- Ball joints/swivel joints
- Lubrication fittings

The above mentioned surfaces are protected by anti-corrosion oil type NILUX ZAPON YELLOW.

7.2 INTERNAL PROTECTION

Hydraulic cylinders are usually tested with mineral oil. The oil film which remains in the internal chamber after inspection ensures sufficient short-term internal protection against corrosion.
7.3 Preservation

Internal protection of hydraulic cylinders is achieved through the testing, washing or filling with protective oil, according to the following table:

<table>
<thead>
<tr>
<th>Preservation conditions</th>
<th>Packaging</th>
<th>Preservative</th>
<th>Storage time in months</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Only tested with</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>protective oil</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tested and filled</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>with protective oil</td>
</tr>
<tr>
<td><strong>Dry areas</strong></td>
<td><strong>Suitable</strong></td>
<td>A</td>
<td>0-12</td>
</tr>
<tr>
<td>Maritime transp.</td>
<td></td>
<td></td>
<td>0-24</td>
</tr>
<tr>
<td><strong>Unsuitable</strong></td>
<td><strong>A</strong></td>
<td></td>
<td>0-9</td>
</tr>
<tr>
<td>Maritime transp.</td>
<td>B</td>
<td></td>
<td>0-12</td>
</tr>
<tr>
<td><strong>Outdoors</strong></td>
<td><strong>A</strong></td>
<td></td>
<td>0-6</td>
</tr>
<tr>
<td>(with suitable protection against water)</td>
<td><strong>B</strong></td>
<td></td>
<td>0-12</td>
</tr>
<tr>
<td></td>
<td><strong>A</strong></td>
<td></td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td></td>
<td>0-6</td>
</tr>
<tr>
<td><strong>Unsuitable</strong></td>
<td><strong>A</strong></td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Maritime transp.</td>
<td>B</td>
<td></td>
<td>0-6</td>
</tr>
</tbody>
</table>

*A = mineral oil  B = anti-corrosive oil*

For the storage of cylinders filled with oil the customer shall provide for a pipe to connect the fittings of the two cylinder chambers.

Hydraulic cylinders filled with oil shall not be exposed to direct sunlight or to other heat sources because, when ambient temperature increases, the hydraulic pressure in the cylinder rises.

In case of storage beyond 6 months, the external surface of the hydraulic cylinder shall be painted or protected with anti-corrosion oil. Non-protected parts, such as coupling surfaces or mechanical interfaces shall also be protected with anti-corrosion oil. For such a period of storage observe the following directions:

- Protect ball joints and coupling surfaces against moisture
- In case of storage with anti-corrosion oil, completely empty the cylinder before any start-up
- Seals cannot be preserved from deformation, therefore they shall be replaced.

In case of non-conforming storage, anti-corrosion oil may cause brittleness of seals and/or incrustation of the surfaces.
7.4 Checks during storage

In order to preserve the hydraulic cylinder in excellent conditions, following measures should be taken while product is stored:

- Once a year submit the cylinder to accurate inspection during which special attention should be paid to:
  - External protection; visual check to verify the presence of damages and rust
  - Hydraulic fluid; check if oxidation or acidification traces are present
  - Inspection and lubrication of the joints
  - Inspection and protection of coupling surfaces or mechanical interfaces
- Extend and retract the cylinder rod over its whole stroke in order to prevent any possible sticking of the seals.

In order to avoid any damage to the seals, we suggest you to rotate the hydraulic cylinders – if they have not been stored in vertical position - every two months.

As concerns the packaged hydraulic cylinders it is advisable to:

- Reclose the packaging carefully if it has been opened for necessary checks
- Add some anti-moisture salts if the packaging is intended for maritime transportation
8 Hydraulic cylinder installation

8.1 Package removal

Follow these steps for a perfect execution:

- Remove the package with care, paying attention not to damage the cylinder
- Dispose the materials of the packaging in compliance with the national provisions of your country or according to your company’s internal regulations.

8.2 Preliminary checks

Before starting any hydraulic cylinder installation, verify:

- That the hydraulic cylinder is exactly the one foreseen for that specific application as concerns its dimensions and design data
- The correct position of the connections, air vents and adjusting screws of the cushioning
- General conditions of:
  - Rod free of bumps, knocks and scratches
  - Plugs or protection plates of the connections shall be intact
  - Interface surfaces for valve blocks shall be intact
8.3 **Installation instructions**

Mounting surfaces on machines and installations must be designed in a way to prevent cylinders torsion when installed. The hydraulic cylinder must be installed so that unwanted lateral loading is prevented during operation. Length of stroke, cylinder stress and fastening shall be observed in order to avoid bending and lateral bending in any position of stroke. (Excerpt from: E DIN ISO 4413: 1999-10/6.2.2.3)

- Secure the hydraulic cylinder in a way that the axial load operates on the centre line of the cylinder.
- Make sure that the cylinder and, in particular, its rod are not damaged upon installation. Mounting elements of the ball/swivel joints, feet and flanges shall be able to absorb the stresses they are submitted to.
- When installing hydraulic cylinders with ball joints or swivel hinges, make sure that no damage is caused to the latter.
- To secure the cylinder, make use of pins and bolts in conformity with the design stresses.

It is advisable not to exceed the tilt/swing angle on ball joints in order to prevent the action of anomalous forces on the mounting elements.

Cylinder mounting shall minimise the following elements (Excerpt from: E DIN ISO 4413: 1999-10/6.2.2):

- Cylinders deformation due to compression or pulling load
- Introduction of lateral or bending loads
- Swivelling speed in the case of trunnion mounting requiring continuous external lubrication

Be careful not to mix up the connections of the “A=Front chamber and of the P=Rear chamber”.

![Fig. 9](image-url)
8.4 Cylinder installation

⚠️ DANGER

UNCONTROLLED AND DANGEROUS MACHINE MOVEMENTS!

Danger of injuries or material damages!

- Before assembling the hydraulic cylinder, depressurize the corresponding part of the installation. If necessary, check that the system is not subject to mechanical stresses.

When the customer assembles the self-aligning clevis or other connection elements on the hydraulic cylinder make sure that the self-aligning clevis is screwed up to mechanical stop.

The fixing elements cannot be used for adjusting the dimension gaps upon assembly.

Remove the protection devices, plugs or flanges, only immediately before the hydraulic connection.

8.5 Hydraulic connection of the cylinder

Hydraulic connection shall be carried out in compliance with the instructions stated in the relevant hydraulic circuit diagram.

8.6 Power supply connection

Power supply connection of the components, such as end of stroke switches and/or position transducers, shall be carried out in compliance with the instructions given in the manufacturer’s data-sheets and according to the information appearing on the reference wiring diagram.
9 Commissioning

9.1 Start-up

Before being installed, all pipes and all connection surfaces must be clean and free from impurities, slags or chips by making use, as stated in the previous paragraph, of only residue-free, industrial cloths. In particular, as concerns welded pipes, make sure that they are free from scales and that they have been flushed and are completely free.

Observe the manufacturer’s instructions for the assembly of fittings.

Sealants such as hemp and putty are not permitted since they may cause contaminations and affect the proper working.

Hose connections must comply with all relevant European and/or international standards.

9.2 Cylinder filling and bleeding with hydraulic oil

<table>
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<th>DANGER</th>
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<tbody>
<tr>
<td><strong>UNCONTROLLED AND DANGEROUS MACHINE MOVEMENTS!</strong></td>
</tr>
<tr>
<td>Danger of injuries or material damages!</td>
</tr>
</tbody>
</table>

- Never unscrew the air-bleed valve completely
- Bleeding shall be carried out only by unscrewing the dowel of the air-bleed valve
- The dowel of the air-bleed valve shall be only partially unscrewed, it shall not be removed

<table>
<thead>
<tr>
<th>DANGER</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CONTACT WITH HYDRAULIC FLUID!</strong></td>
</tr>
<tr>
<td>Danger – damages to health (eyes injuries, damages to skin, intoxication of the respiratory tract)</td>
</tr>
</tbody>
</table>

- Avoid any contact with hydraulic fluids. In case of contact with the eyes, with a blood-vessel or if swallowed, immediately consult a physician
- When using the hydraulic fluids, always observe the safety instructions given by the lubricant manufacturer
- Make use of safety equipment (ex. googles, protective gloves, suitable safety work clothing, safety shoes, etc.)
If you are unsure about how to fill or bleed your hydraulic cylinder, please contact the technicians at **Stocchetta Cilindri S.r.l.**

For hydraulic cylinder filling and bleeding, follow these procedures (starting point is the retracted cylinder):

- Have available a clearly legible circuit diagram of the whole system
- Arrange for a container suitable for oil recovery which leaks during the procedures
- Open the bleed screw, rod side (on cylinder head), when no internal pressure is in the hydraulic cylinder (see Fig. 10 and 11).
- Adjust the hydraulic system so that the pressure on the hydraulic cylinder ranges between 5 and 10 bar. Carefully check that the flow-rate adjusting elements do not allow a situation other than **LOW FLOW-RATE AND LOW PRESSURE**
- If the circuit includes some accumulators, close the shutoff valves
- Fill in the hydraulic system
- Check all fittings and connection points. If leakages have occurred, remove them (re-tightening)
- When no more air is contained in oil, the flow is constant, with no air bubbles and emulsion-free. In this condition the cylinder is considered sufficiently bled.
- Then disable the hydraulic system and close the air-bleed screw
- Follow the same procedures to bleed the cap side
- Actuate the cylinder rod at low speed (lower than 0.05 m/sec) and observe the movement. If air residues are still inside, the movement appears irregular and jerky. In this case, air bleeding operation must be repeated.
- Check the tightness of the rod seals. If the cylinder is new, also in case of slight leakage no seals replacement is immediately necessary. Let the cylinder work for some hours since a running-in period is quite always enough to remove the leakage.
- Check the rod surface condition along its whole length
- Check the “free” working of the trunnions.
If these checks have positive outcome, the hydraulic cylinder is ready for use. Progressively increase the flow rate and the pressure. Check the level of fluid in the tank and, if necessary, top up.

Observe the instructions of the system and product specific operating manuals.

**Fig. 10 – Air-bleed through the plug**
- Unscrew the vent cap by half turn
- Fill the cylinder with oil: during this operation air and oil escape
- Bleeding is completed when air has completely escaped, that is to say when oil comes out without any air bubble.
- Screw tight the vent cap by observing the tightening torque. The plug must be closed oil-tight.

**Fig. 11 – Air-bleed through the screw**
- Unscrew the bleed screw of the check valve by half turn
- Fill the cylinder with oil: during this operation air and oil escape
- Bleeding is completed when air has completely escaped, that is to say when oil comes out without any air bubble.
- Screw tight the bleed screw of the check valve by observing the tightening torque.

Since every machine has particular specific conditions (weight, speed, friction, etc.), identical hydraulic cylinders may have different operating features after having been installed in a machine.
9.3  **Cushioning adjustment**

**DANGER**

**UNCONTROLLED AND DANGEROUS MACHINE MOVEMENTS!**

Danger of injuries or material damages!

- Never unscrew the braking valve completely
- Adjust the braking valve only by unscrewing/screwing the special dowel

This operation must be carried out only after air has been completely bled from the cylinder.

The cushioning adjustment can be considered definite and valid only if the fluid has reached, and maintains, the ideal operating temperature (from 45°C to 55°C) (from 113°F to 131°F).

Carry out the adjustment at a speed of 0.05 m/sec. or lower.

Carry out all manoeuvres with care and check the efficiency of the cushioning.

A correct working of the cushioning assures a progressive and jerk-free deceleration at end of stroke.

**Fig. 12 – Braking valve adjustment**

- Loosen the lock nut (Pos.2) of the braking valve by making use of a suitable tool (spanner/box wrench) and rotate the throttling dowel (Pos.1) by means of a hex-wrench or spanner until the wished damping degree is achieved.

- Tighten the lock nut of the braking valve again. While tightening the lock nut, keep the throttling nut in position.

**DANGER**

**DO NOT UNSCREW THE CARTRIDGE (Pos.3) FOR ANY REASON WHATSOEVER**

Danger of injuries!
10 Operation

The operation data of the hydraulic cylinder shall be considered only related to the machine or the system.

Consult the operating manual of the machine manufacturer for further information.

Skilled personnel can obtain information on the operating parameters, functioning and logic of the hydraulic cylinder by consulting the relevant technical specification sheets in force and in the product-specific documentation.
11 Cylinder maintenance

As a rule, hydraulic cylinders do not require any periodical maintenance interventions. Anyway, it is advisable to carry out a visual inspection approx. every month in order to ascertain whether the hydraulic cylinder works properly. During these checks, pay attention to the following:

- Oil leakage from the corresponding oil ports
- System seals in general and, in particular, tightness of the rod seal which reveals the wearing degree of the latter and of the guide bushing
- The condition of rod surface along its whole length: small cracks or scorings indicate fluid pollution. Usually, this is not worrisome for the cylinder but indicates poor cleanliness of fluid in the circuit. Deeper scorings, in the contact area between rod and bushing, indicate that the bushing is worn out. Very often, contemporaneously, significant leakages are detected and intervention is necessary to replace the worn out cylinder parts.
- During machine standstill, the rod should be retracted in order to prevent corrosion
- In case of applications under strong loads, it is absolutely necessary to check that the trunnions are properly lubricated in order to avoid any premature wearing of the cylinder components. Generally, lubrication intervals for ball joints, rod heads, swivel joints etc. have been established at design stage. Said intervals are indicated in the maintenance programme of the system manufacturer.
12 Disposal

- Dispose the individual materials in compliance with the law provisions. Particular attention must be paid to the disposal of components containing residues of hydraulic fluid.
- Keep to the disposal instructions given in the safety data sheet of the hydraulic fluids used.
- Observe the law provisions of each single country to dispose the electrical and electronic components.

An inaccurate disposal of the hydraulic cylinder, of its components and oil may cause *environmental pollution.*
13 Modifications or changes

No liability can be accepted in case of modifications and/or changes to the product carried out by the customer.

Modifications and/or changes alter the factory settings and, as a consequence, all instructions supplied by Stocchetta Cilindri S.r.l. in these documents are no more valid.

Please report to the Technical Dept. of Stocchetta Cilindri S.r.l. for any question.