Operation and Maintenance Manual
GVO-CHP-DA.IOM.1001 Rev. 0
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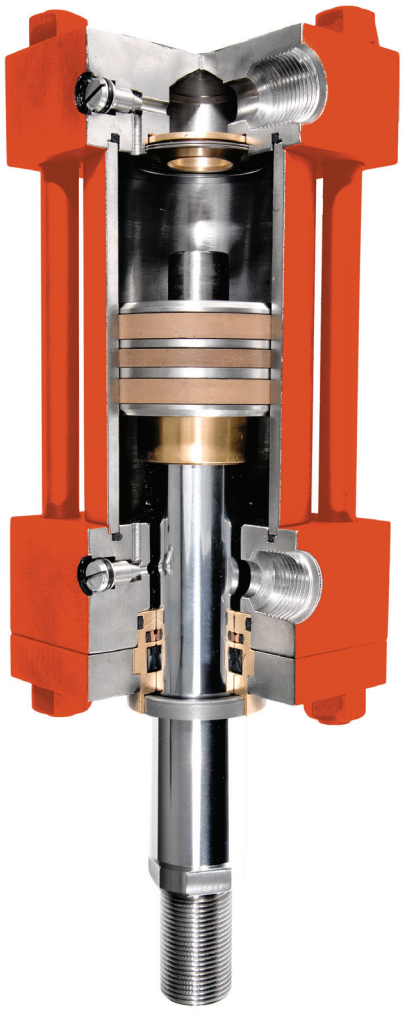
Bettis GVO-C Series

GVO-CHP-DA Hydraulic Actuators



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Section 1: Introduction

Bettis GVO-C Linear cylinder has been engineered and manufactured to meet or exceed the most varied applications.

It has been factory inspected, adjusted and tested to pre-determined tolerances and specifications to ensure trouble free operation.

Section 2: Operation

1. Only filtered hydraulic oil ESSO NUTO-H32 or equivalent should be used to actuate cylinder. The oil must be filtered to remove all contaminants.

2. Care should be exercised to ensure that regulated oil pressure does not exceed the indicated pressure rating.

3. Unless supplied with optional metallic rod-scraper and rod boot, the cylinder should be operated in a low dust and abrasive free environment for maximum life.

4. The standard operating temperature is between –30°C and +120°C (–25°F and +250°F). Consult the factory for extreme temperature applications.

For Special Application, please consult technical staff or your nearest distributor.

Section 3: Maintenance

Bettis GVO-C Linear cylinder has been designed for a long life expectancy, with the exception of the piston packings and gland packings, which should be replaced periodically, depending on environmental conditions and frequency of operation.

NOTE:
This product is only intended for use in large-scale fixed installations excluded from the scope of Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS 2).

3.1 Checking the Gland Packing and Barrel Seals

1. Connect pressure at the rod end port.
2. Verify the gland bushing to observe any abnormal oil accumulation in this zone.
3. Verify the zone between head and barrel.
4. Connect pressure at the cap end port.
5. Verify the zone between cap and barrel.

3.2 Checking the Piston Packing

1. Connect pressure at the cap end port to allow cylinder to fully extend the piston rod.
2. Install a pressure gauge at the rod end port and read it during a lead of time of 30 seconds. If the pressure gauge reads 0 PSI, that means there is no leak. If the pressure rises, the packing should be changed.
3. Connect pressure at the rod end port and the gauge to the cap end port and repeat the same steps to verify the piston packing in the opposite direction.

Section 4: Packing Replacement

4.1 Dismantling the Cylinder

1. Remove the cylinder from machine to which it is mounted.
2. Place the cylinder in a clean work area.
3. Unscrew tie rod nuts and remove the tie rods. Always use appropriate tools.

NOTE:
There are two set screws that retain the tie rods to the head that must be loosened.

4. Remove the head and the cap from barrel. Use a rubber mallet if necessary.
5. Pull out the piston and piston rod assembly from barrel. Take care not to damage the rod and the barrel. **Do Not Disassemble the Rod from the Piston**.
6. Remove gland retainer.
7. Remove packings from both piston and gland bushing, noting orientation of packing lips (vees). Packing must face pressure. Remove seals (O-rings) from head and cap grooves.
8. Verify inside of barrel, gland bushing and rod surface for damage and/or excessive wear.

4.2 Reassembling the Cylinder

1. Clean carefully all parts, grooves and surfaces prior to starting the assembly. Use compressed air to remove all solid particles.
2. Apply a light coat of grease (ESSO LIDOK EP2 or equivalent) to all packings and seal grooves.
3. Place the O-rings in the head and cap grooves.
4. Install the piston packing. Vees must face pressure.
5. Install the wear band on piston (if any).
6. Slide the piston and piston rod assembly into the barrel. Take care not to damage the packing.
7. Carefully install gland seal, gland packing, back-ups and rod wiper on the gland bushing.
8. Insert the gland bushing into the head. Use a rubber hammer if necessary.
9. Install gland retainer.
10. Install the cap on the barrel. Check if the barrel seal (O-ring) is in the groove.
11. Slide the cap over the piston rod, being sure not to damage the bushing packing and barrel seal remains in place. Install the head on the barrel.
12. Install tie rods and nuts. Verify head and cap alignment.
13. Tighten tie rod nuts using a sequential method (1, 2, 3 and 4. See Figure 1). Torque applied: See Table 1.

Figure 1 Tie Rod Nut Torquing Sequence

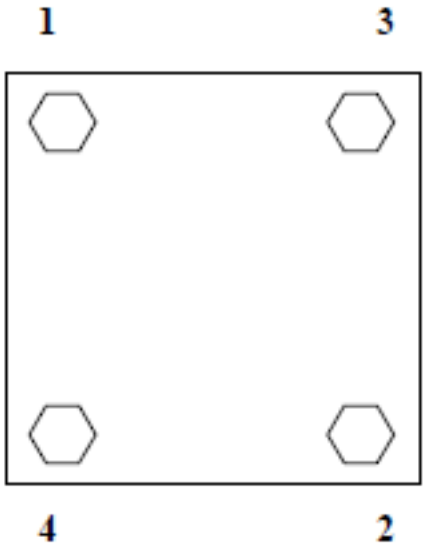

Table 1. Torque Values

Cylinder Bore (Inches)	Number of Tie Rods	Diameter of Tie Rods (Inches)	Torque (lb-ft)
1-1/2	4	3/8	25
2	4	1/2	63
2-1/2	4	1/2	63
3-1/4	4	5/8	168
4	4	5/8	184
5	4	7/8	437
6	4	1	740
7	4	1-1/8	890
8	4	1-1/4	1200

Section 5: Packing-Kit Selection

Always use genuine Bettis GVO-C Linear parts to ensure proper fit and function for continuous trouble free operation.

In order to purchase the right repair kit for your cylinder, you must give us the part number and the serial number shown on the identification tag of the cylinder located on the barrel.

For more technical information, please consult our brochure or call us.

Section 6: Storage Condition

Bettis GVO-C Linear actuators are shipped pre-lubricated, with exposed machined parts protected against corrosion. Piston rods and extended tie rods are protected against physical damage with polyurethane mesh sleeving.
Supply ports are protected with plastic cap plugs. All actuators are ready to use when they are shipped from factory. If the actuators must be stored before installation for a period of time, following storage conditions are required:

1. Actuators must be stored indoors.
2. Actuators must be stored in vertical position to prevent packing deformation.
3. Ambient storage temperature: –20°C to +40°C (–4°F to +104°F).
4. Humidity: maximum 60%.
5. Do not remove protective cap plugs or protective covers.
6. Apply every 6 months a thin layer of metal protective coating on all machined exposed parts (threads).

Before installation and start-up, following steps must be taken:

1. Remove all protective plastic plugs from air supply ports.
2. Spray a small amount (approximately 10 ml) of clean mineral petroleum based oil into the air supply ports.
3. Run the actuator for 8 to 10 dry cycles (piston rod free, without being connected to any device).

If cylinders are stored horizontally, there may be a chance that the piston and gland seals will become deformed and lose their sealing effectiveness.

1. Repeat Steps 1 and 2 as above.
2. Pressurize the cylinder and then cycle the cylinder **Without Any Load** and at slow speed for at least **Twenty Full Cycles**.
3. Observe if there is any leakage across the piston or at the gland bushing.
If so, replace the seals.

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