

DT 17_015

INSTALLATION OPERATION MAINTENANCE MANUAL BYP / BYPS ACTUATORS RANGE

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1 GENERAL INFORMATION

This document provides installation, operation, maintenance and general information for the BYPS actuators range.

This manual contains safety cautions and warnings related to the use of these actuators.

WORKING FLUID: it is recommended to operate the actuator only with dry instrument air or nitrogen.



WARNING: rated working fluid for the actuator is always indicated on nameplate.

Different types of fluids may be used only after DVG verification



WARNING: lubricated fluids are not required for BYP actuators and could create damages to equipment (e.g. positioners).

WORKING TEMPERATURE: It is recommended to always respect the minimum and maximum allowable temperatures indicated on the actuator nameplate.

Working temperature range rules actuator seals material selection which is summarized by below cross reference table:

TEMPERATURE RANGE (°C)	SEALS MATERIALS	LUBRICANTS
-30 / +93	NBR (BUNA)	ENI MU EP2
-60 / +93	FLUOROSILICONE (FVMQ)	AEROSHELL GREASE 7

Grease data sheets are attached in ANNEX B.

WORKING PRESSURE: It is recommended to always respect the minimum and maximum allowable temperatures indicated on the actuator nameplate.

Only qualified personnel, authorized by responsible for the safety of the plant, should perform installation, operation or maintenance activities.

To avoid injury to personnel or damage to products, safety precautions must be strictly adhered to. Modifying this product, substituting non-OEM parts, or using maintenance procedures other than as outlined in this instruction could drastically affect performance and be hazardous to personnel and equipment, and may void existing warranties.

Also, original spare parts supplied by DVG must always be used.

Maintenance / replacement intervals as stated in this document must be respected.

If DVG products (especially sealing materials) have been in storage for long periods, their correct status and remaining service life must be checked before use.



WARNING: before products are returned to DVG for repair or service, DVG must be provided with a certificate which confirms that the product has been decontaminated and is clean. DVG will not accept deliveries if a certificate has not been provided (a form can be obtained from DVG).

1.1 INCOMING GOODS INSPECTION

1. Each delivery includes a packing slip. When unpacking, check all delivered actuators and accessories using this packing slip.
2. Report transportation damage to the carrier immediately.
3. In case of discrepancies, contact your nearest DVG location.

1.2 STORAGE

The service life of the actuator starts the moment the actuator is manufactured.

Any storage time is also regarded as service life.

In order to keep the actuator warranty before the actuator is commissioned on the plant, it is necessary to observe and take appropriate measures during the storage period.

1. Restore the paintworks according to the applicable painting procedure of the components that have damaged during transportation
2. Make sure that plugs are fitted in the pneumatic connections and in the cable entries. The plastic plugs, which close the inlets, do not have a weatherproof function, but are only a means of protection against the entry of foreign matter during transport. If long-term storage is necessary and especially if the storage is outdoors, metal plugs must replace the plastic protection plugs, which guarantee a complete weatherproof protection.
3. If the actuators are supplied separately from the valves, they must be placed onto a wooden pallet so as not to damage the coupling flange to the valve. In case of long-term storage (more than four months), the coupling parts (flange, drive sleeve, insert bush) must be protected from any mechanical damage and by corrosion with protective oil or grease.

If possible, blank off the flange with a protection disk/plate.

4. In case of long-term storage, it is recommended to keep the actuators in a dry place and to provide at least some means of weather protection in the form of a cover or tarpaulin.
5. In case the actuator is equipped with a microswitch housing and/or a control panel the electrical enclosures shall be sealed, clean and dry with no traces of oxidation. In case insert a bag with desiccant silica gel and close accurately.

1.3 PRE-INSTALLATION INSPECTIONS

1. To verify absence of leakage in the cylinder across the piston it is recommended to apply pressure to the cylinder chamber.
2. Stroke the actuator with correct working fluid as stated on actuator nameplate every 12 months.
3. In case the actuator is equipped with manual override (i.e. handwheel or hand pump) the override functionality shall be checked as well.
4. After such operations all the threaded connections of the actuator and the exhaust port of pneumatic components on the control panel should be carefully plugged.

2 ACTUATOR LIFTING

In order to prevent damage to actuator accessories, before starting the lifting operations, ensure that the lifting tools, like chain and clevis hook, are in the correct position and don't interfere with the control panel and pneumatic tubing.

Lifting and handling of the actuator should be done by qualified personnel and in compliance with the laws and regulations in force.

The actuator should be in the normal mounting position on a level surface and with sufficient capacity for the load to be supported.



WARNING: the lifting lugs or eyebolts are appropriate for actuator lifting only. They are not designed to support the combined weight of the valve and actuator assembly together.

An adhesive label is applied onto all DVG actuators giving clear evidence to this safety statement.



During the lifting operations do not stand under the lifted actuator.

The actuator should be handled with appropriate lifting equipment.

The weight of the actuator is reported on the packing slip.



WARNING: always check the overall weight of the actuator and the position of centre of gravity on applicable overall dimensions drawings

2.1 ACTUATOR LIFTING POINTS

Lifting points on BYP / BYPS actuators are normally located on the housing side flange and on the cylinder blank flange.

Either three or four lifting points can be provided.

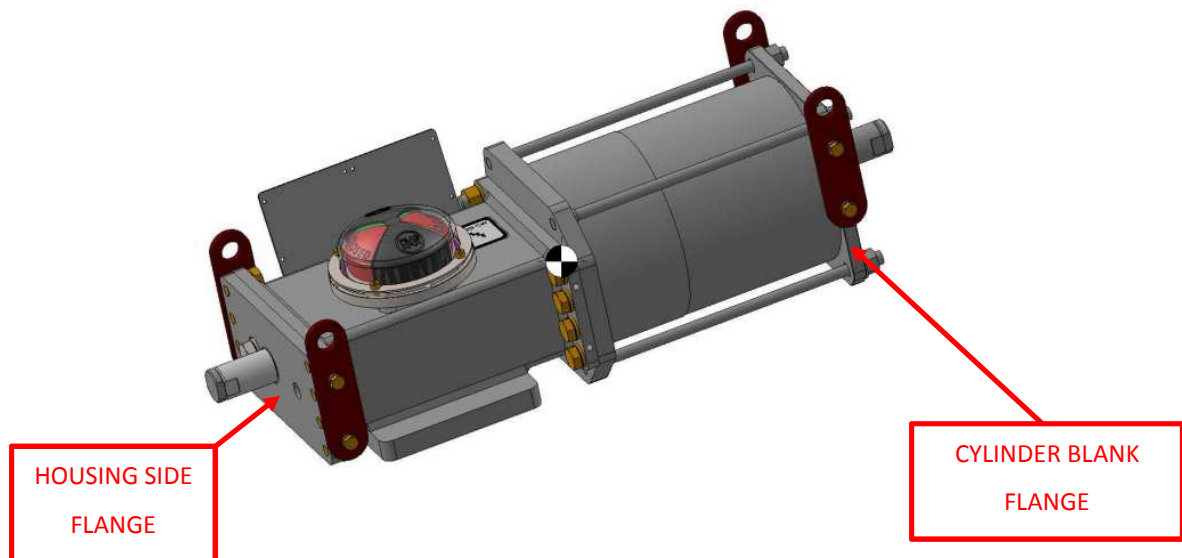


Figure 1: typical lifting arrangement for BYP 05 and BYP 20 actuators

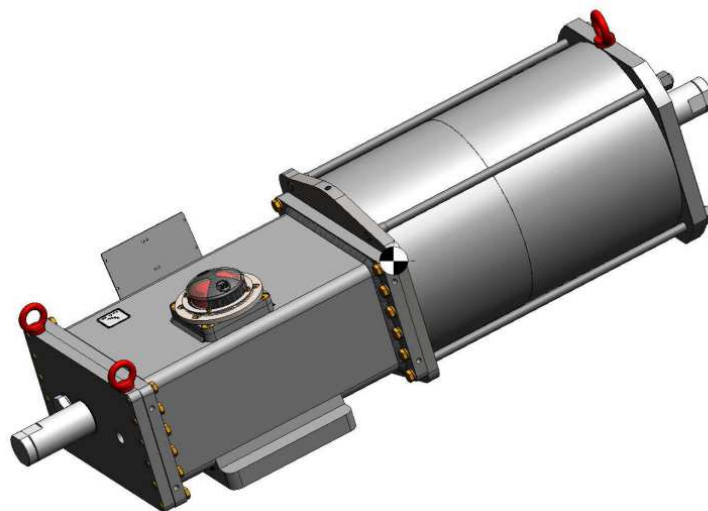


Figure 2: typical lifting arrangement for BYP 50 actuators

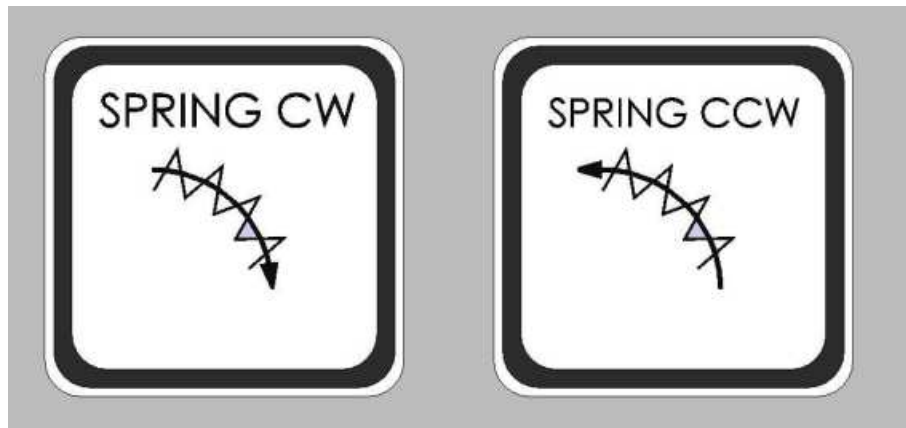
Weights under 25 kg can be lifted up by single worker.

Depending on the local legislation, actuators up to 25 kgs. can be man-handled without lifting equipment.

3 INSTALLATION



WARNING: always check spring assisted stroke direction on the relevant label on actuator



If not differently explicitly required by as a standard clockwise failure is associated to fail-to-close actuators and counter clockwise failure is associated to fail-to-open actuators.



WARNING: always check pneumatic supply ports through dedicated labels on the cylinder, applied close to the ports themselves.

Labelling of pneumatic supply ports is shown in:

- Figure 3 shows typical labelling for pneumatic connection on spring return actuators
- Figure 4 shows typical labelling for pneumatic connection on double acting actuators.

According to ISO 5599 ports are identified with numbering

- "2" for pneumatic port TO OPEN
- "4" for pneumatic port TO CLOSE

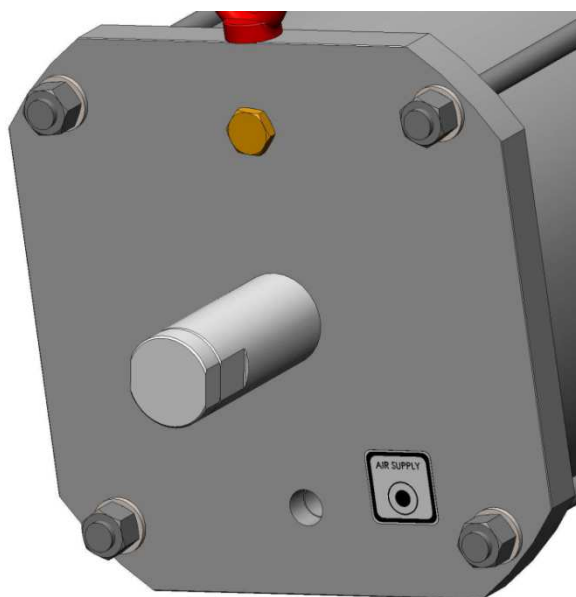


Figure 3: typical supply port marking for spring return actuators

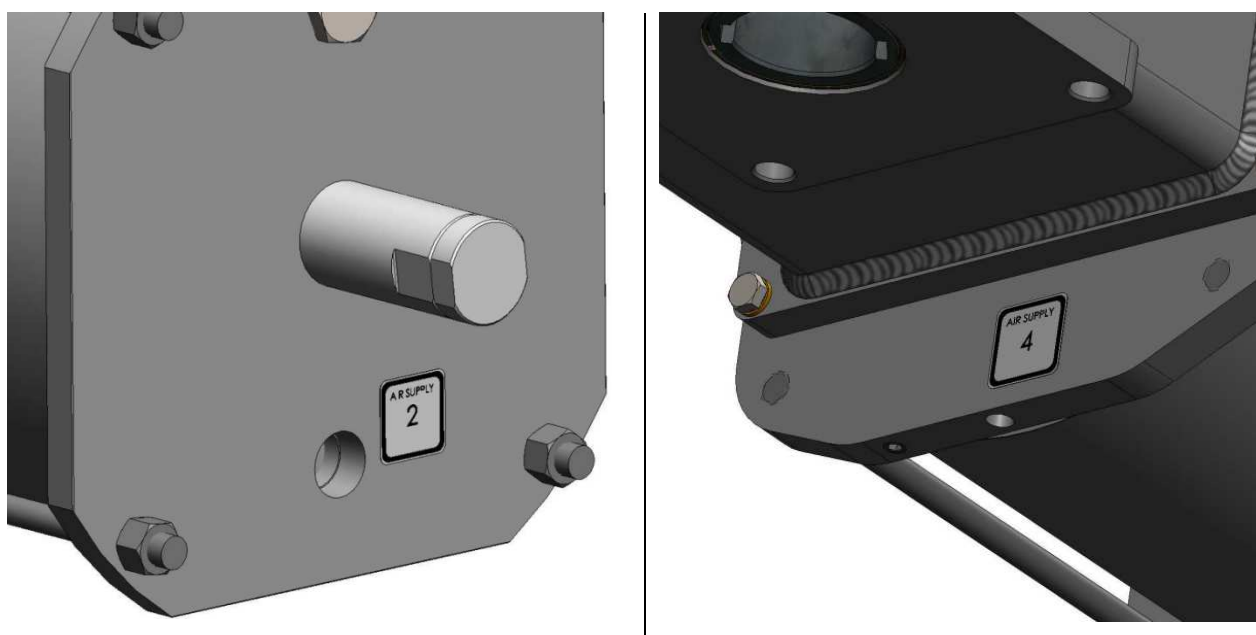


Figure 4: typical supply ports marking for double acting actuators

3.1 INSTALLATION ONTO THE VALVE

This section is relevant to valve integrators and to the situation where the actuators is mounted onto the valve at site.

The actuator can be assembled on top of the valve flange either by using the actuator-housing flange with threaded holes, or by the interposition of a proper closed spool / open bracket.

When the spool or the bracket are foreseen they are assembled to the actuator by means of dowel pins.

The actuator drive sleeve is generally connected to the valve stem by an insert bush or a stem extension. The assembly position of the actuator, with reference to the valve, must comply with the plant requirements (cylinder axis parallel or perpendicular to the pipeline axis).

To assemble the actuator onto the valve proceeds as follows:

1. Check that the coupling dimensions of the valve flange and stem, or of the relevant extension, meet the actuator coupling dimensions.
2. Move the valve to the CLOSED position in case it must be fit with a spring return actuator FAIL TO CLOSE or to the OPEN position in case it must be fit with a spring return actuator FAIL TO OPEN.

For double acting of fail last actuator secure the valve in the same position as the actuator is.

3. Lubricate the valve stem with oil or grease in order to make the assembly easier. Be careful not to pour any of it onto the flange.
4. Clean the valve flange and remove anything that might prevent a perfect adherence to the actuator flange and especially all traces of grease, since the torque is transmitted by friction.
5. If a stem adaptor or stem extension for the connection to the valve is supplied separately, assemble it onto the valve stem and fasten it by tightening the proper stop dowel(s).
6. Move the actuator to its failure position.

7. Clean the actuator flange and remove anything that might prevent a perfect adherence to the valve flange and especially all traces of grease.
8. Lift the actuator through the eyebolts: using a safe and proper lifting system move the actuator onto the valve and lower it to fit the stem adaptor already assembled onto the valve stem.

This coupling must take place without forcing and only with the weight of the actuator.

9. Continue to lower until the spool / bracket sits on the valve flange.
The actuator mounting bolts (or stud bolts) must easily fit the valve flange mating holes.
10. If needed move the actuator few degrees relevant to valve flange and / or adjust end stops (see next Paragraph)
11. Tighten the mounting nuts (or bolts) connecting the base of the spool to the valve flange according to the torque table in ANNEX A of this document.
12. If pneumatic supply pressure is available, operate the actuator to check that it moves the valve smoothly.

3.2 INITIAL OPERATION

1. Check that all electrical supply, control and signal are properly connected to the actuator and / or the control group.
2. Check that the supply pressure and the operating fluid in accordance with the actuator nameplate data.
3. Check the absence of leaks in the pneumatic connections.
4. Check the environmental conditions are compatible with the actuator design condition.

3.3 END-STOPS SETTING

The adjustment of the end-stops is performed through the following steps, which are described separately for the end-stop located on the power cylinder and on the housing side flange.

The power cylinder end-stop allows adjustment of the spring assisted stroke end position (for spring return actuators) or of the CLOSING stroke end position (for double acting actuators).

The housing side flange end-stop allows adjustment of the air assisted stroke end position (for spring return actuators) or of the OPENING stroke end position (for double acting actuators).

3.3.1 POWER CYLINDER END STOP

Reference must be made to below Figure 5.

1. Remove plug (1) with a proper flat spanner
2. Loosen cap (2) with a proper flat spanner
3. Screw or unscrew the dowel (3) through a socket wrench, while keeping the cap (2) stationary with a flat spanner
4. Once the adjustment is completed, tighten end cap (2)
5. Install again plug (1)

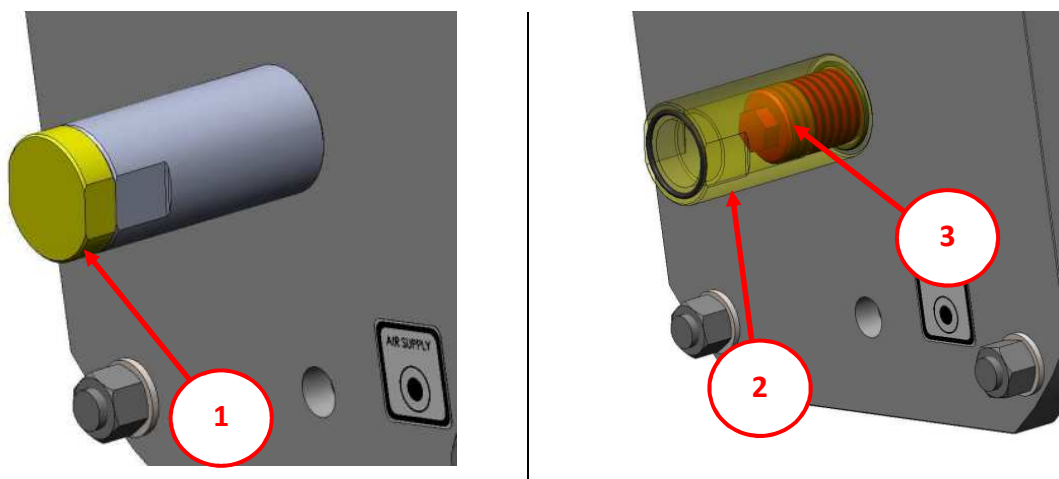


Figure 5: cylinder end stop adjustment

3.3.2 HOUSING SIDE FLANGE END STOP

Reference must be made to below Figure 6

1. Remove plug (1) with a proper flat spanner
2. Loosen cap (2) with a proper flat spanner
3. Screw or unscrew the dowel (3) through an Allen wrench while keeping the cap (2) stationary with a proper flat spanner.
4. Once the adjustment is completed, tighten end cap (2)
5. Install again plug (1)

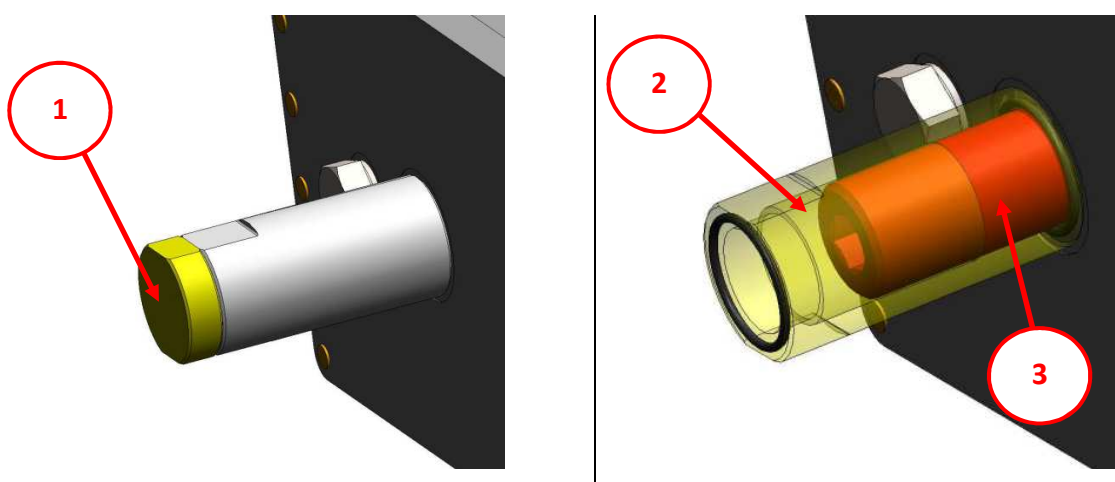


Figure 6: housing flange end stop adjustment

Adjust the end stops of the actuator for the proper OPEN and CLOSED valve positions, per valve manufacturer's recommendations.

Pneumatically stroke the actuator several times to ensure proper operation.

If the actuator is equipped with a switch, positioner or other accessories, perform adjustment of the device.

4 MAINTENANCE

BYP / BYPS actuators do not need maintenance for long periods, even if they are working in severe conditions.

The BYP / BYPS actuators can withstand a 25 years or 10^6 cycles design life based on correct service conditions, proper installation, operation and maintenance.

In order to achieve this industry-leading design life, in-field maintenance is prescribed to be performed every five years for applications in High Demand Mode to IEC 61508 Part 4 .

This interval can be extended to six years of operations for a Low Demand Mode application.

The piston seal and the wear rings replacement should be performed every twelve years.

It is recommended to periodically check the functionality of the actuator, performing the following steps at 1 year interval:

1. Check the pneumatic accessories on the actuator for leaks. Use soapy water (or similar) if necessary.
2. Check the datasheet and data plate on the actuator to ensure correct pneumatic pressure is available and set.
3. Check pressure gauges are working properly.
4. Check analog position feedback linkage and cabling if fitted.
5. Check the actuator cylinder and housing for signs of external pneumatic leakage using soapy water.
6. Check whether the actuator holds position while isolating the air supply.
7. Check the atmospheric vent port of the cylinder for internal leaks around the piston seal.
8. Check the electrical connections to the solenoid-operated valve, position feedback and limit switches.
9. Check the electrical housings for tightness.
10. Clean any dirt and foreign material from the actuator stem.

In case of scheduled preventive maintenance, or following accidental events, refer to the following maintenance instructions regarding the main actuator components (pneumatic cylinder and housing).

NOTICE

This document describes the procedures intended for the ordinary (standard) maintenance of the actuators, for extraordinary maintenance please contact DVG After Sales Office

4.1 SPRING RETURN ACTUATORS PNEUMATIC CYLINDER MAINTENANCE

Maintenance of the pneumatic cylinder can be performed without disassembly the power module from the actuator and the actuator from the valve.

The actuators components are primer coated before assembly.

The use of flat washers under the tie rods nut allows for painting repair after maintenance completion as no damage to the primer coating is occurring.



WARNING: before performing any maintenance activity on the cylinder it is mandatory to remove the pressure from the cylinder.

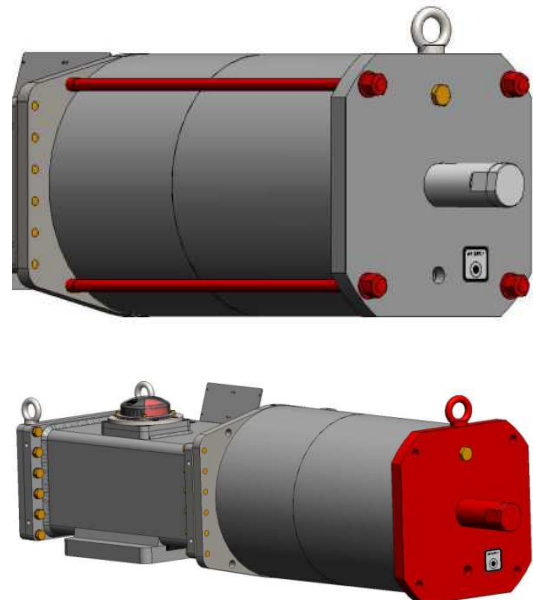
Also check that all pneumatic and power supplies to the actuator are disconnected.



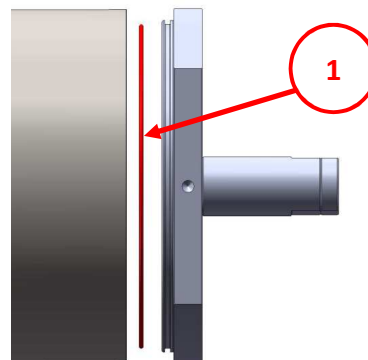
WARNING: in case of spring return actuators make sure the end stop located on the cylinder is fully unscrewed to avoid the spring is still in the compressed position.

Unscrew the nuts from the cylinder tie rods and
where possible, retain the tie rods on the
cylinder in order to avoid corrosion and damage

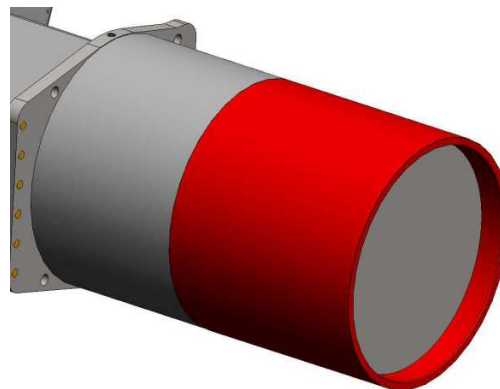
Remove the blank flange from the power
cylinder



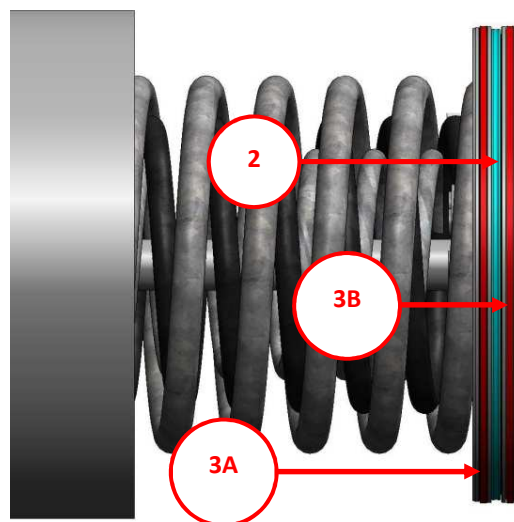
Remove the blank flange o-ring (#1) from relevant groove



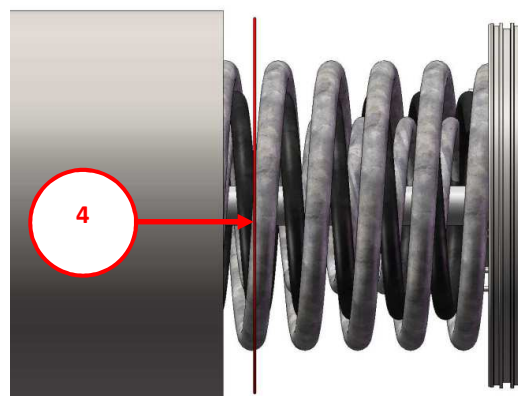
Remove the cylinder tube from the power cylinder



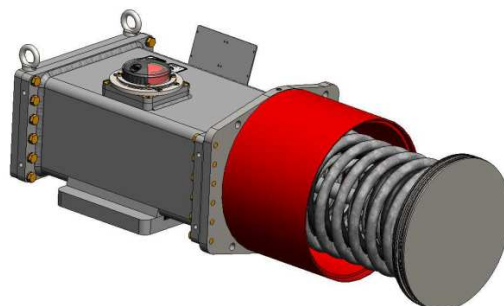
Remove the central seal (#2) and the wear rings (#3A and #3B) from the pneumatic piston



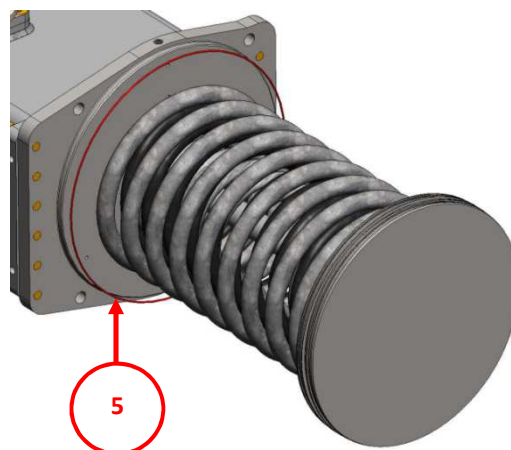
Remove the o-ring (#4) from the spacer tube



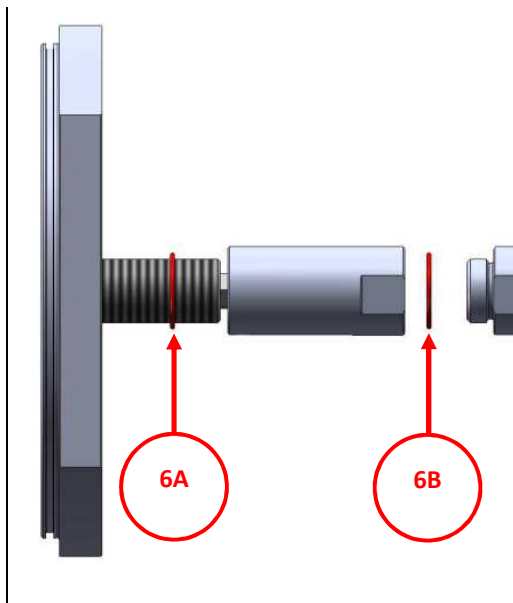
Remove the spacer tube from the power cylinder



Remove the o ring (#5) from the head flange



Unscrew the end stop plug from the end stop cap and the cap from the dowel and remove o-rings (#6A and #6B)



Before reassembly of the power cylinder takes place clean the surfaces and grease all the components.

To reassemble the power cylinder use the reverse procedure as above described.

The tie rods nuts must be tightened using a torque wrench, applying a torque as listed in ANNEX A of this document.

4.2 DOUBLE ACTING ACTUATORS PNEUMATIC CYLINDER MAINTENANCE

Maintenance of the pneumatic cylinder can be performed without disassembly the cylinder from the actuator and the actuator from the valve.

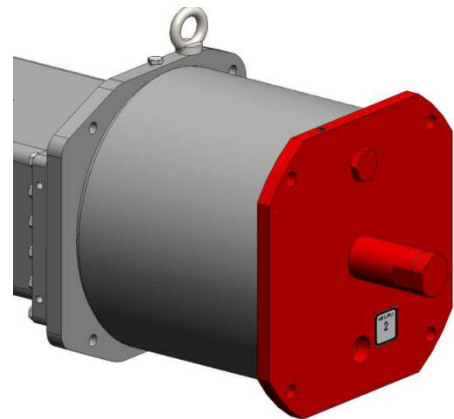


WARNING: before performing any maintenance activity on the cylinder it is mandatory to remove the pressure from the cylinder.

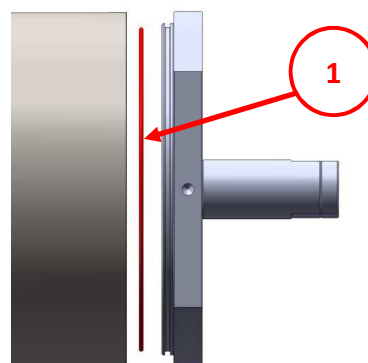
Also check that all pneumatic and power supplies to the actuator are disconnected.

Unscrew the nuts from the cylinder tie rods and,
where possible, retain the tie rods on the
cylinder in order to avoid corrosion and damage

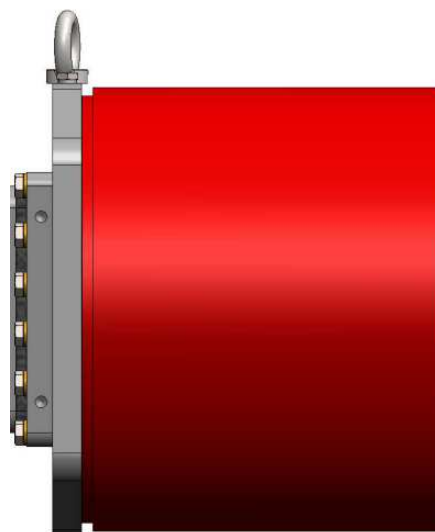
Remove the blank flange from the power
cylinder



Remove the blank flange o-ring (#1) from relevant groove

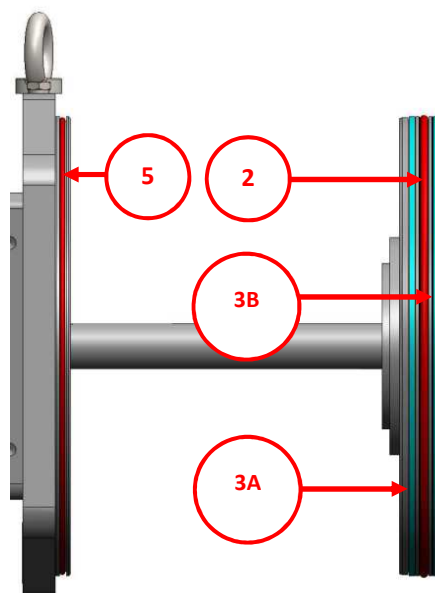


Remove the cylinder tube from the power cylinder

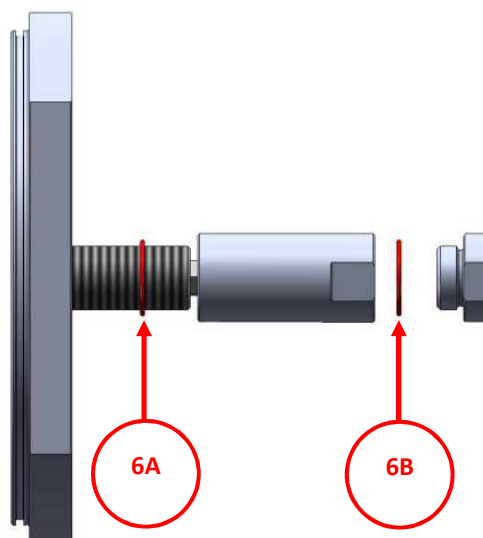


Remove the central seal (#2) and the wear rings (#3A and #3B) from the pneumatic piston

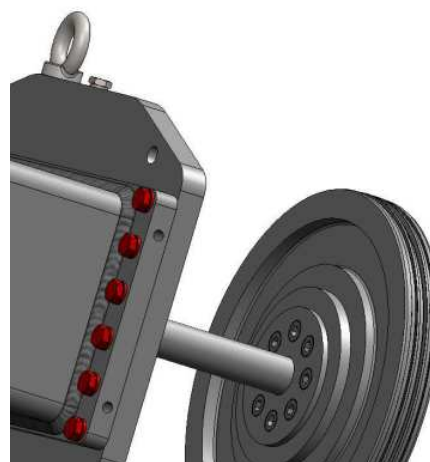
Remove the o-ring (#5) from the cylinder head flange.



Unscrew the end stop plug from the end stop cap and the cap from the dowel and remove o-rings (#6A and #6B)

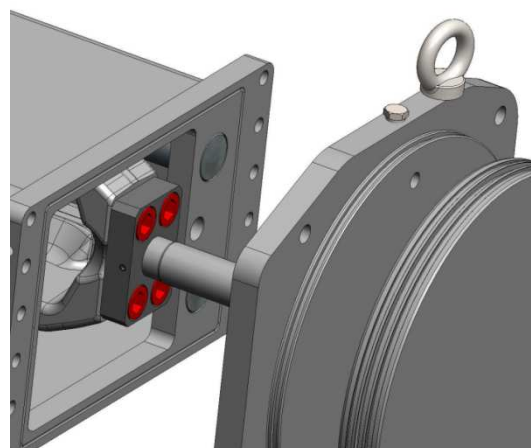


Unscrew the fixing bolts of the head flange to the housing

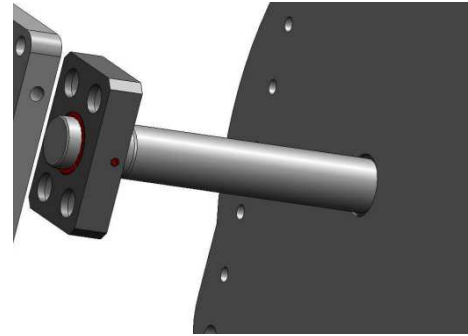


WARNING: keep the head flange secured to lifting devices to proceed with cylinder maintenance

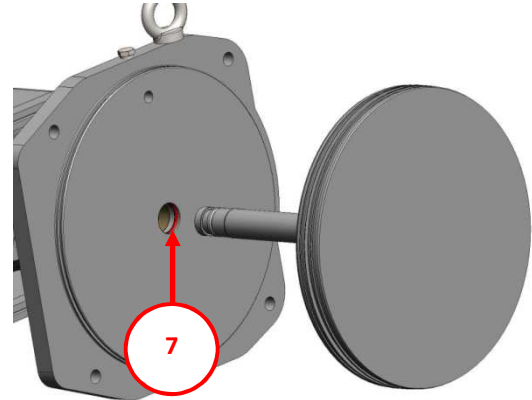
Disconnect the head flange from the housing and remove piston rod fixing flange screws



Remove the piston rod fixing flange locking
dowel and retaining rings



Remove the piston rod assembly from head
flange and remove the piston rod o-ring (#7)
from the head flange groove



Before reassembly of the power cylinder takes place clean the surfaces and grease all the components.

To reassemble the power cylinder use the reverse procedure as above described.

The tie rods nuts must be tightened using a torque wrench, applying a torque as listed in ANNEX A of this document.

Before assembling the head flange of the cylinder to the housing deburr and clean with a cloth the groove machined on the housing side (Figure 7) and fill it with LOXEAL 59-20 G sealant through the applicator supplied along with the sealant itself.

Data sheet of sealant is attached in ANNEX B

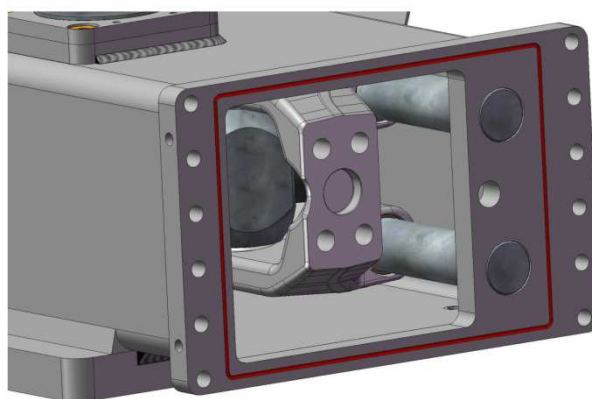


Figure 7: housing side flange sealant groove

4.3 POWER CYLINDER SPARE PARTS

The power cylinder main spare parts and the interval time for standard ON / OFF applications are listed in below table.

Standard time interval for standard ON / OFF applications is described by below table.

Number	Description	Maintenance interval	Double Acting Actuators	Spring return Actuators	Actuator Removal from the Valve
1	O-Ring	maximum [5 years, 2000 cycles] (**)	A	A	NOT REQUIRED
2	(*)		A	A	
3	Wear Ring		A	A	
4	O-Ring		NA	A	
5	O-Ring		A	A	
6	O-Ring		A	A	
7	O-Ring		A	NA	

(*):

X-Ring for standard temperature range actuators

O-Ring for low temperature range actuators

(**) low demand application: maximum [6 years, 2000 cycles]

4.4 HOUSING MAINTENANCE

Standard maintenance of the housing can be performed without disassembly of the actuator from the valve.

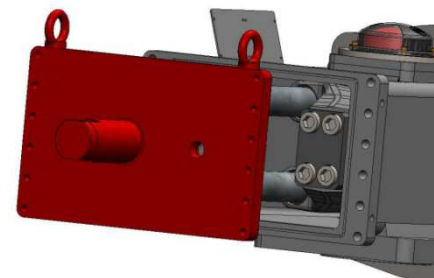
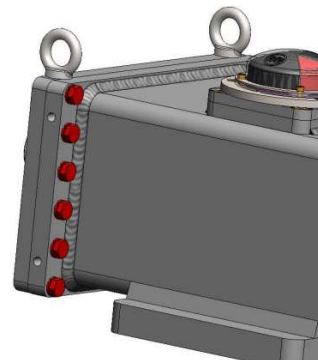
Before performing maintenance of the housing on double acting actuators the actuator must be driven to CLOSED position, with the piston stroked against the end stop mounted on the cylinder flange.



WARNING: before performing any maintenance activity on the housing it is mandatory to remove the pressure from the cylinder.

Unscrew the screws fixing the closure flange to the housing

Remove the closure flange and the end stop assembly from the housing



Check and in case restore the correct greasing of housing internals

Before assembling the closure flange to the housing deburr and clean with a cloth the groove machined on the housing side (below figure) and fill it with LOXEAL 59-20 G sealant through the applicator supplied along with the sealant itself.

Data sheet of sealant is attached in ANNEX B.

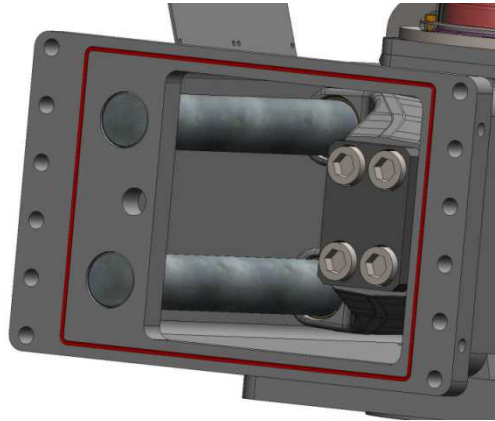


Figure 8: housing side flange sealant groove

5 TROUBLESHOOTING

To prevent the actuator from not functioning properly or a reduction in performance, first ensure that the installation and the adjustment operations are carried out completely in accordance with this manual.



WARNING: when attempting to identify faults, it is very important to observe all the regulations and instructions about safety.

If in doubt choose **SAFETY FIRST** and / or contact DVG After Sales Office for instructions and assistance

PROBLEM	POSSIBLE CAUSE	SOLUTION
The actuator does not move	Actuator has not been properly installed	Check that all the pneumatic connections and that all the pneumatic components have been installed correctly, and are in accordance with the actuator operating mode
		Check that the actuator is properly connected to the valve and that there aren't problems in the mounting kit.
	Problems with supply pressure	Check that sufficient supply pressure is available at actuator inlet port. if possible, place a gauge in line and monitor the pressure level, in order to discover unexpected pressure drops.
	Problems with control group	Check the correct functioning of the control panel. In particular, check all the pneumatic and electric connections
		Check the correct level of supply voltage for solenoid valves and other electrical/electronic components.

	The valve is blocked	Check that valve is free to rotate. If necessary, disassemble the actuator from the valve.
	Exhaust port(s) obstructed	Check vent port(s) are free. If not clean them or replace bug screen / dust excluders
	Problems with lubricants.	Ensure that the actuator is properly lubricated, and that there is no solidified grease among sliding parts or rotating parts. If actuator lubrication is too poor, restore proper greasing. Follow the instructions for housing and cylinder maintenance. Only grease listed in this manual and / or alternative grease authorized by DVG After Sales Office must be used
	Problems with seized parts of the actuator	Check if any moving part is blocked. If so, follow the maintenance instructions given in this manual to perform maintenance or contact DVG After Sales Office for further assistance
	Leakages of the pneumatic cylinder	Check the cylinder for absence of leakage through outer seals Check leakage across the piston through cylinder vent port. If leakages are occurring follow the cylinder maintenance instructions included in this manual
	Problems with springs	Check the proper working of the springs (i.e. absence of noise or mechanical docking during movement). In case of problems contact DVG After Sales Office

The valve does not shut off properly and there are leaks.	The actuator is not correctly adjusted.	Adjust the end stops of the pneumatic cylinder and of the spring, following the instructions included in this manual.
The valve does not complete the stroke, either in OPEN or CLOSE direction	The actuator is not correctly adjusted.	Adjust the end stops of the pneumatic cylinder and of the spring, following the instructions included in this manual.
	Problems with supply pressure	Check that sufficient supply pressure is available at actuator inlet port. If possible, place a gauge in line and monitor the pressure level, in order to discover unexpected pressure drops.
	Exhaust port(s) obstructed	Check vent port(s) are free. If not clean them or replace bug screen / dust excluders

6 ACTUATOR DECOMMISSIONING

After end of service life of the actuator the actuator needs to be decommissioned.



WARNING: before disassembling the actuator from the valve and before any decommissioning activity ensure that the pneumatic connection ports of the cylinder are disconnected and the cylinder is vented to atmospheric pressure.



WARNING: make sure that power and pneumatic supplies are turned off, and any parts of the actuator, the control system and all the pneumatic tubing are depressurized.



WARNING: verify that the actuator is in fail safe position, i.e., that it is not locked in a position with the spring compressed by means of locking devices.

BYPS actuators that are to be decommissioned permanently must have the stored energy in the spring neutralized.

For BYPS actuators, in order to proceed with permanent decommissioning, the supply pressure must be removed and the actuator must be in its fail safe position: in fact, in this condition, any residual spring preload is not transmitted to the actuator.



WARNING: decommissioning of the spring implies use of Oxygen / Acetylene torch and it must be performed by qualified personnel only.

Operations must be done in compliance with the laws and provisions in force.



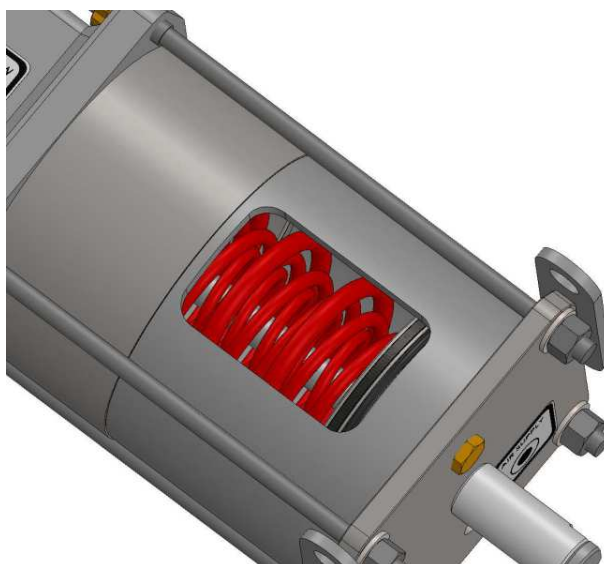
WARNING: during decommissioning of the spring(s) all metal parts will get hot and sparks will fly around power cylinder.

The following steps must be followed to decommission the spring(s):

Cut a window in the cylinder
with a torch



Verify complete access to
spring coils is available



Cut spring(s) coils with a torch
until spring(s) is completely
lose in the cylinder



If coils are not lose cut window
larger



Cut additional coils until the
spring(s) is lose



WARNING: please contact DVG After Sales Office for instructions in case a more detailed procedure or further information are required .



WARNING: failure to neutralize the spring contained in the actuator's spring module or to follow these instructions could lead to injury to personnel or property damage.

1. All disassembled parts of the actuator shall be separated according to their material type (metal, rubber, plastic, oil and grease, electric and electronic equipment ...).
2. Remove the lubricants taking care not to pollute the environment
3. Clean the frame internally using a mixture of water and degreasing soap
4. Dispose of the cleaning fluid and lubricants extracted from the actuator, according to the local laws regarding the disposal of waste material
5. After the actuator's decommissioning, all carbon steel materials/stainless bare material must be send to the scrapping service.
6. In case of dismounting of any electric/electronic component, cable, and other accessories, it must be handled and disposed of as described in the owner's manual, and according to the local laws regarding the disposal of waste material.

ANNEX A - TIGHTENING TORQUE TABLE -

TIE RODS DIAMETER	TORQUE (Nm)
M10	20
M12	45
M16	60
M20	110

SCREW / STUD BOLT DIAMETER	TORQUE (Nm)
M3	0.8
M4	1.9
M5	3.8
M6	6.6
M8	16
M10	32
M12	54
M14	88
M16	136
M20	268
M22	369
M24	461
M27	683
M30	926
M33	1257
M36	1814
M39	2095
M42	2586

ANNEX B - DATA SHEETS -

LOXEAL SEALANT DATA SHEET



UNI EN ISO 9001 - UNI EN ISO 14001
Registered Quality and Environment Management System Company

Technical Data Sheet

LOXEAL 59-20

Description

One component moisture curing silicone based sealant and adhesive releasing non corrosive and low-odour by products.
Provides an extremely flexible gasket between surfaces made of various materials (metal, plastics, glass, ceramics).
Suitable for sealing gear boxes, pumps and motors flanges, oil and water containers, air forced pipes.
Resistant to vibrations, thermal shocks, pressurized air, water, oils and several chemicals.
Keeps its sealing properties within temperatures of - 50°C and + 180°C. Sealed parts can be disassembled using normal tools.

Physical properties

Composition : silicon neutral curing
Colour : black, grey
Appearance : paste
Specific weight (g/ml) : 1,40 - 1,50
Shelf life @ +25° C : 12 months in original unopened packaging

Curing properties

Tack free time : 15 - 30 minutes
Functional curing time : 3 - 6 hours
Final curing time : 24 - 36 hours

Physical properties after curing 7days/+23°C/UR 50% (typical)

Hardness Shore A (ASTM D-2240) : 25 ± 5
Tensile strength (ASTM D-412) : 0,5 - 1,0 MPa
Elongation at break (ASTM D-412) : 400 - 600 %
Temperature range : -65°C/ +180°C
Joint Movement Capability (ASTM C-290) : ± 25%
Dielectric strength (DIN 53481) : 18 kV/mm
Surface resistivity : 3 x 10¹⁵ Ω
Dielectric constant (1MHz) (DIN 53482) : 2,7

Directions for use

Clean and degrease parts to bond with Loxeal Cleaner 10.
Apply enough product to fill the gap.
The product is moisture curing therefore pieces shall be assembled rapidly. Allow full cure before putting stress on pieces assembled.

Storage

Keep product in a cool and dry room at no more than +25°C. To avoid contaminations do not refill containers with used product. For further information on applications, storage and handling contact Loxeal Technical Service.

Safety and handling

Consult Material Safety Data Sheet before use.

Note

The data contained herein, obtained in Loxeal laboratories, are given for information only; if specifics are required, please contact Loxeal Technical Department. Loxeal ensures abiding quality of supplied products according to its own specifics. Loxeal cannot assume responsibility for the results obtained by others which methods are not under Loxeal control. It is user's responsibility to determine suitability for user's purpose of any product mentioned herein. Loxeal disclaims all warranties expressed or implied, including warranties of merchantability or fitness for a particular purpose, arising from sale or use of Loxeal products. Loxeal specifically disclaims any liability for consequential or incidental damages of any kind, including lost profits.

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ENI MUEP2 DATA SHEET

PRODUCT DATA SHEET



eni Grease MU EP

eni Grease MU EP are high performance multipurpose yellow-brown, slightly-fibrous, smooth-textured lithium-base greases containing EP (Extreme Pressure) additives. The grade NLGI 00 contains a special tackyfier that makes the product specially suitable for lubrication for enclosed gear reducers.

CHARACTERISTICS (TYPICAL FIGURES)

GREASE MU EP		00	0	1	2	3
NLGI consistency		00	0	1	2	3
Worked penetration	dmm	425	370	325	280	230
ASTM dropping point	°C	180	180	185	185	185
Base oil viscosity at 40°C	mm ² /s	160	160	160	160	160

PROPERTIES AND PERFORMANCE

- The presence of EP (Extreme Pressure) additives ensures that **eni Grease MU EP** greases form a tenaciously adhering lubricating film which resists displacement even when subjected to heavy pulsating loads, thus preventing metal-to-metal contact of the lubricated surfaces. The typical value of **eni Grease MU EP 2** at the Timken test is of 45 lbs.
- The multipurpose characteristics of **eni Grease MU EP** greases facilitate lubrication planning and reduce the range of stocks to be held.
- Their good physical and chemical stability and their outstanding oxidation resistance ensures that these greases remain unaltered even after long exposure to high mechanical loads and thermal stresses.
- Their high dropping point allows the products to be used over a wide range of temperatures. **eni Grease MU EP 2** passes the following performance tests: FAG FE 9 (DIN 51821-02) and SKF R2F at 120°C.
- They ensure effective rust-protection even where the most yellow metals are concerned and further they adhere extremely well to metal surfaces resisting displacement by vibrations.
- **eni Grease MU EP** greases are water-resistant and can be used in moist conditions and in contact with water, while good pumpability facilitates dispensing even at low temperatures.

APPLICATIONS

eni Grease MU EP are suitable for use in all cases where conditions call for a grease with EP (Extreme Pressure) properties. For example, plain bearings, heavily loaded ball and roller bearings even when operating at high temperatures and for all lubrication requirements in general where operating conditions are especially difficult. Their ability to withstand loads widens their range of application to embrace many fields of technology.

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[IN835.09.13]

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eni Grease MU EP

eni Grease MU EP 00 is especially suitable for the lubrication of enclosed steel cylindrical, conical and helical gears, such as for gear reduction units working at medium temperatures and loads, or for any gear where the oil application is difficult and the grease remains in service for a very long period.

eni Grease MU EP 00 can be employed also in centralized lubrication systems installed on industrial trucks, agricultural machinery, industrial plants and for lubrication of slide ways of machine tools.

SPECIFICATIONS

eni Grease MU EP meets the following classifications:

GREASE MU EP	00	0	1	2	3
ISO 6743-9	L-X-BCHB 00	L-X-BCHB 0	L-X-BCHB 1	L-X-BCHB 2	L-X-BCHB 3
ISO 6743-6	L-CKG 00	L-CKG 0	L-CKG 10	--	--
DIN 51 825	KP00K -20	KP0K -20	KP1K -20	KP2K -20	KP3K -20
DIN 51 826	GP00G	GP0K	GP1K	-	-
MAG (CINCINNATI)	--	P-79	P-72	P-64	--


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AEROSHELL GREASE 7 DATA SHEET



Technical Data Sheet

AeroShell Grease 7

AeroShell Grease 7 is an advanced multi-purpose grease, composed of a synthetic oil thickened with Microgel®, possessing good load carrying ability over a wide temperature range. It is inhibited against corrosion and has excellent resistance to water.

The useful operating temperature range is -73°C to +149°C.

DESIGNED TO MEET CHALLENGES

Main Applications

- AeroShell Grease 7 satisfies nearly all the airframe grease requirements of turbine engine aircraft and also those of piston engine aircraft provided that seal incompatibility does not occur. Most civil aircraft manufacturers approve AeroShell Grease 7 as a general purpose grease either by brand name or by specification. It is recommended for lubricating highly loaded gears, actuator screw mechanisms, etc., also for instrument and general airframe lubrication within the temperature range of -73°C to +149°C.

Specifications, Approvals & Recommendations

- U.S. : Approved MIL - PRF-23827C (Type II)
 - French : Equivalent DCSEA 354/A
- For a full listing of equipment approvals and recommendations, please consult your local Shell Technical Helpdesk, or the OEM Approvals website.

Compatibility & Miscibility

- AeroShell Grease 7 contains a synthetic ester oil and should not be used in contact with incompatible seal materials.
- AeroShell Grease 7 is a clay-based grease approved to MIL-PRF-23827C Type II; it should not be mixed with soap-based greases approved to MILPRF-23827C Type I.

Typical Physical Characteristics

Properties		MIL-PRF-23827C Type II	Typical
Oil type		Synthetic	Synthetic ester (Diester)
Thickener type		Clay	Microgel
Base Oil viscosity	@-40°C mm²/s	-	1150
Base Oil viscosity	@40°C mm²/s	-	10.3
Base Oil viscosity	@100°C mm²/s	-	3.1
Useful operating temperature range	°C	-	-73 to +149
Drop point	°C	165 min	260+
Worked penetration	@25°C	270 to 310	296
Unworked penetration	@25°C	200 min	283
Bomb Oxidation pressure drop 100 hrs	@99°C kPa	70 max	62
Bomb Oxidation pressure drop 500 hrs	@99°C kPa	105 max	96.5
Oil separation 30 hrs	@100°C % m	5 max	3
Water resistance test loss	@38°C % m	20 max	0.8
Evaporation loss 22 hrs	@100°C % m	2.0 max	0.5
Mean Hertz Load	kg	30 min	60
Copper corrosion 24 hrs	@100°C	Must pass	Passes
Bearing protection 2 days	@52°C	Must pass	Passes
Anti-friction bearing performance	@121°C hrs	-	2460
Colour		-	Buff

These characteristics are typical of current production. Whilst future production will conform to Shell's specification, variations in these characteristics may occur.

Health, Safety & Environment

- **Health and Safety**

Guidance on Health and Safety is available on the appropriate Material Safety Data Sheet, which can be obtained from <http://www.epc.shell.com/>

- **Protect the Environment**

Take used oil to an authorised collection point. Do not discharge into drains, soil or water.

Additional Information

- **Advice**

Advice on applications not covered here may be obtained from your Shell representative.

ANNEX C - ACTUATOR CODING PLAN -

BYP	W	-	XX	Y	-	KKK	-	TT	VV	-	ZZ
-----	---	---	----	---	---	-----	---	----	----	---	----

where

W: letter that identifies the type of actuator

[VOID]	DOUBLE ACTING
S	SPRING RETURN

XX: numbers that identify the size of the actuator housing

05
20
50

Y: letter that identifies the scotch yoke type

S	SYMMETRIC
C	CANTED

KKK: numbers that identify the pneumatic cylinder bore

CYLINDER BORE	BYP5-05	BYP5-20	BYP5-50
075	x		
100	x	x	
125	x	x	
135	x	x	
150	x	x	
175	x	x	x
200		x	x
200		x	x
235		x	x
255		x	x
280		x	x
300			x
335			x
360			x

TT: alphanumeric code that identify the spring(s) size

SPRING CODE BYP5-05	SPRING CODE BYP5-20	SPRING CODE BYP5-50
1A	2A	3A
1B	2B	3B
1C	2C	3C
1D	1D	3D
1E	2E	3E
1F	2F	3F
1G	2G	3G
1H	1H	3H
1L	2K	
1M	2L	
	2M	
	2N	

VV: letters that identify the spring assisted operation

CL	SPRING TO CLOSE
OP	SPRING TO OPEN

ZZ: letters that identify if a manual override is fitted

[VOID]	NO MANUAL OVERRIDE
MO	HANDWHEEL
MH	HAND PUMP