CONTROL VALVES

DESIGN & MANUFACTURE

Installation, Operation & Maintenance Manual for Axial Control & Choke Valves

GOODWIN INTERNATIONAL LTD

Control

www.goodwinflowcontrol.com

INSTALLATION & MAINTENANCE INSTRUCTIONS FOR GOODWIN AXIAL CONTROL & CHOKE VALVES

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Failure to adhere to the warnings and requirements stipulated herein may result in injury to personnel, incorrect operation and/or premature failure of the product.

If any statements or requirements in this Installation, Operation and Maintenance document are unclear, please contact Goodwin International Ltd before commencing with the intended operation.

1. Warnings & Safety Instructions

1.1 It is the end users responsibility to ensure that Goodwin Axial Control (Choke) Valves are installed in a properly designed piping system to ensure that flange moments are not excessive and that the system is protected from over pressure by suitable equipment.

1.2 The Goodwin Axial Control (Choke) Valve is not a stand alone safety device; however the valve can be integrated into an overall safety system.

1.3 The end user shall ensure that the pipelines are not used above the pressure temperature rating standard in which the valve has been supplied in accordance with. If the pressures fall outside of this specification, please revert to Goodwin International Ltd for confirmation of acceptability.

1.4 It is the user's responsibility to ensure the correct materials of construction have been specified for the intended application.

1.5 Should the end user deem that there is potential for the valve to be subjected to external fire and subsequently a requirement for the valve to comply with the internationally recognised Fire Testing standards i.e. API 6FA or ISO 10497, this requirement must be clearly specified in the request for quotation (RFQ) and any subsequent purchase order.

1.6 It is the user's responsibility to specify if a Valve Drain is required.

1.7 For any valves that contain a drain connection or plug, the operator must ensure that the pipeline is free from pressure before opening or removing the connection / plug from the valve.

1.8 All pipelines must have sufficient access to each side of the valve to allow for drainage of media before removal of the valve from the line.

1.9 Unless otherwise stated on drawings, valves have 3mm overall corrosion/erosion allowance over the minimum wall thickness stated in the applicable design standard.

1.10 It is the operator's responsibility to ensure that the whole system into which the valves will be installed is designed taking into account the following:

- Traffic
- Wind
- Excessive Vibration
- Earthquakes
- Reaction forces and moments which results from the attachments/piping etc.
- Decomposition of unstable fluids.
- The effects of water hammer on the system.

1.11 The valves must be removed from the line for major inspection and maintenance.

1.12 The valve is designed to be fully open or fully closed; operation of the valve in the incorrect manner will result in premature failure.

1.13 It is the end users responsibility to implement warnings and/or processes to protect personnel against hot and cold external surfaces that could be caused by service conditions.

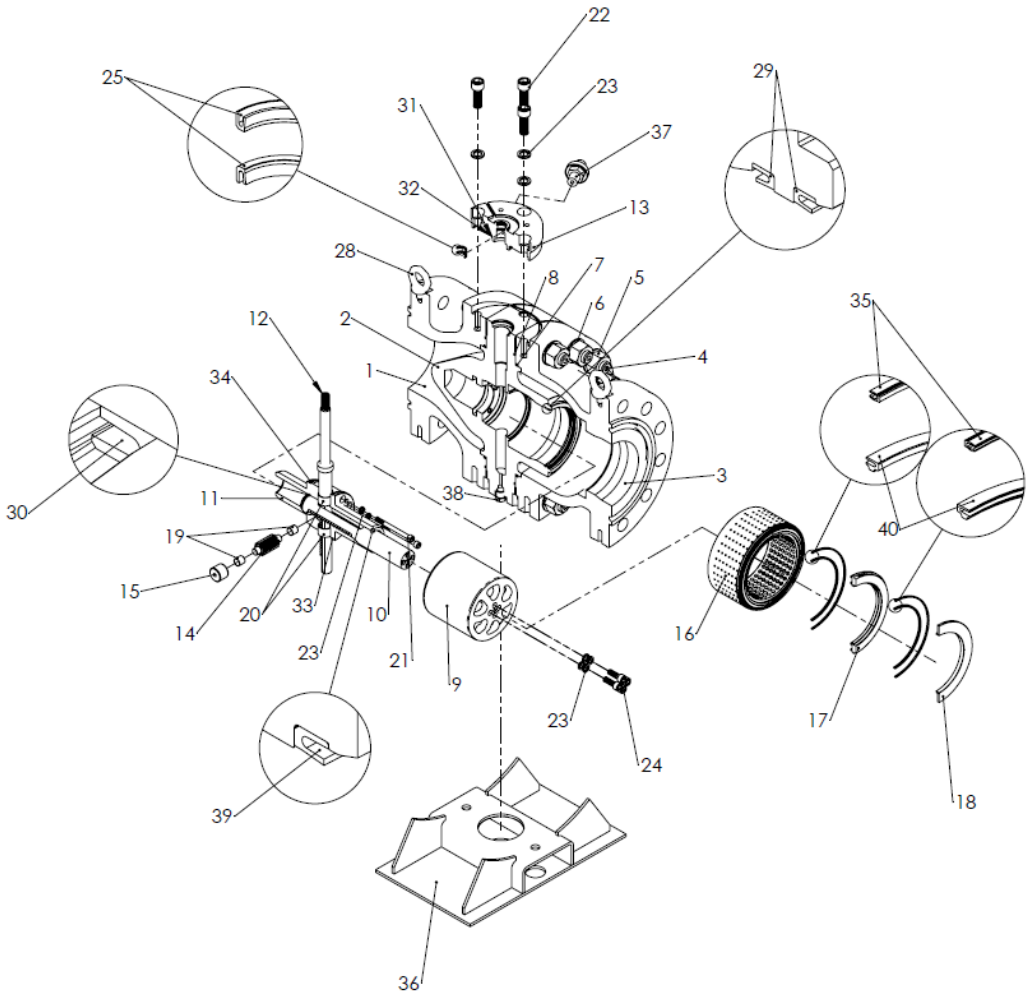
Note 1: This temperature should not exceed minimum or maximum temperatures that are identified on the valve nameplate.

Note 2: If the valve is subjected to a significant periodic thermal shock, it is the responsibility of the end user to bring this to the attention of Goodwin International Ltd to confirm compatibility.

Note 3: If the valve is subjected to a significant thermal shock which has not been notified to Goodwin, the valve shall not be operated until the temperature has had sufficient time to equalise.

1.14 Whilst Goodwin International Ltd will review and take into account the process media in the design/specification process in line with a media compatibility matrix, the final responsibility for correct material selection for process and environment lies with the end user.

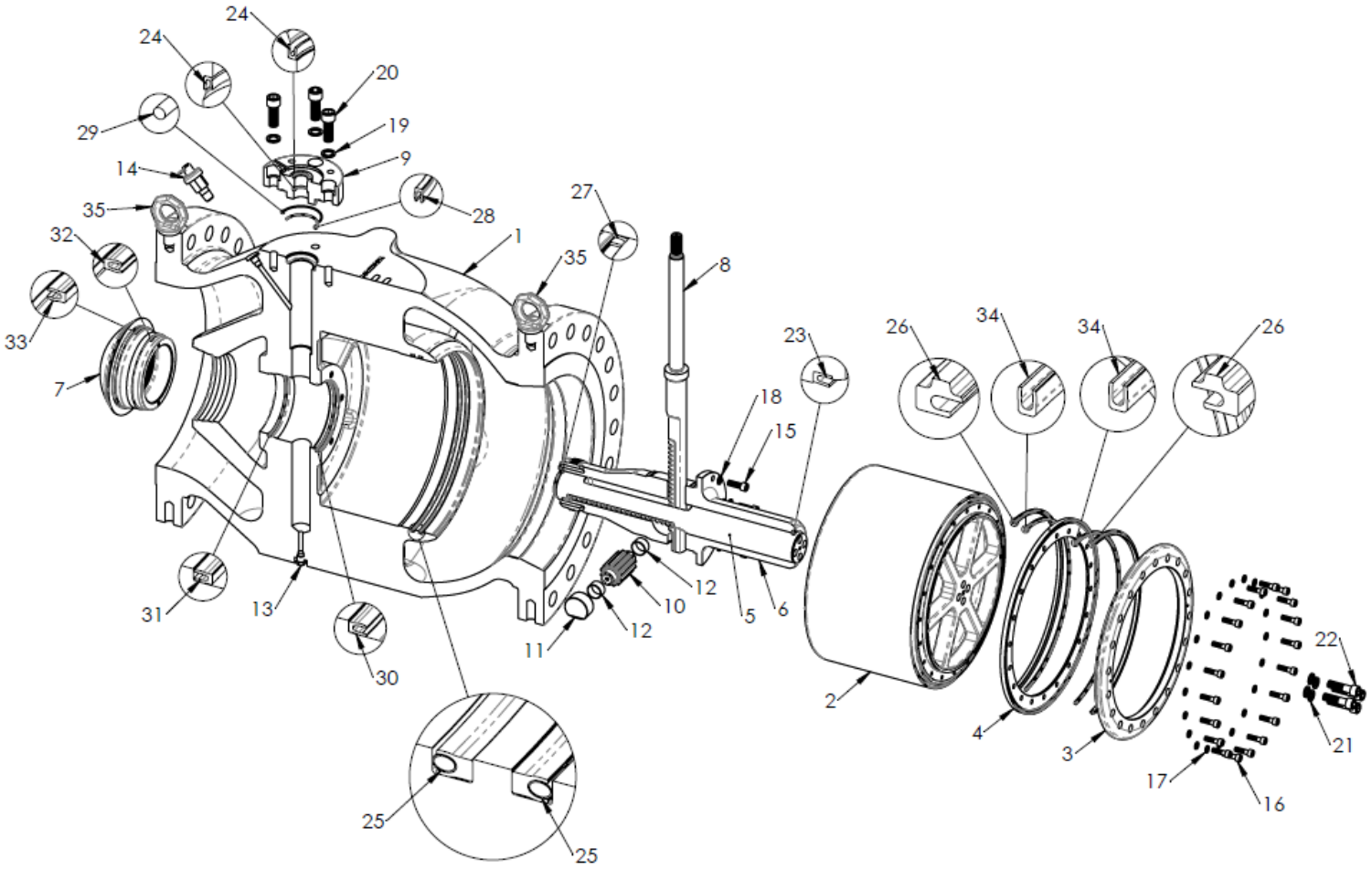
2. Exploded Diagram & Bill of Materials – Three Piece Body



ITEM	DESCRIPTION
1	INLET FLANGE
2	PISTON CARRIER
3	OUTLET FLANGE
4	BODY ASSEMBLY STUD
5	HEX NUT
6	1" STANDARD FLAT WASHER
7	STATIC BODY ASSEMBLY SEAL
8	STATIC BODY ASSEMBLY METAL SEAL
9	PISTON
10	PISTON ROD
11	PISTON ROD CARRIER
12	ACTUATOR SHAFT
13	ACTUATOR SHAFT PLATE
14	PINION GEAR
15	PINION GEAR BEARING CARRIER
16	TRIM
17	PISTON SEAL CARRIER - UPSTREAM
18	PISTON SEAL CARRIER - DOWNSTREAM
19	PINION GEAR BEARING
20	ACTUATOR SHAFT BUSH
21	PISTON ROD CARRIER SECURING SCREW
22	ACTUATOR SHAFT PLATE SECURING SCREW
23	NORD-LOCK WASHER NL10
24	M10 x 30 LONG SKT HEAD CAP SCREW
25	DYNAMIC ACTUATOR SHAFT SEAL
28	EYE BOLT
29	DYNAMIC PISTON SKIRT SEAL
30	DYNAMIC PISTON ROD SEAL
31	STATIC ACTUATOR SHAFT PLATE SEAL
32	ENVIROMENTAL 'O' RING SEAL
33	STATIC PISTON ROD CARRIER SEAL (LARGE)
34	STATIC PISTON ROD CARRIER SEAL (SMALL)
35	STATIC TRIM SEAL
36	SUPPORT FOOT
37	PRESSURE LOCK-OFF FITTING
38	MALE PLUG - 3/8" NPT
39	DYNAMIC PISTON ROD HOUSING SEAL
40	PISTON SEAL

NOTE: The illustration above shows a typical assembly and components of an Axial Isolation valve. Depending on valve size, the internal assembly may differ from that shown above. For actual construction, refer to the general arrangement drawings.

2. Exploded Diagram & Bill of Materials – Single Piece Body



ITEM	DESCRIPTION
1	BODY
2	PISTON SKIRT
3	PISTON FACE
4	PISTON SEAL SPACER
5	PISTON ROD
6	PISTON ROD CARRIER
7	PISTON CARRIER CAP
8	ACTUATOR SHAFT
9	ACTUATOR SHAFT PLATE
10	PINION GEAR
11	PINION GEAR BEARING CARRIER
12	PINION GEAR BEARING
13	MALE PLUG
14	PRESSURE RELIEF FITTING
15	PISTON ROD CARRIER SECURING SCREW
16	PISTON FACE SECURING SCREW
17	LOCKING WASHER
18	LOCKING WASHER
19	LOCKING WASHER
20	ACTUATOR SHAFT PLATE SECURING SCREW
21	LOCKING WASHER
22	PISTON ASSEMBLY SECURING SCREW
23	PISTON ROD DYNAMIC SEAL
24	ACTUATOR SHAFT DYNAMIC SEAL
25	PISTON SKIRT DYNAMIC SEAL
26	PISTON SHUT-OFF DYNAMIC SEAL
27	PISTON ROD DYNAMIC SEAL
28	ACTUATOR SHAFT PLATE STATIC SEAL
29	'O' RING SEAL
30	PISTON ROD CARRIER STATIC SEAL
31	PISTON ROD CARRIER STATIC SEAL
32	PISTON CARRIER CAP STATIC SEAL
33	PISTON CARRIER CAP STATIC SEAL
34	PISTON SEAL SPACER STATIC SEAL
35	EYE BOLT

NOTE: The illustration above shows a typical assembly and components of an Axial Isolation valve. Depending on valve size, the internal assembly may differ from that shown above. For actual construction, refer to the general arrangement drawings.

3. Description of product and function

3.1 General Information

3.1.1 Goodwin CB series Control (Choke) valves are used to control or prevent the flow of liquids and gases through pipelines. Used as part of a control loop, moving the piston position of the CB series valve can influence process conditions both upstream and / or downstream of the valve including pressure control, flow control, level control, chemical concentration and temperature. Designed for highly demanding applications where rapid accurate operation, durable tight shut off, ultra-high reliability and low maintenance are desirable.

CB series valves are suitable for compressible and incompressible media applications, are capable of bi-directional tight shut off and are fully pressure balanced which results in very small actuation forces. The CB series is operated by linear actuation which can be hydraulic, pneumatic, electric or mechanical in order to move the piston in an axial motion.

CB series valves are primarily intended for use as control valves, however they can also be used as shut down valves, emergency shut down valves, blow down valves and can be used as a final element within a Safety Instrumented System (SIS).

The safety function of the CB series valve may be to perform shut down (fail close) or blow down (fail open) within a maximum process time of two seconds, resulting in tight shut off.

For non-safety related applications a fail stay put option is available.

3.1.2 Safety Integrity Level (SIL) capability

CB series valves are designed to offer a Safety Integrity Level Capability of SIL2 in a 1oo1 arrangement and SIL3 in a 1oo2 arrangement in accordance with IEC 61508:2010 2nd Edition.

3.1.3 Life and Duty Rating

CB series valves are rated for an initial design life of 30 years.

The duty cycle of the valve is a single (one) operation per hour. If the required operation frequency is lower or higher than this, the design life and maintenance schedule of the valve can be recalculated by Goodwin International Ltd.

The life of the valve can be extended through a thorough inspection and testing regime as determined and conducted by Goodwin International Ltd.

3.1.4 Actuation & Instrumentation

CB series valves require an actuator to be able to operate. Where the valve is used in a Safety Instrumented System, the actuator and instrumentation must have a suitable SIL capability for the application.

3.1.5 Valve, Actuator and Instrument Integration

The valve, actuator and instrumentation package must be Functional Safety Assessed as an integrated piece of equipment in order to assign a SIL capability to the whole arrangement.

3.2 Size / Pressure Class / Materials of Construction

CB series valves are available in sizes ranging from 2”- 48” (DN50- DN1200) and pressure classes ASME 150# to 2500# & API 3000 to 10000.

The valve has two body arrangements – Three Piece Valve Body (2” - 12”) & Single Piece Valve Body (14” – 48”).

The CB series Control (Choke) Valve can also be constructed from a wide variety of materials including: Carbon steel, Stainless steel, Duplex steel, Super Duplex steel, Low - High Alloy steel, Nickel Alloy and Titanium.

4. Transport and storage

Goodwin Axial Control (Choke) Valves are professionally packed to ensure that the goods will arrive at their destination in the condition that they left our manufacturing facility.

Valves may be packed in the Horizontal or Vertical position depending on valve and/or actuator size unless client or project specifications mandate the packing requirements.

Valves will be shipped in the closed position unless otherwise requested.

If for any reason, the goods require storage prior to use, the valves shall be stored in the packing case in which they were delivered by Goodwin International Ltd. Valves must be stored on dry ground and under cover to prevent direct water ingress. Valves must be stored inside a warehouse with low, non condensing humidity conditions to prevent any possibility of water damage.

If valves are unpacked and stored unprotected for any period of time, Goodwin International Ltd will not accept liability for any surface corrosion that subsequently occurs.

Contact Goodwin International Ltd immediately should damage be observed to the packing case which could have potentially damaged the contents within the case.

For any specific transport, storage and packing requirements refer to the contract packing procedure.

5. Unpacking Valves & Lifting

5.1 General

5.1.1 All valves are supplied with lifting points and lifting aids which may be in the form of a high strength eyebolt or lifting brackets. The lifting aids supplied are intended specifically for the valve into which they are packed with.

5.1.2. Where eyebolts have been used - the lifting eyebolt component specification i.e. GN581 and eyebolt thread size will be etched around the circumference of the drilled lifting point hole.

5.1.3 Lifting operations must only be performed by trained personnel to prevent injury when unloading the valve from the packing case. The lifting aids supplied are suitable to unload and install the valve. All lifting aids should be disposed of after installation.

5.1.4 It is the user's responsibility to ensure that a suitable lifting plan or method statement is developed prior to lifting the valve assembly.

5.1.5 Remove all flange face protection. This could include, flange opening covers, caps or discs that have been attached to protect machined surfaces where applicable.

5.1.6 All machined surfaces must be cleaned using paraffin or similar liquid to remove all traces of any protective coating.

5.1.7 All lifting equipment must be inspected and certified for use periodically (refer to local regulations). Always visually inspect equipment for damage before commencing with any lift.

5.1.8 The crane or lifting equipment that is used must have the capability to safely lift the total weight of the assembled Valve, Actuator and Ancillary equipment (where applicable).

The total weight of the valve, actuator and ancillary component assembly must be considered when developing a lifting plan i.e. Total Assembly weight = Valve weight + Actuator weight + Ancillary components weight. The weight of each part (Valve, Actuator & Ancillary components) will be individually marked on the valve nameplates. If in doubt over the assembly weight, refer to the project approved General Arrangement Drawing prior to lifting.

5.2 Lifting the valve from the packing case

Valves may be packed in the Horizontal or Vertical position depending on valve and/or actuator size unless client or project specifications mandate the packing requirements.

5.2.1 Valve packed in the Vertical position

5.2.1.1 The valve and actuator assembly shall be removed from the packing case using only the identified valve lifting points.

5.2.1.2 Prior to lifting the valve assembly, ensure that the lifting slings are threaded through the Actuator lifting points for stability. Refer to Figure 1.0 which illustrates the preferred lifting technique.

Under no circumstances lift the valve by the Actuator lifting points alone. These points are not rated to lift the entire assembly.

5.2.2 Valve packed in the Horizontal position

5.2.2.1 The valve and actuator assembly shall be removed from the packing case using only the identified valve lifting points

5.2.2.2 Carefully manoeuvre the actuator into the Vertical position ensuring that the valve body remains grounded throughout the process.

5.2.2.3 Prior to lifting the valve and Actuator assembly, ensure that the lifting slings are threaded through the Actuator lifting points for stability. Refer to Figure 2.0 which illustrates the preferred lifting technique.

Under no circumstances lift the valve by the Actuator lifting points alone. These points are not rated to lift the entire assembly.

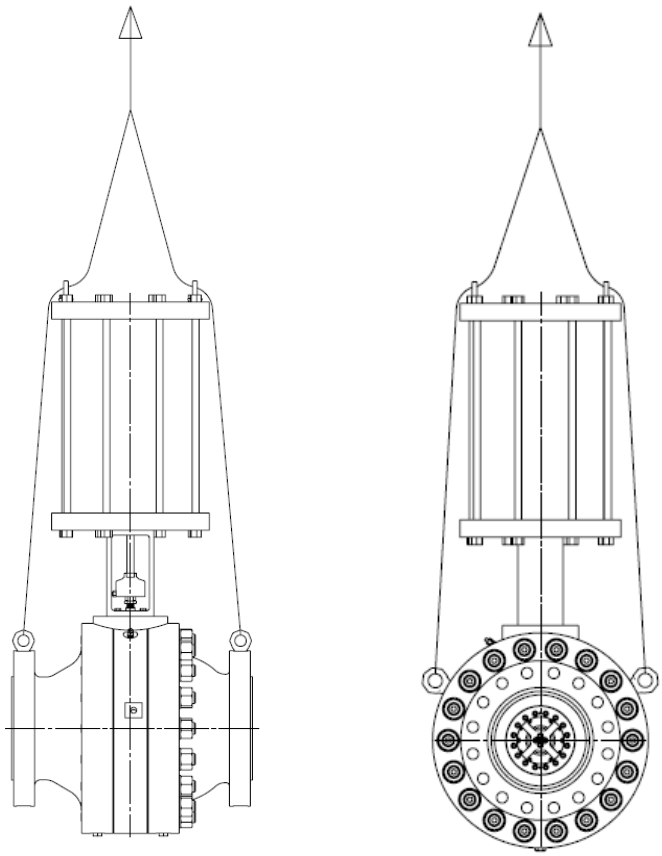


Figure 1.0 - Preferred lifting arrangements when the valve assembly is packed in the Vertical position.

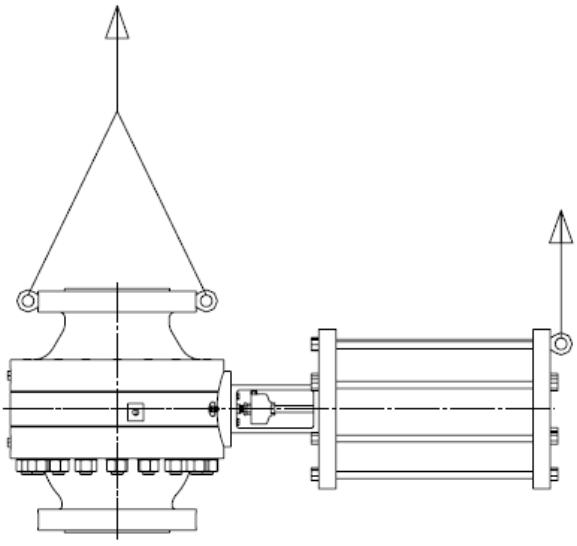


Figure 2.0 - Preferred lifting arrangements when the valve assembly is packed in the Horizontal position.

6. Name Plate & Marking

All valves will be supplied with a nameplate showing the following information as a minimum:

- Manufacturer Name
- Unique Serial Number
- Rated Working Pressure
- Valve Style
- Valve Size
- Valve Pressure Class
- Capacity (Rated)
- Stroke
- Characteristic

A typical nameplate format can be found in Figure 3.0.

Figure 3.0 - Nameplate format example

Additional client / project specified information may be put onto a separate nameplate with any International specifications that the valve complies with; this could include CE marking, ATEX marking or SIL marking etc.

The valve assembly weight will also be marked on a separate nameplate.

The material grade, body heat number and normal flow direction is also permanently marked (hard stamp, engraved or cast on) onto the valve body as a minimum.

Installation in the incorrect direction will result in the valve not performing as expected. This may also result in damage occurring to the valve and surrounding equipment.

7. Installation

Prior to installation, always verify that the valve is the correct item for the intended application. This can be done using the valve and nameplate markings (i.e. Valve Type Size, Rating, Materials of construction, PED, ATEX, SIL Level).

7.1 Installation checks / Instructions

7.1.1 Verify that the Valve and Actuator assembly plus any instrumentation, connections and pipework meet the required safety level for the zone in which the valve is to be installed.

7.1.2 Should the valve identification tag have to be removed for any reason when installing the valve into the required line, ensure that it is re-affixed securely on or adjacent to the valve so that full traceability of the valve is maintained.

7.1.3 Prior to lifting, ensure that the Valve and Actuator assembly will have sufficient support in the pipeline once installed. Take necessary actions if support is required.

7.1.4 Check that the valve is in the correct orientation using the Flow Arrow marking on the Valve Body.

7.1.5 Ensure that there is sufficient space between the pipe flanges during installation of the valve, in order to avoid damage to the flanges and allowing the gaskets to be installed.

7.1.6 Ensure all faces are clean, flat and free from all burrs and indents. If the flange face has been damaged, for whatever reason, it may require re-machining to ensure that the gasket will not leak. Guidance for what is internationally acceptable for "Permissible Defects for Raised Face Flanges" can be found in ASME B16.5 & ASME B16.47 dependant on the valve size. Our interpretation of this can be found in Appendix 2.

7.1.7 Using the developed lifting plan, lift the Valve and Actuator assembly into the required position using a mechanical lifting device with the eyebolts fitted into the lifting points. Always use the lifting aids provided.

7.1.8 The mating pipe flanges on the pipeline must be parallel and concentric. The connecting bolts must be tightened uniformly (avoiding distortion) and in crosswise alternating order. The pipeline must under no circumstances be pulled toward the valve to close the joint.

7.1.9 The installation shall not put any significant strain on the valve. The pipeline shall be able to expand/contract to prevent this. Any significant bending moments must be identified and agreed with Goodwin International Ltd.

7.2 Fixing the valve between the mating flanges

7.2.1 Valves secured by Bolting

Assemble gaskets / ring joints of the type and material quoted in the specification on either side of valve face and between pipe flanges situated centrally between securing studs. Tighten studs to the required torque, using the opposite studs (180 degree tightening method) to ensure even loading on gasket seat faces throughout circumference.

The hardness level of the ring joint used must always be lower than the base material of the valve body. Goodwin International Ltd recommends that the hardness of the ring joint is a minimum 20 HB points softer than the base material of the valve body. The valve body hardness can be verified against the material test certification.

For Raised Face (RF) end connections, Goodwin International Ltd recommends a graphite spiral wound gasket complete with an inner and outer ring.

7.2.2 Valves secured by Clamp Connectors

Assemble seal ring into valve end face bore, offer up pipe flange to seal ring, secure with top and bottom clamp halves over hub ends, insert and tighten stud bolts - opposite corners – to ensure even clamping using the predetermined torque value – See clamp manufacturers instructions.

For other types of end connection, consult Goodwin International Ltd for the best installation practice.

7.3 Seals & Bolting

7.3.1 Seals

It is the valve user's responsibility to select appropriate flange seals ensuring that the seal can withstand the expected bolt loading without injurious crushing and that they are suitable for the service conditions.

7.3.2 Bolting

7.3.2.1 It is the valve user's responsibility to select appropriate bolting for the installation.

7.3.2.2 For the maximum bolt force permitted when using NPS 1/2" though NPS 24" flanges, refer to ASME B16.5. Where supplied valves fall outside of the scope of ASME B16.5, the maximum bolt figures will be provided within the valve documentation.

Care must be taken to ensure that the bolting force applied does not exceed the maximum allowable force for each valve size and pressure class. If in doubt, refer to the applicable flange standard or contact Goodwin International Ltd.

8. Preparing for Test and Operation

Prior to testing an installed item, the following check must be carried out:

8.1 The valve must be installed correctly as per the Installation section of this document.

8.2 All nuts and bolts must be tight and correctly positioned.

8.3 All lock off valve(s) / openings must be free from obstruction and all temporary plugs must be removed (where applicable).

8.4 The actuator must have an adequate power supply. Where appropriate, check that the actuator is working correctly using the local and/or remote switches.

8.5 Local environmental conditions must be considered i.e. Extreme Temperatures, Dust, and Sand etc. Take precautions to prevent equipment damage.

8.6 The user must ensure that Electrical Continuity Tabs, where required, are installed correctly.

8.7 The valve must be in the closed position prior to start up.

It is the user's responsibility to ensure that the correct materials of construction have been specified and that all necessary safety warnings in relation to the valves particular installation are displayed appropriately by the user (e.g. the temperature of the valve's outer surfaces is determined by the media passing through the pipeline. If extreme temperatures should occur within the pipeline, the user shall risk assess the installation. This may then be classed as a potential hazard for anyone who might come into contact with the valve).

9. Valve Actuator

The Axial Control (Choke) valve is operated by an Actuator. This could be Hydraulic, pneumatic, electric, mechanical or electro-Hydraulic.

Where the Axial Control (Choke) valve is expected to perform a safety function within a stated response time, the actuation method selected must be capable of the speed of operation required.

The instruction manual for the actuator must be followed to operate the valve. A copy of the actuator manual will be contained within the packing case of the valve.

10. Proving

10.1 Factory Acceptance Testing

10.1.1 Every Axial Control (Choke) Valve purchased from Goodwin International Ltd has undergone in-house pressure testing after assembly and inspection - This includes a Hydrostatic Shell test, Hydrostatic Seat test, Functional test and Break out Force test as a minimum.

10.1.2 The allowable leakage rates and test durations for the tests carried out at Goodwin International Ltd facility is specified in the Inspection and test plan and test certificates.

10.2 Onsite Pressure Testing

In line pressure tests must be carried out appropriate to the valve size, pressure class, piping class and the service conditions of the line. It is the end users responsibility to define the exact testing required for the intended application.

10.3 Onsite Functional Testing

Functional testing must be completed prior to use. The minimum recommended practice for Functional testing shall be as follows:

a. For Pneumatically and Hydraulically Actuated valves, the Actuator filter regulator must be set according to the rated supply pressure stated in the valve documentation. Refer to the Actuator Installation, Operation and Maintenance manual for further details.

NOTE: Failure to comply with this point may result in damage and/or failure to the valve.

b. The Axial Control (Choke) Valve must be able to smoothly strokes from fully open to fully closed. The time taken for the full open to full close stroke must be checked against the process requirements.

c. The Axial Control (Choke) Valve must be able to smoothly stroke from fully closed to fully open. The time taken for the full close to full open stroke must be checked against the process requirements.

d. Limit switches must trigger at the required settings (where present).

e. Position transmitter must transmit at the required settings (where present).

f. The Axial Control (Choke) Valve must move to the fail-safe position when the solenoid valve is de-energised (Pneumatic / Hydraulic actuators where present). Verify the fail-safe position is as per the process requirements.

g. The Axial Control (Choke) Valve must move to the fail-safe position when the Actuator supply is disconnected (Electrical / Pneumatic / Hydraulic actuators where present). Verify the fail-safe position is as per the process requirements.

h. The Axial Control (Choke) Valve must move to the fail-safe position when the signal positioner is disconnected (where present).

i. The Axial Control (Choke) Valve must be able to operate against full process differential pressure in both preferred and reverse directions using minimum actuator supply pressure.

j. The lock off valve (where present) must have the Anti Tamper Seal intact. If the assembly does not have a lock off valve, a test block or an alternative may be fitted, in this case contact Goodwin International Ltd for further instructions.

A checklist (IOM-003-CB/F1) has been provided in Appendix 4 of this Installation, Operation & Maintenance manual. This checklist is to be completed and returned to Goodwin International Ltd as proof that the Functional Test has been successfully completed.

The completed checklist must contain the Goodwin International Ltd unique reference as noted on the valve nameplate to allow traceability to the valve.

Failure to complete the Functional test and return the checklist as described in this section may invalidate the Valve warranty.

If the Valve and/or Actuator are not performing to the required specification criteria, refer to the Troubleshooting section of this manual prior to contacting Goodwin International Ltd for assistance.

11. Maintenance Instructions

It is the user's responsibility to conduct regular inspections on the Goodwin Axial Control (Choke) valve once the item has been installed. The intervals for such inspections are as follows:

- Visual inspection of the valve externals and flanges - Monthly Inspection
- Proof test requirements - When the Axial Control (Choke) Valve is used in a safety critical application where SIL capability is being claimed, the advised proof test interval is 12 months. This must be validated for the whole Safety Instrumented Function (including other subsystems) and any changes to this frequency must be confirmed not to impact the overall risk reduction provided by the valve as part of the SIF subsystem.
- Major Inspection and Maintenance must carried out by Goodwin International Ltd or Goodwin International Ltd trained personnel / appointed third party representatives - 6 Years (this period can be sooner in more severe service conditions)

11.1 Monthly Inspection

11.1.1 Whilst the valve is in service an inspection of the valve externals must be completed checking the flanges, gaskets, bolting arrangement, valve coating, actuator, actuator connection, relief valve etc.

11.1.2 This guideline is based on the valve being used in clean line media and working under normal flow conditions.

11.1.3 Flanges and Gaskets - Check the flange connection for any signs of leakage. If a leak is located, it is necessary to remove the valve from the line and replace the Gasket or Ring Joint to prevent excessive emissions hazardous to personnel and to prevent damage to the valve and surrounding equipment.

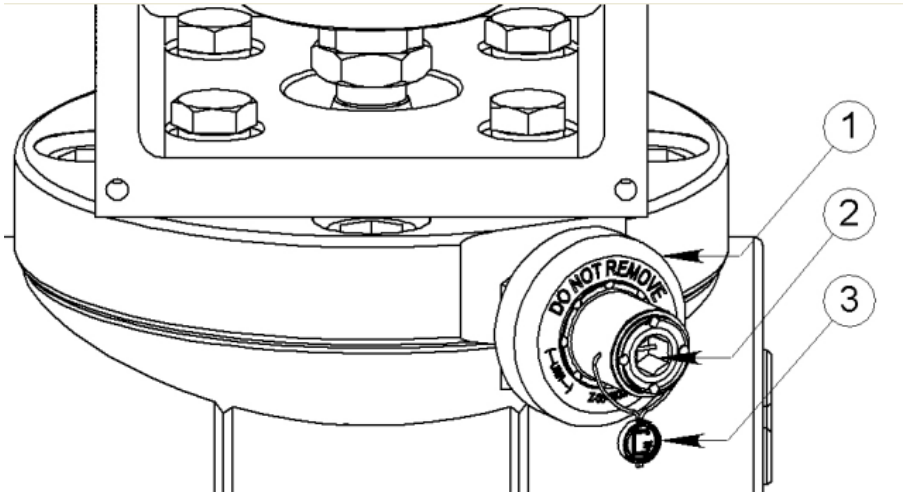
11.1.4 Body bolting arrangement - All bolting must be checked to ensure that it has remained secure.

11.1.5 Coating - The valve coating must not be damaged. If any damage is found, this must be repaired immediately. Minor damage can be repaired onsite. For major damage which exposes the base material, Goodwin International Ltd must be contacted immediately.

11.1.6 Actuator - The Actuator, Actuator wiring and instrumentation must be checked for signs of damage.

11.1.7 Lock off Valve (Optional) - Check for leakage from this area. If a leak is identified (leakage can be confirmed by a slight noise or presence of grease), stop the leak to atmosphere by tightening the lock off grub screw. See Fig 4.0 for diagram of the Lock off Valve arrangement.

Once the leak has been stopped, contact Goodwin International Ltd immediately as the Piston Rod Seals will be in need of replacement.



1. Lock off Valve Body
2. Lock off Valve Grub Screw
3. Anti-Tamper seal

Fig 4.0 - Lock off Valve

To stop the leakage from the Lock off valve in an Emergency situation, proceed to break the Tamper seal and tighten the Lock off grub screw. Following this operation, cause of the leakage shall be rectified and the Lock off Valve shall be replaced at the soonest opportunity. Goodwin International Ltd should be contacted immediately.

Under no circumstances remove this fitting whilst the valve is installed.

11.2 Major Inspection

11.2.1 After Six years of service (or sooner if service or project requirements dictate), the valve must be removed from the pipeline and a thorough inspection of the valve conducted.

11.2.2 It may be necessary that the valve is returned to Goodwin International Ltd to carry this inspection out.

11.2.3 This inspection must be carried out by or under the supervision of a Goodwin International Ltd qualified operative. Goodwin International Ltd must be contacted when this type of inspection is required.

11.2.4 Before removing any equipment from service, consideration must be given to the line media which has been flowing through the pipeline. It may be necessary to take additional safety precautions and to wear protective clothing - refer to local regulations and site instructions.

11.2.5 The Axial Control (Choke) valve has cavities which can retain traces of media and must be cleaned prior to shipment or operatives working on the valve. For further advice please contact Goodwin International Ltd.

11.2.6 All supply lines must be disconnected from the Actuator prior to removing from service. Refer to the Actuator operation manual.

It is the user's responsibility to ensure that the valve and pipeline are completely de-pressurised prior to removing the valve from service. Once the pipeline is completely de-pressurised, cycle the valve once i.e. Fully open position to fully closed position to release any pressure that could potentially be in locked in cavities.

It is the user's responsibility to ensure that the valve is free from Hazardous substances prior to removing the valve from service.

11.3 Preventative / Scheduled Maintenance

11.3.1 Regular maintenance must be conducted on the Goodwin Axial Control (Choke) valve to maintain the high level of performance that the valve has been manufactured and tested in accordance with.

11.3.2 This maintenance must be completed by a Goodwin International Ltd qualified operative or by personnel who have been trained and approved by Goodwin International Ltd.

Contact Goodwin International Ltd to develop a specific maintenance plan in conjunction with the local or project requirements.

When re-installing the Valve and Actuator assembly in the pipeline follow the installation section of this manual. Do not re-use the original end connection Gaskets or Seal Rings.

12. Lubricants

During the valve manufacture at Goodwin International Ltd facility, the following lubricant grades are used as standard for service conditions between -50°c and +200°c.

No	Lubricant Grade
1.	Mobiltemp SHC 100 NLGI 2

No	Lubricant Grade
2.	Swagelok Silver Goop

No	Lubricant Grade
3.	Solent Silicon Grease

Where extreme service temperatures (i.e. <-50°c and >+200°c) have been specified on the valve data sheets, it may be necessary for Goodwin International Ltd to use another grade of lubrication that is suitable for the temperature range. If applicable, this will be specified in the valve documentation.

There is no requirement for re-lubrication during operation.

When maintaining the valve, the same lubricant grades must be used.

Only Goodwin International Ltd qualified operatives or personnel who have been trained and approved by Goodwin International Ltd are permitted to service the valves.

13. Spare Parts

Spare parts, including seals, can be ordered directly from Goodwin International Ltd. When ordering parts it is important to note the valve serial number so that Goodwin can identify the exact part that is required.

Only use parts or instruments that have been approved by Goodwin International Ltd. Using non-compatible parts can lead to improper functioning of the valve and the valve could become unsafe to operate.

Goodwin International Ltd recommends keeping a complete set of spare seals in stock.

For any other issues, please contact Goodwin International Ltd. to assist in identifying possible causes and corrective actions.

Manufacturing Facility

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14. Changes History

Revision	Date	Description of Change	Approved by
1.00	19/07/2017	Initial issue	Paul Root
2.00	27/11/2018	Maintenance Warning Added	Mark Davies
3.00	27/07/2020	Amended following periodic Review	Mark Davies

APPENDIX 1

Troubleshooting

Symptom	Possible Cause	Corrective Action
1. Valve not sealing correctly resulting in excessive seat leakage.	Valve internals including seal surfaces not clean.	Remove valve and operate (open and close) numerous times. With the valve in the open position, ensure sealing surfaces are free from dust / scale / debris / oil etc. that may have got into the valve during storage and ensure that all rust preventative applied by Goodwin has been removed thoroughly.
	The Static Trim / Piston Seals (BOM Item No 35/40) are damaged or contain debris preventing shut-off.	Remove valve and visually inspect the Static Trim / Piston Seals (BOM Item No 35/40). If found to be clear from debris, operate (open and close) numerous times. If the leakage persists, the seals may need to be replaced. Contact Goodwin International Ltd. with evidence for assessment.
	Seals other than the Static Trim / Piston Seals (BOM Item No 35/40) mentioned above are damaged.	Contact Goodwin International Ltd. with evidence for assessment.
	The valve is not fully closed.	Ensure that the actuator is operating correctly - refer to symptom 3
2. Valve does not open and close	The actuator is not functioning	Test the actuator independently as per the actuator manufactures user manual. If the test proves that the actuator is functioning correctly, refer to symptom number 4.
	Incorrect actuator installation	Contact Goodwin International Ltd. with evidence for assessment.
3. The valve is operating but does not fully open and close.	Incorrect actuator installation	Contact Goodwin International Ltd. with evidence for assessment.
	Actuator controls are defective	Verify that the actuator has a sufficient energy supply - electricity, compressed air or Hydraulic fluid (refer to the actuator manufactures user manual for recommendations) Restore energy supply as required
		Check the power to the actuator operating system. Repair the control if required.
4. Valve does not open and close after proving that the actuator is working correctly (refer to	The Piston Rod (BOM Item No 10) is being prevented from moving correctly.	Remove the valve and visually ensure that the internals are free from foreign objects.

symptom 2 before using this corrective action)		If possible remove any object that may be effecting the movement. Check for signs of damage and report to Goodwin International Ltd with evidence for assessment.
	The valve internals are damaged	Remove the valve and check for damage. If damage has occurred to any component, Contact Goodwin International Ltd. with evidence for assessment.
5. Valve Internals and/or Seals are damaged / seat not sealing correctly.	The valve may have operated in a line with debris which has caused the damage.	Contact Goodwin International with evidence for assessment.

APPENDIX 2

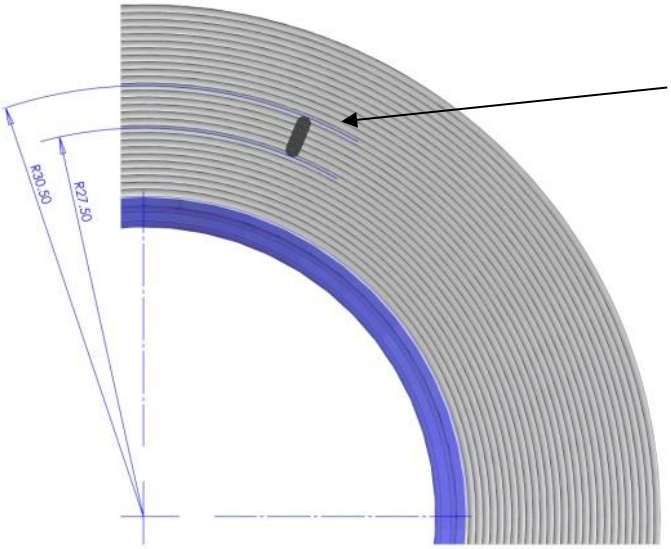
Goodwin International Ltd Interpretation of ASME B16.5 (Section 6.4.6 & Table 3) & ASME B16.47 (Section 6.1.5 & Table 30)

For full and detailed information on this topic the user would have to purchase the above two standards if they are not already in their possession.
a) Any scratch or imperfection that is less than half the depth of the raise face serrations is acceptable;
b) Any imperfection is measured by looking at the inner and outer radius of it in relation to the centre of the flange and is measured by the differences in the two radiuses to the centre of the flange;
c) Imperfections adjacent to each other must be separated by at least 4 times the imperfection size calculated in point b) of the largest imperfection to be acceptable.

Allowable Imperfection size:

Valve Size	Largest allowable imperfections that **are not** deeper than the Raise Face serrations	Largest allowable imperfections that **are** deeper than the Raise Face serrations
2"	3.0mm	1.5mm
3"	4.5mm	1.5mm
4"	6.0mm	3.0mm
6"	6.0mm	3.0mm
8"	8.0mm	4.5mm
10"	8.0mm	4.5mm
12"	8.0mm	4.5mm
14"	8.0mm	4.5mm
16"	10.0mm	4.5mm
18"	12.0mm	6.0mm
20"	12.0mm	6.0mm
24"	12.0mm	6.0mm
30"	12.5mm	6.0mm
36"	12.5mm	6.0mm
40"	14.0mm	7.0mm
48"	14.0mm	7.0mm

<u>Measuring indication size</u>:



An example of an indication measuring 3mm.

APPENDIX 3

Functional Safety Checklist / Record Sheet

GOODWIN INTERNATIONAL	Quality Assurance Form	IOM-003-CB/F1 Revision 0.00

CB Type Control (Choke) Valve
Functional Safety Checklist / Record Sheet

Goodwin International Job Number (including valve number):

Ref	Check List Item	Operation Successful (Y/N)	Comment if Not Successful (N)	Signature/ Initials of Responsible Person
a.	For Pneumatically and Hydraulically Actuated valves, check that the Actuator filter regulator must be set according to the rated supply pressure stated in the valve documentation. NOTE: Failure to comply with this point may result in damage and/or failure to the valve.			
b.	The Axial Control (Choke) Valve must be able to smoothly strokes from fully open to fully closed. The time taken for the full open to full close stroke must be checked against the process requirements.			
c.	The Axial Control (Choke) Valve must be able to smoothly stroke from fully closed to fully open. The time taken for the full close to full open stroke must be checked against the process requirements.			
d.	Limit switches must trigger at the required settings (where present).			
e.	Position transmitter must transmit at the required settings (where present).			
f.	The Axial Control (Choke) Valve must move to the fail-safe position when the solenoid valve is de-energised (Pneumatic / Hydraulic actuators where present). Verify the fail-safe position is as per the process requirements.			
g.	The Axial Control (Choke) Valve must move to the fail-safe position when the Actuator supply is disconnected (Electrical / Pneumatic / Hydraulic actuators where present). Verify the fail-safe position is as per the process requirements.			
h.	The Axial Control (Choke) Valve must move to the fail-safe position when the signal positioner is disconnected (where present).			
i.	The Axial Control (Choke) Valve must be able to operate against full process differential pressure in both preferred and reverse directions using minimum actuator supply pressure.			
j.	The lock off valve (where present) must have the Anti Tamper Seal intact. If the assembly does not have a lock off valve, a test block or an alternative may be fitted, in this case contact Goodwin International Ltd for further instructions.			

(Note - if any sections above are unacceptable (N) the test must not proceed until remedial action is taken and the Yes (Y) condition established)

The completed form must be submitted to Goodwin International Ltd (flowcontrol@goodwingroup.com)

TEST ENGINEER	
Name (Print):	**Contact Details (Telephone / email):**