



INSTALLATION, OPERATION AND MAINTENANCE MANUAL OF BOLTED BONNETGATE VALVES

YES VALVE

Instructions

These instructions provide information about Wafer type Butterfly Valves. They are for use by personnel who are responsible for installation, operation and maintenance of Butterfly Valves.

Safety Messages

All safety messages in the instructions are flagged with an exclamation symbol and the word Caution, Warning or Danger. These messages indicate procedures that must be followed exactly to avoid equipment damage, personal injury or death.

Safety label(s) on the product indicate hazards that can cause equipment damage, personal injury or death. If a safety label becomes difficult to see or read, or if a label has been removed, please contact for replacement label(s).



WARNING!

Personnel involved in the installation or maintenance of valves should be constantly alert to potential emission of pipeline material and take appropriate safety precautions. Always wear suitable protection when dealing with hazardous pipeline materials. Handle valves, which have been removed from service with suitable protection for any potential pipeline material in the valve.

Inspection

Butterfly Valve has been packaged to provide protection during shipment, however, it can be damaged in transport. Carefully inspect the unit for damage upon arrival and file a claim with the carrier if damage is apparent.

Parts

Recommended spare parts are listed on the assembly drawing. These parts should be stocked to minimize downtime.

Order parts from your sales representative, or directly ordering parts, located on the data plate attached to the valve assembly. Also include the part name, the assembly drawing number, and the quantity stated on the assembly drawing.

Service

Service personnel are available to install, maintain and repair all products. We also offers customized training programs and consultation services.

For more information, contact us or visit our website.

YES VALVE

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YES VALVE

Description

Gate valves are multi-turn valves with rising stem i.e. they require a number of rotation of hand wheel for full close or full open of the valve. All Gate valves shall be used only in full open or full close position. If used in slight or half open position, the wedge (gate) may vibrate/chatter and also cause wire drawing at the seating area. Therefore Gate valves shall not be used for flow regulation.

All valves close by rotating the hand wheel clockwise and open by rotating counter-clockwise.

For hand wheel operated valves the projection of stem above the hand wheel indicates whether the valve is in open or close position. In gear operated valves as the stem top may not be visible, a separate indicator is provided to indicate the position of valve.

The valve is closed by driving the wedge down into the corresponding taper in the body. The wedge and body seat rings are matched and lapped for perfect sealing. When the valve is fully open, the stem backseats in the bonnet bush.

Typical C/S view of Gate Valve is shown in **Fig.1**. For actual construction details of valves supplied, please refer General Assembly Drawing (GAD) submitted.

Handling

Valves shall be properly supported and secured before moving, to prevent possible damage to valve, property or harm to personnel.

Do not drag the valve on the ground while transporting. A minimum of one foot height from the ground is to be maintained while moving the valve.

Valve shall not be slung around the valve port for transportation. For large size valves lifting lugs are provided for this purpose.

The crane wire shall not be slung around the actuator/gear unit to avoid any load acting on it. Also, ensure that the while handling the valve, no external load acts on the actuator/gear unit.

Valve shall not be handled with the hand wheel keyed/ fixed to the gear unit. The hand wheel shall be dismantled before handling and transporting the valve.

Installation

General

Carefully unpack the valve and check for identification plates or tags etc.

- It is recommended to install Gate with stem vertical up in longitudinal pipe lines.
- The performance of the valve will be better if the flow is smooth. It is suggested to avoid installation of valves where turbulence is expected (Example: Immediate after elbows, bends, pumps, etc.)
- It is recommended to install swing check valves at a distance equal to 10 times or more the pipe diameter from the upstream elbows for better performance.
- Downstream elbows have negligible effect on check valve performance; however in cases of severe downstream flow disturbances, a distance of 3 times pipe diameters is recommended between downstream elbows and check valve.

YES VALVE

- It is recommended to install swing check valves in uniform flow lines and shall have sufficient flow to keep the disc at full open condition.
- If the identification plate / arrow plate / tag is lost or destroyed during the shipment or while in storage or if it is not legible, contact YES Valves.
- Look for any special warning tags or plate attached to or accompanying the valve and if any, take appropriate action.
- It is recommended to remove all foreign particles from the pipe line by flushing it with a suitable fluid. Corrosion inhibitors shall be added to the flushing medium to prevent any corrosion due to trapped fluids.
- Remove the end protectors and protective sheath within the flow bore valve, wherever provided.
- Gasket contact faces of the valve end flanges and pipe flanges shall be inspected thoroughly for scratches / defects. Scratches, if any, shall be corrected by grinding the surfaces or by rubbing with emery sheet.
- After cleaning, operate the valve for at least two complete cycles before installing.
- Ensure that the valve is in fully closed position during installation
- The pipes/flanges shall be properly aligned and provisions made to minimize stresses from external load/thermal expansion. Always review pipe manufacturer's recommendation.
- In case of pipes with long overhangs, adequate support/jacks shall be provided at the flange ends of the pipe so as to avoid bending of pipes due to weight of the valve.
- The fasteners on the valves might have loosened or relaxed during transportation or long storage. It is highly recommended that all fasteners (Body-bonnet/cover joint, yoke, gland, gear unit/actuator) shall be retightened to the required torque provided in appendix.

The improper alignment of the pipe and the valve during installation can lead to unbalanced tightening of the flanges which may cause excessive stress on the flanges and bolts and lead to leakage.

Flanged Ends

- Refer [Appendix A1](#) for applicable standards
- Clean valve flanges and companion flanges and remove protective grease from the valve flanges. Clean the valve interiors adjacent piping prior to mounting of the valve pipe joint.
- Align the bolt holes of the valve end flange and pipe flange.
- Fasteners shall be well lubricated for ease of installation
- Insert the gasket (not supplied with valve) and tighten the fasteners. Flange fasteners shall be tightened evenly, using suitable device in cross rotation to prevent damage to the flange.
- For sequence of tightening fasteners, refer [Appendix A2](#)
- For larger flanged valves, which are provided with foot support supporting base/pedestal shall be placed beneath the valve after the alignment and bolting of the pipe.

YES VALVE

If valve is not cleaned or if cleaning is done after valve installation, cavities may form a natural trap in the piping system. Any impurity not dissolved or washed out by the flushing fluid/line fluid may settle in such cavities and adversely affect valve performance.

Operation

General

- Performance life of the valve can be maximized if the valve is used within the rated range, in accordance with design parameters.
- For understanding the internal construction refer to the catalogue and general assembly drawing of the valve.

Operation Mechanism

Gate valve opening/closing is achieved using Hand wheel/Gear unit/Electrical/Hydraulic/Pneumatic Actuator.

Gear Unit

Gear units are provided on valves for easier operation. Clockwise operation is for closing and counter clockwise for opening of the valve (Fig. 2). The position of the valve can be noted using the position indicator provided on the gear unit. The number of turns will depend on the gear unit used.

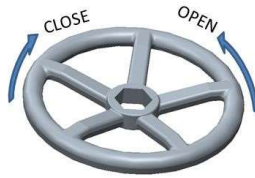


Fig. 2

Forcing the hand wheel, chain wheel against the stops will not provide tighter shutoff of the valve And may damage the seat faces, stem or gear unit.

Electric Actuator

It gives multi-turn output and is either directly mounted on valve or on the gear unit. The actuator drives the gear unit shaft which in turn rotates the stem nut and because of this Gate / Globe valve stem travels linearly. Electrically actuated valves are provided with declutching mechanism for manual operation of the valve. For electric actuators, YES Valves recommends to adhere to the instructions as per actuator IOM. Actuator settings are done at factory and normally resetting at site will not be required.

YES VALVE

In Gate and Globe valves, electrically actuated valves shall be normally set as below:

Open : Position

Close : Torque

Pneumatic / Hydraulic Actuator

Pneumatic/hydraulic actuators are fitted directly on the valve, without gear unit. It is recommended to adhere to the instructions as per actuator manual.

In case, valves are supplied as bare stem, as per customer requirement, ensure that connecting devices for actuators do not exert any radial loads on the valve stem, as it may lead to bending of the stem and excessive loading on the wedge. This in turn can cause the torque to increase and may lead to problem in valve operation

Maintenance

Introduction

For enhanced life of the valve and better operability, it is recommended to do a periodic inspection and maintenance of the valves as per the procedure explained below:

The frequency of observation depends on its application. YES Valves recommends that valve shall be inspected every month for high cycle valves (whichever earlier) for smooth operation and leak free performance. This is recommended even for stored valves also. It is advisable to maintain a record of the performance of the valve.

Safety Procedure

Always prefer to depressurize the pipeline when taking up any maintenance activity on the valve/ actuator. Always disconnect the electrical supply to the electrical actuator before carrying out any maintenance activity on the valve/actuator.

Study carefully and understand the instructions outlined in the installation, operation & maintenance manual of the valve & actuator before taking up any maintenance.

Routine Maintenance

The following activities can be carried out during the routine maintenance of the valves.

Item to Inspect	Gate
Check for Gland leaks	✓
Check Body-Bonnet/cover joint leaks	✓
Check Stem threads for Wear	✓
Ensure Stem and seal areas are free from debris	✓
Check all lubrication points	✓
Check condition of Gear Unit / Actuator (if used)	✓
If conditions permit, operate valve	✓

YES VALVE

Inspect valve for obvious damage	✓
Inspect all external connections	✓

1. Check for Gland leaks

Check the tightness of the gland nuts and tighten evenly if required. If the leak persists, the packing shall be renewed. The pipeline shall be shut off so that there is no pressure inside the valve before the gland eye bolts are loosened. Refer assembly procedure. It should also be noted that the valve should be able to operate freely at all times. If the valve cannot operate due to excessive packing force, the packing has become worn and must be replaced during a system shutdown.

Caution: Do not overstress the bolting.

Caution: Do not attempt to replace gland packing when the line is under pressure.

2. Check for Body Bonnet/Cover Joint leaks

Check the tightness of the bolting and tighten the bolts at the vicinity of the leak. If the leak still persists, renew the gasket. The section of the pipe shall be shut off to ensure no pressure is trapped in the line, before dismantling the bonnet.

For the valves which are used at high temperature application, it is recommended to retighten the flange bolts after one month of operation to avoid the leak through joints.

Caution: Do not overstress the Bolting.

Caution: Do not attempt to replace gasket when the line is under pressure.

3. Check all Lubrication points

Grease the stem threads and Yoke sleeve in Gate and Globe valves periodically to reduce wear, operating torque, and to deter corrosion. Care should be taken to ensure that only the threaded portion of the stem is lubricated. (Grease: Copper gel or equivalent)

4. Check condition of Gear Unit / Actuator

Gear operated valves are fitted with enclosed water tight gear units. Generally the gear units are filled with grease. They do not require any additional maintenance. However in case extreme difficulty in operation, remove the top cover and refill the grease.

In case of Actuator operated valves, the actuator shall also be operated to check smooth operation.

YES VALVE

Storage

Valves shall be stored in covered area which is dust free, least humid and well ventilated. Ensure that the end protectors are in place before the valve is stored, as dry contaminants like dust, sand, grit etc. can scratch metal seating surfaces and the soft parts, leading to leakage during operation.

If the valve end protectors are removed for any check or testing, the same preservation and protection shall be done after the check or testing.

The valve shall always be maintained in an ambience with temperature higher than the dew point temperature at the storage location, so as to avoid collection of water droplets on the valve surface.

Do not keep the valve directly on the floor. Valve shall be placed on wooden pallet such that it is at least at a height of 6 inch from the floor.

Care shall be exercised not to damage the extended portion of the adaptor, gear unit/ actuator during storage.

Do not apply tar, grease or any other material inside the valve, as it could impair the performance of the valve.

Improper handling and /or storage may cause disc/seal damage or deformation of shaft or seat, which will affect sealing and operational performance of the valve.

Part Identification

YES VALVE

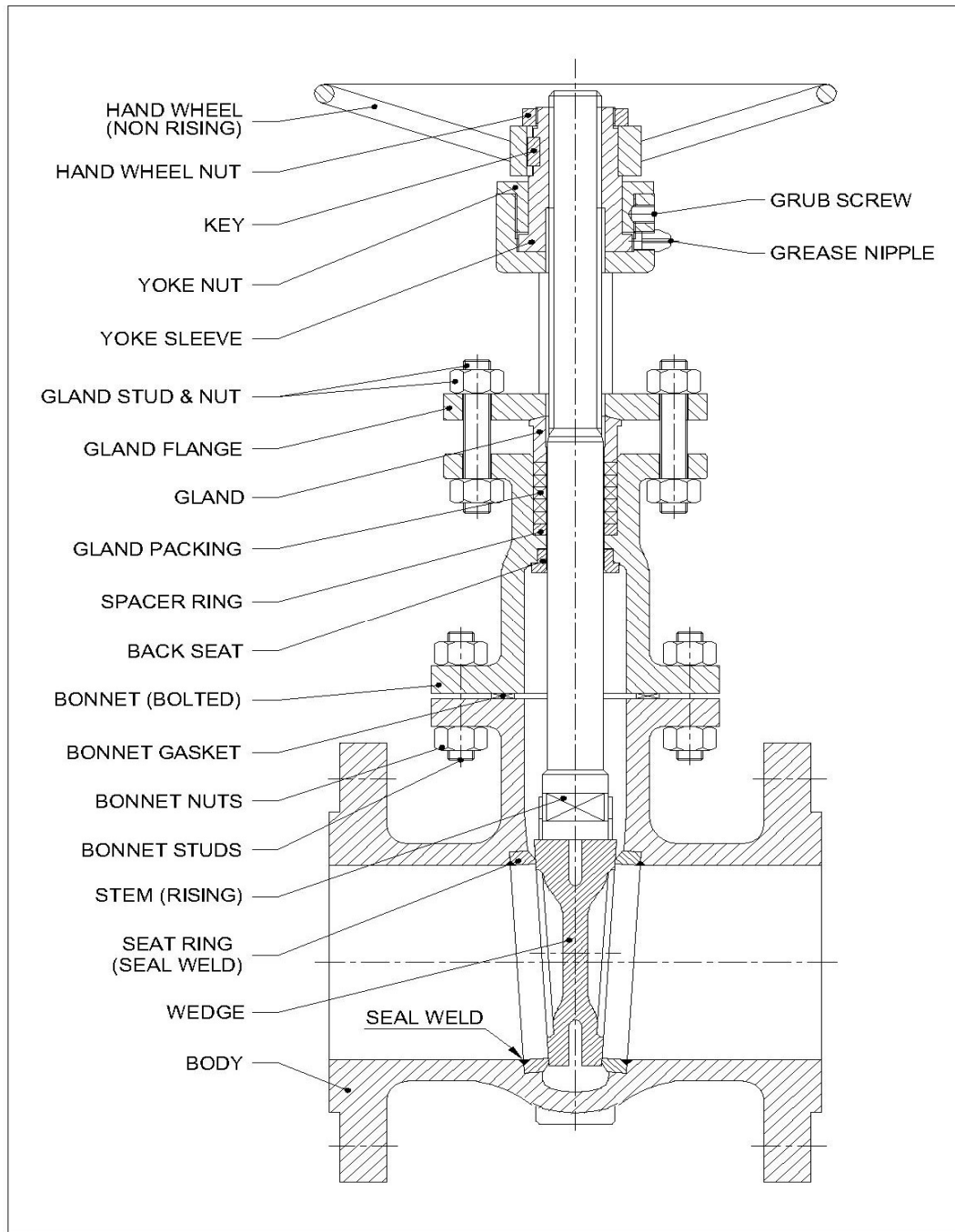


Fig. 1 Gate Valve - Typical

Removing Valve from Pipeline

Follow the steps below to remove the valve from the pipeline.

YES VALVE



WARNING!

Loosening the flange bolts on a pressurized valve can allow the valve to suddenly shift position and release uncontrolled pipeline fluid. To avoid personal injury or pipeline damage, relieve the pressure in the pipeline before loosening the pipeline flange bolts.

1. Relieve pressure in the pipeline, and drain the pipeline.
 2. Close the valve.
-



WARNING!

Moving parts from accidental operation of a powered actuator can cause personal injury or equipment damage. Disconnect and lock out power to actuator before servicing.

3. If the actuator is powered, disconnect and lock out the pneumatic, hydraulic, or electrical power to prevent accidental operation.
4. Support the valve, remove the flange bolting, and remove the valve from the pipeline. Refer to the lifting requirements in the *“Installation”* section.

Disassembling the Valve

YES VALVE

- All valves are designed to permit inspection without removing the body from the pipeline. The section of the pipe shall be shut off to ensure no pressure is trapped in the line, before dismantling the valve for inspection.
- Gate and Globe valves can be inspected by removing the bonnet assembly. However, the valves shall be kept in fully open or partially open position to relieve pressure in the body cavity before removing the bonnet assembly.
- Check valves can be inspected by removing the cover.
- In case of Check valve, there is no stem and hence only the cover is to be removed. The disc is hinged inside the body. For ease of illustration only the word bonnet is used below in the dismantling and reassembly procedure. This may be changed to read as cover with respect to Check valves.
- Keep the valve in mid position and remove the hand wheel / gear unit / actuator from the top of the valve (Fig. 3).
- Loosen the body-bonnet bolting and remove the studs and nuts
- Lift the bonnet assembly including stem and wedge out of the body (Fig. 4). Care shall be taken not to drop the wedge while lifting out.
- Mark the matching surfaces of the gate and body seat rings of Gate valves so that they are not interchanged during assembly.
- Remove the bonnet gasket.
- Carry out the required replacement of the parts and reassemble the valve with new parts □
for gear unit or actuator orientation change, refer Appendix A3.



Fig. 3

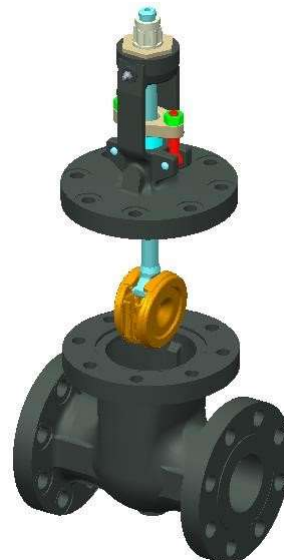


Fig. 4

Reassembling the Valve

- Place the gasket on body correctly. It is recommended to use fresh gasket. Refer Gasket Replacement Procedure.

YES VALVE

- Lower the bonnet assembly including the wedge smoothly into the body, keeping the wedge in open position. Remember to match the marking done earlier on wedge and body seat rings.
- A blue bearing test will confirm if there is a uniform contact between wedge and body seat rings.
- If required replace the gland packing. Refer Packing Installation Procedure.
- Tighten the gland nuts as per torque given in Table 2.
- Fit the bonnet studs and tighten the nuts as per torque figures shown in Table 1, evenly working at diagonally opposite pairs. Do not over tighten as the gasket may get damaged.
- Assemble the Hand wheel / Gear unit.
- Operate the valve from fully closed to fully open position manually and ensure smooth operation.

Troubleshooting

Problem	Reason	Action
Valve Leaking	Valve not closed fully	Re-tighten the hand wheel
	Valve seating damage	Dismantle and lap the seating
	Bypass valve not closed fully	Close the bypass valve fully
	Bypass valve seat may be damaged	Check the seating of the bypass valve
Not closing fully	Debris inside the valve	Clean the pipeline
Leakage through Gland	Packing loosened	Tighten the gland bolts
	Packing worn out	Replace the packing
Leakage through Bonnet / Cover joint	Bonnet / Cover bolting loose	Tighten the bolting
	Gasket damage	Dismantle and replace the gasket

APPENDIX A

TECHNICAL INFORMATION

YES VALVE

A1 - References

Design Compliance:
API 600

Face to Face Dimensions

ASME B16.10 Face-to-Face and End-to-End Dimensions of Valves

End Connections

ASME B16.5 Pipe Flanges and Flange Fittings (NPS ½ through NPS 24)

ASME B16.47 Large Diameter Steel Flanges (NPS 26 through NPS 60)

ASME B16.25 Butt-welding Ends

Testing Standard

API 598 Valve Inspection and Testing

EN12266 PART-1 Industrial Valves - Testing Of Valve

A2 - Tightening Sequence & Torque

The tightening sequence for all possible number of bolting, the star logic to be followed is explained below:

- Tighten the first four nuts in the sequence shown Fig.6. This helps in correct location of the mating parts.
- Tighten the other bolts in the sequence shown Fig.7.
- The sequence goes clockwise around the bolt.
- Ensure that the recommended torque (refer Table1 & 2) is maintained in all bolting.

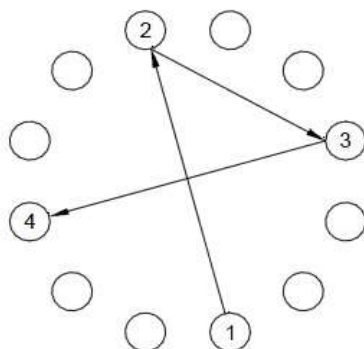


Fig.6. Initial Tightening

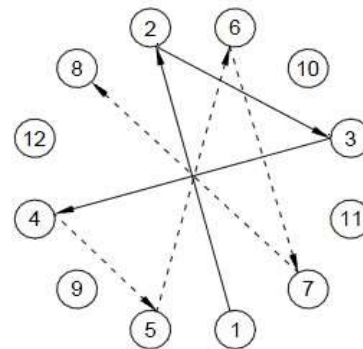


Fig.7 Sequence of Tightening

Table 1 Body-Bonnet/Cover Tightening Torque

YES VALVE

THREAD SIZE, inch-TPI	TORQUE, Nm		
	B7/B7M/B16/L7/L7M/ L43/660 Cl.A/UNS N07718/UNS 09925	B8 Cl.2/B8C Cl.2/ B8M Cl.2/B8T Cl.2/ XM-19	UNS N06625 Gr 1
1/4-20 UNC	7	7	5
5/16-18 UNC	15	15	10
3/8-16 UNC	25	25	15
7/16-14 UNC	40	40	25
1/2-13 UNC	60	60	40
9/16-12 UNC	90	90	60
5/8-11 UNC	120	120	80
3/4-10 UNC	215	215	145
7/8- 9 UNC	345	315	230
1-8 UNC	520	475	345
1.1/8-8 UN	765	625	510
1.1/4-8 UN	1075	880	715
1.3/8-8 UN	1460	975	975
1.1/2-8 UN	1925	1285	1285
1.5/8-8 UN	2480	1655	1655
1.3/4-8 UN	3140	2090	2090
1.7/8-8 UN	3900	2600	2600
2-8 UN	4775	3180	3180
2.1/4-8 UN	6900	4600	4600
2.1/2-8 UN	9575	6380	6380
2.3/4-8 UN	12865	8575	8575
3-8 UN	16835	11225	11225
3.1/4-8 UN	21545	14365	14365
3.1/2-8 UN	27065	18045	18045

YES VALVE

lbf.ft = Nm / 1.35582

Table 2 Gland Tightening Torque

VALVE SIZE			TORQUE, Nm									
			GATE VALVES				GLOBE VALVES					
			CLASS									
	150	300	600	900	1500	2500	150	300	600	900	1500	2500
2"	10	15	20	35	35	90	10	15	30	125	205	715
2.1/2"	15	20	-	-	-	-	-	-	-	-	-	-
3"	15	20	35	-	70	185	20	20	55	120	315	1555
4"	20	20	50	55	90	-	30	40	80	190	445	-
5"	30	40	-	-	-	-	-	-	-	-	-	-
6"	30	40	90	100	135	490	30	65	105	375	1330	-
8"	30	45	95	135	220	-	55	115	200	505	1530	-
10"	35	65	125	180	335	1150	60	100	240	790	3515	-
12"	55	70	155	270	445	-	60	175	650	1590	-	-
14"	55	75	230	290	585	-	95	245	720	-	-	-
16"	60	90	240	290	-	-	145	-	-	-	-	-
18"	75	115	255	380	1185	-	155	-	-	3065	-	-
20"	90	120	270	470	-	-	205	-	-	-	-	-
22"	95	175	-	-	-	-	-	-	-	-	-	-
24"	135	185	330	770	2415	-	-	-	-	-	-	-
26"	140	200	525	-	-	-	-	-	-	-	-	-
28"	145	260	600	-	-	-	-	-	-	-	-	-
30"	155	260	650	-	-	-	-	-	-	-	-	-
32"	155	260	-	-	-	-	-	-	-	-	-	-
34"	190	480	685	-	-	-	-	-	-	-	-	-
36"	190	480	805	-	-	-	-	-	-	-	-	-
38"	205	505	-	-	-	-	-	-	-	-	-	-
40"	330	530	1000	-	-	-	-	-	-	-	-	-
42"	340	560	1000	-	-	-	-	-	-	-	-	-
44"	345	-	-	-	-	-	-	-	-	-	-	-
48"	395	735	-	-	-	-	-	-	-	-	-	-

YES VALVE

54"	465	1155	-	-	-	-	-	-	-	-	-	-
56"	465	-	-	-	-	-	-	-	-	-	-	-
60"	485	1400	-	-	-	-	-	-	-	-	-	-
64"	720	-	-	-	-	-	-	-	-	-	-	-
72"	810	-	-	-	-	-	-	-	-	-	-	-

lbf.ft = Nm / 1.35582

Note:

Gland Tightening Torque values provided is applicable for standard graphite die-moulded packing with split braided filament end rings. Torque value will depend on the packing material used. For other packing materials, please consult YES Valves.

A3 - Actuator / Gear Unit Reorientation Procedure:

Gear unit or Actuator orientation change procedure is given below,

- Depressurize the line and keep the valve in half open position.
- Remove actuator/gear unit bottom screws.
- Rotate the actuator/gear unit and change orientation to required position, match holes in the yoke to that of the gear unit.
- Insert the bottom screws & tighten to required torque.
- Operate the valve 2 to 3 times before pressurizing line.
- In order to dismount actuator/gear unit from valve, after unscrewing the bottom screws of yoke, lift the actuator/ gear unit slightly and rotate it for few turns in counter-clock wise direction so as to remove the stem from actuator bush. Thus actuator/gear unit can be dismantled from valve. (Fig. 8 & 9)

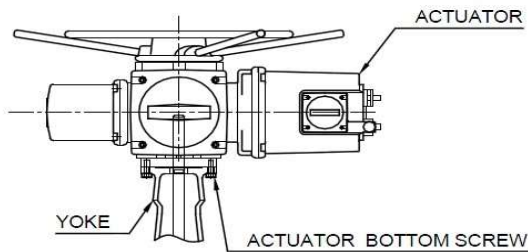


Fig. 8

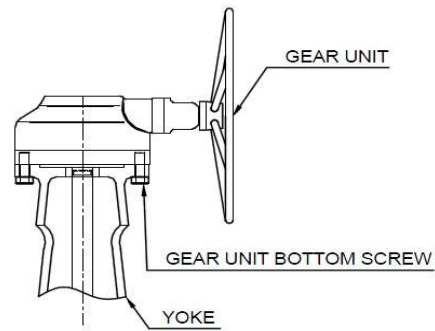


Fig. 9

YES VALVE

Do's and Don'ts

Do's	Don'ts
Before taking valve for erection, make sure that is cleaned properly from inside and outside and there are no foreign particles or metallic chips sticking on to sealing element.	DO NOT lift the valve by the hand wheel, gear box, actuator or bypass arrangement.
While installing the operator, make sure that the valve is in fully closed position.	DO NOT use the lifting points located on the Gear Unit / actuator, if any, to lift the valve. These Lifting points are for the Gear unit / actuator only.
Make sure to remove the entire rust preventive on the machined surface in the flow area before a valve is put in the pipe line.	DO NOT over-tighten packing gland nuts. Over tightening will increase the torque required to operate the valve.
Carefully read the identification plate details and install the valve in the right place and for the correct duty conditions for which it is Designed and manufactured. Gate with pressure relief arrangement, Globe and Check valves have preferred sealing direction marked By an arrow on the valve body beneath the identification plate.	DO NOT use impacting devices to tighten up the bolting on the body/bonnet (cover). Use suitable mechanical devices for tightening.
Make sure to supply rated voltage and frequency to the electrical actuator.	DO NOT tighten the body/bonnet nuts when the wedge/disc is in the fully closed position.
Swing check valves shall also be installed in vertical pipe line with flow in upwards direction.	DO NOT keep the Gate valves in partial open Condition to regulate flow.