



INSTALLATION, OPERATION AND MAINTENANCE MANUAL

API 6D SLAB CONDUIT GATE VALVES

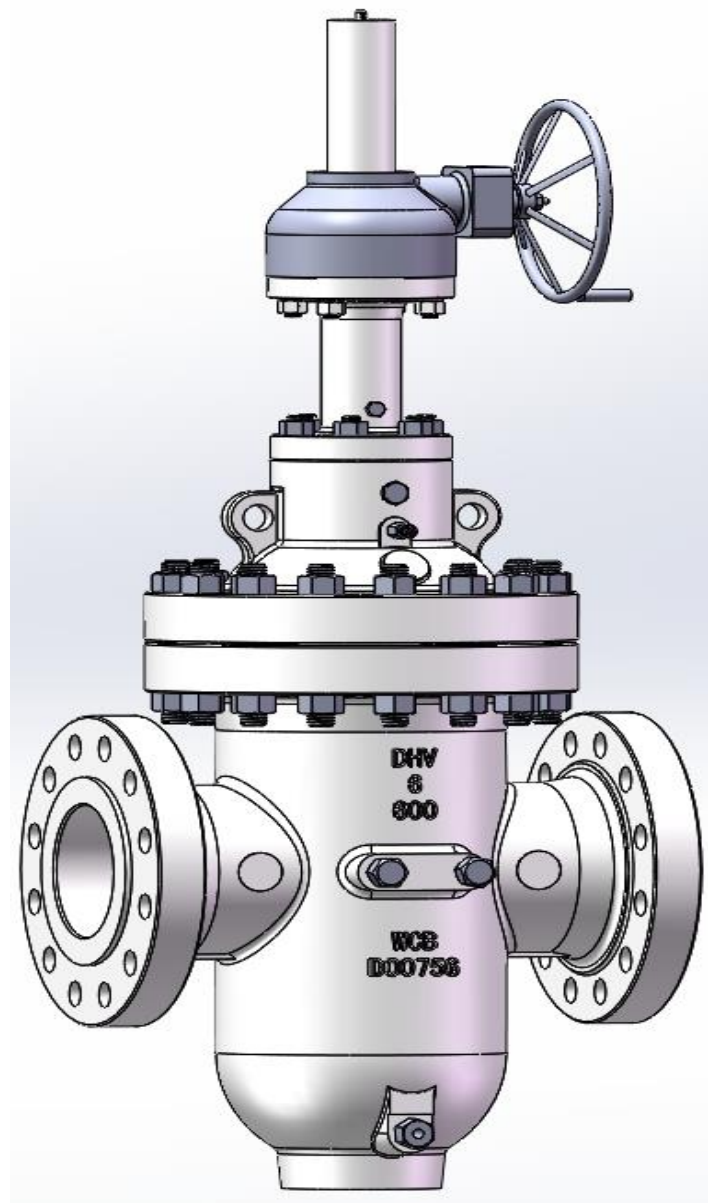


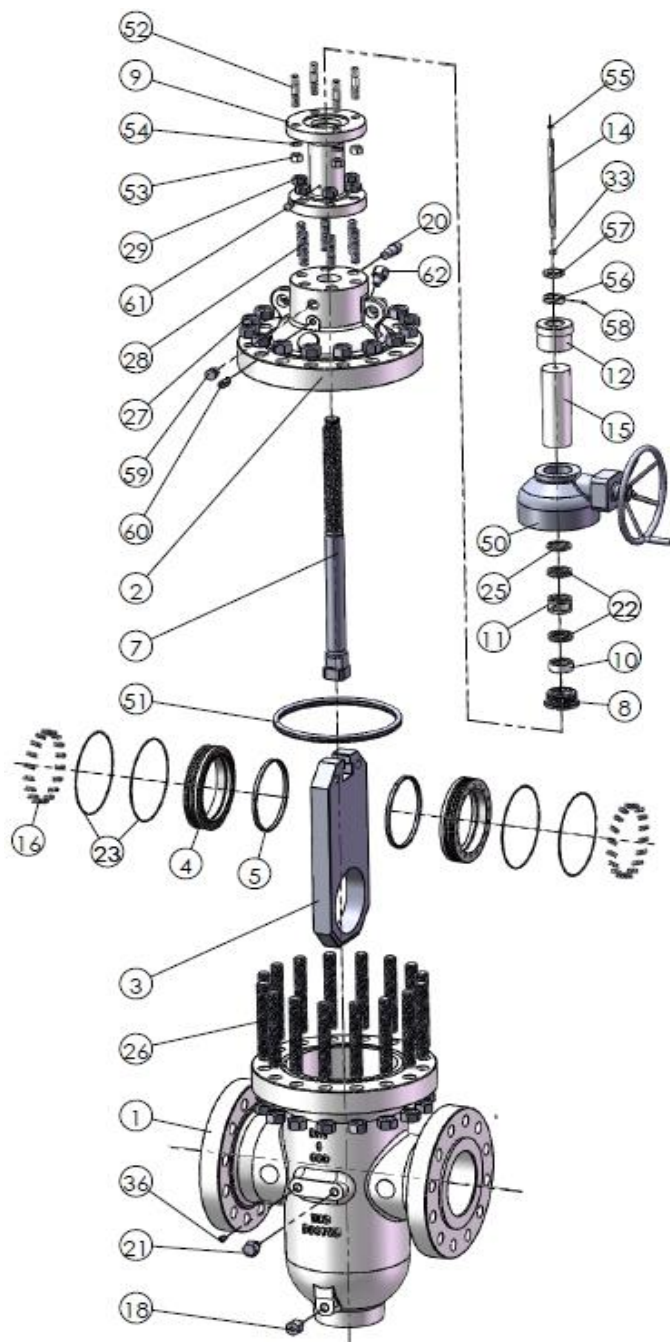


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TYPICAL CONFIGURATION

API 6D SLAB CONDUIT GATE VALVES



| NO. | Part Name |
|-----|------------------------|
| 1 | Body |
| 2 | Bonnet |
| 3 | Gate |
| 4 | Seat |
| 5 | Seat Insert |
| 7 | Stem |
| 8 | Backseat |
| 9 | Yoke |
| 10 | Packing Plate |
| 11 | Lantern Ring |
| 12 | Stem Nut |
| 14 | Indicator |
| 15 | Dustproof Cover |
| 16 | Spring |
| 18 | Drain Fitting |
| 20 | Stem Sealant Injection |
| 21 | Seat Sealant Injection |
| 22 | Packing |
| 23 | O-Ring |
| 25 | Graphite Packing |
| 26 | Stud |
| 27 | Nut |
| 28 | Stud |
| 29 | Nut |
| 33 | Nut |
| 36 | Injection Check Valve |
| 50 | Gear |
| 51 | Ring Type Joint |
| 52 | Stud |
| 53 | Nut |
| 54 | Spring Washer |
| 55 | O-Ring |
| 56 | Stop Block |
| 57 | Nut |
| 58 | Screw |
| 59 | Plug Screw |
| 60 | Drain Fitting |
| 61 | Plug Screw |
| 62 | Drain Fitting |



FOREWORD

Personal Safety and Long Term Ownership of your DHV API 6D Slab Conduit Gate Valve is the most important matter in reviewing our Installation, Operation & Maintenance Manual. This manual will provide all the necessary safety guidelines for our valve including information for valve transportation, storage, installation, operation and maintenance. Please read carefully before installing or servicing the valve.

DHV provides general guidelines in this manual, and cannot provide specific data and warnings for all possible applications. The purchaser/end user must therefore assume responsibility for proper valve selection, sizing, installation, operation, and maintenance of DHV valve products. The purchaser/end user should read and understand this document and any instructions provided with the product, and conduct training with its employees and contractors to ensure they are aware of the proper and safe use of DHV valve products in connection with the specific application.

1. END USER INSTRUCTION

Personnel safety is always the most important factor in the transportation, storage, installation, operation and maintenance of any valve. DHV valves are designed to meet the customer's order requirements and specifications. DHV disclaims all responsibility for problems that may be caused by applications other than the specified use. Valve service pressure/temperature information is detailed on the valve name plate. When selecting a valve, always consider the application, service and temperature for the intended service. Select the applicable valve material for anti-corrosion and anti-abrasive service. For safety of personnel and plant/environment: Prior to conducting any service on the valve, ensure the valve is not under pressure, properly vented, and drained. For all electric, hydraulic or pneumatic actuated valves, all power connections to the valve/actuator must be turned off before performing any maintenance and service. When performing any operation, maintenance or service, personal protective equipment should be used, such as protective clothing, oxygen masks, safety glasses, work gloves, etc. DHV will not be responsible for any loss or expense resulting from the failure of equipment, damage to any property, or death or injury to any person resulting in whole or in part from repairs or modifications performed by other than authorized DHV personnel. Such unauthorized repairs shall also serve to terminate any contractual or other warranty, if any, on the equipment and may result in the equipment no longer meeting applicable requirements.



2. VALVE TRANSPORTATION AND STORAGE

2.1 TRANSPORTATION

1. Valves should remain in the closed position to prevent damage to the seating surface during shipping and handling. Each valve should be securely packaged either on a pallet or in a crate to avoid any damage during shipping.
2. Use the proper hoisting equipment to transport the valve, especially when lifting or lowering the valve. Special attention to personnel safety and the care of the valve should be made when transporting the valve. Avoid impacting or striking the valve during transportation. Lay the valve on a clean flat surface; avoid laying the valve on the flange face. Ensure there is adequate clearance around the valve for proper operation and maintenance.

When lifting the valve, use the valve lifting lugs; if the valve does not come with lifting lugs, use an appropriate sized sling through the valve yoke to lift the valve.



WARNING: NEVER USE THE HAND WHEEL OR VALVE STEM TO LIFT THE VALVE.

3. During transportation, ensure the valve's paint, name plate and flange sealing surfaces are fully protected. Do not drag the valve across the floor, or place the valve flange sealing face on the floor.
4. For those valves not required to be immediately installed, do not open the end flange protective covers. Ensure the valves are stored in a safe, clean environment and are protected from rain and dust.

2.2 STORAGE

1. Valves should be stored in the closed position. Valve ports and flange serration surfaces should be kept sealed with protective flange covers.
2. Valves should be stored in a dust free, low humidity and well-ventilated room, not in direct contact to the floor. If possible, the valves shall be kept in the original packing crate. If the valves must be stored outdoors, keep them in the original crate or shipping container. Ensure the valve's packaging is stored on raised blocking to avoid moisture damage. Protective covering should be used for protection against dust and rain.
3. Valves should never be stacked on top of each other, to avoid any valve distortion which may affect valve performance and cause personnel injury.
4. Valves that have been stored for an extended time should be cleaned and inspected prior to installation. Inspect the sealing surface to ensure it is clean and free of any debris or damage.



5. Do not expose the valve to any corrosive environment as this may cause damage to the valve stem threads.

3. VALVE INSTALLATION

- Review all documentation to fully understand the valve and related information that will provide safe installation and a long service life for your valve.
- Valve information can be found on the valve body, and the name plate. Fig 1 is a typical nameplate.
- Valve ends should have a protective cover to protect the valve bore from any foreign particles and dust which will damage the gate and seat sealing surfaces.

A typical valve nameplate for a DHV Slab Conduit Gate Valve. The nameplate includes the DHV logo and 'DHV INDUSTRIES, INC.' on the left. The main title is 'SLAB CONDUIT GATE VALVE' with 'LOW EMISSION' below it. On the right, it specifies 'API 6D' and 'API 6FA NACR MR 0175'. The nameplate is divided into two columns of fields. The left column contains: SIZE (6(DN150)), CLASS (600(PN100)), FIG NO. (CA30FX-SG-S-GO), S/N NO. (blank), and pressure ratings (1480 psi at -20 °F, 1310 psi at 300 °F). The right column contains: BODY (WCB), STEM (F6A), GATE (A105N+ENP), and SEAT (A105N+ENP/NYLON-M). A DATE field is at the bottom right.

| | | | |
|--------------------|----------------|--------------------|-------------------|
| SIZE | 6(DN150) | BODY | WCB |
| CLASS | 600(PN100) | STEM | F6A |
| FIG NO. | CA30FX-SG-S-GO | GATE | A105N+ENP |
| S/N NO. | | SEAT | A105N+ENP/NYLON-M |
| 1480 psi at -20 °F | | 1310 psi at 300 °F | |
| | | DATE | |

Figure 1 Typical Valve Nameplate

| | |
|-----------|------------------------------|
| SIZE | Nominal Valve Size |
| CLASS | Pressure Class |
| FIG NO. | Figure NO. See DHV's Catalog |
| S/N NO. | Valve Series Number |
| BODY | Body Material |
| STEM | Stem Material |
| GATE | Gate Material |
| SEAT | Seat & Seat Insert Material |
| psi at °F | Pressure-temperature Rating |
| DATE | Manufacture Date |

Nameplate Information

3.1 INSPECTION BEFORE INSTALLATION

3.1.1 Before installation, check the valve name plate and valve body information to ensure the valve is suitable for the intended service.

3.1.2 Before installation, remove the flange cover and the protective film on the flange sealing face, inspect the bore and the flange sealing surface, remove any dirt with a clean soft cloth, use an anti-corrosive cleaning liquid to clean if necessary, and never use any other chemical products.

3.1.3 Inspect the flange gasket (including ring gasket) sealing surface and ensure it is in acceptable condition for installation.

3.1.4 After cleaning the valve and before installation, open and close the valve one time. Ensure the valve operates smoothly. If abnormal operation is experienced, stop the operation and inspect the valve stem and valve bore for any obstructions that may be preventing normal operation.

3.1.5 After successfully cycling and assuring the proper operation of the valve, return the valve to the closed position until installation is complete. If for any reason the valve must remain in the open position, ensure the valve sealing surfaces are protected.



3.2 INSTALLATION

3.2.1 Position the valve into the pipe or the flange connection; ensure that any stress caused by improper pipe alignment is relieved first. Valves are not intended to be a means of aligning improperly fitted pipe.

3.2.2 Install the valve using qualified piping standards and practices. Valves marked with flow direction must be installed in line with the piping flow.

3.2.3 The recommended orientation for slab conduit gate valves is upright with the valve in a horizontal line with the hand wheel positioned vertically above the valve centerline.

FLANGE ENDS:

- Select the proper gasket (including ring gasket) to install, line up the bolt holes between the valve flange and pipeline flange, then install the bolts and nuts and tighten to the accepted piping and bolting standards. The bolt threads should be lubricated first for ease of bolting.
- Use an appropriate sized torque wrench when tightening the bolt/nut, to avoid flange deformation. Please follow Fig 2 and Table 1 for bolting sequence and bolting torque. If the bolting quantity is different from the chart shown, please follow the same principle to get a new sequence to follow.
- For large diameter valves, the valve must be properly and safely supported during installation. After installation is completed, valve supports should be moved to the bottom of the valve flanges.
- After valve installation is complete, recheck and tighten the bolts including the gland bolts as necessary to the values provided in Table 1 & Figure 2.
- It is recommended that the tightness of the joint bolt tension and gland bolts be inspected at least yearly. Refer to Table 1 & Figure 2.



DURING INSTALLATION, IF VALVE IS NOT IN LINE WITH THE PIPELINE, FLANGE FACES ARE NOT PARALLEL TO EACH OTHER, OR BOLTING TORQUE IS NOT UNIFORM, VALVE LEAKAGE MAY BE EXPERIENCED.



Table 1 Bolting Tightening Torque Chart

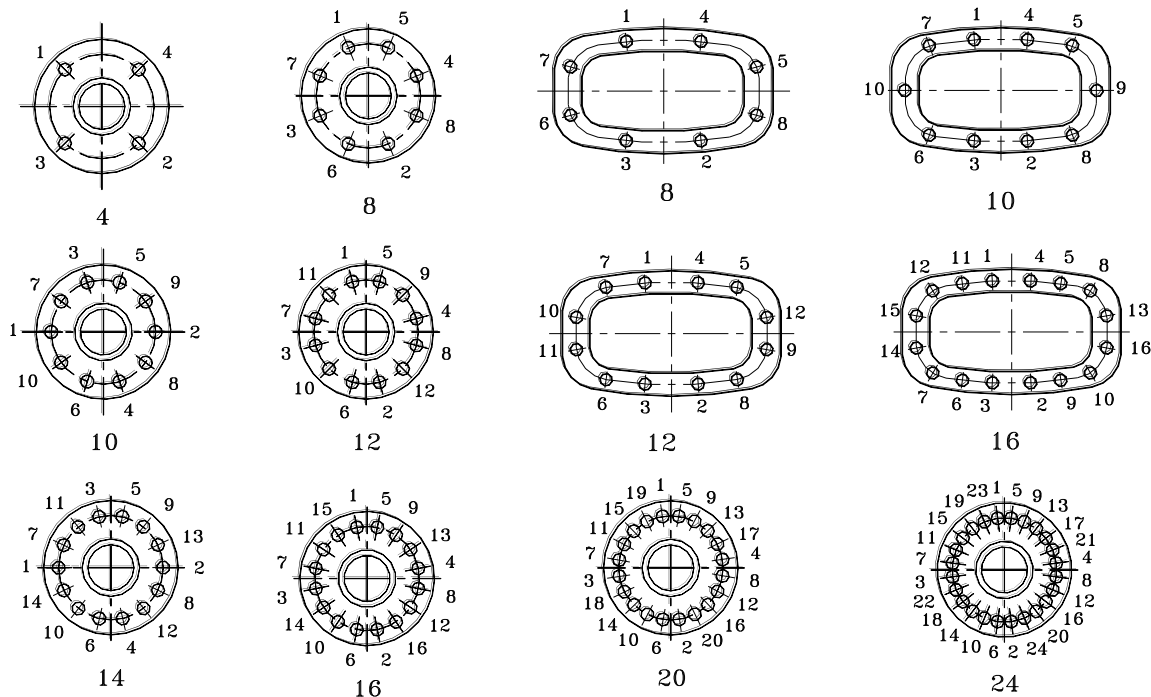
| Stud Size (Inch) | Measurement: Newton-meters N·m Tolerance: +/- 10% (Conversion: 1 ft·lb= 1.36 N·m 1 N·m = .74 ft·lb) | | | | | | |
|---------------------|---|-------|-------------------|----------|---------|---------|-------|
| | B7M/L7M | B7/L7 | B8 (I)/ B8M(I) | B8M (II) | B8 (II) | B8MLCuN | B16 |
| 5/16-18UNC | 21 | 27 | 8 | 25 | 26 | 9 | 28 |
| 3/8-16UNC | 36 | 47 | 13 | 43 | 45 | 16 | 48 |
| 1/2-13UNC | 85 | 111 | 32 | 101 | 107 | 37 | 112 |
| 9/16-12UNC | 121 | 158 | 45 | 144 | 152 | 53 | 160 |
| 5/8-11UNC | 165 | 217 | 62 | 197 | 208 | 72 | 218 |
| 3/4-10UNC | 289 | 378 | 108 | 344 | 362 | 126 | 380 |
| 7/8-9UNC | 459 | 601 | 171 | 459 | - | 200 | 605 |
| 1-8UNC | 683 | 894 | 255 | 683 | - | 298 | 901 |
| 1-1/8-8UN | 992 | 1298 | 370 | 811 | - | 433 | 1308 |
| 1-1/4-8UN | 1381 | 1807 | 515 | 1130 | - | 602 | 1820 |
| 1-3/8-8UN | 1860 | 2435 | 693 | 1167 | - | 812 | 2452 |
| 1-1/2-8UN | 2438 | 3192 | 909 | 1530 | - | 1064 | 3214 |
| 1-5/8-8UN | 3126 | 4092 | 1165 | - | - | 1364 | 4120 |
| 1-3/4-8UN | 3931 | 5146 | 1465 | - | - | 1715 | 5182 |
| 1-7/8-8UN | 4863 | 6367 | 1813 | - | - | 2122 | 6411 |
| 2-8UN | 5933 | 7767 | 2211 | - | - | 2589 | 7820 |
| 2-1/4-8UN | 8519 | 11152 | 3175 | - | - | 3717 | 11229 |
| 2-1/2-8UN | 11764 | 15400 | 4385 | - | - | 5133 | 15507 |
| 2-3/4-8UN | 15742 | 18747 | 5867 | - | - | 6869 | 18747 |
| 3-8UN | 20528 | 24447 | 7651 | - | - | 8958 | 24447 |



Table 1 Bolting Tightening Torque Chart (cont.)

| Stud Size (mm) | Measurement: Newton-meters N·m Tolerance: +/- 10% (Conversion: 1 ft·lb= 1.36 N·m 1 N·m = .74 ft·lb) | | | | | | |
|-------------------|--|-------|-------------------|----------|---------|---------|------|
| | B7M/L7M | B7/L7 | B8 (I)/ B8M(I) | B8M (II) | B8 (II) | B8MLCuN | B16 |
| M10 | 43 | 56 | 16 | 51 | 54 | 19 | 56 |
| M12 | 73 | 96 | 27 | 87 | 92 | 32 | 96 |
| M16 | 175 | 230 | 66 | 209 | 221 | 77 | 232 |
| M20 | 338 | 443 | 126 | 338 | 424 | 148 | 446 |
| M24 | 578 | 757 | 215 | 578 | - | 252 | 762 |
| M30 | 1134 | 1484 | 422 | 928 | - | 495 | 1495 |
| M36 | 1964 | 2572 | 732 | 1232 | - | 857 | 2589 |
| M42 | 3125 | 4091 | 1165 | 1960 | - | 1364 | 4119 |

Figure 2 Bolt Tightening Sequence





WELD ENDS:

- Weld ends must be kept clean with no burrs, oil, dirt or foreign objects.
- The valve end and pipe end must be in proper alignment for effective welding.
- Follow the approved WPS to perform the welding. During welding, insure the temperature near the seat area does not overheat which will cause sealing area distortion. Protect the valve bore to prevent welding slag and foreign matter from entering the valve.
- After welding, use approved and proper Non-Destructive Testing (NDT) method to check the welds; clean the welds thoroughly, and then perform local heat treatment if required.
- When installation is complete, and prior to system testing and start-up, clean the valve by flushing the line of debris and other materials that may have accumulated inside the valve and in the valve seating area and surfaces during construction. When flushing the valve, open the valve fully, flush for a determined time based on line size. Close the valve and allow fluid to fill the line, while opening and closing the valve while flushing. Fully close the valve, if seat leakage is noted after flushing, repeat flushing procedure. If leakage from the seat is still evident, the seating surface may be damaged and need repair.

4. VALVE OPERATION

- To assure maximum valve performance, only use a valve that is suitable for the rated pressure/temperature and corrosive environment.
- For your safety and normal operation, please read the following valve operation procedures:
 - 4.1** The valve must be kept either in the fully open or fully closed position. Never throttle or leave the valve at the half-open position as erosion of the disc and seating surface may occur and stem damage will result.
 - 4.2** Rotating the valve hand wheel clockwise will close the valve; counter-clockwise operation will open the valve, this is also applicable to gear or motor actuated operation. Closing the valve requires the specified stem torque to assure the closure of the valve at the rated pressure.
 - 4.3 CAUTION:** For personal safety, always use an appropriate sized valve wrench to open and close the valves (Recommendation: A valve wrench no larger than twice the diameter of the hand wheel should be used when opening or closing a valve). Never use an oversized torque wrench (with higher torque output) to operate the valve, as over **torqueing** may result in permanent distortion to the internal valve components resulting in the valve malfunctioning. The use of pneumatic impact wrenches for the quick opening or closing of the valve is not recommended; binding or stem damage may occur.
 - 4.4** Never operate the valve without authorization and a full understanding of the safe operation procedures, inspections and proper handling instructions.



4.5 When a valve is in the fully open position, rotate the hand wheel one quarter turn from the fully open position. This action will ensure that packing tightness is verifiable.

4.6 Back seating a valve is means of stopping or reducing packing leakage until the packing can be replaced. Valve packing should only be replaced when the valve is NOT under pressure. It is not recommended to repack a valve under pressure. To backseat the valve, rotate the hand wheel to the fully open position; do not over torque as this will cause thermal binding.

5. VALVE MAINTENANCE

Valves should be inspected regularly during operation and any findings should receive immediate attention in order to avoid any further damage to the valve or the system. Regular inspection and maintenance should be scheduled at a minimum of twice per year, or more often if required.

5.1 Valve surfaces and other moving parts such as the stem, hand wheel or gear operators, are areas that will easily accumulate dust, corrosion, oil and debris, thus resulting in excessive wear and damage. Therefore regular inspection and cleaning of these components is necessary. Stem threads should be lubricated regularly with a lubricant containing copper, molybdenum disulfide lubricant.

5.2 Regular maintenance of the valve is required to assure smooth operation. Stem threads should be inspected and lubricated frequently to ensure ease of operation. Lubrication of the stem should be conducted every six months or more often as needed, based on the environment the valve is installed. Inspection should confirm that the valve is sealing properly. Stem packing should be inspected at least every six months to ensure zero leakage from the packing chamber. For water & oil service, regular maintenance should be scheduled every 3 months. For more corrosive mediums, inspection and maintenance should be completed once a month.

5.3 Valves that are not operated frequently; remaining in the open or closed positions for long periods of time should be partially operated on a monthly basis to expel lubricant throughout the stem nut, bearings or gears. Excessive effort to open or close the valve may indicate the valve stem needs to be lubricated, or the valve packing compression is too tight, or if debris and particle matter on the threads are preventing the operation of the stem. Damaged components should be considered when the valve will not operate after all efforts of adjustments and lubrication has been completed.

5.4 During maintenance or servicing of the valve, all replacement parts must be the same as the original specification (parts dimensions and materials). End user may also purchase the spare parts such as packing, gaskets, bolts/nuts etc. when ordering the valve. With the new packing, gasket or bolt/nuts installed, the valve must pass the applicable pressure testing prior to installation and service.



5.5 When the valve seat or stem sealing surface is damaged by foreign particles, the emergency sealant injection fittings should be used to first inject the valve cleaner to purge any old grease out, then use proper sealant (suitable to the medium) through a manual pump to fill with sealant. See Table 3 for recommended sealants.

5.5.1 Prior to injecting any sealant, lubricant or any other material into the valve, verify that the product is compatible with the valve trim.

Table 3 – Cleaner, Lubrication & Sealant

| BRAND | MODEL | PURPOSE |
|-------------------------------|------------------------------------|-------------------------------|
| Sealweld | Valve Cleaner Plus | Cleaner / Flush |
| Sealweld | Equa-Lube Eighty | Lubrication |
| Sealweld | 5050 | Sealant |
| Val-Tex | Valve Flush | Cleaner / Flush |
| Val-Tex | 2000 | Lubrication |
| Val-Tex | 80 | Sealant |
| NOMINAL PIPE SIZE (INCHES) | CLEANER/FLUSH PER SEAT (OUNCES) | LUBRICANT/SEALANT (OUNCES) |
| 2 | 5 | 3 |
| 3 | 7 | 4 |
| 4 | 9 | 5 |
| 6 | 13 | 7 |
| 8 | 17 | 9 |
| 10 | 21 | 12 |
| 12 | 26 | 14 |

(The above table is a general recommendation, your specific application or condition may require an alternate solution.)

5.6 For metal seated slab conduit gate valves, if the seating surfaces of the disc or the seats are scratched or show slight pitting of less than 0.005" (0.1 mm): these can be removed by lapping. If defects are deeper than 0.005", proper machining practices of grinding and machining by qualified machinist should be implemented. For soft seated valve, if the seat insert is scratched, or damaged, change a new seat insert. To assure the sealing capability, the valve must pass all required applicable pressure tests before returning to service. If all pressure containing parts are in need of repair, consider replacing the entire valve.



5.7 At NO time shall any weld repair be conducted on the valve while in service. Never strike the valve with a hammer or other impact device. Ensure that no excess weight is placed on the valve that was not part of the original manufacturer design.



WARNING! ANY MAINTENANCE OR REPAIR MUST NOT OCCUR UNTIL THE VALVE BODY PRESSURE IS COMPLETELY RELEASED. NO REPAIR WORK SHALL BE CONDUCTED WHILE THE VALVE IS UNDER PRESSURE.

6. DETAILED DISASSEMBLY AND ASSEMBLY

6.1 SLAB CONDUIT GATE VALVE DISASSEMBLY

- 6.1.1** Loosen and remove the bonnet/body flange bolts and nuts.
- 6.1.2** Use the proper design and sized hoist or crane to remove the bonnet assembly slowly and carefully, do not damage the seating surface.
- 6.1.3** Remove the disc from the stem, carefully hold and prevent the stem from rotating; turn the hand wheel counter clockwise until the stem head is outside the top of the gear box. Remove the stem protector and then remove the stem indicator (including indicator nut), round nut, screw, and stop plate from the stem in order.
- 6.1.4** Carefully hold the stem, turn the handwheel clockwise to remove the stem slowly and carefully.
- 6.1.5** Loosen and remove the bolts and nuts between yoke and bonnet, remove the yoke from bonnet.
- 6.1.6** Use a packing hook or similar tool to remove the packing from the packing bore, take care to ensure no damage to the packing bore sealing surface finish.
- 6.1.7** Remove the bonnet gasket from the body.
- 6.1.8** For Valves fitted with an actuator or gear operator: follow the order in removing the top flange bolts, nuts, washers. Remove the gear box or actuator from the top, and carefully observe the outside configuration of the gear box or the actuator.
- 6.1.9** Unless it has been damaged, we do not recommend removal of the back seat.

6.2 SLAB CONDUIT GATE VALVE ASSEMBLY

- 6.2.1** When re-assembling the valve, inspect and ensure that all components are thoroughly clean before installing into the valve body or bonnet. All rust and dirt should be removed with a wire brush or emery cloth. Oil solids and grease adhered to the valve stem and yolk should be removed with approved solvents. All threaded components should be well lubricated, paying



special attention to the valve stem and yolk nut threads. DHV recommended lubricants are referenced in 5.1.

6.2.2 Install the new seat assembly into the body. Special tools may be required.

6.2.3 Install the stem to the bonnet, carefully holding the stem when install the sealing system.

Note: For stem sealing stem installation see section 6.3

6.2.4 Install the gate to the bonnet assembly, install the bonnet gasket, then install the gate/bonnet assembly into the body, take care that you do not damage the seat insert, then install the yoke to the bonnet.

6.2.5 Ensure that all studs and nuts are clean and free of rust, corrosion, burrs and previous lubricants. DHV recommends installing new bolting when assembling body and bonnet connections. DHV recommends coating the stud threads and surface under the nut with molybdenum disulfide. All tightening of the bolting should be by hand; followed by the appropriate tightening sequences outlined in Table 1 Bolt Tightening Torque Chart & Figure 2 Bolt Tightening Sequence. It is important to follow proper torque procedures. Each bolt should be torqued in steps of approximately 20% of final torque. Recheck all bolting once completed.

6.2.6 Over torque can cause deformation of the body/bonnet flange causing leakage. Failure to properly follow the tightening sequence will result in the gasket not being compressed evenly, resulting in gasket leakage.

WARNING: Never use impact devices to tighten the bolting on the body/bonnet connections. Use suitable designed mechanical devices such as hand torque wrenches for tightening and refer to Table 1. Torque wrenches and standard wrenches may be used in combination when performing tightening sequences.

6.2.7 Install the handwheel or gear box, and turn the handwheel or gear operator clockwise until the stem head is outside the top of the stem nut or the gear box. And then install the stop plate, screw, round nut and stem indicator (including indicator nut) in order.

6.2.8 To assure the valve is sealing properly, perform the required pressure testing per recognized and applicable design standards.

Table 2

| When Torque Wrenches are Not Available or Suitable, The Use of Standard Wrenches and Guidelines Will Apply to Avoid Over Torque or Damage to the Valve. | |
|---|---------------------------|
| BOLT SIZE | LENGTH OF WRENCH (inches) |
| 3/8" | 5" |
| 1/2" | 6" |
| 9/16" | 9" |
| 5/8" | 12" |
| 3/4" | 18" |
| 7/8" | 24" |
| 1" | 30" |
| 1-1/8" | 36" |
| 1-1/4" | 42" |

6.3 PACKING INSTALLATION SEQUENCE

6.3.1 For valves size up to 16 inch, stem sealing system is as Figure 3

Install the packing ring, Lip seal packing, lantern ring, lip seal packing and graphite packing into the packing chamber in sequence. Take care that you do not damage the lip seal packings.

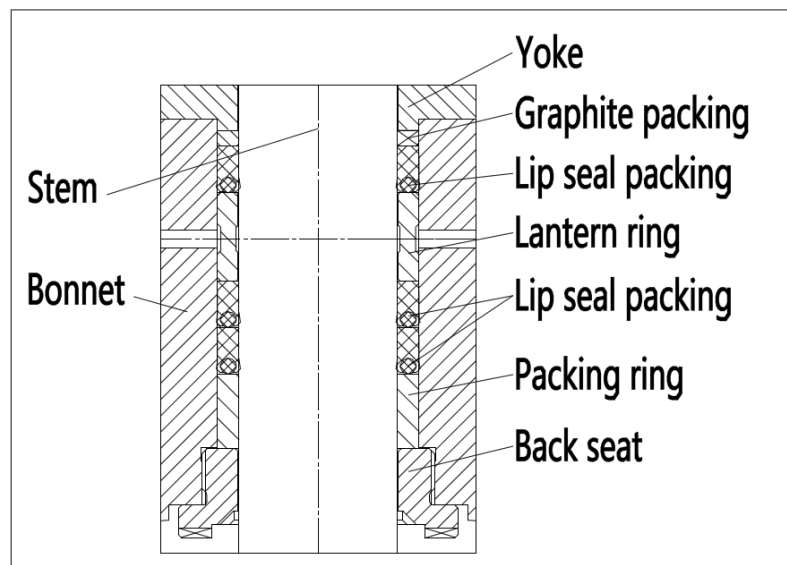


Figure 3 - Lip Seal Packing

6.3.2 For valves size larger than or equal to 16 inch, stem sealing system is as Figure 4 or Figure 5.

Install the o-rings into the lantern ring, then install the lower packing ring, graphite packings, lantern ring, graphite rings and upper packing ring into the packing chamber. Take care that you do not damage the o-rings.

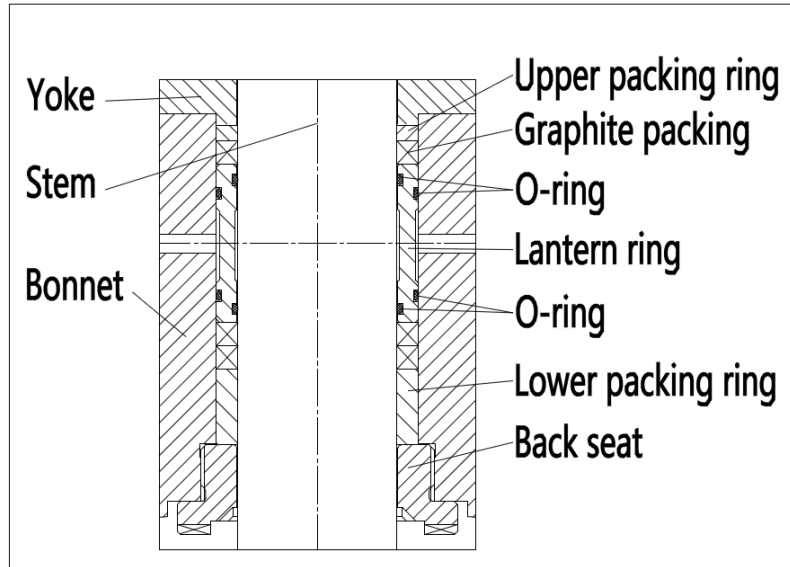


Figure 4 - O-ring & Graphite Packing

Install the lower packing ring, chevron packings, lantern ring, chevron packings, upper packing ring in sequence, take care that you do not damage the chevron packings.

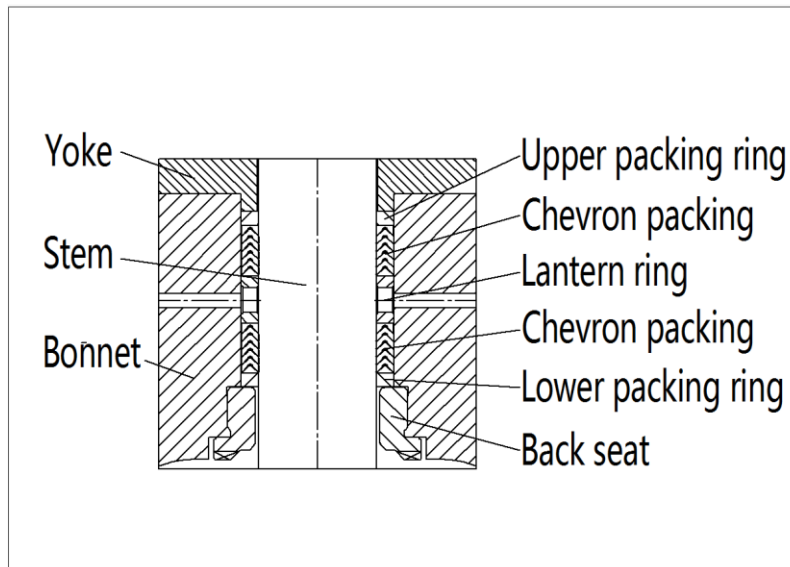


Figure 5 - Chevron Packing



7. TROUBLESHOOTING

| TROUBLE | PROBABLE CAUSE | REMEDY |
|--|--|--|
| Packing Chamber Leakage | Not enough packing / Gland bushing binding (only figure 5) | Increase packing ring quantity |
| | Packing worn / Packing chamber damaged | Replace with new packing Repair the packing chamber |
| | Stem sealing surface damaged | Replace or repair the stem |
| Leakage at sealing surface | Dirt on the sealing surface | Clean the sealing surface |
| | Sealing surface damaged | Repair the sealing surface Change new seat insert |
| Cannot operate normally | Stem threads and stem nut threads worn out | Replace stem or/and stem nut |
| | Debris may be trapped between stem/stem nut, or gland flange/gland | Remove debris |
| Bonnet gasket leakage | Loosen flange bolt/nut | Re-torque the flange bolt/nut |
| | Bonnet gasket failed | Replace new gasket |
| Valve body and bonnet both damaged and valve leaks | Water hammer effect | Careful operation, avoid sudden stopping of the pump or closing the valve too fast |
| | Corrosion over time. Wall thickness may be below minimum required | Regularly check the wall thickness, replace the valve ahead of the time. |
| Gate will not operate normally | Excessive torque applied to the gate in the closed position | Use proper torque to close the gate |
| | Stem maybe deformed and jammed | Replace valve stem |



8. WARRANTY AND SERVICE

8.1 VALVE WARRANTY PERIOD

8.1.1 Valve warranty period is 12 months from the date shipped from the factory.

8.1.2 In the event the end user encounters an issue of quality, please notify DHV immediately. DHV reserve the right to investigate and settle all issues of quality concerns directly with the end user. Refer to DHV's standard warranty policies for questions or concerns regarding warranty concerns.

8.1.3 Addressing a valve quality issue within the warranty period:

DHV reserves the right to review and respond to all requests for warranty repair or replacement, prior to making any replacement or repairs by the end user.

8.1.4 DHV will not be held responsible for any damage due to natural disaster, such as earthquake, hurricane etc. during valve shipment.

8.1.5 DHV must to be consulted for any warranty issue before being held responsible for any repairs or valve replacement.

8.2 SERVICE

8.2.1 If required by the contract, DHV may provide and perform field installation and start up testing.

8.2.2 Upon end user request, DHV can provide services in monitoring the valve quality and history for Long Term Ownership. Additionally, DHV can provide all the necessary training of repair services to the valve, as well as training on safe valve operations.



APPENDIX I

Installation & Automation Requirements for DHV Gate Valves

Vertical orientation requirement of valves during operation, testing, and installation is prescribed to all gate valves.

Assembly

Includes all non DHV branded hand levers, gearboxes, actuators, and any connecting adaptor plates and/or couplings.

- All gate valve operators must be assembled in the upright position vertically above the valve's centerline.
- Gearboxes, actuators and necessary adapters must conform to the valve's ISO pad top works design where applicable.
- Adapter plates and gears must be bolted to the valve top works plate using the correct bolt size, torque, and tightening pattern.
- The stem must be protected at all times from unnecessary movement, stress, force or other potential damage while insuring the stem remains centered in the yoke tube during installation
- Automation mechanisms must be designed, assembled, and supported in a manner as to not exert uneven or unbalanced forces on the valve assembly that could contribute to a side load condition.

NOTE: DHV valve top works fully comply with the requirements set forth in ISO 5210 latest edition. All gears or actuators assembled to DHV valves shall comply with the requirements of ISO 5210 latest edition. Additionally, all gears or actuators shall utilize a spigot return to ensure proper ISO pad alignment on all connections and/or attachments including valve, adapter plates, gearboxes, and actuators. Exceptions may be considered based on order requirements outlined in the purchase order.

Operation

Gate valves must be oriented in the vertical position any time the valve is operated or cycled.

- Personnel installing the operator must ensure there is no abnormal stem movement or run out during operation.
- All "stops" and or "limits" must be correctly set to prevent damage or unnecessary wear to the valve.

Testing

Applies to all methods of hydro testing and pre-commissioning testing.

- Gate valves must be oriented in the vertical position during any operation and testing processes.
- Procedures must be compliant to API specifications.

Installation

- Gate valves must be installed and operated in the vertical position only.
- Gate valves must always be either fully open, or fully closed once installed and are not designed or intended for throttling applications.

Shipping

Valves need to be fully closed during shipment and actuators need to be braced to support the extra weight at the top end of the valve.

Failure to follow these manufacturer prescribed requirements will void any warranties



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