KVT OM Manual, Hi-Fluidic® Parallel Slide Gate Valve

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KVT's Hi-Fluidic®

Spring Loaded Parallel Slide Gate Valve

Operation & Maintenance Manual

Important Notes!

This O&M manual contains very important instructions to operate & maintain the valve safely. The instructions must be read and fully understood by each and every person installing, operating, adjusting, maintaining, repairing, transporting or using this equipment in any manner.

Fluid Flow & Valve Specialist

KEY VALVE TECHNOLOGIES LTD.

Sihwa-Kongdan 4Ba-702Ho,

Seonggok-Dong, Ansan-City, Gyeonggi-Do

KOREA, Republic of

Tel. : +82-31-432-0752

Fax.: +82-31-496-0752

Website : http://www.keyvalve.com

e-mail : kvtsales@keyvalve.com

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1. VALVE DESCRIPTION

1.1 RECOMMENDED USES

KVT *Parallel Slide (Spring Loaded) Gate Valves* are designed to provide isolation of flow in a piping system or a component when closed. They are not suitable for modulation of flow, i.e. throttling. For throttling service, KVT provides the parallel slide control gate valves instead.

1.2 OPERATING PRINCIPLES

The principle parts of a double disc valve are the body, bonnet, disc assembly, stem and top works (Figs. 1 to 4). The body and bonnet contain the fluid. The disc assembly is positioned by the stem to block fluid flow which flows through the body or is raised into the body neck to provide a passage for a free fluid flow.

Seat seal in the *Parallel Slide (Spring Loaded) Gate Valve,* which uses the disc, is created by combination of internal pressure and spring force. When the line pressure is high, the pressure differential between the upstream and downstream ports forces the downstream disc shift against the downstream seat and creates a seal. At lower line pressure (approximately under 100 psi), the pressure force alone does not adequately create a seal. The resulting mechanical force from the hard pressed discs against the seat rings, by a spring deflecting apparatus located between the discs and the rings, provides additional force necessary to give a seal.

1.3 FEATURES

1.3.1 Bonnet Seals

KVT *Parallel Slide (Spring Loaded) Gate Valve*s are supplied with three types of body-bonnet closures; bolted bonnet, welded bonnet or pressure seal.

The bolted bonnet closure comes with a bolted flange tongue, a groove joint with spiral-wound stainless steel gasket and a graphite filler. The seal for sealing the bolt preload provides necessary compressive force on the gasket.

Pressure seal type closures (Figs. 1 to 4) utilise a tapered graphite ring gasket (10) for required sealing. The gasket is placed in the body neck bore by a space ring (11). The tapered inner

surface of the gasket bears against the mating annular surface on the valve bonnet. When the pressure is given internally, the bonnet is forced to shift against the pressure seal gasket, subsequently wedging it against the body neck wall. A slight interference angle produces a line contact and high sealing pressure. The greater the valve pressure, the tighter the metal-to-metal seal. It is unnecessary to opt for bolting to maintain the seal, even if the bonnet is initially drawn into contact with the pressure seal by guide flange.

1.3.2 Disc Assembly and Seats

The KVT parallel slide disc assembly (Figs. 1 to 4, Trim Detail) consists of dual floating discs and disc spring mechanism between them. The disc holder (05) holds two discs and is connected to the stem. Disc assembly connects normally with screwed or T-type slotted to the stem. For power-actuated valves and 4” (DN100) and larger size manual valves, the connection is screwed joint.
Body seat rings are set into machined recesses in the body, which support and retain the rings. A seal weld is provided between the body and the seat rings and does not give any structural support, hence used only for sealing. The seat rings can be replaced.

1.3.3 Valve Actuation (Top works)

A *Parallel Slide (Spring Loaded) Gate Valve* is actuated by moving the disc assembly in and out of the seats with the stem. The necessary thrust for opening or closing is imparted to the stem by the valve actuator, which is supported and restrained by the yoke structure. Five types of actuators are normally supplied; hand wheel, manual gear, electric motor, pneumatic cylinder, and hydraulic cylinder. The first three impart rotary motion to a yoke sleeve nut, which converts the rotary motion to linear stem movement through the acme stem threads. The pneumatic and hydraulic cylinder actuators provide direct linear motion to the stem.

Sealing of the bonnet-stem penetration is accomplished by a bolted gland stuffing box containing one ring type or a combination packing set (17). An emergency backup seal is provided in the form of a back seat, by rigidly mounting to the bonnet.

2. CARE OF VALVE PRIOR TO INSTALLATION

2.1 PRECAUTIONS TO INSTALLATION

Thoroughly inspect it for any damage during shipping. For safety, the following items should be checked:

1. **Hand wheel and shaft check for bending or impact damage.**
2. **Switches and actuating mechanisms bent or broken parts?**
3. **Missing or loose bolting?**
4. **End covers in place?**
5. **Is valve securely fastened to shipping skid?**
6. **Abrasion damaged paint?**
7. **Are spare parts shipped with valve in place and secure?**

2.2 HANDLING

KVT valves which weigh more than 45 kgf (100 lbf) are shipped strapped to wooden skids designed to be handled by a forklift or an overhead crane. Prior to installation, it is recommended that the valve be kept on skids and a forklift be used for lifting or moving. If an overhead crane is used, care must be taken not to shift the valve away from the centre of gravity. Slings should be passing underneath the valve, not by the places such as the corners of wooden skids for lifting.

2.3 STORAGE

Store valves on their shipping skids in a clean dry area, protected from the weather. KVT valves are shipped with un-tightened the packing gland bolts. Since stem corrosion pitting may occur when valves are stored with packing being tightened, it is suggested that tightening of the packing all the way is not recommended until the valve is ready to be put in service.

Power-actuated valves, if stored for more than a few months, require special attention. Motor and switch compartment heaters, if supplied, should be connected. Due to a possible condensation on the internal parts of the actuator, change in humidity and rapid and/or extreme temperature should be avoided. Storage in a temperature and humidity controlled environment is desired. Long-term storage of power actuators may violate the terms of the warranty and the manufacturer should be notified for any specific instruction.

3. INSTALLATION PROCEDURE

3.1 RIGGING

When lifting the valve for installation, it is important that slings of adequate size be used. Use an appropriately sized sling to safely lift the weight of the valve. Slings should pass under the valve body and through the yoke arms. It is recommended to block carefully to prevent any damage or possible abrasion to component parts and finishes.

3.2 CLEANING

Prior to installation, remove the valve end covers and inspect for cleanliness. If any sign of foreign matter is observed in the valve, open the valve and place it on its side (stem horizontal) and flush thoroughly with water. Steam or air may be used if water is not available but exercise caution that the high speed steam or air may not clear the debris out of the valve.

3.3 INSTALLING VALVE IN LINE

3.3.1. The pipe must be rigidly supported and be aligned with the valve. Excessive end moments, instigated from coal springs of the connecting pipe, may result in a seat misalignment, which may consequently cause a seat leakage.

3.3.2. Prior to welding of weld end valves into the line, raise the disc assembly sufficiently enough from the seat a sufficient distance to prevent arcing.

3.3.3. *Parallel Slide (Spring Loaded) Gate Valve*s may be installed in either direction of fluid flow. However, refer to the specifications for exact orientation, flow direction and possibly the port location.

3.3.4. It is recommended that the valve be installed with the stem vertical. This orientation provides enhanced packing life and simplifies disassembly / reassembly.

3.3.5. Following an installation of the valve in the line, tighten the stem packing(See maintenance section 5.4 for specific instructions.). This operation may be performed after valve cleaning if deemed to be more convenient.

3.3.6. Before the valve is placed in for operation, tightly secure all bolts and lubricate parts per section 5.5. Body seat rings are set into machined recesses in the body, which support and retain

the rings. A seal weld is provided between the body and the rings, and weld is for sealing only and is not provide any structural support. The seat rings are replaceable.

4. OPERATING THE VALVE

Prior to operating the valve for the first time, please verify that the valve has been prepared in accordance with the preceding sections of this manual.

4.1 HAND ACTUATED

Hand wheel actuated valves can be closed in clockwise direction of the wheel and open in counterclockwise direction. This is true also for the hand wheel on gear and motor-actuators.

4.1.1. KVT *Parallel Slide (Spring Loaded) Gate Valve*s, if properly set up and maintained, it should be closed with minimal effort on the hand wheel. The required total force at the rim of the hand wheel should not exceed 400N(39kgf). For DN50(2inch) and smaller sized hand wheel operated parallel slide gate valve, the force at the rim of the hand wheel is to be limited 100N(10kg). **If tight shut-off is not achieved, do not use "any extra loading" or any other means to give extra leverage.** Instead, open and close the valve once in an attempt to dislodge any foreign matter on the seating area that may be interfering with closure. If this fails, disassemble the valve and inspect the internals for galling or other possible damages.

"WARNING"
Do not use impact type leverage method to open or close the KVT *Parallel Slide (Spring Loaded) Gate Valves.*

4.2 ELECTRIC MOTOR ACTUATED

4.2.1. The electric motor actuator has been sized for specific operating conditions that the valve has been designed for. The valve will be opened and closed to positions set by limit switches, torque switches are not used to control the normal operation of the valve. Unauthorised re-setting of the limit switch and torque switch settings must be prevented.

4.2.2. The actuator is designed to close the valve against the specific conditions but its torque switch will stop the actuator if anything should foul the internal parts of the valve and cause the

torque switch setting to be exceeded. Extra hand wheel effort must not be exerted on the valve or further damage will occur. However, reversing the direction of operation may allow the obstruction to pass through the valve and travel downstream if this is desired. When any defect in the valve and/or actuator is apparent it should be investigated as soon as practicable.

"WARNING"

Equally, if a valve is found to leak in its closed position, extra effort must not be applied by the use of the hand wheel. And then the valve should be attended to at the earliest possible time. This is a parallel slide gate valve which does not utilise any "tools to make extra loads" or extra loads at the end of travel to make the valve seal. Any such loading serves only to strain and damage valve components.

4.2.3 The motor actuators on KVT valves are pre-adjusted for correct operation when initially shipped from the KVT shop. It is not necessary to make adjustment of the torque and limit switches when the valve is placed in operation, unless the actuator has been removed from the valve or the switch adjustments have been tampered with.

4.2.4. The adjustment of the torque or limit switches are not recommended without first consulting with KVT Service Engineers. Failure to obtain proper authorization for resetting torque or limit switches may void the warranty.
Under no circumstances should the torque and/or limit switches be completely bypassed.
They are integral part of the valve to provide added protection of the valve internals. Removal of such parts may cause extensive and/or irreversible damage to the entire equipment.

"WARNING"

Do not re-adjust torque or limit switches without presence of a qualified service engineer. For KVT parallel slide (spring loaded) gate valves, it is not necessary to set up the torque switches.

Torque switch setting uses the manufacture's preset values when the valve closes.

Only allow limit switch setting for closed position; Open position will be set with torque switch set up.

4.2.5. The valve is normally supplied with the limit switches wired to stop the actuator to both the closed position and the open position in full. Using the torque switch to control travel in the

opening and closing direction both may damage the stem, disc holder and backseat.

"WARNING"

The valve can only be back seated by using the hand wheel. For ROTORK® AWT model actuator, please recheck carefully the settings of limit switch position after an extra use of hand wheel override at the closed valve position under the limit switch setting.

4.2.6. When powering the actuator for the first time, observe if the direction of rotation is correct. If not, the power leads should be reversed.

4.2.7. Manual operation may be performed at any time by pulling the declutch lever downward. The lever will stay in the manual mode until the electric motor is actuated whereupon it will automatically disengage.

4.3 OPERATING TIPS

Do :

- **Operate valves at least every 3 months.**
- **Keep stem clean and lubricated.**
- **Inspect valves regularly.**
- **Lap seats promptly if valve leaks**
- **Apply normal torque on hand wheel**
- **Check packing regularly.**

Do Not :

- **Over tighten packing**
- **Limit the travel of the electric actuator via torque switches, neither for closing nor for opening (backseating) the valve. (the limitation of travel should be realised via limit switches in both end positions).**
- **Keep valve back seated in a normal operation.**
- **Keep *Parallel Slide (Spring Loaded) Gate Valve* in a partially open position for any length of time or use for throttling.**
- **Bypass or reset torque or limit switches without a qualified engineer.**
- **Use unauthorised actuator assists such as-pipe wrenches or cheaters.**
- **Bring valve to fully back seated position immediately upon opening a valve in a hot system. Allow 15 minutes for stem to cool before back seating valve.**

********* <u>For throttling service in the gate valve, KVT provides the parallel slide control gate valves</u>.**

5. MAINTENANCE

KVT valves are designed as almost maintenance free. When used in proper applications and operated according to the manual, it is guaranteed to provide reliable operation for many years. Upon inspection, the adjustment and (if necessary) replacement of the stem packing are only part that may require any attention. The frequency is dependent on the service conditions, the type of packing used and the provision taken when it is installed. Some other maintenance recommendations are include in the following sections.

5.1 INSPECTION

A periodic inspection is essential for detection of any possible malfunction and preventing of a minor defect from becoming a major problem. It is very important that leakage from any of the major seals (packing, disc/set, body bonnet) to be addressed immediately. The smallest leakage can quickly become a major problem if it is not treated immediately.

Some other areas that should be included in a periodic inspection program are :

1. Lubrication :
   Stem
   Yoke Sleeve
   Motor Actuator Drive Sleeve
   Pneumatic/Hydraulic Actuator Sliding Surfaces
2. Cleaning :
   Stem
   Packing Area
   Body Bonnet Studs
3. Bolting :
   Body-Bonnet
   Bonnet Yoke
   Motor Actuator
   Pneumatic/Hydraulic Actuator
4. Packing Adjustment

5.2 LUBRICATION

1. Stem : Keep stem threads lubricated with a light coating of grease.
2. Yoke Sleeve : Lubricate with general purpose grease every 6 months. Apply with grease gun to grease fitting.
3. Air cylinder operated valves require only a light coating of grease or oil on the moving parts.
4. Motor-actuator: Every 6 months lubricate drive sleeve top bearing, using grease gun on pressure fitting in housing cover. See Motor-actuator Manual for further information.

5.3 CLEANING

The frequency and extent of cleaning depend on the location of valves and service conditions. It is important that the stem and packing gland parts be kept clean and free of foreign material. Do not allow water or dirt to be accumulated in the body neck bore area above the pressure seal of pressure seal valves. Accumulation of any corrosive or extraneous material may interfere with removal of the bonnet. Excessive rust should not be allowed to build-up on the body-bonnet bolting of bolted bonnet valves.

5.4 PACKING

KVT *Parallel Slide (Spring Loaded) Gate Valve*s are installed with a graphite formed packing, unless specified otherwise.

1. The ability of packing to seal the stem is dependent on the amount of loading that each individual ring receives. It is particularly important for the bottom rings in the stuffing box to be forced tightly into the place. This is most easily accomplished by ramming the rings into place with the packing iron. When packing double packing boxes with leak-off, it is essential that sufficient number of rings of lower packing be installed to position the lantern ring to the leak-off level.

   Check first if the gland nuts are to tightened enough. The packing of valves is normally supplied with untightened condition.

   After confirming the stuffing box is full and clean, tighten the gland nuts evenly to ensure the gland is concentric with the stem.

   Beware that the cocking of the gland or gland flange can cause binding and scoring of the stem.

2. Operate the valve once to verify that the packing is not too tight and is binding the stem.
3. After the valve has been in operation for a few days, retighten the packing nuts to compensate for the compression of the packing. If it is founded that there is excessive room in the stuffing box, it is recommended to add another ring of packing.
4. Remove stem from back seated position so that packing does not dry out.

5.5 BOLTING TORQUE VALUES

At regular intervals, no more than 6 months, check the tightness of all bolts. Bolted bonnet valves should have the body-bonnet bolting torque to the values shown in following Table.

Stud Size	A193 B7/B16	A193 B8/B8M	A453 660	Remarks
M8	1.5	0.9	1.6	
M10	2.7	1.6	2.7	
M12	6.2	3.8	6.9	
M14	9.6	5.5	9.6	
M16	12.4	7.7	13.7	
M18	18.8	12.7	18.8	
M20	23.3	15.0	24.0	
M24	42.0	24.0	42.0	

Unit : kgm, assumed friction coefficient of 0.2 without damage to the designed bolting material.

5.6 REFINISHING SEALING SURFACES

Minor discontinuities in both the disc and seat sealing surfaces, which may cause leakage, can, in many cases, be accommodated by lapping. Major defects, such as cracks or deep gouges, may require replacement of the part.

(NOTE : Lapping is a polishing process in which a sealing surface is sanded with an abrasive material on an apparatus. The abrasive is commonly found in paste form or bonded to a paper backing. Detailed instructions for the use of lapping abrasives and apparatus are generally included in the equipment.)

In addition to following manufacturer's recommendations for lapping materials, the precaution as per KVT's detailed instructions (separate) should be observed.

6. DISASSEMBLY

By carefully following these instructions, any KVT valve can be easily disassembled and reassembled. If problems are encountered with equipment, KVT Field Service should be contacted. The use of improper tools or methods may cause severe damage to the valve and may void the warranty. Prior to attempting disassembly of a particular valve, please refer to the specific assembly drawing for the valve.

6.1 ACTUATOR REMOVAL

KVT valves are supplied with a wide variety of actuating mechanisms. The degree of difficulty involved in the removal varies. Simple bolt-on units such as hand wheels, gear units and electric motor units are relatively easy. Their removal requires only the use of good mechanical practices. More complex pneumatic and hydraulic units may require specialised skills.
Their removal and disassembly should only be attempted by trained personnel. More detailed information on special actuators will be provided in a separate manual when needed. Nevertheless, the following general guidelines are provided for reference:

1. Before any attempt to remove the actuator is made, personnel should verify that the system is depressurised and drained.
2. The valve should then be cycled partially to remove any trapped pressure and to insure that the disc is not stuck in the seat.
3. The disc should then be gently lowered into the seat.

6.1.1 Hand wheels

On hand wheel-actuated valves (Fig. 1 and Fig. 2) the hand wheel can be removed by removing the hexagon nuts (30) and pulling the hand wheel (28) off the yoke sleeve (25). Care should be taken not to lose the hand wheel keys (27).

6.1.2 Electric Motor

Although various types of electric motor actuators are supplied, the same pattern for their removal is applied for all. Prior to the removal of all power and control wiring should be disconnected from the actuator. With the stem protector and cap screws removed, and the actuator properly supported, it can be raised in the same manner as the gear unit.

6.2 PRESSURE SEAL BONNET VALVES

6.2.1 Yoke: Removal/Installation

Unscrew the yoke bolting (24) after removal of hand wheel and turn the sleeve (25) loose and then remove the yoke flange (23). Make loose the stopper bolting and remove the stopper. The yoke (22) should be free to be lifted directly from the valve, if the actuator and yoke sleeve have been removed. If the actuator is in place, thread the yoke from the stem by turning the hand wheel or rotating the yoke. Assembly is the reverse the previous procedure for the reassembly.

NOTE : Should the valve be completely disassembled, unseat the disc slightly before removing the yoke and actuator.

6.2.2 Bonnet:

The following instructions assume the yoke has been removed as explained above.

(1). 3" (DN80) and smaller size valves

a. Unscrew the gland nuts (21) and remove the gland flange (19) and packing follower (18). Put them in a safe place and thread the nuts back on the gland studs to prevent loss. Remove the packing.

b. The guide flange (13) in this design is threaded on the O.D. of the bonnet neck. The lock nut (15) is used to raise both the bonnet and the retainer as one piece. In order to disassemble this type of bonnet, the lock nut (15) and guide flange (13) should be loosened first. Once the force on the retainer is relieved, it can easily be unscrewed off the bonnet. (Note : In order to lift the retainer of the bonnet, the gland retaining assembly must first be completely removed.)

c. Tap the bonnet sharply to break the seal between it and the pressure seal gasket (10). The bonnet will drop downward against its stop, uncovering the guide flange (13).

d. The bonnet is now ready for removal from the body.

(2). 4" (DN100) and larger size valves

e. Unscrew the gland nuts (21) and remove the gland flange (19) and packing follower (18). Put them in a safe place and thread the nuts back on the gland studs to prevent loss. Remove the packing.

f. The guide flange (13) in this design is joined with several bonnet retaining bolts/nuts (14,15) on the O.D. of the bonnet neck. The bonnet retaining bolts/nuts (14,15) is used to raise and tighten the bonnet sealing of V-shape graphite gasket. In order to disassemble this type of bonnet, the bonnet retaining bolt/nut (14, 15) and guide flange (13) should be loosened first.

Once the force on the retainer is relieved, it can easily be unscrewed off the bonnet. (Note : In order to lift the retainer of the bonnet, the gland retaining assembly must first be completely removed.)

g. Tap the bonnet sharply to break the seal between it and the pressure seal gasket (10). The bonnet will drop downward against its stop, uncovering the guide flange (13).

h. The bonnet is now ready for removal from the body.

6.2.3 Disc and Stem Removal/Installation

Remove disc holder (6) from the stem (5). The other parts such as seat ring (4), disc springs (7) and pin (8) are automatically removed. It is recommended to take good care of the disc springs and seats for their being expensive to replace.

7. ASSEMBLEY

Before starting the reassembly of the valve, all parts should be thoroughly cleaned and inspected. All foreign material should be removed from any area of the valve. However, there are certain critical areas that absolutely free of dirt, weld spatter, filing, and etc.

These include the following.

1. Disc and seat sealing surfaces
2. Bonnet OD (on pressure seal valves)
3. Body neck ID (on pressure seal valves)
4. Gasket tongue (on flanged bonnets)
5. Gasket groove (on flanged bodies)
6. Bonnet studs and nuts
7. Stem (all)
8. Stuffing box (ID)
9. Gland (all)
10. Pressure seal gasket

The above areas must also be free of any nicks, scratches, gouges, etc. Any damage in these areas must be repaired. Any questions about the acceptability of any surface condition should be discussed with a service engineer prior to using the part.

7.1 PRESSURE SEAL BONNET VALVES

7.1.1 Disc/Stem Assembly

The disc assembly procedure in a pressure seal valve is reverse of the disassembly.

7.1.2 Bonnet

Once the stem-disc assembly is in place, the bonnet (2) can be inserted into the neck. Care must be taken in lowering the bonnet on the stem, so that neither the backseat nor any surface of the stem is damaged. It is again very important to keep the bonnet from cocking, as it is lowered into the body. If binding occurs, straighten the bonnet before making a re-insertion. Measuring from the bonnet bolting surface to the top of the body is the simplest way to detect cocking. With the bonnet resting on the counter bore in the neck, a new gasket (10) with space ring can be inserted. For the gasket may also cock, it must be inserted with care. Once these are in place, the guide flange can be put into place. If the valve is installed in an other than a stem vertical position, it may be necessary to orient or hold the retainer such that the pieces stay in place until the bonnet is moved into its raised position.

Once the guide flange in its proper position on top of the body neck, the bonnet lock nut (15) may be inserted through the bonnet retainer and threaded into their holes in the bonnet. Repeat turning lock nut by a couple of turns, then proceeding to the adjacent guide flange, the bonnet will be raised squarely until it is firmly in contact with the gasket. Note that it is not necessary to torque the guide flange. The bonnet is sealed by pressure. The only function of the guide flange is to hold the bonnet in contact with the gasket until it is deformed by pressure, locking the joint together and insuring a tight seal.

Note : In order to obtain a tight seal at low pressures, it may be necessary to deform the gasket by tightening the guide flange

During first time operating at service conditions (after installation or after disassembly), all bonnet-bolting on pressure sealed valves should be tightened for proper sealing of the gasket and to prevent mis-alignment of the bonnet.

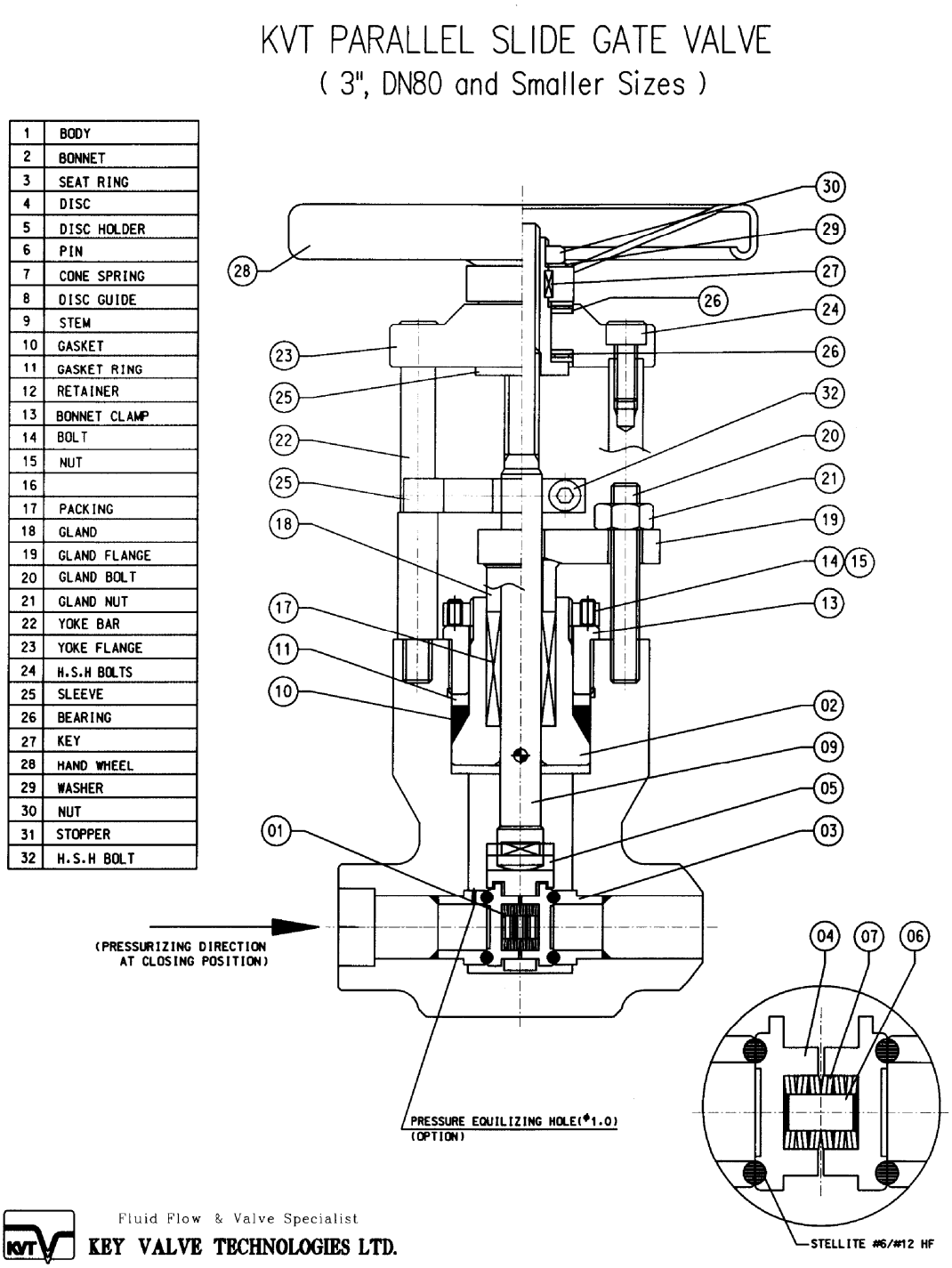


Fig. 1. PRESSURE SEALED BONNET PARALLEL SLIDE GATE VALVE - 1

(Size DN80/3" and Smaller, Forging, Pressure Class ANSI 900 and Above)

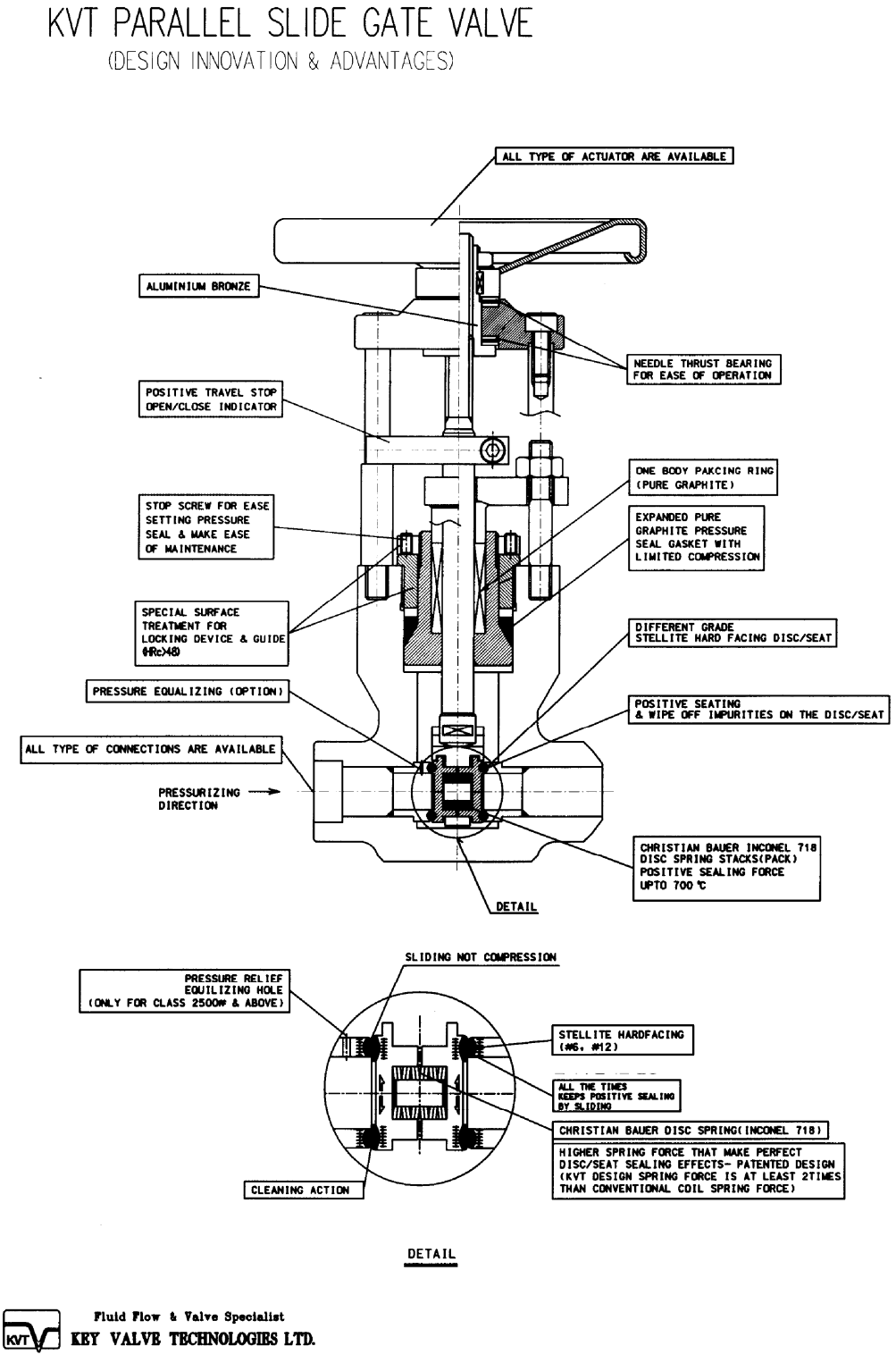


Fig. 2. PRESSURE SEALED BONNET PARALLEL SLIDE GATE VALVE - 2

(Size DN80/3" and Smaller, Forging, Pressure Class ANSI 900 and Above)

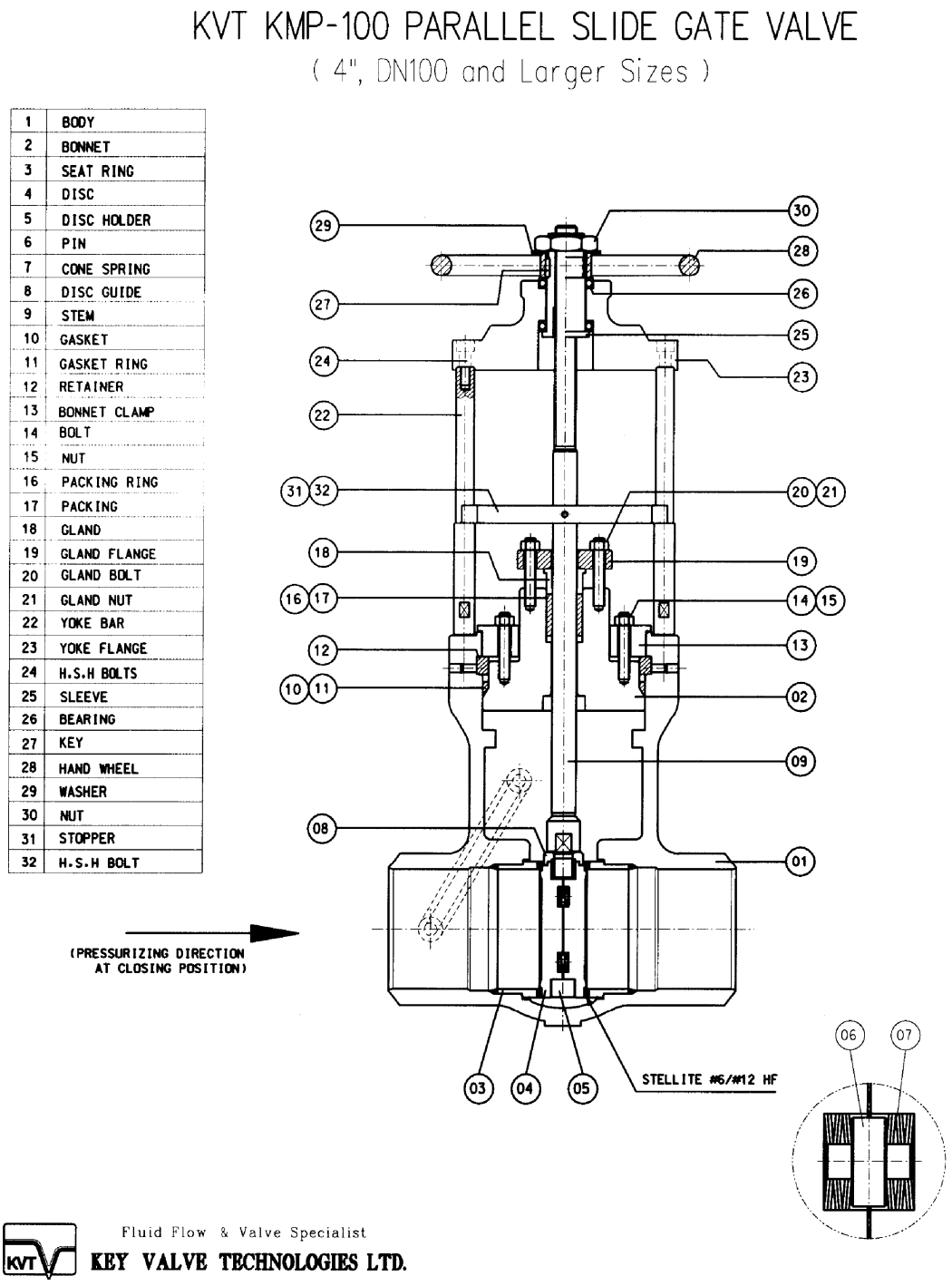


Fig. 3. PRESSURE SEALED BONNET PARALLEL SLIDE GATE VALVE - 1

(Size DN100/4"And Larger, Casting, Pressure Class ANSI 900 and Above)

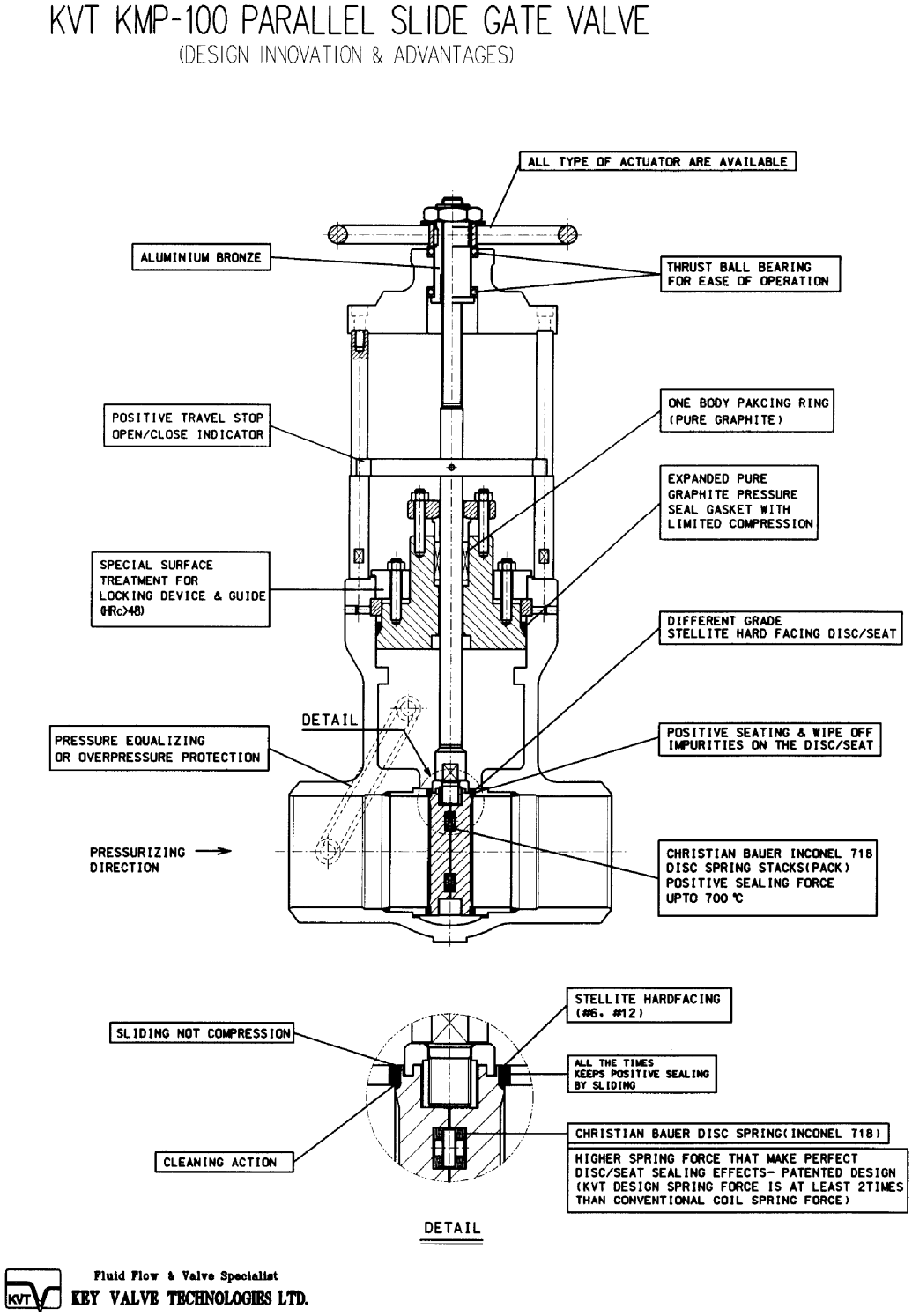


Fig. 4. PRESSURE SEALED BONNET PARALLEL SLIDE GATE VALVE - 2

(Size DN100/4"And Larger, Casting, Pressure Class ANSI 900 and Above)

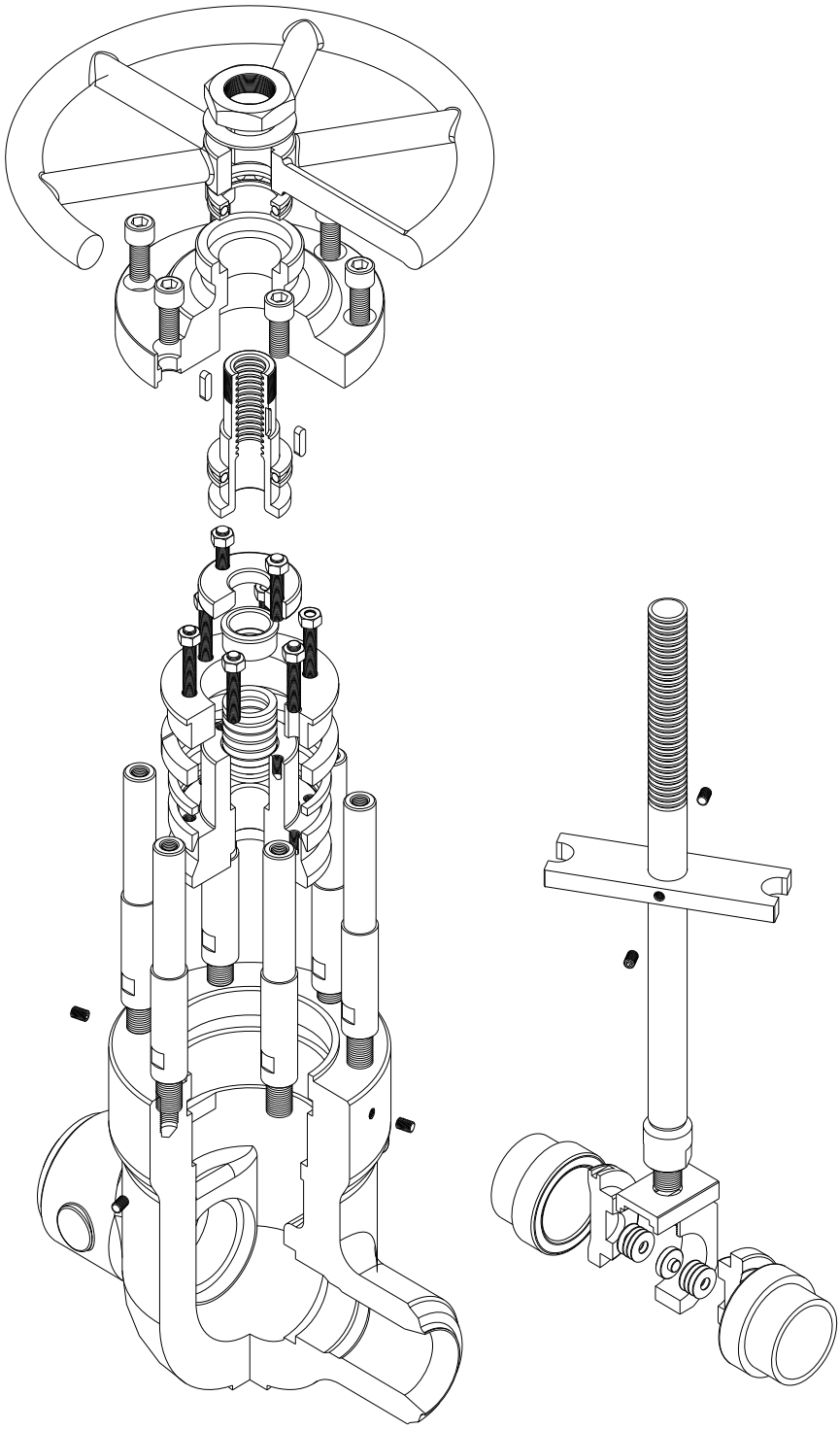
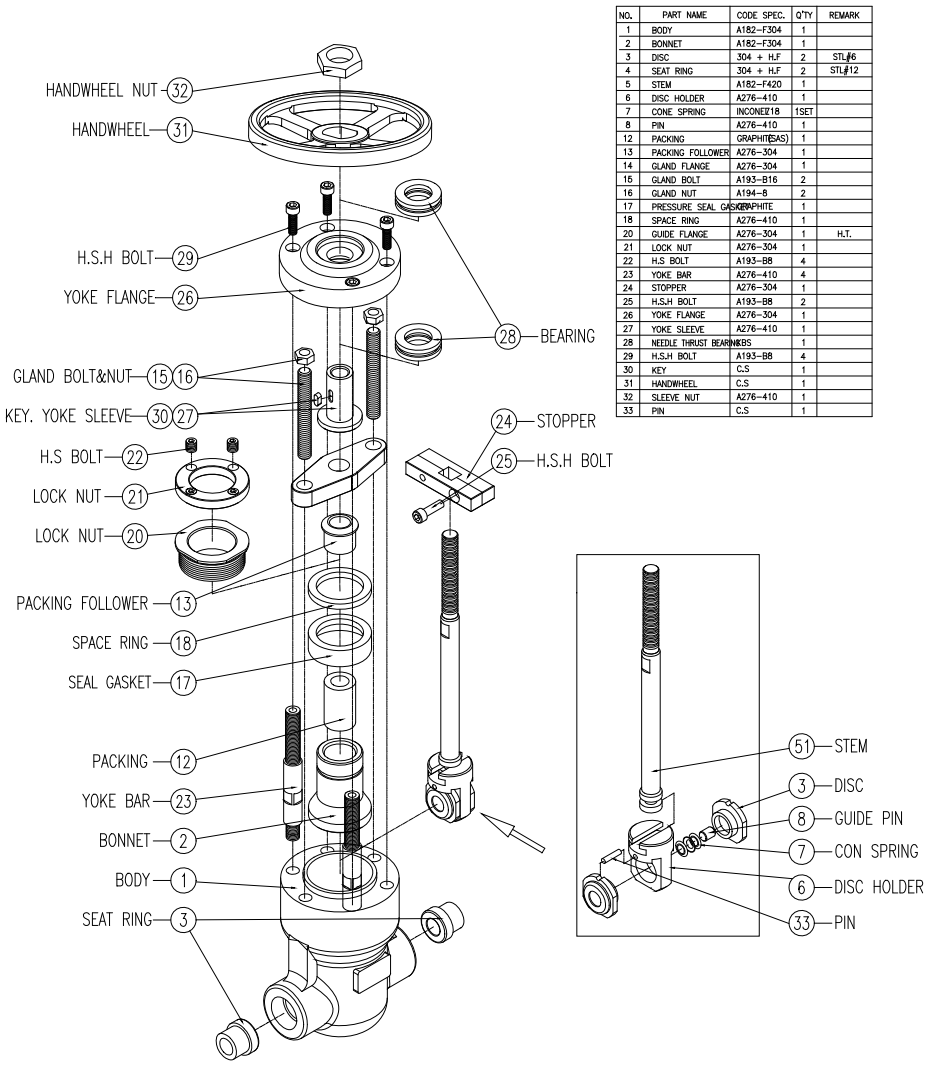


Fig. 5. PRESSURE SEALED BONNET PARALLEL SLIDE GATE VALVE – Exploded (Size DN100/4”and Larger, Casting, Pressure Class ANSI 900 and Above)



NO.	PART NAME	CODE SPEC.	Q'TY	REMARK
1	BODY	A182-F304	1	
2	BONNET	A182-F304	1	
3	DISC	304 + H.F	2	STL#6
4	SEAT RING	304 + H.F	2	STL#12
5	STEM	A182-F420	1	
6	DISC HOLDER	A276-410	1	
7	CONE SPRING	INCONEL718	1SET	
8	PIN	A276-410	1	
12	PACKING	GRAPHITE(SAS)	1	
13	PACKING FOLLOWER	A276-304	1	
14	GLAND FLANGE	A276-304	1	
15	GLAND BOLT	A193-B16	2	
16	GLAND NUT	A194-8	2	
17	PRESSURE SEAL GASKET	GRAPHITE	1	
18	SPACE RING	A276-410	1	
20	GUIDE FLANGE	A276-304	1	H.T.
21	LOCK NUT	A276-304	1	
22	H.S BOLT	A193-B8	4	
23	YOKE BAR	A276-410	4	
24	STOPPER	A276-304	1	
25	H.S.H BOLT	A193-B8	2	
26	YOKE FLANGE	A276-304	1	
27	YOKE SLEEVE	A276-410	1	
28	NEEDLE THRUST BEARING	SBS	1	
29	H.S.H BOLT	A193-B8	4	
30	KEY	C.S	1	
31	HANDWHEEL	C.S	1	
32	SLEEVE NUT	A276-410	1	
33	PIN	C.S	1	

Fig. 6. PRESSURE SEALED BONNET PARALLEL SLIDE GATE VALVE – Exploded
(Size DN50/2”and Smaller, Forged, Pressure Class ANSI 1500 and Above)

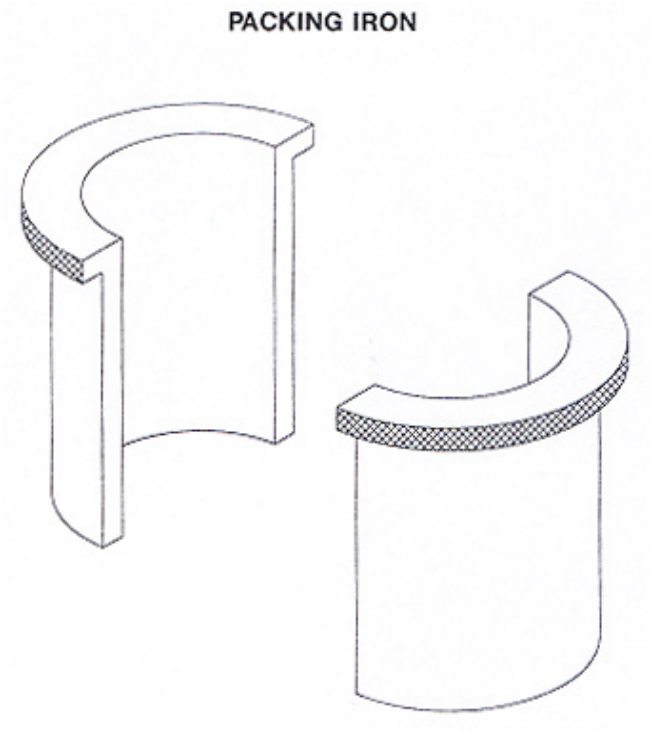


Fig. 7. PACKING IRON

8. Preventive Measures

Transport : During transport and installation, valves can be subject to sudden knocks. Therefore check and rectify mis-aligned glands and bonnets. Damaged coatings should be touched-up as soon as possible to prevent corrosion.

Site storage : Always store valves indoors and preferably in its original packing to prevent damage and the ingress of dirt or moisture. Make sure the position of the valves during site storage is “as supplied”.

Installation : After storage, check valves for internal cleanliness. Any foreign objects should be removed. Install the valves in the pipe according to the arrow of flow direction indicated on the valve body. When no arrow is shown the valves can be used bi-directional.

Welding : For welding do not disassemble the valve, but place it in its fully opened or closed position. If electric arc welding processes are used, make sure not to connect any poles the other parts of the valve than the valve body (as close as possible to the welding area) or preferably to the connecting pipe.

PWHT : Post weld heat treatment should be executed inductively and with the valves in the fully assembled condition and in the fully closed position.

Blasting : If for any reason valves are shot blasted, please make sure to prevent ingress from blasting grid to the gland and the internals and thoroughly clean the valves afterwards. Before starting to shot blast make sure the valves are in the fully closed position and stems are fully protected. For pressure sealed valves also protect the area between the bonnet and support for ingress of grid.

Painting : Make sure valves are in the fully closed position and stems and identification plates are fully protected. Before applying additional layers of painting check their compatibility with the existing coating systems.

Insulation : Make sure gland bolting and (if possible) bonnet bolting is accessible after insulation and make sure the tightness of the stem packing can be checked without removing the insulation. For pressure sealed valves, the accessibility of bonnet-bolting is mandatory.

Flushing : At flushing all valves should be in the fully opened position to enable foreign objects to pass and to prevent these objects being trapped between stem and backseat or disc and seat. Therefore electric operated valves should be fully opened by hand.

Pickling : Applying the correct pickling process is the sole responsibility of the subject contractor. In case of doubts, HP valves should be contacted. Before the start of any picking process, the valves should be in the fully opened position to prevent ingress of pickling medium in the packing area while after pickling the system should be thoroughly flushed.

Operating : Valves close when rotating the hand wheels clockwise. The use of spanners or pipes to increase leverage can damage the valves and therefore is not permitted. If valves do not seal using the normal operating mechanism often spanners do not solve this because other reasons (such as foreign objects, misaligned glands, scoring stems) than insufficient sized operating mechanisms prevent the valve from fully closing.

At commissioning and operating check all stem packings for leakage. If leakage is identified, immediately tighten the gland bolting to stop the leakage and to prevent erosion of the stem packing.
At commissioning and operating check all gaskets for leakage. If leakage is identified, immediately check the alignment of the bonnet and rectify any misalignments. Make sure the bonnet-bolting is sufficiently tightened.

During first time operating at service conditions (after installation or after disassembly), all bonnet-bolting on pressure sealed valves should be tightened for proper sealing of the gasket and to prevent mis-alignment of the bonnet.

Medium and high pressure valves vents and drains usually are placed in tandem, whereas the upstream valve is used as the “isolator” and the downstream valve as the “regulator”. To prevent damage to the seat of the isolator, both valves always should be used in the following sequence at opening: 1) open isolator, 2) open regulator. At closing the sequence is as follows: 1) close regulator, 2) close isolator.

Maintenance : Carefully read the manufacturer's IO&M manual before (dis)assembling valves. Regularly check stem packings, gaskets and lubrication. At re-assembly of valves always install new packings and glands. Only use genuine spare parts.

9. Trouble Shooting

Indication	Probable cause	Rectification
High operating force	Misalignment of gland flange causing the gland flange to contact the stem.	Re-align gland flange and check stem for damage. In case the stem is damaged it should be replaced.
	Overstressed gland-bolting	Un-tighten the gland bolting to reduce the packing-friction. Make sure no leakage occurs during operation.
	Foreign objects between stem and gland flange	Unscrew gland bolting and remove foreign objects. In case stems are severely damaged they should be replaced.
	Non-genuine stem packing has been used increasing stem-friction.	Replace by genuine parts.
Valve will not close completely / passing valves	Foreign objects inside the valve prevent it from fully closing.	Open, as quickly as possible (to prevent erosion), the valve (acc. manufacturer's maintenance instructions) and remove foreign objects.
	Due to foreign objects the valve-stem and/or seating surfaces have been damaged.	Disassemble the valve and remove foreign objects, as quick as possible (to prevent erosion), and relap seating area's according the manufacturer's instructions.
	Limit switches on electric operated valves are malfunctioning or are incorrectly adjusted; preventing the valve from reaching its fully closed position.	Operate the valve manually and re-adjust the limit switches. In case of malfunctioning limit switches these should be replaced.
	Torque switches on electric operated valves are malfunctioning or are incorrectly adjusted.	Reset the switches according the valve manufacturer's recommendation with respect to value and disconnection method.
	Adjustment of coupling on pneumatic operated valves is incorrectly preventing the valve from fully closing.	Re-adjust the coupling according to the manufacturer's instructions.
Valve will not open completely	Foreign objects inside the valve (between stem and backseat) score the stem and prevent it from fully opening.	Open the valve (acc. manufacturer's maintenance instructions), remove foreign objects and replace the stem.
	Limit switches on electric operated valves are malfunctioning or are incorrectly adjusted; preventing the valve from reaching its fully opened position.	Operate the valve manually and reset the limit switches. In case of malfunctioning limit switches these should be replaced.
	Torque switches on electric operated valves are malfunctioning or are incorrectly adjusted.	Reset the switches according the valve manufacturer's recommendation with respect to value and disconnection method.
	Adjustment of coupling on pneumatic operated valves is incorrectly preventing the valve from fully opening.	Re-adjust the coupling according to the manufacturer's instructions.
Gate valve will not open	Valve has been closed with excessive force	Dismantle valve to open it while preventing damage.
	Torque/limit switches have been adjusted incorrectly	Reset switches to manufacturer's instructions.
	The force required to unseat the wedge or discs increased due to pressure locking (high pressure water captured in the inter-disc space) or over-pressurization (heating up water captured in the inter-disc space).	Make sure not to apply excessive force to open the valve since this will cause damages to the internals. In case of a pressure equalizing line, make sure the equalizing valve is opened. If a pressure equalizing line is non-existent, carefully loosen the gland bolting to allow water or steam passing the stem-packing. Be careful not to cause packing blow-out. Consult the valve manufacturer for more detailed instructions on how to proceed as well as for recommended accessories for pressure equalizing.

Leaking stem packing	Misaligned gland or insufficiently tightened gland bolting.	Immediately carefully tighten the gland bolting until the leakage stops.
	Valve has been long-term storage item at the user before being installed.	Replace stem packing.
	Damage to the valve-stem or stuffing box	Replace by genuine parts
	Non-genuine stem packing have been used leading to leakage.	Replace by genuine parts.
Leaking gasket	Misaligned bonnet (for bolted bonnet valves) due to transportation or incorrect maintenance.	Re-align bonnet and replace gasket if required.
	Bonnet bolting has not been tightened immediately after the valve first (after installation or re-assembly) reached its service conditions preventing the gasket to seal optimum.	Tighten the bonnet-bolting immediately. If leakage doesn't stop the gasket and/or valve body sealing area has been damaged due to erosion and should be replace/repaired as per manufacturer's recommendations.
	Gasket is worn or damaged	Replace by genuine parts
	Non-genuine gaskets have been used leading to leakage.	Replace by genuine parts.
Leakage trough valve body or bonnet	Long-term leakage across seat has eroded through the valve body.	Replace valve. To prevent future problems, repair passing valves as quickly as possible
	Imperfection in casting.	Replace valve. To prevent future problems, review minimum NDE specifications.
Hand wheels and stems are bent	Damaged during transportation or installation or excessive force has been applied to the valve while using spanners or other leveraging devices.	Replace damaged parts and prevent future damage.
Corrosion on valve parts	This can be caused by incorrect selection of coating systems, incorrect application or due to damaging during transportation and installation.	Touch-up the damages immediately as per manufacturer's instructions. If result is insufficient contact the manufacturer.
Damaged membrane on pneumatic operated valves.	Excessive air pressure damaging the membrane.	Replace the membrane and re-adjust the air filter/regulator to 6bar maximum.