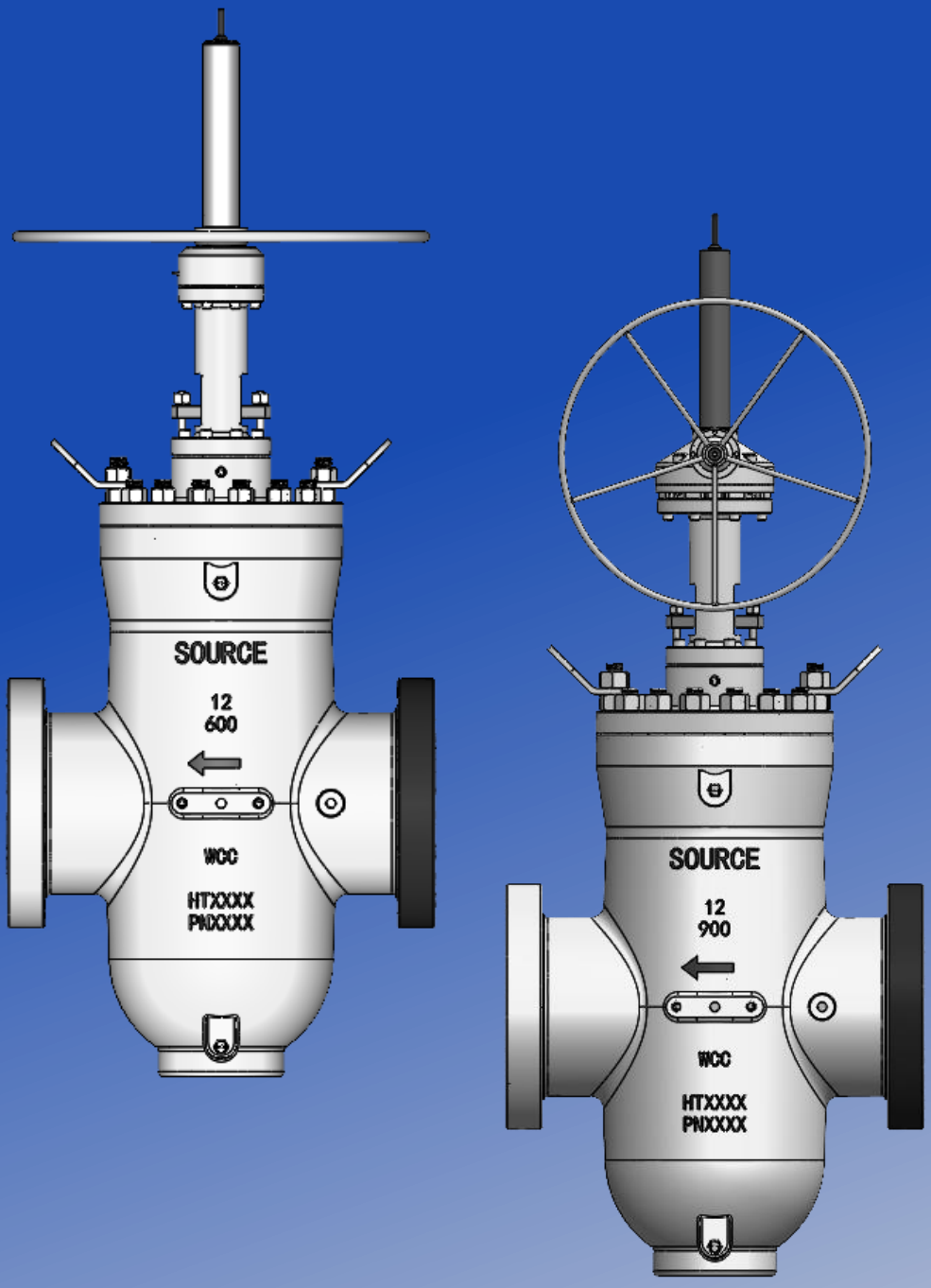
VERSA GEOTHERMAL MASTER GATE VALVES



Issued 251218

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Versa Geothermal Master Valve (HWO)
Versa Geothermal Master Valve (BGO)

DRILLING & PRODUCTION GEOTHERMAL WELLHEAD VALVE

VERSA™ GEOTHERMALWELLHEAD VALVE

SOURCE®

SV-06 R01

PRODUCTS INTRODUCTION

The **GEOTHERMAL WELLHEAD GATE VALVE** is an unidirectional full bore through conduit valve with rising stem and parallel expanding gate and segment for tight mechanical seal which is normally unaffected by pressure variation. The full bore design allows pigs, scrappers to run through the valve without any damage of the internal components.

The stem is sealed by reinforced PTFE packing and injectable packing. In an emergency, injecting injectable packing into packing box would affect a temporary seal while the valve is under pressure. In addition, tightening the two packing gland nuts is an alternative method to affect an emergency seal in event of stem packing leakage.

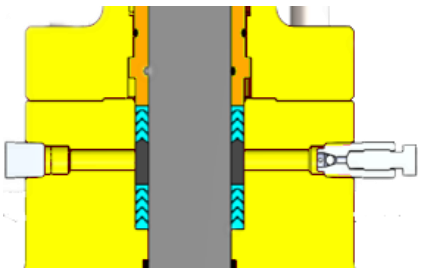
The gate valve does not require lubrication for normal operation. However, lubricants can be injected to promote smooth operation if required. As request, thermal relief valve or relief system(not supplied as default) will be furnished to protect the valve when over pressure is inside the body cavity.

The Expanding Gate Valve is also employed for Steam Injection and Geothermal Service applications.

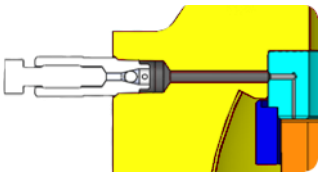
The expanding valve is designed, manufactured and tested reference to API Spec. 6D and based on customer specification.

FEATURES:

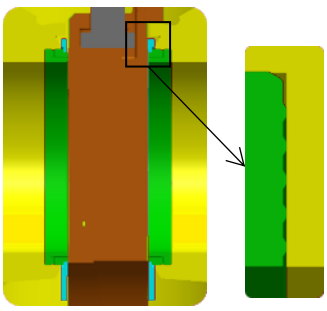
- NPS 10”, 12-3/8”, 13-5/8”, Pressure Class 600-900
- Metal to Metal Sealing (Gate-to-Seat & Seat-to-Body)
- Graphite Reinforced Packing and Injectable Packing
- High Temperature up to 650˚F
- Rising Stem with Manual Handwheel Operation
- Expanding Wedge Gate and Seats Design
- Flange Connection refer to requirement of API 6D



A unique design reinforced PTFE stem packing to provide excellent resistance to chemicals and corrosive elements



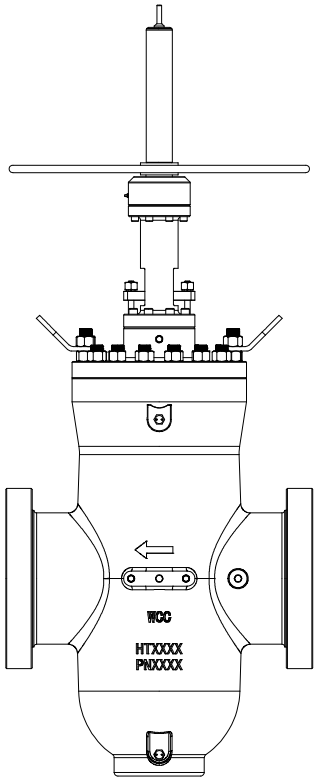
In the event of leakage due to gate and/or seat damage, sealant can be injected to affect a emergency seal until the valve is up for repair.

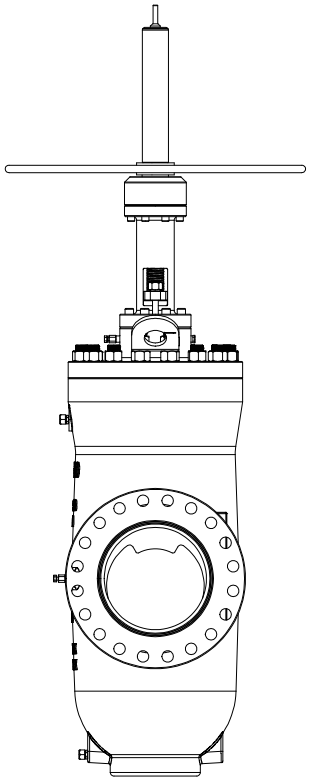


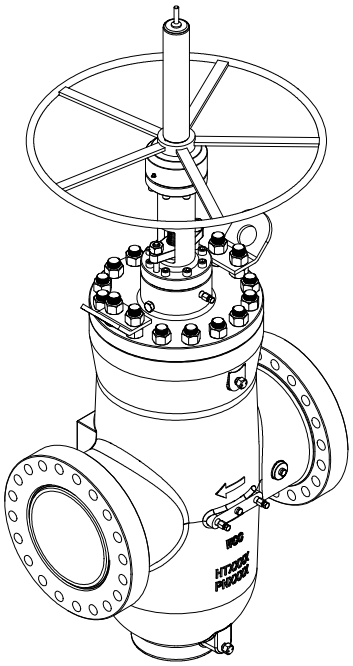
Pressed fit seat with metal to metal sealing. Seat bottom seal protrusions for better sealing of seat to body

Stellite hard-faced gate and seat.

PRODUCT VIEW AND FUNCTION







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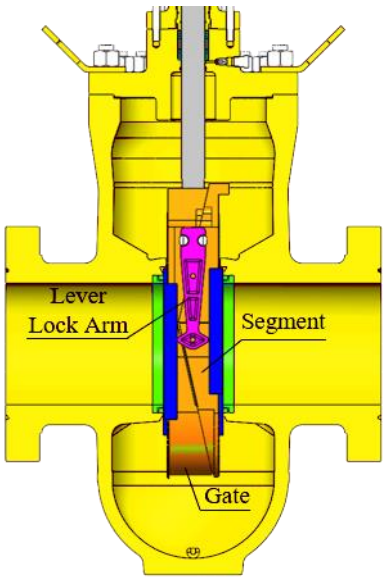
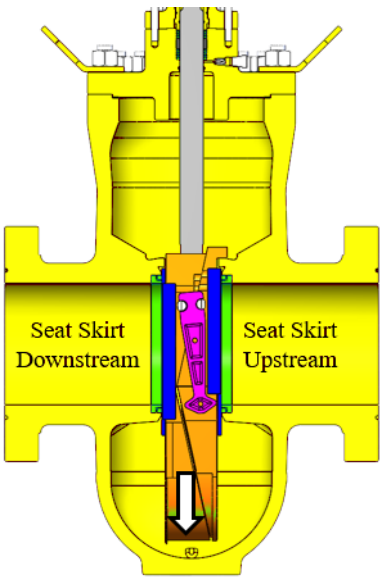
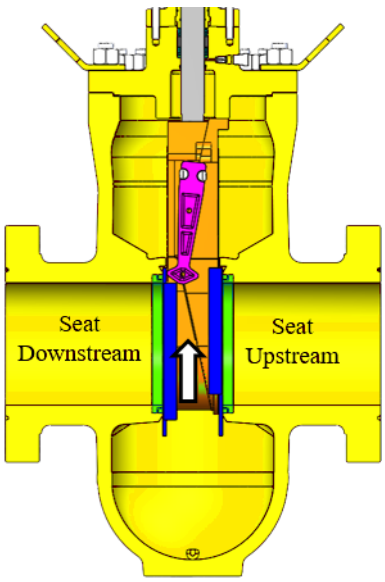






Stroking Position:

When stroking to open or closed position, the lever lock arm is held parallel neutral position to the gate faces by the seat skirt.

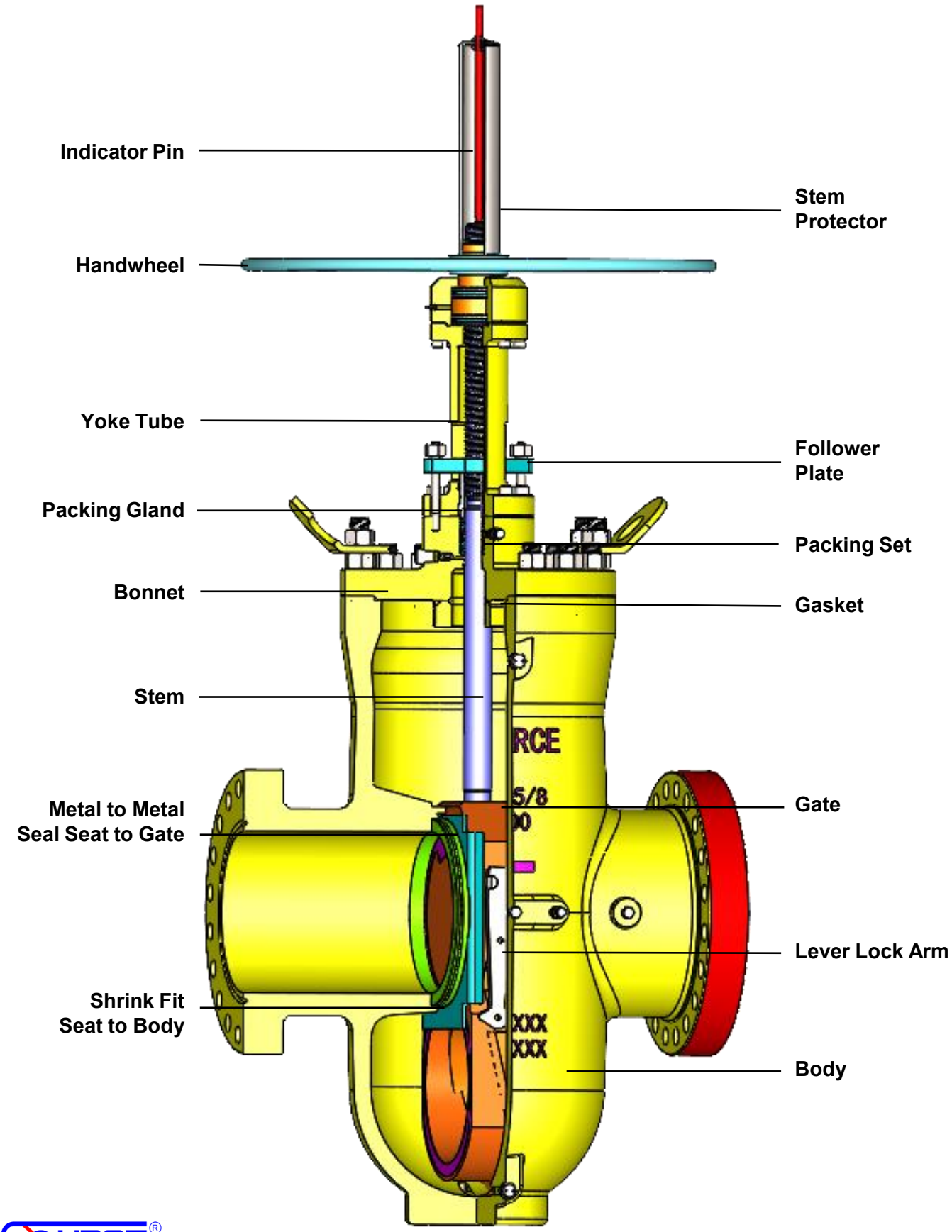
Fully Closed:

The segment going down is stopped by contacting with body stop. The upstream seat skirt allows the lever to tilt and the gate is wedged downward, expanding the segment and gate against both seats to form a tight mechanical seal.

Fully Opened:

The segment is stopped by contacting with the bonnet stop. The downstream seat skirt allows the lever to tilt and the gate is wedged upward, expanding the segment and gate against both seats.

GEOTHERMAL WELLHEAD VALVE



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DRILLING & PRODUCTION GEOTHERMAL WELLHEAD VALVE

VERSA™ GEOTHERMAL WELLHEAD VALVE

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PRODUCTS INTRODUCTION

The **GEOTHERMAL WELLHEAD GATE VALVE** is an unidirectional full bore through conduit valve with rising stem and parallel expanding gate and segment for tight mechanical seal which is normally unaffected by pressure variation. The full bore design allows pigs, scrappers to run through the valve without any damage of the internal components.

The stem is sealed by reinforced PTFE packing and injectable packing. In an emergency, injecting injectable packing into packing box would affect a temporary seal while the valve is under pressure. In addition, tightening the two packing gland nuts is an alternative method to affect an emergency seal in event of stem packing leakage.

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The Expanding Gate Valve is also employed for Steam Injection and Geothermal Service applications.

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FEATURES:

- NPS 10”, 12-3/8”, 13-5/8”, Pressure Class 600-900
- Metal to Metal Sealing (Gate-to-Seat & Seat-to-Body)
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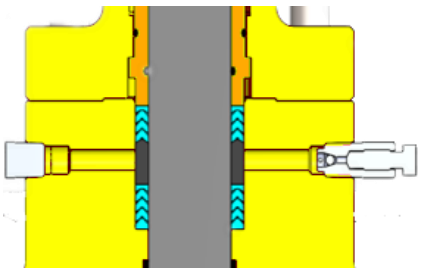
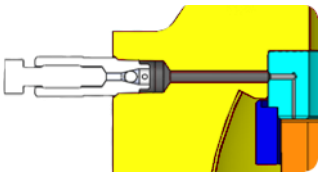
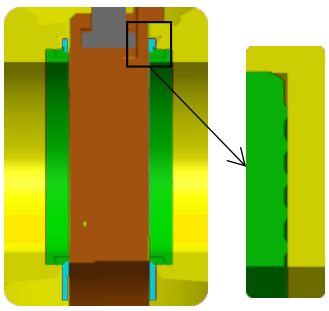


A unique design reinforced PTFE stem packing to provide excellent resistance to chemicals and corrosive elements



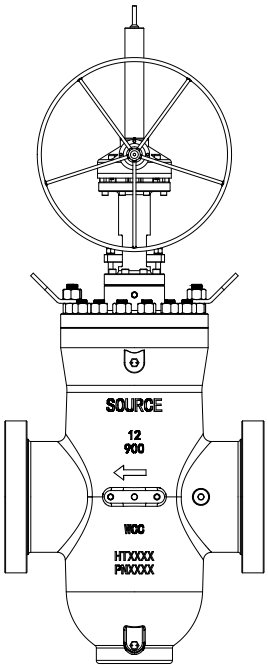
In the event of leakage due to gate and/or seat damage, sealant can be injected to affect a emergency seal until the valve is up for repair.

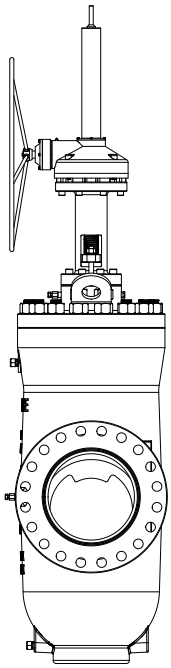


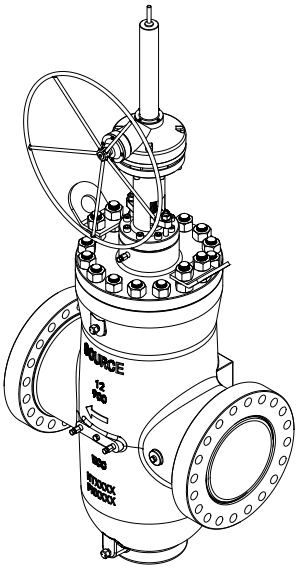
Pressed fit seat with metal to metal sealing. Seat bottom seal protrusions for better sealing of seat to body

Stellite hard-faced gate and seat.

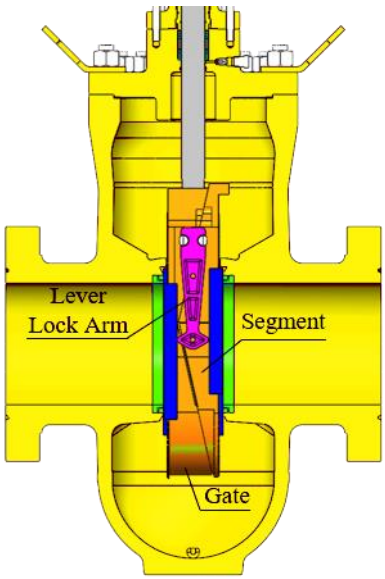
PRODUCT VIEW AND FUNCTION

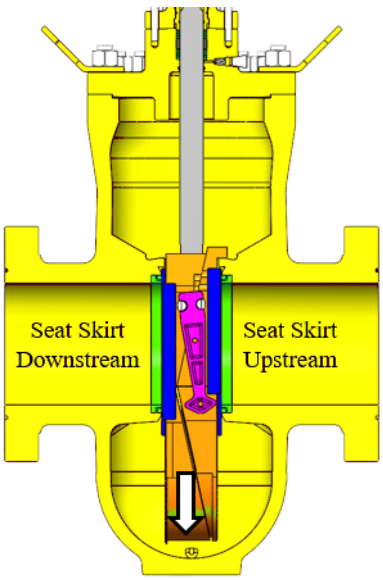


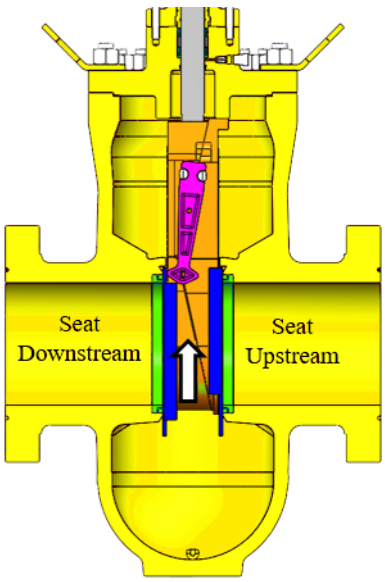




THREE OPERATION STATUS:







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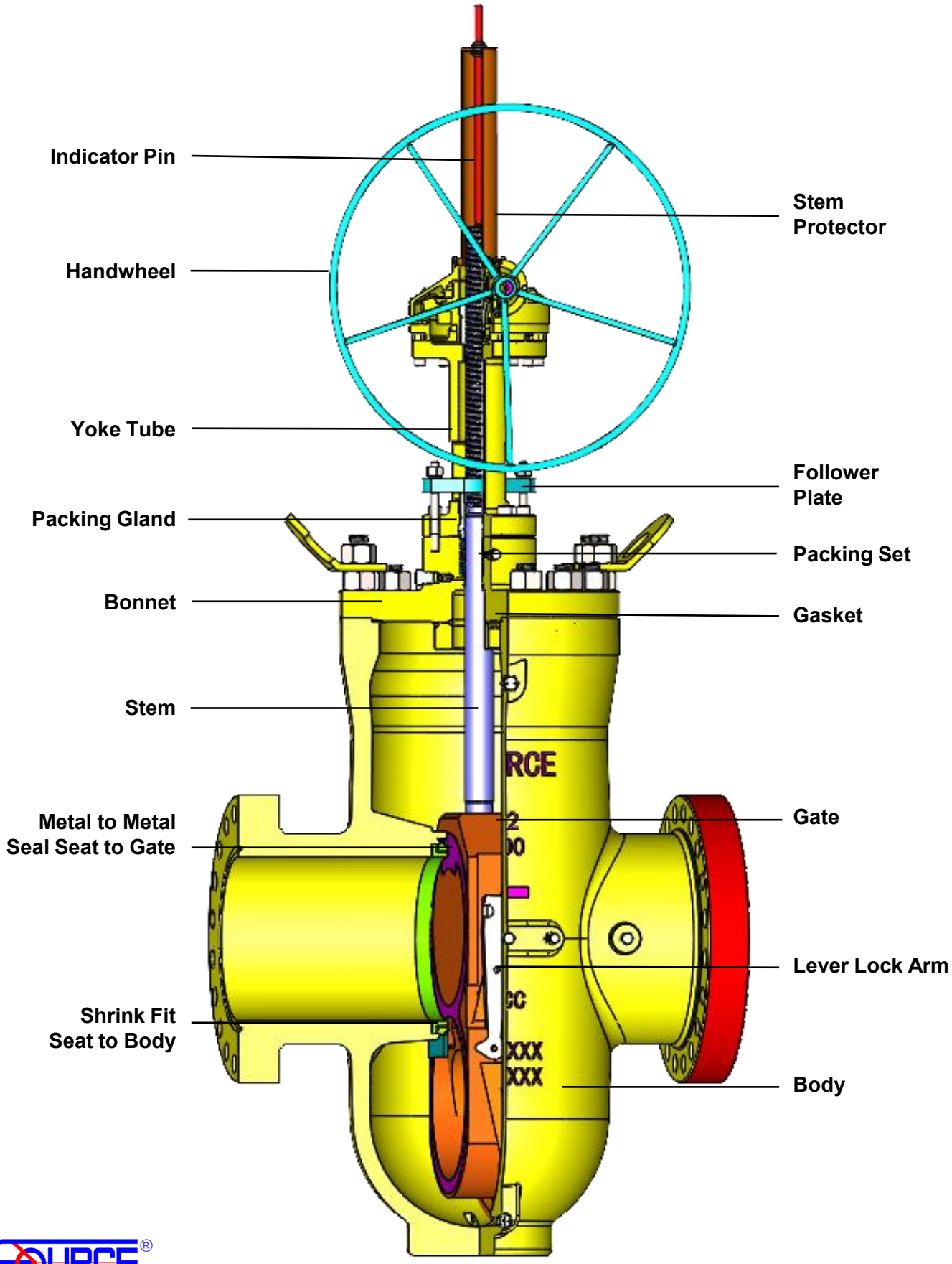
GEOTHERMAL WELLHEAD VALVE



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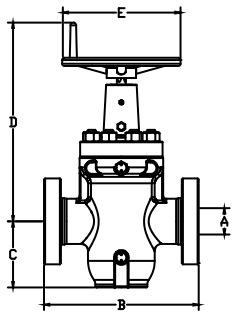
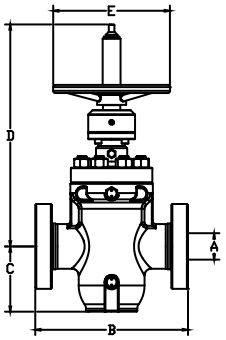
EXPANDING GATE VALVE REFERENCE DIMENSIONS AND WEIGHTS (NON-RISING STEM)



A Valve Bore
B Flange Face to Face
C Bore Centerline to Bottom of Valve
D Bore Centerline to Handwheel Top
E Handwheel Diameter
N Number of Turns to Open/Close
WT Estimated Weight

NPS in	Pressure Class	A		B		C		D		E		WT		N	API
		in	mm	in	mm	in	mm	in	mm	in	mm	lbs	kg		Ring
2	600	2 1/16	52	11.63	295	4.81	122	19	489	13	330	119	54	13	R-23
	900	2 1/16	52	14.63	372	5.02	128	19	494	13	330	123	56		R-24
3	600	3 1/8	79	14.13	359	7.07	180	22	556	13	330	218	99	20	R-31
	900	3 1/8	79	15.13	384	7.13	181	22	556	13	330	299	136		R-31

EXPANDING GATE VALVE REFERENCE DIMENSIONS AND WEIGHTS (RISING STEM)



A Valve Bore
B Flange Face to Face
C Bore Centerline to Bottom of Valve
D Bore Centerline to Handwheel Top
E Handwheel Diameter
N Number of Turns to Open/Close
WT Estimated Weight

NPS in	Pressure Class	A		B		C		D	-Closed -Open	E		WT		N	API Ring
		in	mm	in	mm	in	mm	in	mm	in	mm	lbs	kg		
2	600	2 1/16	52	11.63	295	4.81	122	23.15	588	13	330	119	54	13	R-23
								25.90	658						
	900	2 1/16	52	14.63	372	5.02	128	23.57	599	13	330	123	56		R-24
								26.27	667						
3	600	3 1/8	79	14.13	359	7.07	180	24.15	613	13	330	218	99	20	R-31
								28.15	715						
	900	3 1/8	79	15.13	384	7.13	181	24.85	631	13	330	299	136		R-31
								28.85	733						
10	600	10	254	31.13	791	19.75	502	66.29	1684	30	762	2204	1002	34	R-53
								77.10	1958						
	900	10	254	33.13	842	20.15	512	66.29	1684	30	762	2721	1237		R-53
								77.10	1958						
12 Note	600	12 3/8	314	33.13	842	23.00	584	71.00	1803	30	762	2673	1215	44	R-57
								85.75	2178						
	900	12 3/8	314	38.13	969	23.50	597	73.51	1867	24	610	3362	1528	176	R-57
								88.35	2244						

Note: All the valves are handwheel operated, except 12" Class900 valve is bevel gear operated.

GEOTHERMAL EXPANDING GATE VALVE

Operating & Service Manual

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Operating & Service Procedure

Manual Geothermal Expanding Gate Valve

OPS-810 Rev.01

Information provided in this Recommended Procedure is of general nature based on accepted operating practices. Source Manufacturing or its agents makes no representation, warranty or guarantee in connection with this recommended procedure and expressly disclaims any liability or responsibilities when any part of this recommended procedure is adopted. The user is the best judge when applying this procedure base on specific equipment installation and the operating conditions.

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Section 1 General Information

The GEOTHERMAL EXPANDING GATE VALVE is full bore through conduit valve with rising stem and parallel expanding gate and segment for tight mechanical seal which is normally unaffected by pressure variation. The full bore design allows pigs, scrappers to run through the valve without any damage of the internal components.

The stem is sealed by reinforced PTFE packing and injectable packing. In an emergency, injecting injectable packing into packing box would affect a temporary seal while the valve is under pressure. In addition, tightening the two packing gland nuts is an alternative method to affect an emergency seal in event of stem packing leakage.

The gate valve does not require lubrication for normal operation. However, lubricants can be injected to promote smooth operation if required. In the event of leakage due to gate and/or seat damage, sealant can be injected to affect an emergency seal until the valve is up for repair.

Relief valve or relief system (not supplied) shall be furnished to protect the valve when over pressure is inside the body cavity.

The gate valve is not designed to be used as a throttle valve.

The expanding valve is designed, manufactured and tested in accordance with API Spec. 6D unless otherwise specified.

ALL OPERATORS AND MAINTENANCE PERSONNEL SHOULD BE THOROUGHLY TRAINED IN THE SAFE OPERATION, MAINTENANCE, AND INSPECTION OF THIS EQUIPMENT.

Section 2 Installation

1 Unpacking

a) The valve is shipped in full open or full closed position with flange end protectors installed. This is to preclude debris from falling into valve cavity.

b) Remove flange protectors and thoroughly inspect interior of valve and end connections for damage or foreign material.

c) Install loose items such as hand wheels, etc. if separated from valve assembly.

2 Handling

a) Proper lifting equipment should be provided to handle the valve.

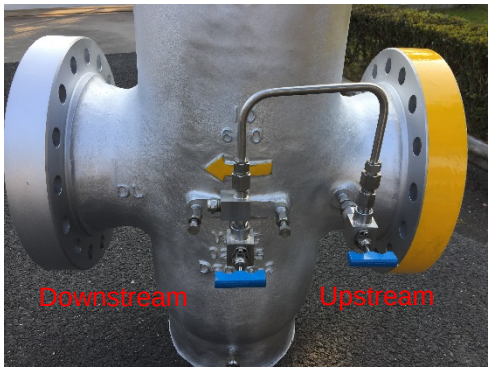
b) Lift lugs are provided for lifting.

⚠ CAUTION:

Do not use hand-wheels or other protruding parts of the valve to lift the valve. Avoid damaging the end connection faces, fittings and bypass relief systems if provided during handling.

3 Installation

Install the valve in the open position with the preferred upstream pressure side. The preferred upstream pressure side is the right hand flange when looking at the lettered and fitting side of the body. This can be identified by arrow of flow direction as shown in picture.

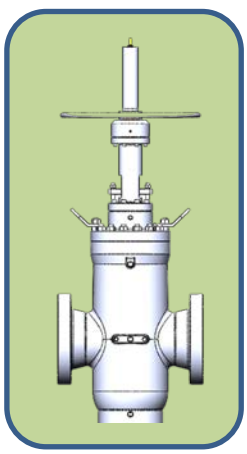


a) Flanged end valves should be installed using the appropriate gasket (not supplied) and conventional flange installation procedures.

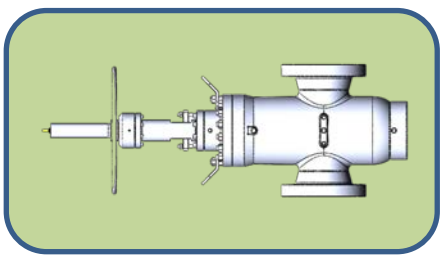
b) Prior to operating the valve from the open position, the conduit should be thoroughly flushed to prevent foreign matter from damaging sealing surfaces.

c) After installation and system testing, the valve should be drained to remove test fluid.

d) The gate valve shall be installed in the vertical or horizontal orientation as shown below.



CORRECT



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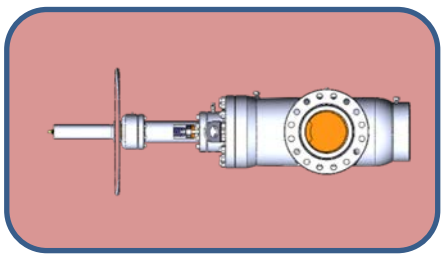


INCORRECT

Section 3 Features

1 Closure Mechanism

The valve is designed with an expanding gate and segment assembly for positive closure. A full operating cycle is defined as movement of the gate from one position (i.e., fully open) to the opposite position (i.e., fully closed), and then back to the original position. When stroking to either fully open or fully closed position, when the segment comes to a stop , the gate continue to slide along the machined taper surface forcing the gate and segment wedge apart into positive contact with the seats, thus ensuring metal to metal seal.

a) **Stroking Position (Figure 1):** When stroking to open/closed position, the lever lock arm is held parallel neutral position to the gate faces by the seat skirt.

b) **Fully Closed (Figure 2):** The segment going down is stopped by contact with the body stop. The upstream seat skirt allows the lever to tilt and the gate is wedged downward, expanding the segment and gate against both seats to form a tight mechanical seal.

c) **Fully Opened (Figure 3):** The segment is stopped by contact with the bonnet stop. The downstream seat skirt allows the lever to tilt and the gate is wedged upward, expanding the segment and gate against both seats

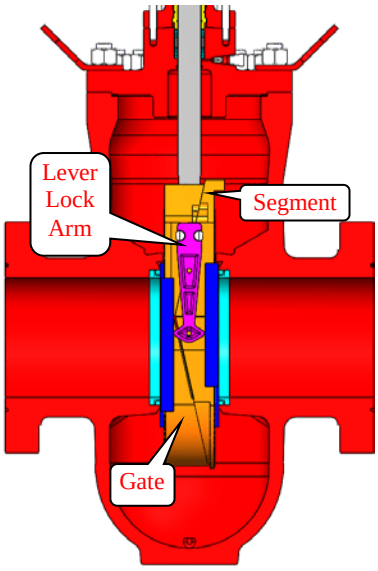


Figure 1

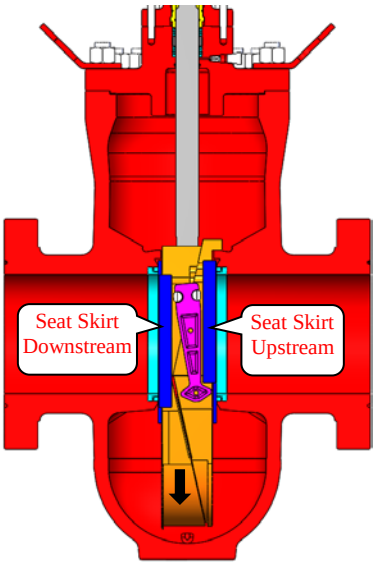


Figure 2

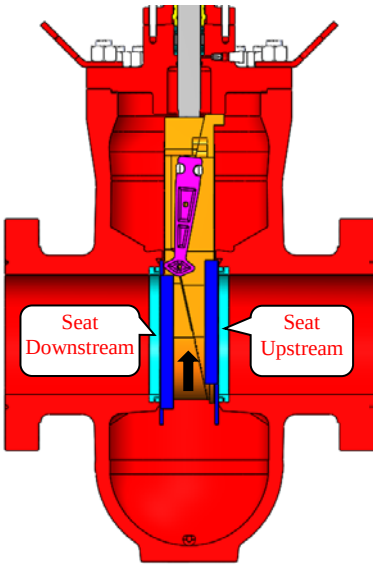


Figure 3

2 Seats

The valve is designed with forced fit seats. The seat is designed with a groove and passages which allow sealant to be injected into the seat and gate/segment as shown in Figure 4. This allows for emergency field rectification in case of damage or wear to gate/segment and seat

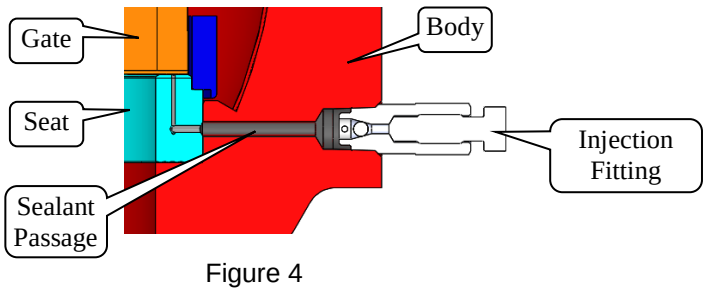


Figure 4

3 Stem & Seals

a) The forged head of the stem fits into a slot in the gate. The upper end of the stem is threaded for operation. A cover or cap protect the stem threads from the elements or from accidental damage. An indicator rod attached to the stem protrudes through the stem protector to provide visual indication of the gate in open or closed position as shown in Figure 5.

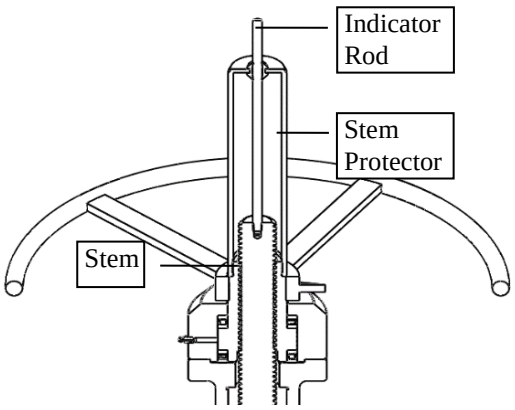


Figure 5

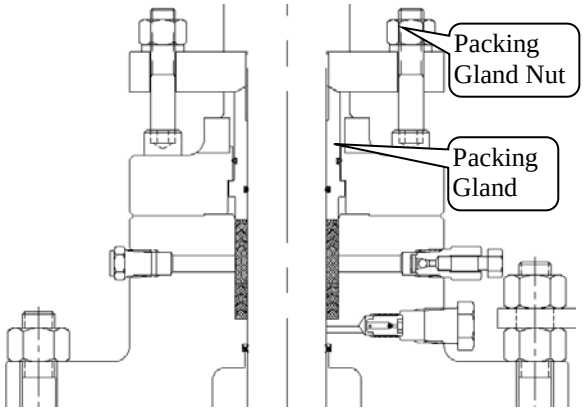


Figure 6

b) The stem is sealed with a unique design reinforced PTFE stem packing to provide excellent resistance to chemicals and corrosive elements as shown in Figure 6. The packing box has provision for emergency stem sealant injection in case of a stem packing leakage. In addition, packing can also be energized by tightening two packing gland nuts as shown in Figure 6. Thus the stem sealing has multiple emergency contingency in case of a leakage.

4 Body & Bonnet

The valve has a bolted bonnet. There is a dual seal between the body and bonnet. The primary seal is metal to metal with a secondary non-metallic seal.

5 Hand-wheel Operation

Hand-wheel operated valves have roller thrust bearings on the both sides of the stem nut, the bearings reduce the torque required to operate the valve.

6 Pressure Relief

The expanding gate valve design will trap pressure in valve body cavity when the valve is in the full open or closed position, high internal pressures can result from thermal expansion. Valve in liquid service must have either a relief valve or body cavity thermal relief system (always vents to upstream side of the valve).

⚠ CAUTION:

Failure to install a properly set relief valve may cause rupturing of the body resulting in catastrophic release of pressure.

If relief system used, make sure needle valves in the systems are open except during testing.

7 Fittings

The valve is provided with three (3) injection fittings (see Figure 7) and two (2) vent/grease fittings (see Figure 8) in the assembly. Two (2) injection fittings are for emergency seat sealant injection (located on the middle of the valve body and either side of the gate) and another one on bonnet is for stem packing sealant injection. Two (2) vent/grease fittings are provided for venting

and draining the body cavity (located on the centerline of the body).

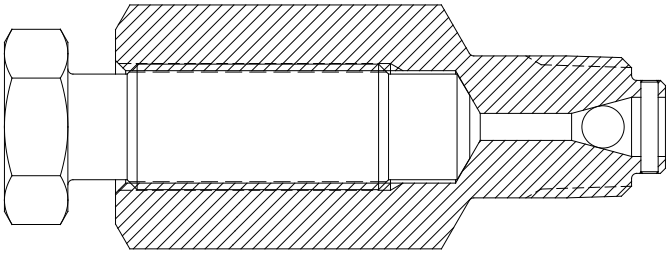


Figure 7

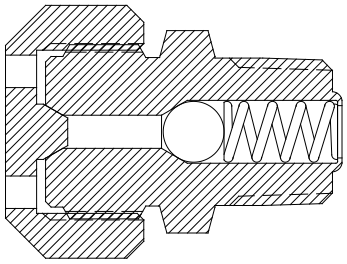


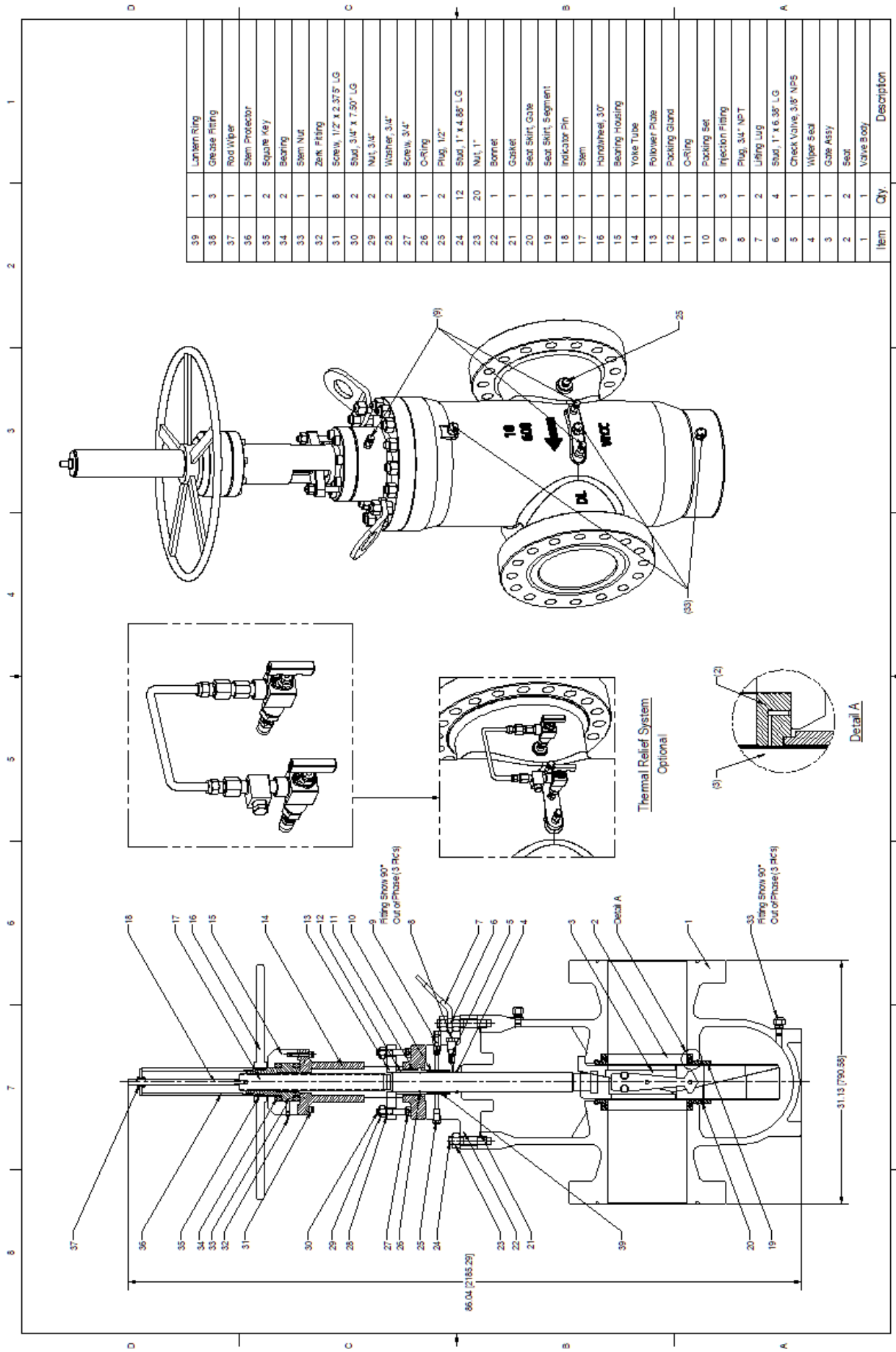
Figure 8

NOTE:

These vent/grease fittings will not pass large solids when venting. Care should be taken that a false indication of venting does not occur.

8 Assembly Drawing

Assembly drawing, see next page.


Item | Qty. | Description
1 | 1 | Valve Body
2 | 2 | Seat
3 | 1 | Gate Assy
4 | 1 | Wiper Seal
5 | 1 | Check Valve, 3/8" NPS
6 | 4 | Stud, 1" x 6.38" LG
7 | 2 | Lifting Lug
8 | 1 | Plug, 3/4" NPT
9 | 3 | Injection Fitting
10 | 1 | Packing Set
11 | 1 | O-Ring
12 | 1 | Packing Gland
13 | 1 | Follower Plate
14 | 1 | Yoke Tube
15 | 1 | Bearing Housing
16 | 1 | Handwheel, 30"
17 | 1 | Stem
18 | 1 | Indicator Pin
19 | 1 | Seat Skirt, Segment
20 | 1 | Seat Skirt, Gate
21 | 1 | Gasket
22 | 1 | Bonnet
23 | 20 | Nut, 1"
24 | 12 | Stud, 1" x 4.88" LG
25 | 2 | Plug, 1/2"
26 | 1 | O-Ring
27 | 8 | Screw, 3/4"
28 | 2 | Washer, 3/4"
29 | 2 | Nut, 3/4"
30 | 2 | Stud, 3/4" x 7.50" LG
31 | 8 | Screw, 1/2" x 2.375" LG
32 | 1 | Zerk Fitting
33 | 1 | Stem Nut
34 | 2 | Bearing
35 | 2 | Square Key
36 | 1 | Stem Protector
37 | 1 | Rod Wiper
38 | 3 | Grease Fitting
39 | 1 | Lantern Ring
Thermal Relief System
Optional
Detail A
Fitting Shown 90° Out of Phase (3 Pl
86.04 [2185.29]
31.13 [790.58]

Section 4 Operation

1 Normal Operation

The expanding gate valve is designed for full open to full closed operation by stroking of the stem. Internal stops are provided to position the gate. Clockwise turn the hand-wheel to CLOSE the valve until it becomes tight. Counter-clockwise turn the hand-wheel to OPEN the valve. Do NOT back off the hand-wheel and leave it tight in both the open and closed positions.

It is not recommended to use any leverage tool to open or close the valve, carefully observe the position of indicator during open and closing operation.

The valve, in good condition, can provide block and bleed capability in the full closed position

2 Emergency Seal Operation

2.1 Emergency Seat Sealant Injection

Remove the hex head fitting stringer, insert sealant stick into both upstream and downstream injection fittings (Figure 9), run stringer all the way in against the seat of the fitting, repeat injection of the sealant until sufficient to eliminate leakage.

2.2 Emergency Seat Sealant Injection

Remove the hex head fitting stringer, insert injectable packing stick into injection fittings (Figure 7), run stringer all the way in against the stem packing fitting, repeat injection of the injectable packing until sufficient to eliminate leakage. Discontinuous operation may be required to evenly distribute the sealant, generally once the pressure rises above valve rated pressure, hold for 2 or 3 minutes.

NOTE:

Balance torque should be applied on both sides of gland nuts to adjust the position of follower plate.

Section 5 Maintenance

The gate valves are designed for long term operation with the lowest limit of routine maintenance. Periodical maintenance will be recommended as the following advices to promote trouble-free service and long life.

1 Periodical Maintenance

Inspect every six (6) months for any leakage, abnormal sound and bolt loosened, see Trouble Shooting for temporary solution to problems.

A full open-close or partial cycle operation of the valve once a month where practicable.

Grease the stem threads periodically by removing the stem protector with the valve in the open position and applying a good lithium based grease directly to stem threads. Install stem protector after lubrication.

Pump in a small amount of good lithium based bearing grease to bearing housing once a year. DO NOT overfill.

2 Body Flushing & Draining

After long time service, there is a possibility of line scale, sediment or other foreign material accumulated in the lower body cavity. This can prevent the gate/segment from reaching the full downward position and closing fully against the seat. This could result in throttling of the flow which may cause severe erosion and damage to the seats and the gate/segment assembly. Finally, the sediment may eventually plug the openings and prevent draining the valve body. It is advisable to periodically drain and flush the valve.

2.1 Draining Procedure

Remove the vent safety cap (Figure 9) on the vent/grease fitting in the bottom of the body, back out the stringer of pressure releasing tool until it stops, install the releasing tool (Figure 10) to vent/grease fitting, turn the stringer until it contacts ball check, then 1/2 turn further to drain the body. Once completion, back out the stringer of releasing tool to allow ball check in vent/grease fitting to reseat, replace safety cap (vent cap) on the fitting.

⚠ **CAUTION:**

Always face away from the exhaust port when draining the valve.

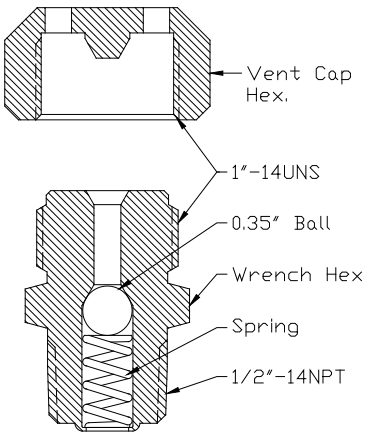


Figure 9

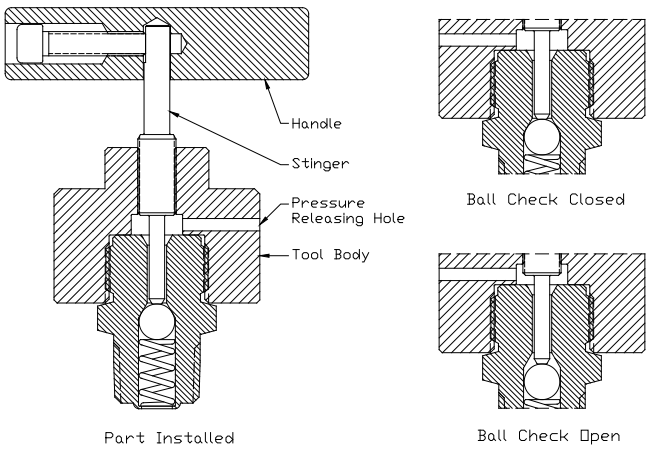


Figure 10

2.2 Flushing Procedure

With the valve in full-closed position, ensure body cavity pressure bleed off, carefully remove both of the upper and lower body vent fitting (Figure 9), pump flushing media (pressurized water) into body from upper body vent and foreign material comes out from lower body vent. After completion, replace the both vent/grease fitting with safety cap to body correctly.

3 Thermal Relief System Maintenance

Relief system must be tested at least twice a year to ensure proper function. Repair or replace, as required to eliminate any abnormalities.

4 Replacing Reinforced PTFE Stem Packing

Detach yoke tube from bonnet prior to replacement of reinforced PTFE stem packing.

Remove the NPT plug (Figure 11) and use a suitable pressure fitting or inlet connector, pressurize from the injection hole (Recommended pressure <200psi) to push packing set out of packing box, then install a new stem packing.

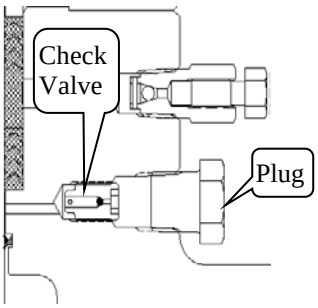


Figure 11

5 Troubleshooting

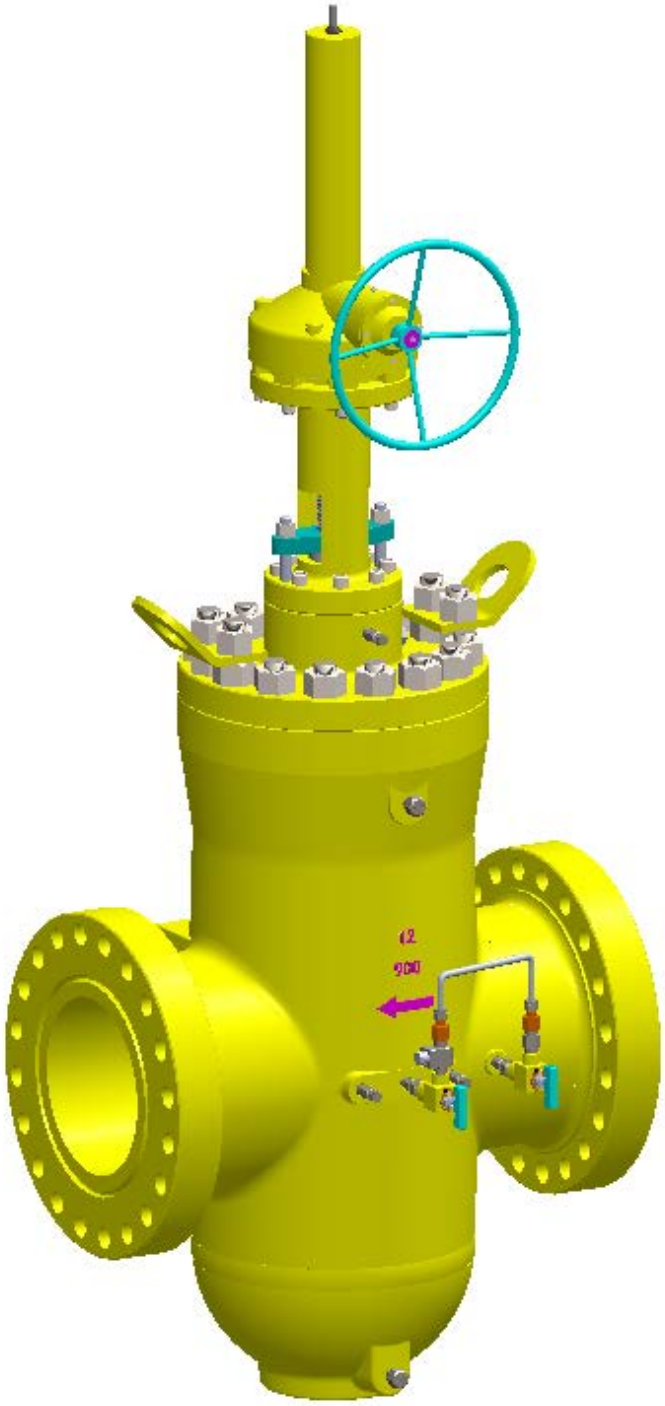
No.	Trouble	Possible Reason	Trouble Shooting
1	Stem packing leakage	Damage packing	Tighten the packing gland nuts on follower plate or inject stem packing
2	Vent/grease fitting or plug leakage	Fitting or plug screw loose	Tighten the screw
3	Leakage in bonnet flange	Bonnet bolts loose	Tighten bonnet bolts as necessary
		Damage to gasket	Replace the gasket
4	Valve seats not seal	The valve is not fully closed	Fully close the valve
		Damage to seat sealing surface	Replace the damaged sealing element
5	Valve not open or close	Excessive pressure trapped in body cavity in full open and closed position	Use pressure releasing tool on one of the vent fittings to vent the trapped pressure.
6	Difficult to open or close	Dry stem	Inject lubricant as necessary
		Valve has not been opened or closed for a long time, the seats and gate tied tightly	Open and close the valve rapidly several times till the gate is loosened, then open or close the valve to required position.
7	Imbalance of operation	Dry bearing	Inject lubricant as necessary
		Possible damage to drive nut or bearing	Replace the damaged parts

Approval Record & Revision History

Rev.	Date	Record of Changes (Only last three revision histories are recorded)
00	2017/10/20	Initial Release
01	2019/03/28	Delete Max. Recommended Injection Packing Box Pressure section in Section 4

VERSA GEOTHERMAL WELLHEAD GATE VALVE

Operating & Service Manual



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Operating & Service Procedure

Manual Geothermal Wellhead Gate Valve

Date: March 2019

OPS-807 Rev.02

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Section 1 General Information

The **Geothermal Wellhead Gate Valve** is full bore through conduit valve with rising stem and parallel expanding gate and segment for tight mechanical seal which is normally unaffected by pressure variation. The full bore design allows pigs, scrappers to run through the valve without any damage of the internal components.

The stem is sealed by reinforced PTFE packing and injectable packing. In an emergency, injecting injectable packing into packing box would affect a temporary seal while the valve is under pressure. In addition, tightening the two packing gland nuts is an alternative method to affect an emergency seal in event of stem packing leakage.

The gate valve does not require lubrication for normal operation. However, lubricants can be injected to promote smooth operation if required. In the event of leakage due to gate and/or seat damage, sealant can be injected to affect a emergency seal until the valve is up for repair.

Relief valve (not supplied) shall be furnished to protect the valve when over pressure is inside the body cavity.

The expanding valve is designed, manufactured and tested in accordance with API Spec. 6D unless otherwise specified.

ALL OPERATORS AND MAINTENANCE PERSONNEL SHOULD BE THOROUGHLY TRAINED IN THE SAFE OPERATION, MAINTENANCE, AND INSPECTION OF THIS EQUIPMENT.

Section 2 Installation

2.1 Unpacking

a) The valve is shipped in full open or full closed position with flange end protectors installed. This is to preclude debris from falling into valve cavity.

b) Remove flange protectors and thoroughly inspect interior of valve and end connections for damage or foreign material.

c) Install loose items such as hand wheels, etc. if separated from valve assembly.

2.2 Handling

a) Proper lifting equipment should be provided to handle the valve.

b) Lift lugs are provided for lifting.

2.3 Installation

Install the valve in the open position with the preferred upstream pressure side. The preferred upstream pressure side is the right hand flange when looking at the lettered and fitting side of the body. This can be identified by arrow of flow direction as shown in right picture.

a) Flanged end valves should be installed using the appropriate gasket (not supplied) and conventional flange installation procedures.

b) Prior to operating the valve from the open position, the piping should be thoroughly flushed to prevent foreign matter from damaging sealing surfaces.

c) After installation and system testing, the valve should be drained to remove test fluid.

⚠ **CAUTION:**

Do not use hand-wheels, gearbox or other protruding parts of the valve to lift the valve. Avoid damaging the end connection faces, fittings during handling.

Section 3 Features and Advantages

3.1 Closure Mechanism

The valve is designed with an expanding gate and segment assembly for positive closure. A full operating cycle is defined as movement of the gate from one position (i.e., fully open) to the opposite position (i.e., fully closed), and then back to the original position. When stroking to either fully open or fully closed position, when the segment comes to a stop, the gate continue to slide along the machined taper surface forcing the gate and segment wedge apart into positive contact with the seats, thus ensuring metal to metal seal.

Stroking Position (Figure 1): When stroking to open/closed position, the lever lock arm is held parallel neutral position to the gate faces by the seat skirt.

Fully Closed (Figure 2): The segment going down is stopped by contact with the body stop. The upstream seat skirt allows the lever to tilt and the gate is wedged downward, expanding the segment and gate against both seats to form a tight mechanical seal.

Fully Opened (Figure 3): The segment is stopped by contact with the bonnet stop. The downstream seat skirt allows the lever to tilt and the gate is wedged upward, expanding the segment and gate against both seats.

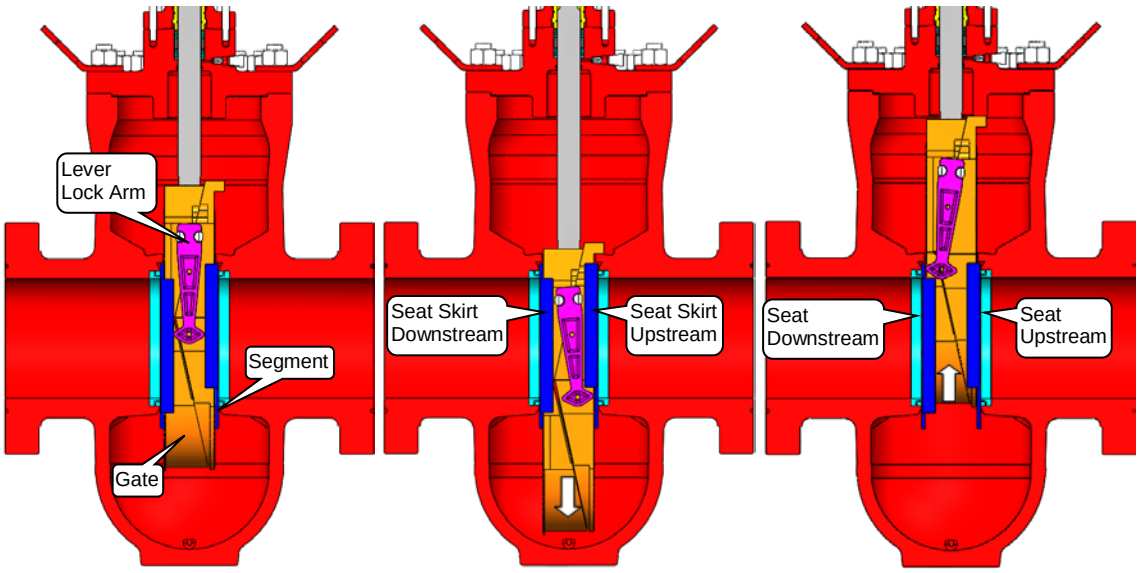


Figure 1 Figure 2 Figure 3

3.2 Seats

The valve is designed with forced fit seats. The back-seat sealing profile has a series of protruding surface to affect a metal to metal sealing under mechanical force and/or line pressure.

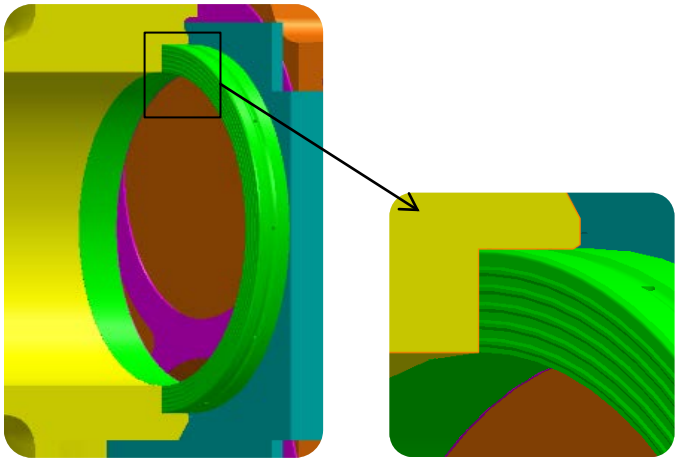


Figure 4

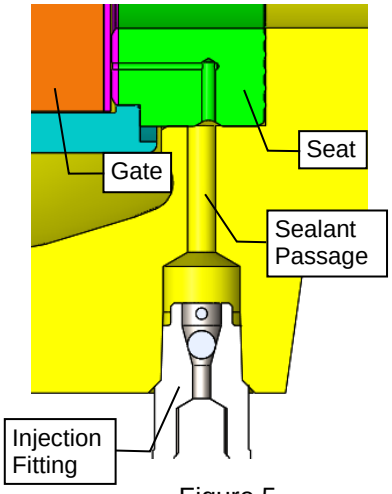


Figure 5

The seat is designed with a groove and passages which allow sealant to be injected into the seat and gate/segment sealing surface as shown in Figure 5. This allows for emergency field rectification in case of damage or wear to gate or seat.

3.3 Stem/Seals

a) The forged head of the stem fits into a slot in the gate. The upper end of the stem is threaded for operation. A cover or cap protect the stem threads from the elements or from accidental damage. An indicator flag attached to the stem protrudes through the stem protector to provide visual indication of the gate in open or closed position as shown in Figure 6.

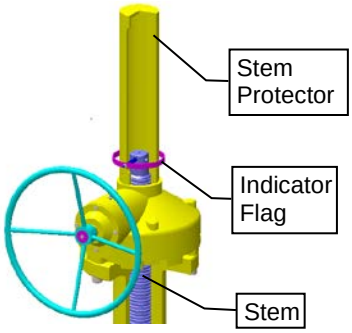


Figure 6

b) The stem is sealed with a unique design reinforced PTFE stem packing to provide excellent resistance to chemicals and corrosive elements as shown in Figure 7. The packing box has provision for emergency stem sealant injection in case of a stem packing leakage. In addition, packing can also be energized by tightening two packing gland nuts as shown in Figure 8. Thus the stem sealing has multiple emergency contingency in case of a leakage.

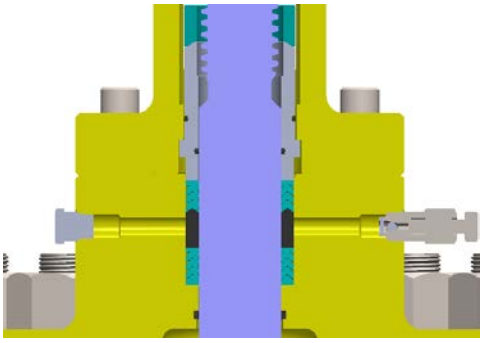


Figure 7

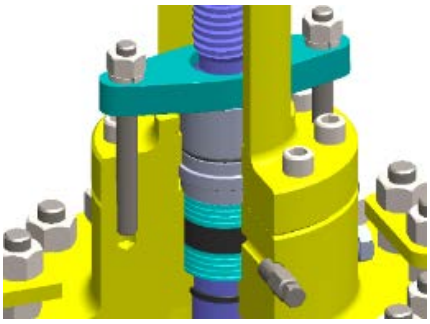


Figure 8

3.4 Body/Bonnet

The geothermal wellhead gate valve has a bolted bonnet. There is a dual seal between the body and bonnet. The primary seal is metal to metal with a secondary non-metallic seal.

3.5 Handwheel Operation

Handwheel operated valves have a gear operator which the reduction ratio is **4.1: 1**. It can reduce the torque required to operate the valve.

3.6 Actuation

The valves are normally furnished with hand-wheel or bevel gear operators, as appropriate for each size. They can readily be adapted to fit a wide range of power operators, if desired. Power operators can be installed in the field or at the manufacturing facility.

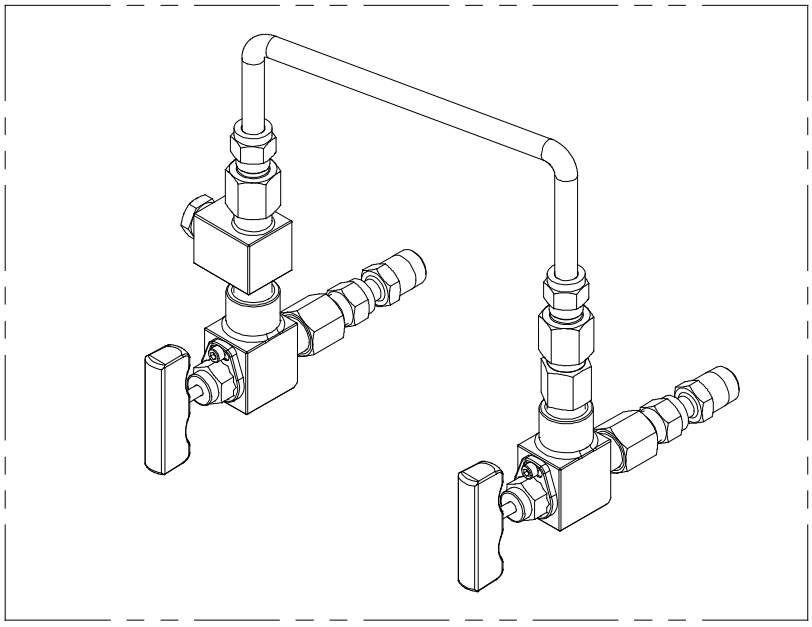
3.7 Pressure Relief

The expanding gate valve design will trap pressure in valve body cavity when the valve is in the full open or closed position, high internal pressures can result from thermal expansion. Valve in liquid service must have either a relief valve or body cavity thermal relief system (always vents to upstream side of the valve).

⚠ **CAUTION:**

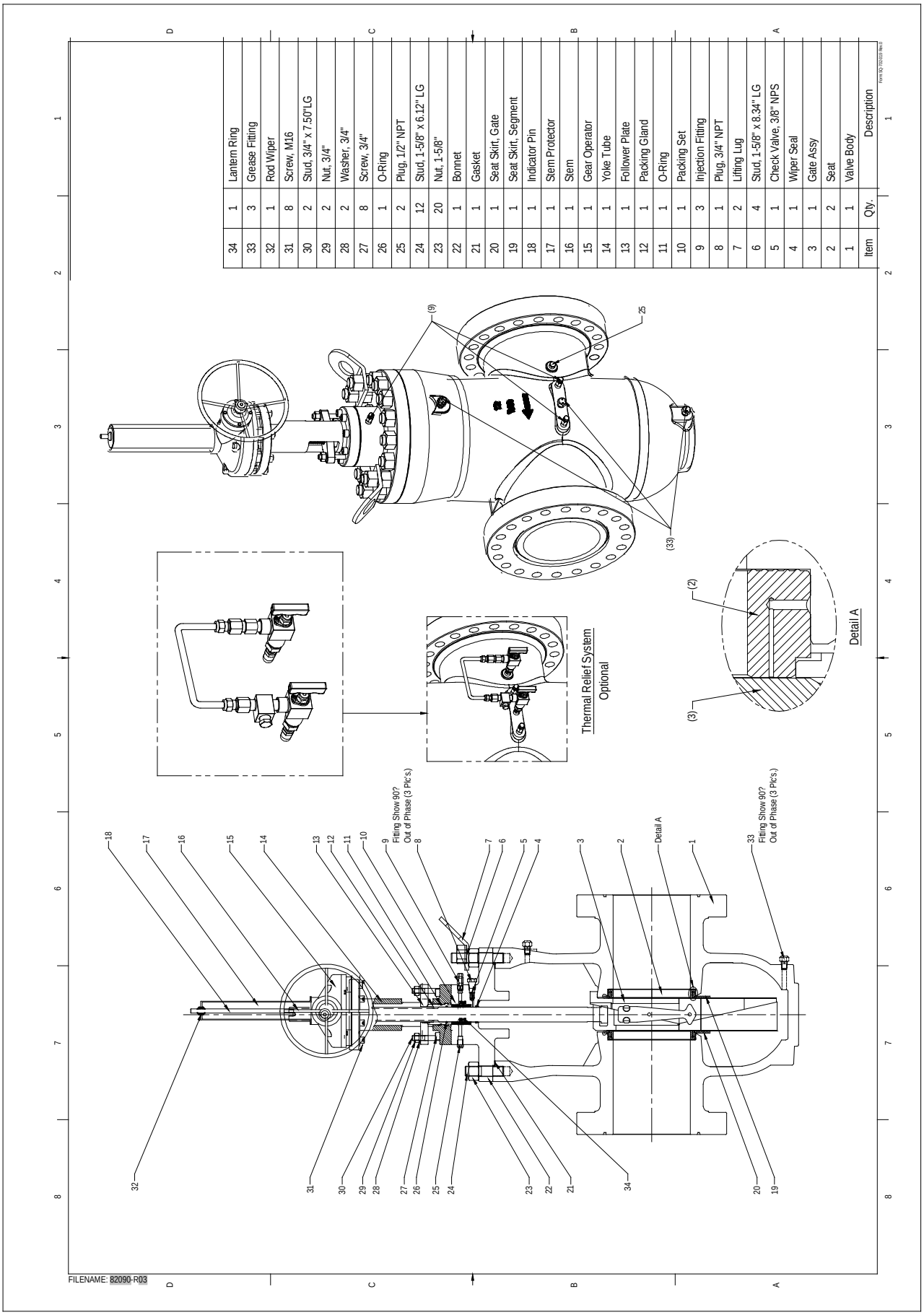
Failure to install a properly set relief valve may cause rupturing of the body resulting in catastrophic release of pressure.

If relief system used, make sure needle valves in the systems are open except during testing.



Thermal Relief System
Optional

Assembly drawing:


Item | Qty. | Description
1 | 1 | Valve Body
2 | 2 | Seat
3 | 1 | Gate Assy
4 | 1 | Wiper Seal
5 | 1 | Check Valve, 3/8" NPS
6 | 4 | Stud, 1-5/8" x 8.34" LG
7 | 2 | Lifting Lug
8 | 1 | Plug, 3/4" NPT
9 | 3 | Injection Fitting
10 | 1 | Packing Set
11 | 1 | O-Ring
12 | 1 | Packing Gland
13 | 1 | Follower Plate
14 | 1 | Yoke Tube
15 | 1 | Gear Operator
16 | 1 | Stem
17 | 1 | Stem Protector
18 | 1 | Indicator Pin
19 | 1 | Seat Skirt, Segment
20 | 1 | Seat Skirt, Gate
21 | 1 | Gasket
22 | 1 | Bonnet
23 | 20 | Nut, 1-5/8"
24 | 12 | Stud, 1-5/8" x 6.12" LG
25 | 2 | Plug, 1/2" NPT
26 | 1 | O-Ring
27 | 8 | Screw, 3/4"
28 | 2 | Washer, 3/4"
29 | 2 | Nut, 3/4"
30 | 2 | Stud, 3/4" x 7.50"LG
31 | 8 | Screw, M16
32 | 1 | Rod Wiper
33 | 3 | Grease Fitting
34 | 1 | Lantern Ring
Thermal Relief System
Optional
Detail A
Fitting Show 90°
Out of Phase (3 Plc's.)
FILENAME: 82090-R03

Section 4 Regular Field Maintenance

4.1 Normal Operation

The geothermal wellhead gate valve is designed for full open to full closed operation by stroking of the stem. Internal stops are provided to position the gate. Clockwise rotate the handwheel to **CLOSE** the valve, rotate counter-clockwise to **OPEN** the valve. The expanding gate valve is not designed to be used as a throttle valve.

The geothermal wellhead gate valve is provided with three (3) combination injection fittings (see Figure 9) and three (3) grease fittings (see Figure 10) in the Assembly. Two (2) injection fittings are for emergency seat sealant injection (located on the middle of the valve body and either side of the gate) and another one on bonnet is for stem packing sealant injection. Three (3) grease fittings are provided for venting and draining the body cavity (located on the centerline of the body).

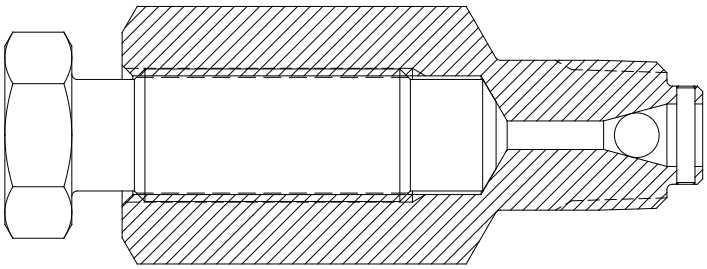


Figure 9

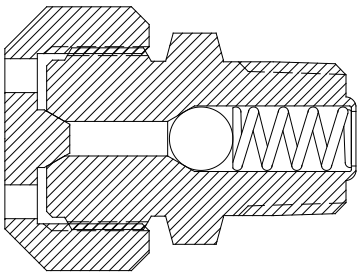


Figure 10

NOTE:

These combination fittings will not pass large solids when venting. Care should be taken that a false indication of venting does not occur.

4.2 Block & Bleed Operation

The gate valves, in good condition, provide block and bleed capability in the full closed position. This means that the body cavity pressure can be vented to atmosphere while pressure is maintained.

4.2.1 Block and Bleed Applications

a) Verify integrity of both seats.

b) Allow draining and/or flushing of the valve body cavity.

c) Absolute prevention of downstream leakage to assure safety of downstream activities.

4.2.2 Block and Bleed Procedure

a) Operate valve to the full-closed position.

b) Carefully remove the upper body combination fitting safety cap (vent cap) (Figure 11).

CAUTION:

Watch the fitting body to insure that it does not turn while turning the cap. Do not attempt removal of the fitting while the valve is subjected to line pressure.

c) Install the pressure releasing tool (see Figure 12) with the stinger retracted. Turn the stinger until it contacts the ball check, then 1/2 turn further to vent the body.

CAUTION:

Care should be taken to insure that the exhaust port on the side of the vent fitting is directed away from personnel.

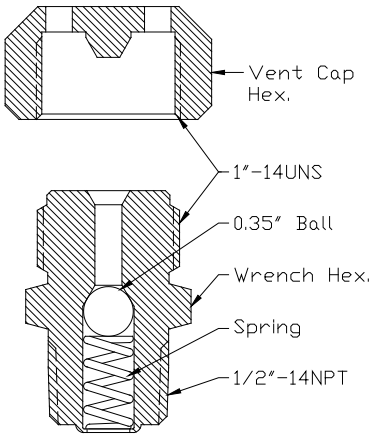
d) Continue venting until body pressure reaches atmospheric pressure.

NOTE:

Length of time required to vent the body will be proportional to the compressibility, the pressure and the size of the valve.

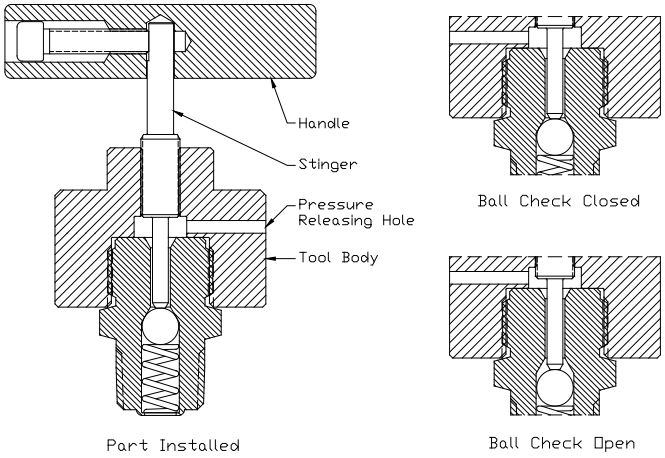
e) After completion, back out the stinger of the pressure releasing tool to allow the ball check in the grease fitting to reseat and permit easy removal of the pressure releasing tool.

Replace safety cap (vent cap) on the lower drain grease fitting.



Grease Fitting

Figure 11



Pressure Releasing Tool

Figure 12

4.3 Emergency Seat Sealant Injection

The geothermal wellhead gate valves are designed for long term operation without routine maintenance. Regular injection of sealant is expressly not recommended.

4.3.1 Emergency Sealant Injection Applications

The geothermal wellhead gate valves have the provision for emergency seat sealant injection. This feature provides a means for emergency seal of a damaged sealing surface using sealant. Injecting sealant in the upstream and downstream seat fittings will provide complete sealing in most downstream and block and bleed leakage situations. Operation of the valve after sealant injection usually requires re-injection of sealant.

4.3.2 Emergency Sealant Injection Procedure

a) Remove the plug in combination injection fitting (Figure 9). Manually inject sealant into both upstream and downstream sealant fittings while observing leakage.

b) Reinstall the plug and rotate the plug clockwise to continue inject sealant until sufficient to eliminate leakage. Partial operation may be required to evenly distribute the sealant. Continued injection is wasteful and contaminates the flow stream.

4.4 Emergency Stem Injectable Packing Sealing

The geothermal wellhead gate valves are designed with a packing gland and follower plate as illustrated in Figure 8. In the event of damage to the stem packing which causes a leak, operating as per **Section 3, 3.3 (b)** to eliminate the leakage.

NOTE:

Balance torque should be applied on both sides of bolt to adjust the position of follower plate.

4.5 Body Flushing & Draining

4.5.1 Draining Procedure

Draining can be accomplished by venting the body as Section 4, 2.2. Then removing the combination fitting from the bottom of the body.

CAUTION:

Never remove any fitting without verifying that the fitting is not pressurized.

4.5.2 Flushing Procedure

Flushing the valve body is merely a combination of the Block and Bleed Procedure and the Draining Procedure. The vent fitting can then be removed to allow introduction of the flushing media.

4.5.3 Potential Hazards of Accumulated Fluids

Solid foreign material may settle out of the flow stream and into the lower section of the valve body. This can prevent the gate/segment from reaching the full downward position and closing fully against the seat. This could result in throttling of the flow which may cause severe erosion and damage to the seats and the gate/segment assembly. Finally, the sediment may eventually plug the openings and prevent draining the valve body.

4.6 Replacing Injectable Packing

There may be occasions when the packing must be replaced. The valve must be in the fully closed position. Bleed the valve body using the procedure in **Section 4, 2.2**. Screw the injector plug in all the way against the seat, then remove the injector plug from the fitting **ONLY** after being certain that the internal ball check is fully seated and is sealing.

Remove the plug opposite the packing fitting. Inject packing into packing box until the old packing is discharged through the packing plug opening. Replace the packing plug, then inject packing.

CAUTION:

Be certain that no man is on the front of the packing plug opposite the packing injection fitting when removing the packing plug.

4.7 Replacing Reinforced PTFE Stem Packing

Detach yoke tube from bonnet prior to replacement of reinforced PTFE stem packing.

Remove the NPT plug (Figure 13) and use a suitable pressure fitting or inlet connector, pressurize from the injection hole (Recommended pressure <300psi) to push packing set out of packing box, then install a new stem packing.

NOTE:

Replacement of reinforced PTFE stem packing belongs to major overhaul operation, refer to Section 5, 5.2.

Section 5 Maintenance

5.1 Stem

Grease the stem threads periodically by removing the stem protector with the valve in the open position and applying a good lithium-based bearing grease directly to stem threads. Install stem protector after lubrication.

5.2 Major Overhaul

Major overhaul procedures are beyond the scope of this manual. Replacement of internal components and seals should be performed by those knowledgeable in the repair and reconditioning of this product.

5.3 Troubleshooting.

No.	Trouble	Possible Reason	Trouble Shooting
1	Stem packing leakage	Damage packing	Screwing the bolts tightly on follower plate
2	Sealing incompletely to upstream and downstream (the pressure in middle cavity cannot relieve to low pressure)	The gate is not close completely	Close the valve
		Damage to sealing surface	Replace the damaged sealing element
3	Leakage in bonnet flange	Bonnet bolts loose	Tighten bonnet bolts as necessary
		Damage to gasket	Replace the gasket
4	Difficult to open or close	Dry stem	Inject lubricant as necessary
		Valve has not been opened or closed for a long time, the seats and gate tied tightly.	Open and close the valve rapidly several times till the gate is loosened, then open or close the valve to required position.
5	Imbalance of operation	Dry stem	Inject lubricant as necessary
		Possible damage to drive nut or bearing	Replace the damaged parts

Approval Record & Revision History

Rev.	Date	**Record of Changes** (Only last three revision histories are recorded)
00	2015/10/10	Initial Release
01	2018/11/28	Re-edit
02	2019/03/28	Delete Max. Recommended Injectable Packing Box Pressure in Section 4