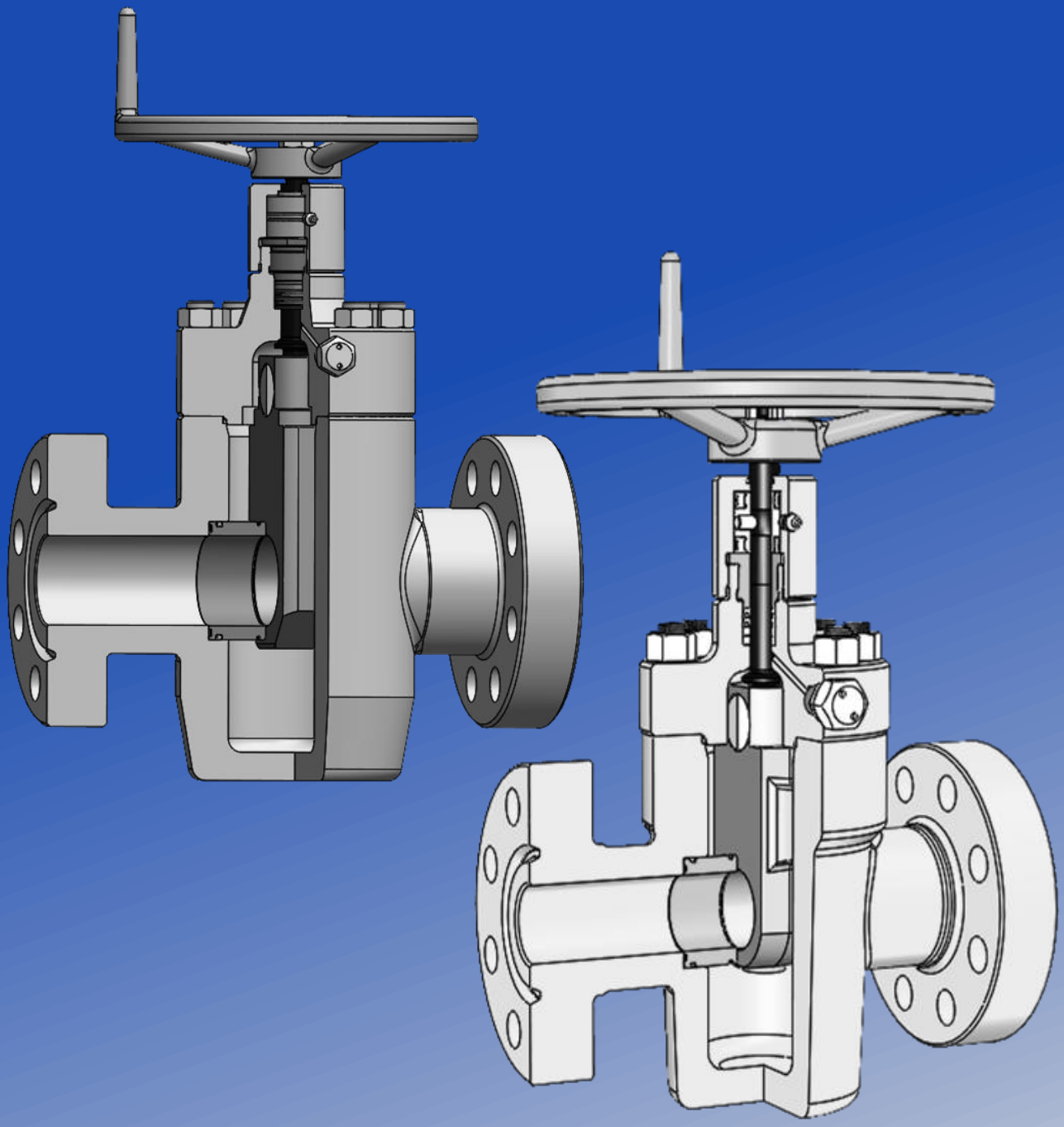
VERSA-SLAB™ GATE VALVES



API 6A LICENSE
LICENSE NO. 6A-0541

Issued 210723

API 6D LICENSE
LICENSE NO. 6D-0477

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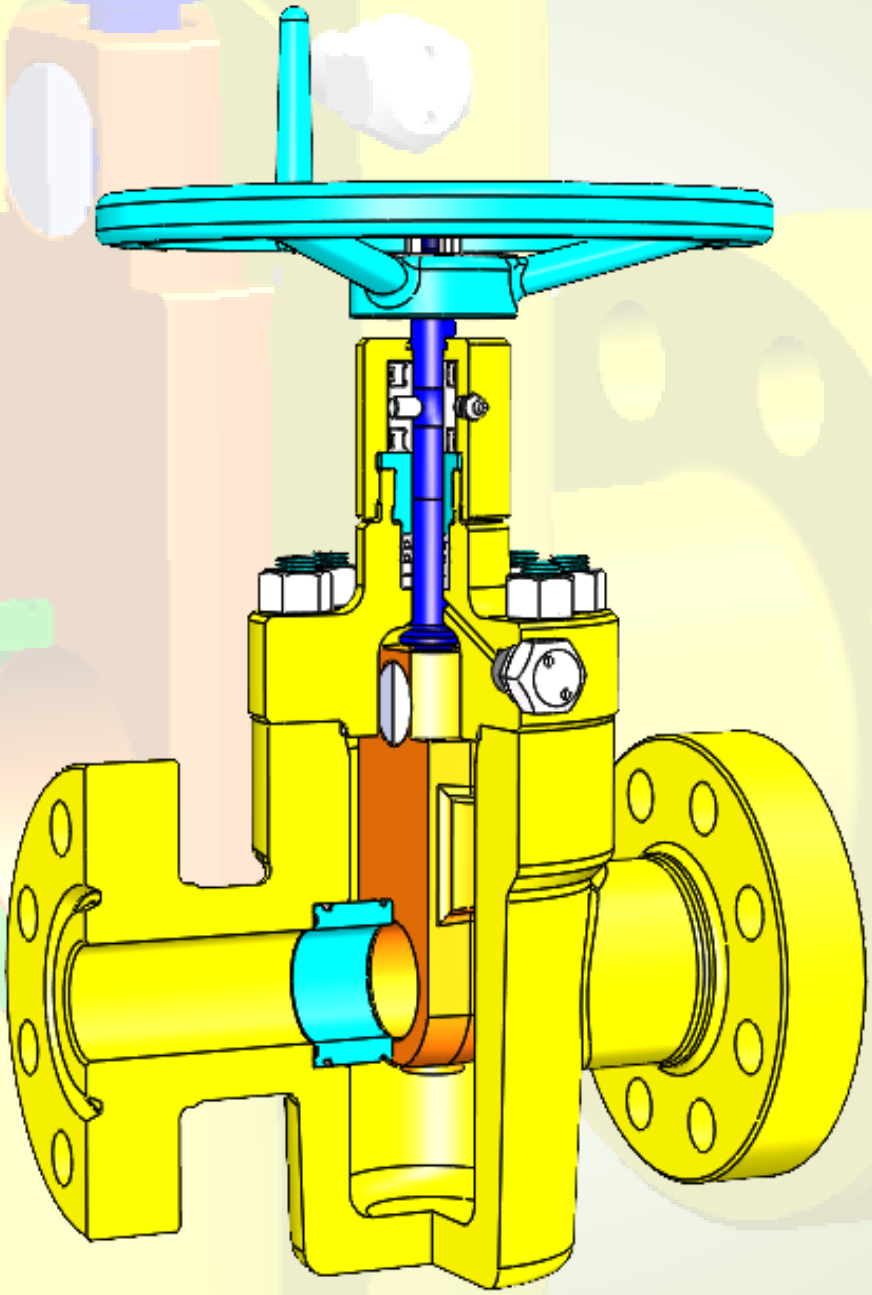
VERSA-SLAB™-LS GATE VALVE



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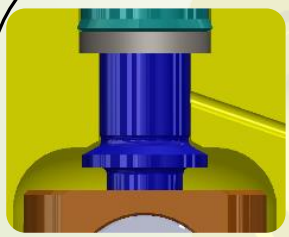
SV-02 R00

Advantages of the SOURCE Design

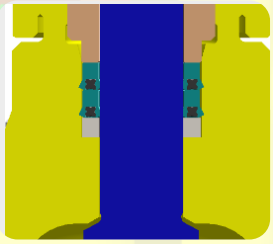
The **VERSA GATE VALVE** series offer an economical field proven oilfield valve for the oil & gas industry. A choice of versa-slab and versa-wedge gates is available which are purpose designed to maximize usage of common parts such as the universal valve body and bonnet assembly to afford an overall cost effective valve . The versa gate valve line of products are designed and manufactured to the latest requirements of API 6A specifications and API Q1/ISO9001 quality assurance.

VERSA-SLAB LS GATE VALVE FEATURES:

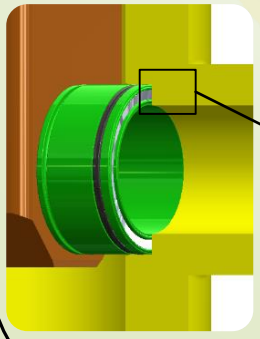
- 2000 to 5000 psi
- 2-1/16″ to 5-1/8″
- Bi-directional Flow and Seal
- Metal to Metal Sealing (Gate-to-Seat & Seat-to-Body)
- Non-rising Stem Design
- Floating Gate and Seat Design
- Stem Backseat
- Elastomeric or Non-elastomeric Stem Packing Available
- Low Operating Torque
- Forged Body and Bonnet
- Tested to Requirements of API 6A



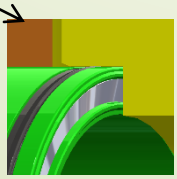
Metal to Metal stem backseat sealing allows stem packing replacement with valve under pressure.

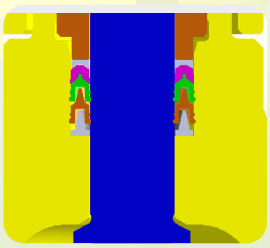


Packing design for different services temperature, pressure and drilling and production fluids.
For PR1 service, standard elastomeric seal packing is used.



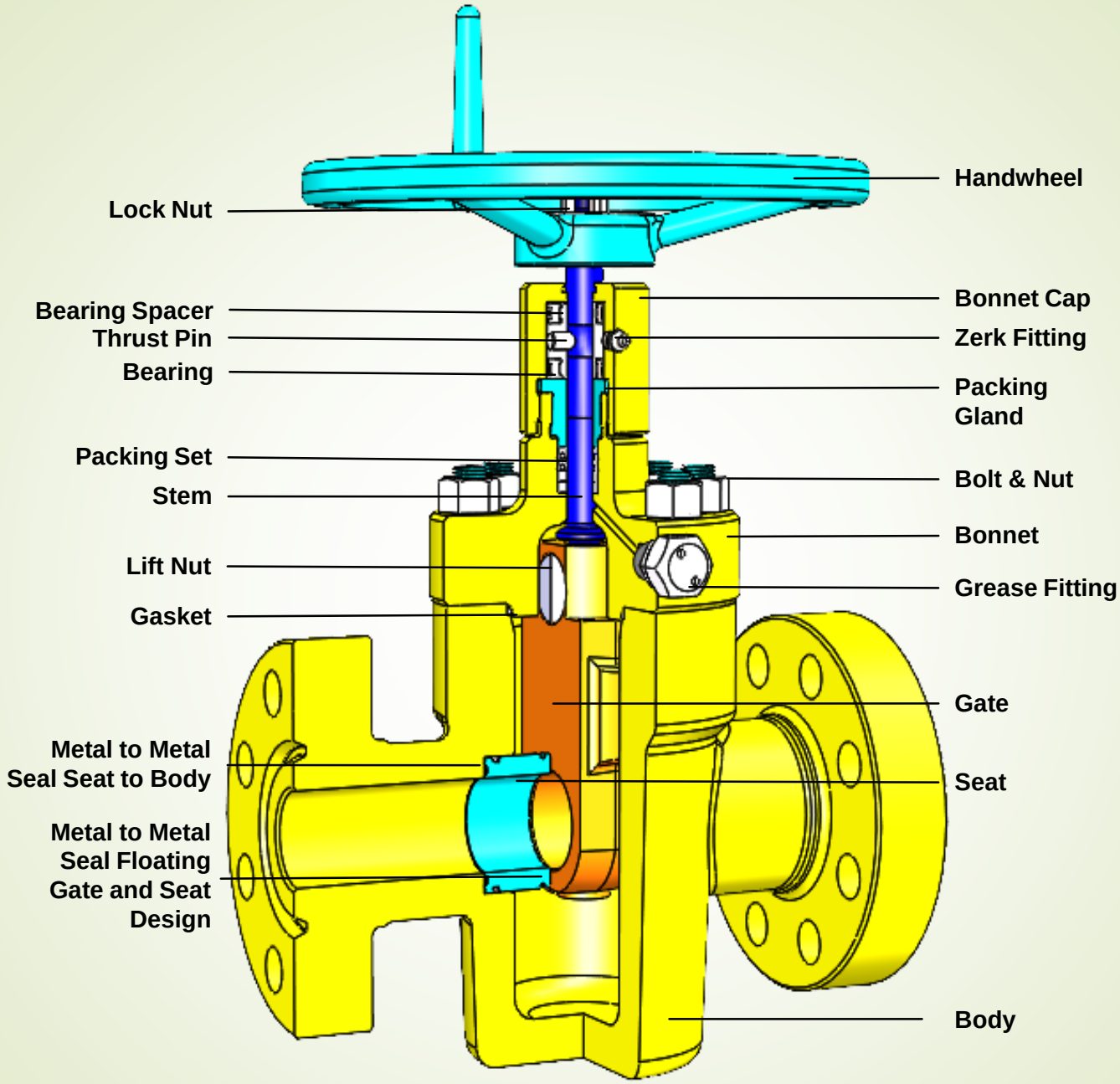
Metal to Metal seat/body and seat/gate sealing.





For PR2 service, special design non-elastomeric SV stem packing is used.
SV stem packing provides an excellent service for chemicals in oil and gas production fluids.

VERSA SLAB GATE VALVE



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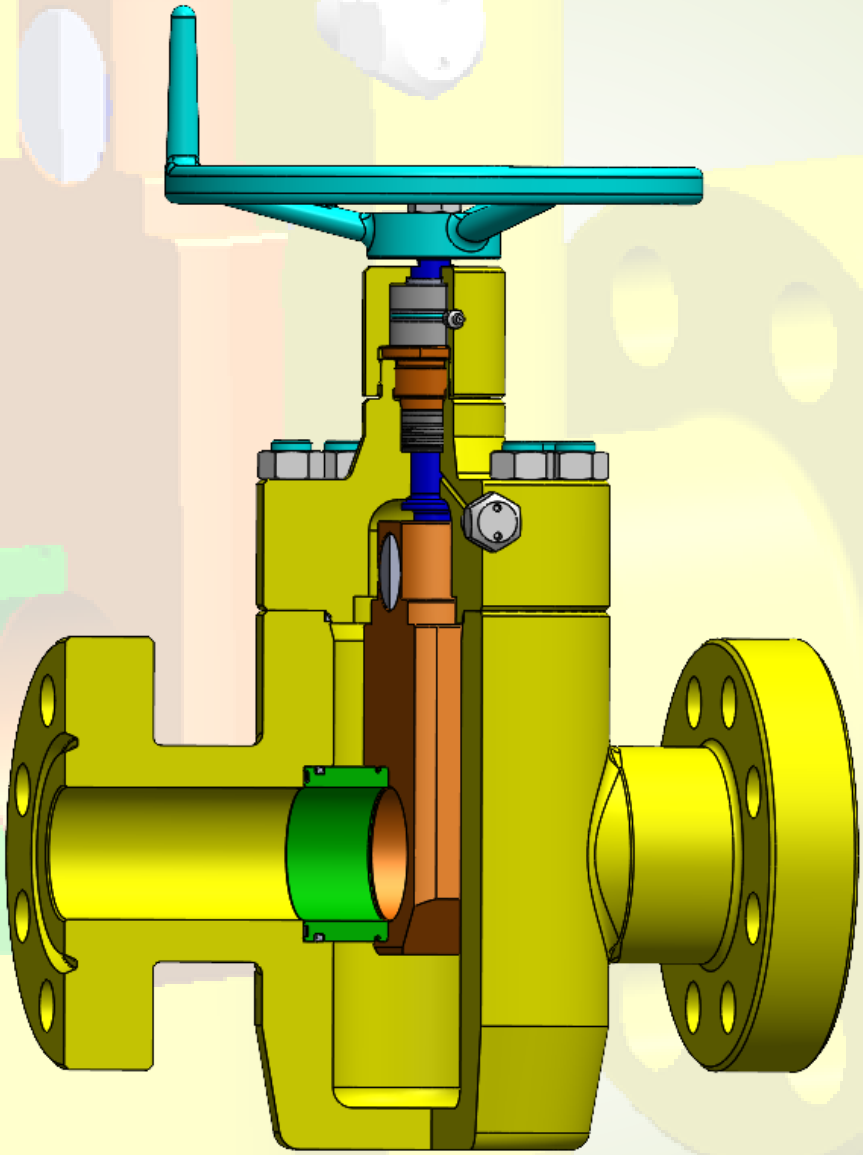
VERSA-SLAB™-HS GATE VALVE



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LICENSE NO. 6A-0541

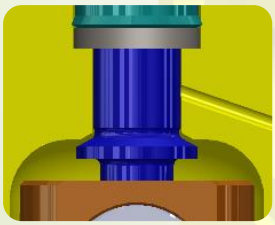
SV-01 R00

VERSA-SLAB™ GATE VALVE

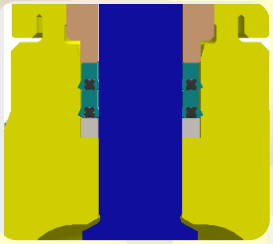
The **VERSA GATE VALVE** series offer an economical field proven oilfield valve for the oil & gas industry. A choice of versa-slab and versa-wedge gates is available which are purpose designed to maximize usage of common parts such as the universal valve body and bonnet assembly to afford an overall cost effective valve . The versa gate valve line of products are designed and manufactured to the latest requirements of API 6A specifications and API Q1/ISO9001 quality assurance.

VERSA-SLAB GATE VALVE FEATURES:

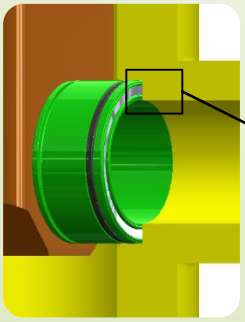
- 2000 to 10000 psi
- 2-1/16″ to 5-1/8″
- Bi-directional Flow and Seal
- Metal to Metal Sealing (Gate-to-Seat & Seat-to-Body)
- Non-rising Stem Design
- Floating Gate and Seat Design
- Option of Specific Seat Seal and Bonnet BX or VX Seal Design
- Option of Tungsten Carbide Coating of Gate and Seat
- Stem Backseat
- Elastomeric or Non-elastomeric Stem Packing Available
- Low Operating Torque
- Forged Body and Bonnet
- Tested to Requirements of API 6A



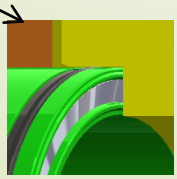
Metal to Metal stem backseat sealing allows stem packing replacement with valve under pressure.

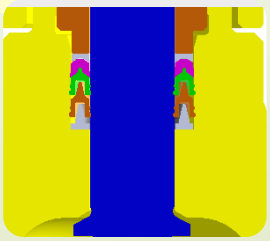


Packing design for different services temperature, pressure and drilling and production fluids.
For PR1 service, standard elastomeric seal packing is used.



Metal to Metal seat/body and seat/gate sealing.

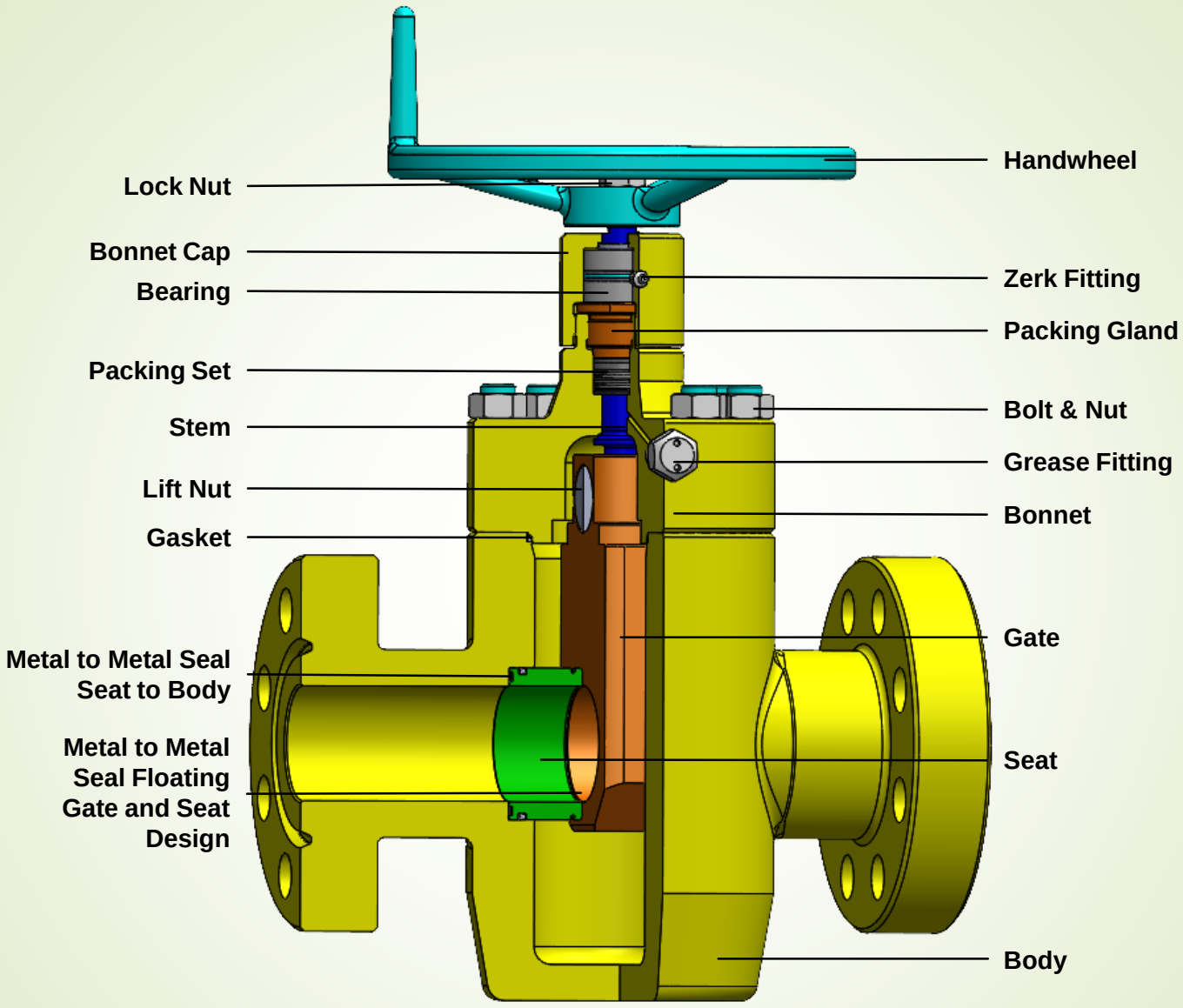




For PR2 service, special design non-elastomeric SV stem packing is used.
SV stem packing provides an excellent service for chemicals in oil and gas production fluids.

VERSA-SLAB™ GATE VALVE

Slab Gate Valve 2000~5000 psi



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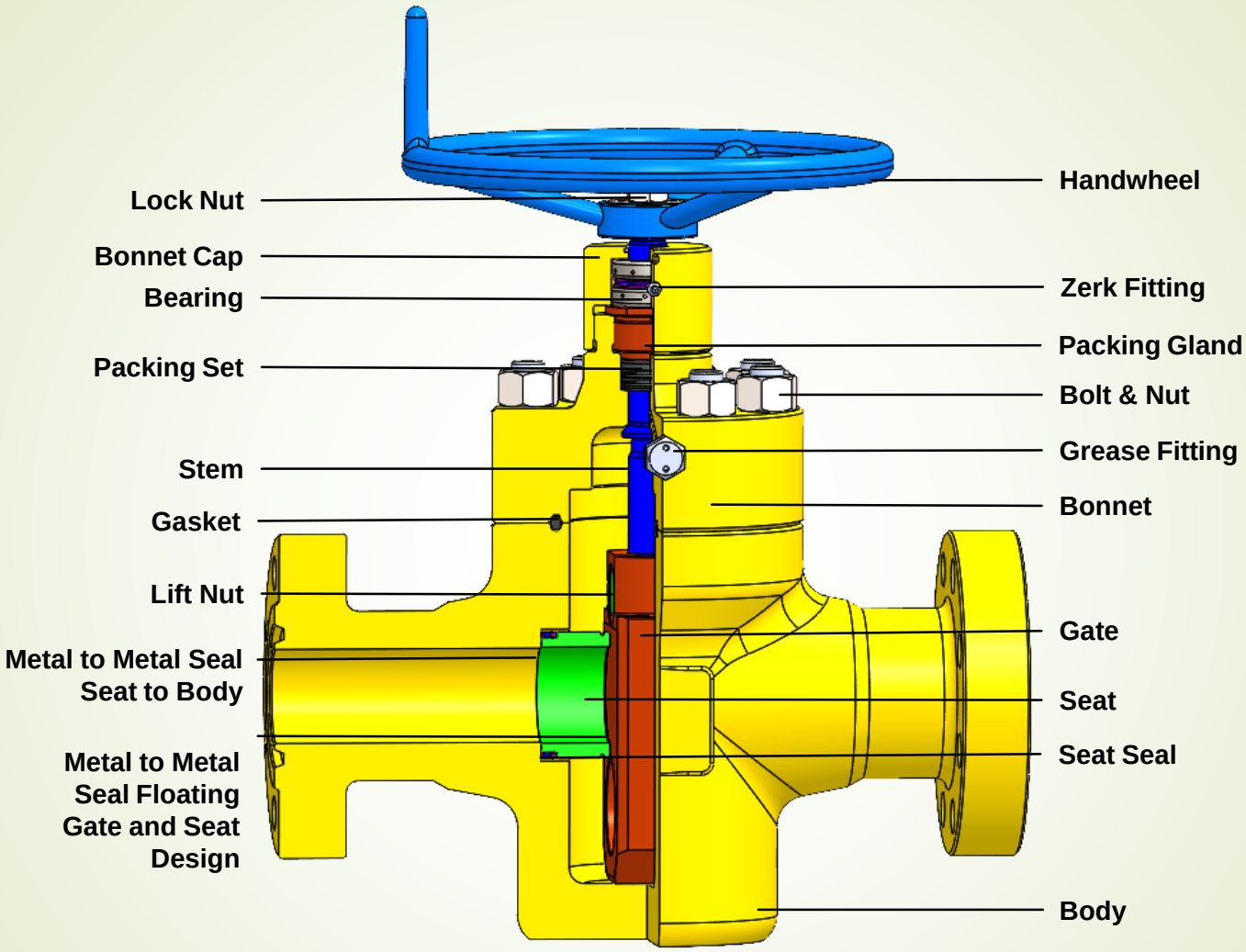
VERSA-SLAB™ GATE VALVE

Slab Gate Valve 10000 psi



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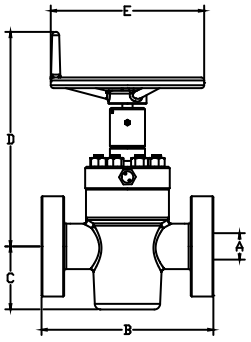
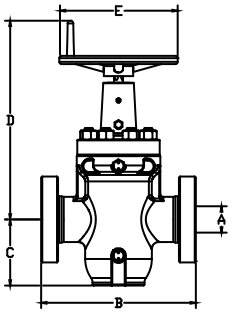
SLAB GATE VALVE REFERENCE DIMENSIONS AND WEIGHTS



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

Nominal Size	Working Pressure (psi)	A		B		C		D		E		WT		N	API Ring
		in	mm	in	mm	in	mm	in	mm	in	mm	lbs	kg		
2 1/16	2000	2.06	52.3	11.62	295	4.95	126	18.07	459	13	330	158	72	13 1/2	R-23
	3000-5000	2.06	52.3	14.62	371	5.38	137	18.87	479	13	330	180	82		R-24
	10000	2.06	52.3	20.50	521	5.5	140	19.7	500	16	406	286	130	13	BX-152
2 9⁄16	2000	2.56	65.0	13.12	333	6.18	157	19.65	499	13	330	275	125	20	R-26
	3000-5000	2.56	65.0	16.62	422	6.28	160	19.95	507	13	330	297	135		R-27
3 1⁄8	2000	3.12	79.2	14.12	359	6.93	176	21.35	542	13	330	218	99	20	R-31
	3000	3.12	79.2	17.12	435	7.15	182	21.35	542	16	406	299	136		R-31
	5000	3.12	79.2	18.62	473	7.15	182	21.35	542	16	406	339	154		R-35
3 1/16	10000	3.12	79.2	24.38	619	8.22	209	22.02	559	16	406	528	240	19	BX-154
4 1⁄16	2000	4.06	103.1	17.12	435	8.62	219	23.41	595	16	406	517	235	24	R-37
	3000	4.06	103.1	20.12	511	8.8	224	23.41	595	16	406	559	254		R-37
	5000	4.06	103.1	21.62	549	8.8	224	23.95	608	20	508	605	275		R-39
	10000	4.06	103.1	26.38	670	9.5	241	26.1	663	24	610	924	420	24-1⁄2	BX-155
5 1⁄8	5000	5.12	130.0	28.62	727	11.69	297	27.3	693	20	508	1225	557	23	R-44
	10000	5.12	130.0	29.00	737	12.71	323	32.5	826	24	610	1364	620	23 1/2	BX-169

WEDGE GATE VALVE REFERENCE DIMENSIONS AND WEIGHTS

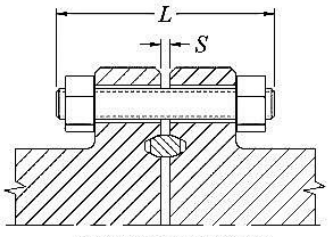


A Valve Bore
B Flange Face to Face
C Bore Centerline to Bottom of Valve
D Bore Centerline to Handwheel Top
E Handwheel Diameter
N Number of Turns to Open/Close
WT Estimated Weight

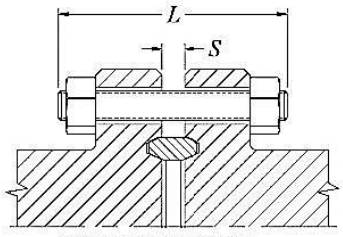
Nominal Size	Working Pressure (psi)	A		B		C		D		E		WT		N	API Ring
		in	mm	in	mm	in	mm	in	mm	in	mm	lbs	kg		
2 1/16	2000	2.06	52.3	11.62	295	4.81	122	19.25	489	13	330	119	54	13	R-23
	3000-5000	2.06	52.3	14.62	371	5.06	129	19.43	494	13	330	123	56		R-24
2 9⁄16	2000	2.56	65.0	13.12	333	5.62	143	20.18	513	13	330	178	81	15-1⁄2	R-26
	3000-5000	2.56	65.0	16.62	422	5.93	151	20.43	519	13	330	218	99		R-27
3 1⁄8	2000	3.12	79.2	14.12	359	7.18	182	22.5	572	13	330	218	99	20	R-31
	3000	3.12	79.2	17.12	435	7.31	186	21.88	556	13	330	299	136		R-31
	5000	3.12	79.2	18.62	473	7.31	186	21.88	556	16	406	339	154		R-35

RECOMMENDED FLANGE BOLT LENGTHS & RING GASKET TYPE

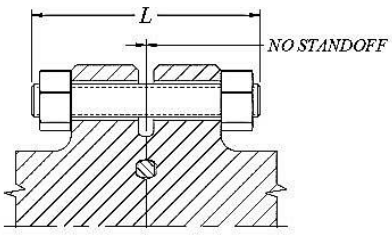
Recommended Bolt Lengths						
Nominal Size	Working Pressure (psi)	Stud			Nut	Ring Gasket
		Bolt Size and Thread	Length +0.125/−0	Qty	Qty	
2 1/16	2000	5/8-11 UNC	5	8	16	R23
	3000-5000	7/8-9 UNC	6.5	8	16	R24
	10000	3/4-10 UNC	5.5	8	16	BX-152
2 9⁄16	2000	3/4-10 UNC	5.5	8	16	R26
	3000-5000	1-8 UNC	7	8	16	R27
3 1⁄8	2000	3/4-10 UNC	5.75	8	16	R31
	3000	7/8-9 UNC	6.5	8	16	R31
	5000	1-1/8-8 UNC	7.75	8	16	R35
3 1/16	10000	1-8 UNC	7.25	8	16	BX-154
4 1⁄16	2000	7/8-9 UNC	6.5	8	16	R37
	3000	1-1/8-8 UN	7.5	8	16	R37
	5000	1-1/4-8 UN	8.5	8	16	R39
	10000	1-1/8-8 UN	8.5	8	16	BX-155
5 1⁄8	5000	1-1/2-8 UN	10.5	8	16	R44
	10000	1-1/8-8 UN	9.25	12	24	BX-169



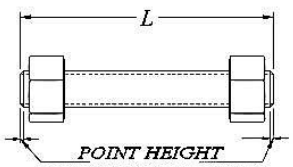
API TYPE 6B FLANGE WITH R GASKET



API TYPE 6B FLANGE WITH RX GASKET



API TYPE 6BX FLANGE



STUD BOLT WITH NUTS

LENGTH = 2(T + t + d) + S + 2(P)

T is total flange thickness;

t is plus tolerance for flange thickness;

d is heavy hex nut thickness;

S is flange face standoff (with “RX” gasket),S=0 for BX connection which has no standoff height;

P is point max. (1.5 x pitch).

6A GATE VALVE TRIM CHART

TRIM		SERVICE CONDITION	BODY	BONNET	GATE	SEAT	STEM[*3]
AA	Non-sour Service	Standard Trim, Non Corrosive	A487 4C /4130LA	4130LA	4130LA	4130LA	17-4PH
BB		Stainless Trim, Slightly Corrosive	A487 4C /4130LA	4130LA	410SS	410SS	17-4PH
CC		Full Stainless Trim, Moderately Corrosive	410SS	410SS	410SS	410SS	17-4PH
DD-0.5	Sour Service	Standard Trim, Non Corrosive	A487 4C /4130LA	4130LA	4130LA	4130LA	17-4PH
DD-NL		Standard Trim, Non Corrosive	A487 4C /4130LA	4130LA	4130LA	4130LA	4130LA
EE-0.5		Stainless Trim, Slightly Corrosive	4130LA	4130LA	410SS	410SS	17-4PH
EE-1.5		Stainless Trim, Highly Corrosive	4130LA	4130LA	410SS	410SS	410SS
EE-NL		Stainless Trim, Highly Corrosive	4130LA	4130LA	410SS	410SS	Inconel 718[*4]
FF-0.5		Full Stainless Trim Highly Corrosive	410SS	410SS	410SS	410SS	17-4PH
FF-1.5		Full Stainless Trim Highly Corrosive	410SS	410SS	410SS	410SS	410SS
FF-NL		Full Stainless Trim Highly Corrosive	410SS	410SS	410SS[*3]	410SS[*3]	Inconel 718[*4]
HH-NL[*5]		Highly Corrosive Extreme Service	4130 W/625 Inlay[*5]	4130 W/625 Inlay[*5]	Inconel 718[*4]	Inconel 718[*4]	Inconel 718[*4]

NOTES:

1.This trim chart provides information on materials included in standard valves offered by Array. Special materials, trims and configurations are available upon customer request.

2.Standard trim parts are QPQ nitrided. Tungsten Carbide HVOF, Hardfaced gates and seats are available for any TRIM upon request.

3.Materials for sour service trims conform to latest edition of NACE MR0175/ISO15156. Explanation for suffixes used for sour trims:

a) 0.5 = 0.5 psi maximum partial pressure of hydrogen sulfide(H2S)

b) 1.5 = 1.5 psi maximum partial pressure of hydrogen sulfide(H2S)

c) NL = No limit to hydrogen sulfide (H2S) exposure.

4.Inconel 718 is an alternative material for upgrade.

5.Inconel 718 is only "NL" for temperatures K thru U. Inconel 725 can be used up to temp. X.

6.CRA material is not available for temp. Y service.

7.Source reserves the right to use material class ZZ when customers request materials of construction that do not comply with current NACE MR0175/ISO standards

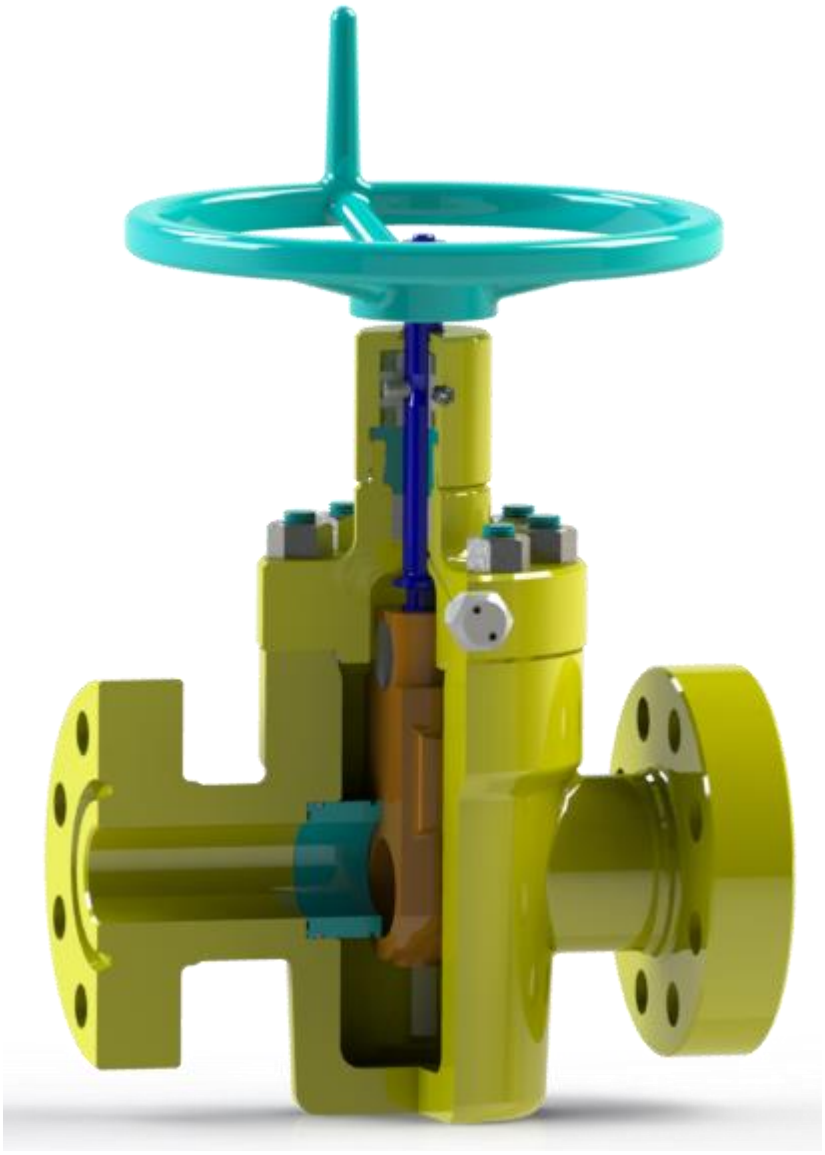
Temp. Class	Temperature Range			
	℃		°F	
	min.	max.	min.	max.
K	–60	82	–75	180
L	–46	82	–50	180
N	–46	60	–50	140
P	–29	82	–20	180
S	–18	60	0	140
T	–18	82	0	180
U	–18	121	0	250
V	2	121	35	250
X	–18	180	0	350
Y	-18	350	0	650

NOTE

Minimum temperature is the lowest ambient temperature to which the equipment can be subjected. Maximum temperature is the highest temperature of the fluid that can directly contact the equipment.

VERSA-SLAB™-LS GATE VALVE

Operating & Service Manual



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Operating & Service Procedure

Manual VERSA-SLAB™-LS Gate Valve

Date: May 2016

OPS-804 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.

Table Of Content

Section 1 Warnings

The VERSA-SLAB™–LS Gate Valve is a bi-direction non-rising stem manual operated valve incorporating a floating gate and seats design. The gate is connected to the stem through a barrel lift nut in the gate. This arrangement permits the gate to float freely and enhance a pressure assisted seal when acted on by the differential pressure across the gate. Constant contacts behind the gate and seats are maintained by action of wave springs located behind the seats and help to keep debris from accumulating into the valve cavity.

The bonnet is bolted to the valve body and pressure integrity is achieved by means of a metal ring gasket. Pressure energized U-type stem packing are used to isolate pressure in the valve cavity. The stem has a selective back seat feature to facilitate replacement of stem packing in the field when the valve cannot be removed from service.

The gate is actuated by rotation of the stem-opening (counter-clockwise rotation) and closing (clock- wise rotation). The bearing spacer is sandwiched by needle bearing assembly to provide a sturdy low operating torque gate valve.

The bonnet is equipped with a ½" grease/injection fitting for lubrication of the valve cavity and the bonnet cap has a standard grease zerk for lubrication of the stem bearing assembly.

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

Section 2 General Operation

2.1 General Description

The VERSA-SLAB™–LS Gate Valve means closing member (shutter) movable in the vertical direction of the channel axis of the valve, the pipe is mainly used as cutting medium effect, i.e., fully open or fully closed use. As the throttle valve is generally not used. It can be used in high temperature and high pressure, and can be used in various media.

Rotate stem clockwise to "close", counterclockwise to "open".

2.2 Operation Specification

Refer to specific assembly drawing and parts list.

Size (Bore)	Working Pressure (Psi)	Breaking Torque (FT LBS)	Running Torque (FT LBS)	No. of Turns
2-1/16"	2000 ~ 5000	<20	<10	16
2-1/16"	10000	<35	<20	14
2-9/16"	2000 ~ 5000	<40	<25	20
2-9/16"	10000	<80	<30	16
3-1/8"	2000 ~ 5000	<50	<30	20
3-1/16”	10000	<100	<50	20
4-1/16"	3000 ~ 5000	<80	<35	23
4-1/16"	10000	<180	<40	23

Breaking Torque denotes torque applied to open valve at full differential rated working pressure.

Running Torque denotes torque applied to operate valve after pressure is equalized across the gate.

NOTE:

It is important to back off ¼ turn after fully opening or closing valve. This is to allow the gate to freely float acting on by line pressure.

Section 3 Assembly Procedure

3.1 Installing Seat Assembly to Valve Body

a) Thoroughly clean the internal of valve body.

b) Lightly grease seat and install lip seal on the side of groove towards wave spring end of seat.

c) Coat the seat pockets in the valve body with grease.

d) Carefully press seat assembly evenly into the seat pockets, wave spring facing inside of pocket.

e) Place bonnet gasket on valve body and makeup the flange blots or studs into the valve body.

NOTE:

For tap end stud, the shorter end is installed to valve body.

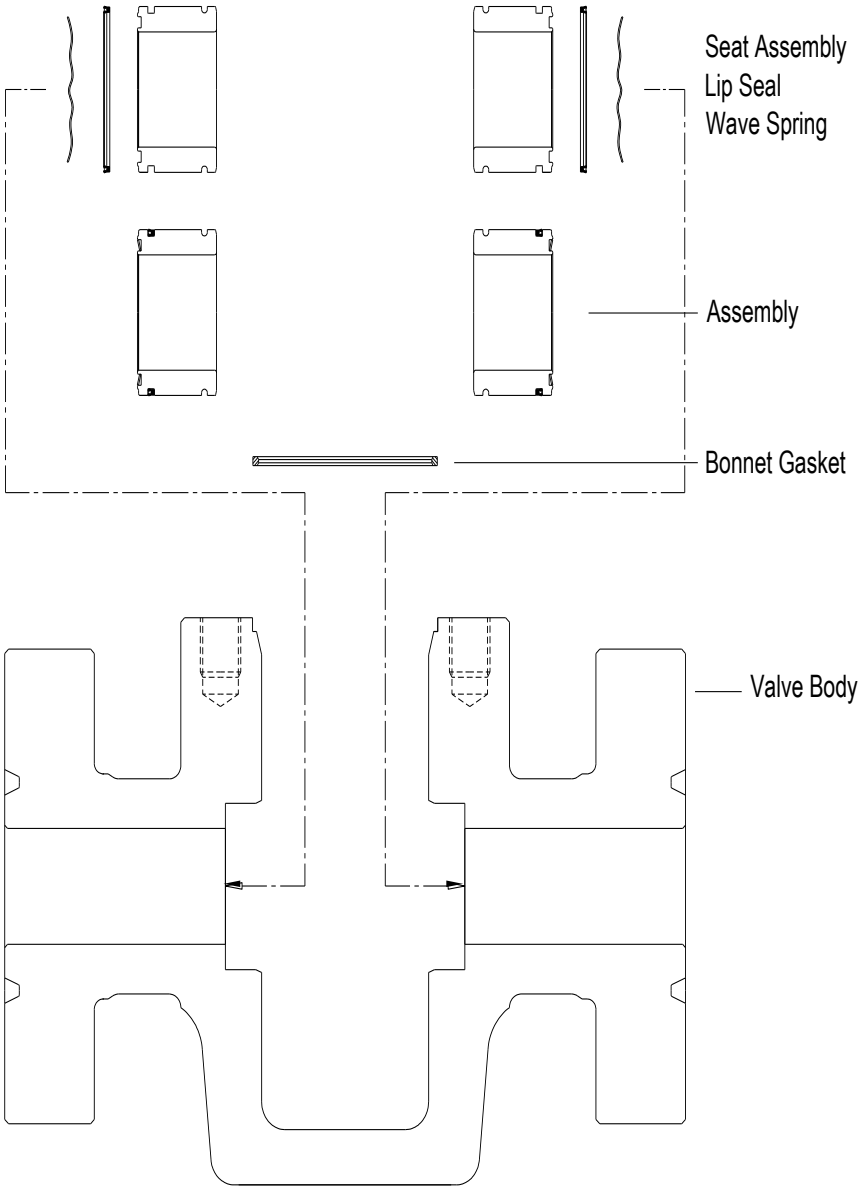


Diagram Ⅰ (Valve Body/Seat Assembly)

3.2 Installing Bonnet Assembly

⚠CAUTION:

The stem bearing assembly must be firmly lock down by the bonnet cap against the packing gland to operate properly. Any slack or clearance in the bearing spacer, bearings due to improper assembly would affect the operating torque as the needle bearings would no longer working effectively.

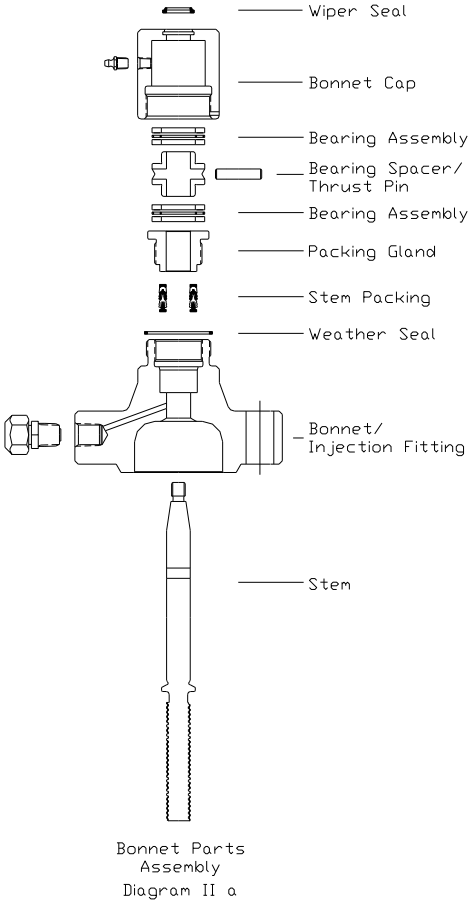
a) Lightly grease stem and install to bonnet from the bottom.

b) Lightly grease stem packing and slip over stem and evenly press them into bonnet cavity. Ensure no grease or water is trapped between to two packing. (Note: Stem Packing should be installed with U-cup side facing down into bonnet pocket)

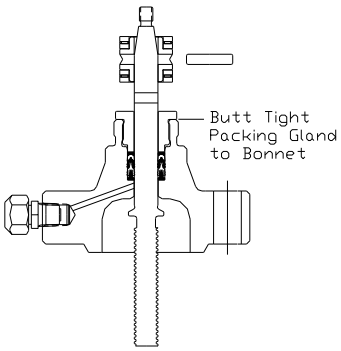
c) Install packing gland over stem and make up to bonnet. The packing gland should be sitting butt tight on top of bonnet.

d) Install bearing assembly and bearing spacer over stem and insert thrust pin through bearing spacer and stem. Rotate stem until stem/bearing assembly sits firmly on top of packing gland.

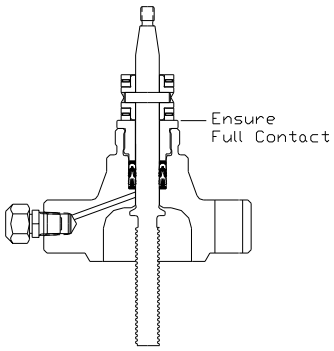
e) Install the bonnet cap over the stem and make up snugly tight to bonnet.



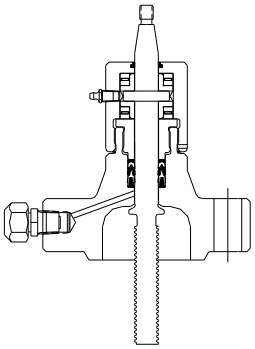
Bonnet Parts Assembly
Diagram II a



Install Stem Packing
Diagram II b



Install Bearing Assembly
Diagram II c



Install Bonnet Cap
Diagram II d

3.3 Install Gate to Bonnet Assembly

a) Lightly grease the barrel lift nut and insert to the gate. Carefully make up gate assembly to the stem by left hand rotation, until the stem has fully engaged the lift nut and partially penetrate the gate.

b) Lightly grease the 2 sealing faces of the gate.

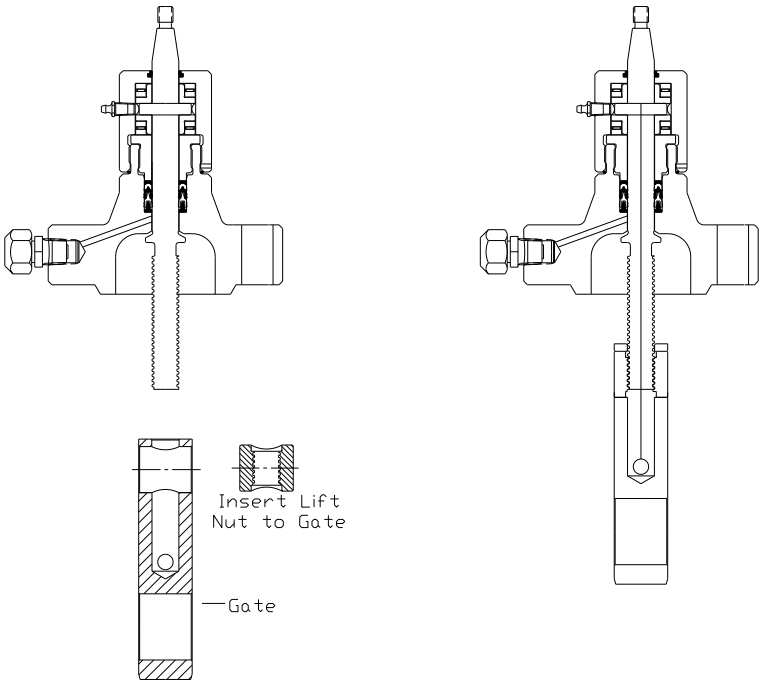


Diagram III a

Diagram III b

Bonnet/Gate
Assembly

3.4 Installing Bonnet/Gate Assembly to Valve Body

a) Carefully lift bonnet/gate assembly over the valve body and stab the gate in the space between the seats. A seat spreader aid may sometimes be necessary to spread the seats to make it easier for installing the gate. Once the gate has started between the seats it would easily slide all the way down until the bonnet comes into contact with the valve body.

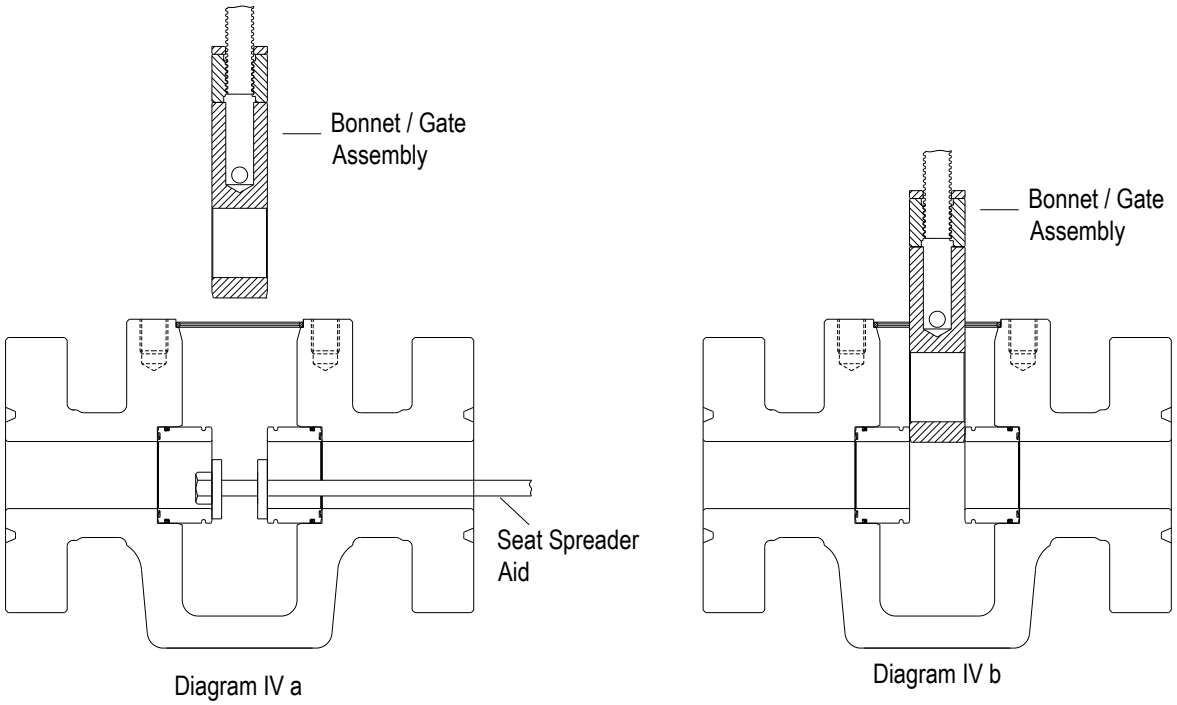


Diagram IV a

Diagram IV b

b) Orient the bonnet to locate the injection fitting at 90º to the direction of flow for easy access during field lubrication.

c) Make up four nuts in alternate position around the bonnet and operate the valve close and open to verify it is working smoothly. Make up the rest of the nuts and tighten in a crisscross manner to specified make up torque.

(Reference API 6A Table D2 Recommended Bolting Torque).

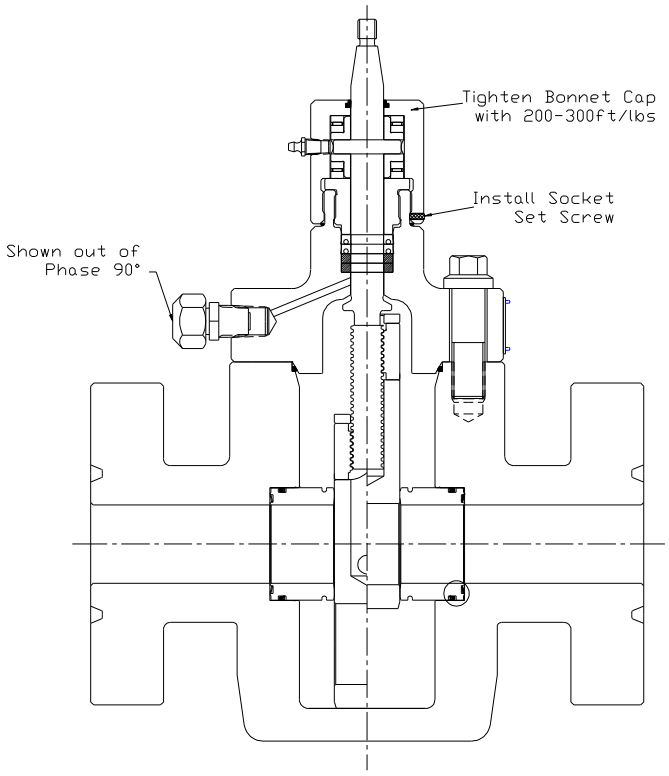


Diagram IVc

3.5 Lubrication

Fill the valve cavity with lubricant through the injection fitting per Table 1. After removing the grease gun, use a stinger to open the ball-check in the injection fitting to allow excessive grease to bleed off. Rotate the hand wheel to help excessive grease bleed out. Lightly grease the bearing assembly through the grease zerk on the bearing cap. Finally snug tight the bonnet cap install the set screw to lock the bonnet cap down.

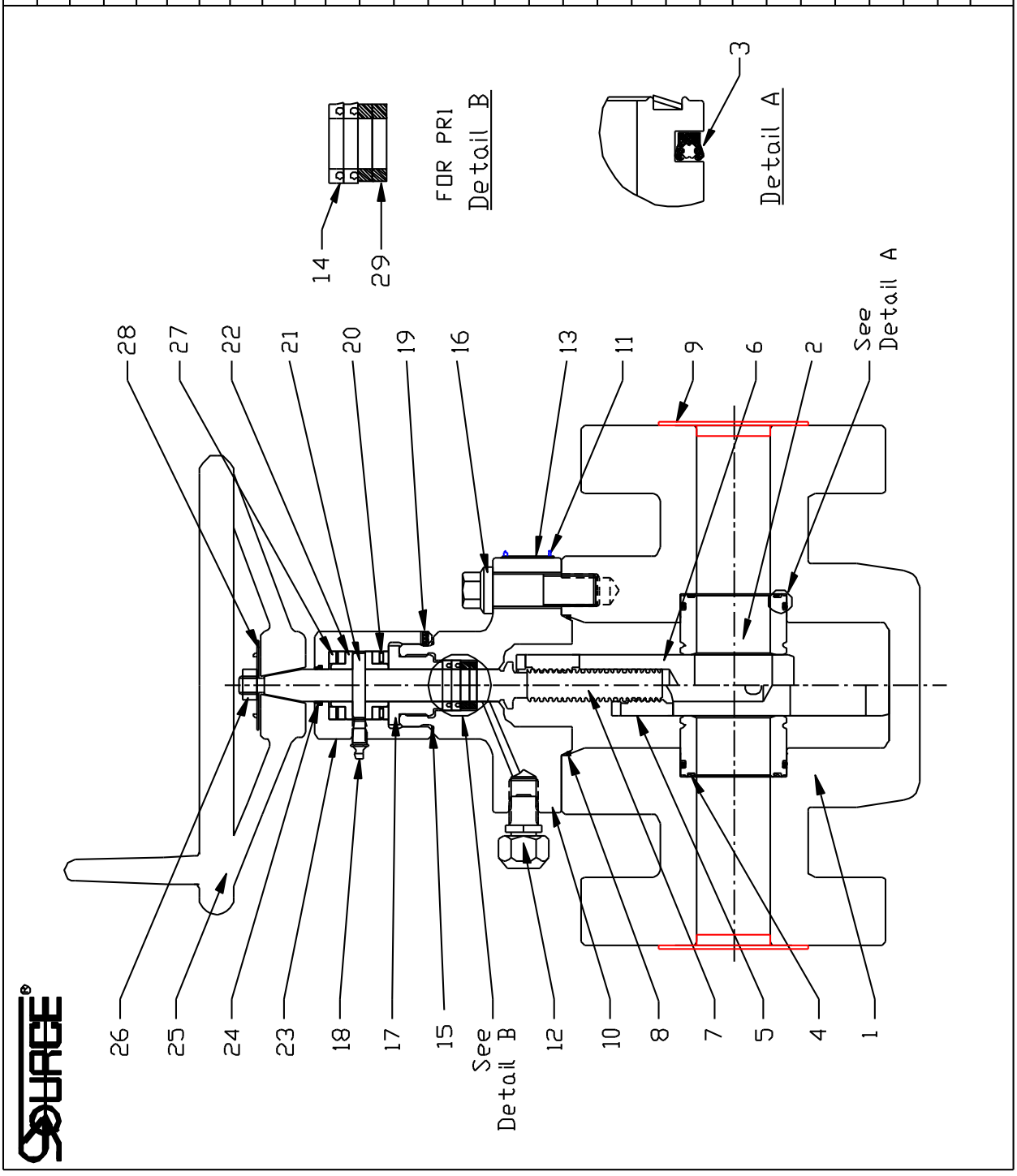
NOTE:

Recommended procedure for disassembly basically follows the reverse steps in the above assembly

Assembly Drawing:

--to be continued

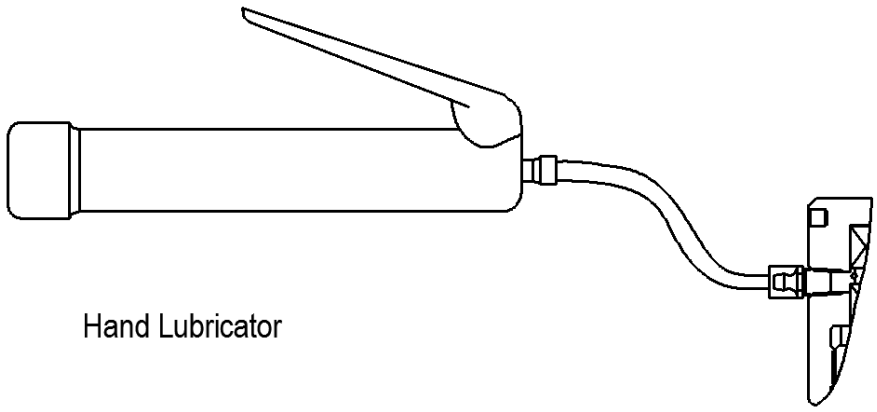
Item	Qty	Description
29	2	Packing Washer
28	1	Operating Disk
27	4	Washer, Bearing
26	1	Lock Nut
25	1	Handwheel 13"
24	1	Wiper Seal
23	1	Cap, Bonnet
22	1	Spacer, Bearing
21	1	Thrust Pin
20	2	Needle Bearing
19	1	Set Screw
18	1	Zert Fitting
17	1	Packing Gland
16	8	Bolt, Hex Flg Head
15	1	Weather Seal
14	1	Packing Assy
13	1	Name Plate
12	1	Grease Fitting
11	7	Rivet
10	1	Bonnet
9	2	Protector
8	1	Gasket, Bonnet
7	1	Stem
6	1	Slab Gate
5	1	Lift Nut
4	2	Wave Spring
3	2	Lip Seal
2	2	Seat
1	1	Valve Body



Section 4 Regular Field Maintenance

4.1 Stem Bearing Assembly Lubrication

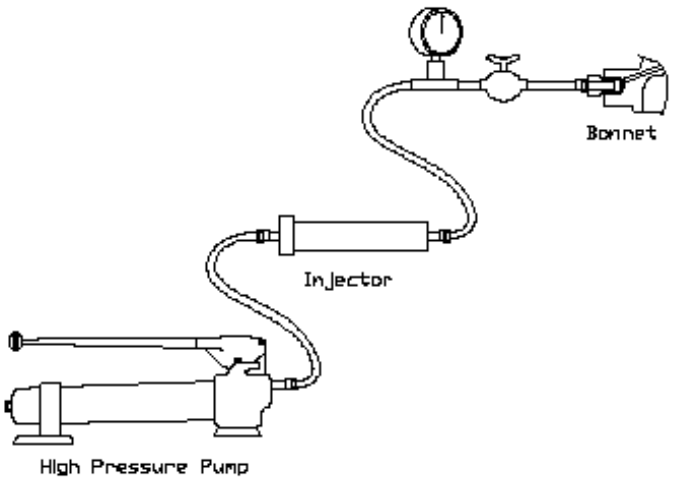
Regular lubrication of the stem bearing assembly is essential to maintain a trouble free and smooth operation of a valve. A good grade of automotive grease is generally used and is injected through the grease zerk located on the bonnet cap with a hand held lubricate.



Lubrication of Stem Bearing

4.2 Valve Cavity Lubrication

The valve cavity should be lubricated on a regular basis to ensure continuous smooth operation of the valve. A general rule of thumb is to re-grease the valve cavity after about 50 cycle of operations of whenever the valve has been in dormant over a long period of time. Whenever possible lubrication should only be done after the valve is isolated from the pressure.



Lubrication of Valve Cavity
Under Line Pressure

1) Lubrication Procedure with Isolated Line Pressure

a) Close valve. Remove cap on injection fitting located on the bonnet and install stinger cap to bleed off

any pressure trapped in the valve cavity.

b) Make up hose of injection pump to bonnet injection fitting and pump the approximate displacement volume of grease as shown in Table 1 into the valve cavity.

c) Operate the valve open/close several times to distribute the grease in the valve cavity. Continue to pump until the required amount is displaced.

d) Closed the valve. Bleed pressure and remove grease pump. Re-install injection fitting cap.

Table 1

Valve Sizes	Rectangular Cavity	Round Cavity
2-1/6" 2000 to 10000 Psi	1.0 Lbs	2.0 Lbs
2-9/16" 2000 to 5000 Psi	2.0 Lbs	3.0 Lbs
2-9/16” 10000 Psi		3.0 Lbs
3-1/8" 2000 to 5000 Psi	3.0 Lbs	4.0 Lbs
3-1/16” 10000 Psi		4.0 Lbs
4-1/16" 3000 to 5000 Psi		5.0 Lbs
4-1/16" 10000 Psi		5.0 Lbs

2) Lubrication Procedure with Open Line Pressure

In a situation where the line pressure cannot be isolated to perform valve cavity lubrication, a high pressure grease gun may be employed to force pressurized grease into the cavity.

a) Close valve. Slowly back off cap on injection fitting. If the ball-check in the fitting is bleeding pressure, than quickly retighten cap and abort the attempt to lubricate valve under line pressure. Otherwise, proceed lubrication as follows.

b) Install an isolation needle valve between injection fitting and the high pressure injection pump. Shut-off needle valve, pump grease pressure up to approximately 1,000 psi higher the line pressure in the valve.

c) Open needle valve to allow the pressurized grease to force open the ball-check and flow into the valve cavity. Repeat this procedure until sufficient grease is injected into the valve cavity.

d) Close needle valve, remove injection pump and replace the cap to the bonnet injection fitting.

4.3 Field Replacement of Parts

1) Replacement of Stem Packing

The VERSA-SLAB™–LS Gate Valve is designed with the stem back seat feature to allow replacement of stem packing while the valve is in service. The stem back seat can be performed with the valve either in the open or closed position. However, as far as possible, the back seating of the stem is done preferably with valve in closed position when field replacement of stem packing is desirable.

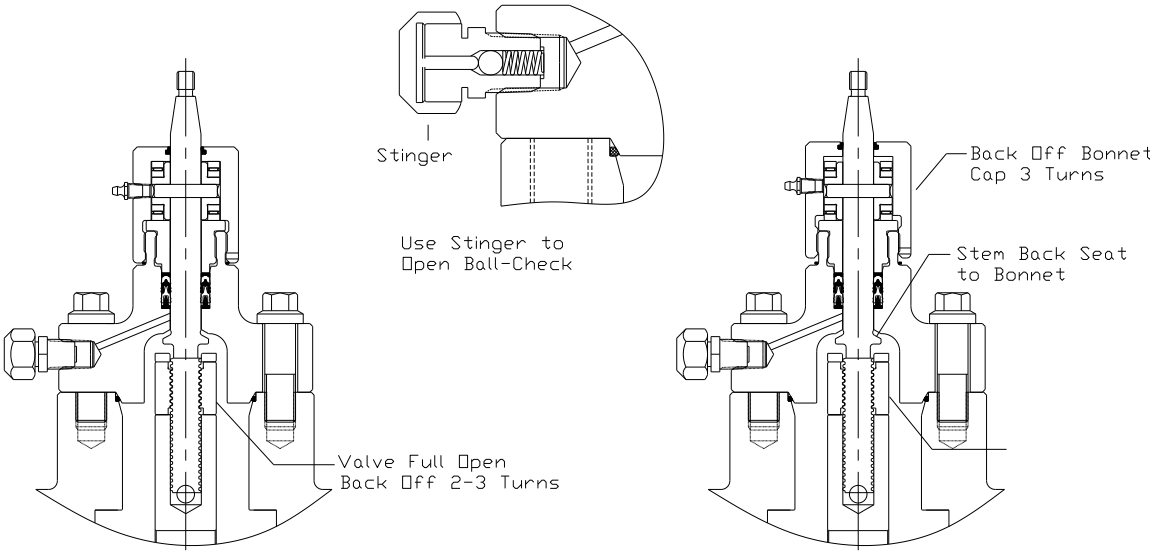


Diagram V a

Diagram V b

2) Back Seat Stem – Valve in Open Position

a) Open valve fully and rotate hand-wheel counterclockwise about 2 turns to allow sufficient clearance for the stem/gate assembly to move up against the bonnet back seat profile when the bonnet cap is back off.

b) Remove set screw on the bonnet cap. Mark location and back off bonnet cap 3 full turns. If there is sufficient line pressure in the valve the stem could be seen rising as the bonnet cap is back off. The stem would stop the upward movement once the back seat taper on the stem comes into contact with the matching profile in the bonnet. If no line pressure is present, an upward heave on the hand-wheel would similarly raise the stem.

c) Remove the cap on the injection fitting (located on the bonnet) careful not to inadvertently backing off the fitting by applying a back-up wrench if necessary. Install a cap stinger to the injection fitting and slowly make up to depress the ball-check to bleed off any pressure trapped in the packing cavity of the bonnet. If no further pressure is bleeding off than the stem back seat is verified to hold pressure.

WARNING:

In the event of continuous pressure bleeding, back off the bonnet cap another full turn in case the stem has not moved up far enough to coin a seal in the bonnet. If this still does not stop the pressure bleed off indicating the stem back seat is unable to hold pressure, quickly retighten up the bonnet cap the same number of turns back to its original marked position and re-install the set screw.

In this situation the valve must be removed from service to replace the stem packing or the line pressure must be completely isolated if the valve cannot be remove.

d) Proceed to remove hand-wheel, bonnet cap and bearing assembly. While doing so careful not to accidentally push or exert any force on the stem as it may inadvertently unseat the stem back seat. Carefully unscrew packing gland. Remove the stem packing. One easy way is to blow air or pump grease through the injection fitting to “pop” the packing out of the bonnet.

e) Install new stem packing careful to install them with the expander spring side facing down into the bonnet box. A little oil would help to squeeze the packing down. Replace packing gland. (See Assembly Procedure for more information on assembly)

⚠ **CAUTION:**

If the replacement of stem packing is perform under line pressure and stem back seat, the task should be carried out in the most efficient and swift manner to minimize exposure time.

f) Remove stinger cap and reinstall protective cap to bonnet injection fitting. Install bearing assembly and bonnet cap and set screw. (See Assembly Procedure for more information on assembly detail)

⚠ **CAUTION:**

Making up of bonnet cap will result in unseating the stem back seat and may subject stem packing to line pressure in the valve.

g) Lubricate stem bearing and valve cavity if necessary according to aforementioned recommended procedures.

3) Stem Back Seat – Valve in Closed Position

a) Close valve fully and back off ¼ turn.

b) Remove set screw on the bonnet cap. Mark location and back off bonnet cap 3 full turns. If there is sufficient line pressure in the valve the stem could be seen rising as the bonnet cap is back off. The stem would stop the upward movement once the back seat taper on the stem comes into contact with the matching profile in the bonnet. In case there is no line pressure, an upward heave on the handwheel would similarly raise the stem.

The rest of the procedure steps c)-g) is similar to the procedure as in Stem Back Seating in Valve Open Position.

Section 5 Recommended Spare Parts

Two forms of Versa-Slab Gate Valve Repair Kits are available to cater for regular and major refurbishing of used valves.

A mini-repair kit is for regular for replacement of all elastomeric parts.

An all-renew repair kit is for a complete rebuilt of a valve when it is deemed economical to do so. The all-renew repair kit consists of all the parts in a valve except valve body & bonnet, studs & nuts and hand-wheel.

Over-sized seats are available on order when the seat pockets of a valve require overbore for a new seat pocket.

Extracted from API 6A Appendix

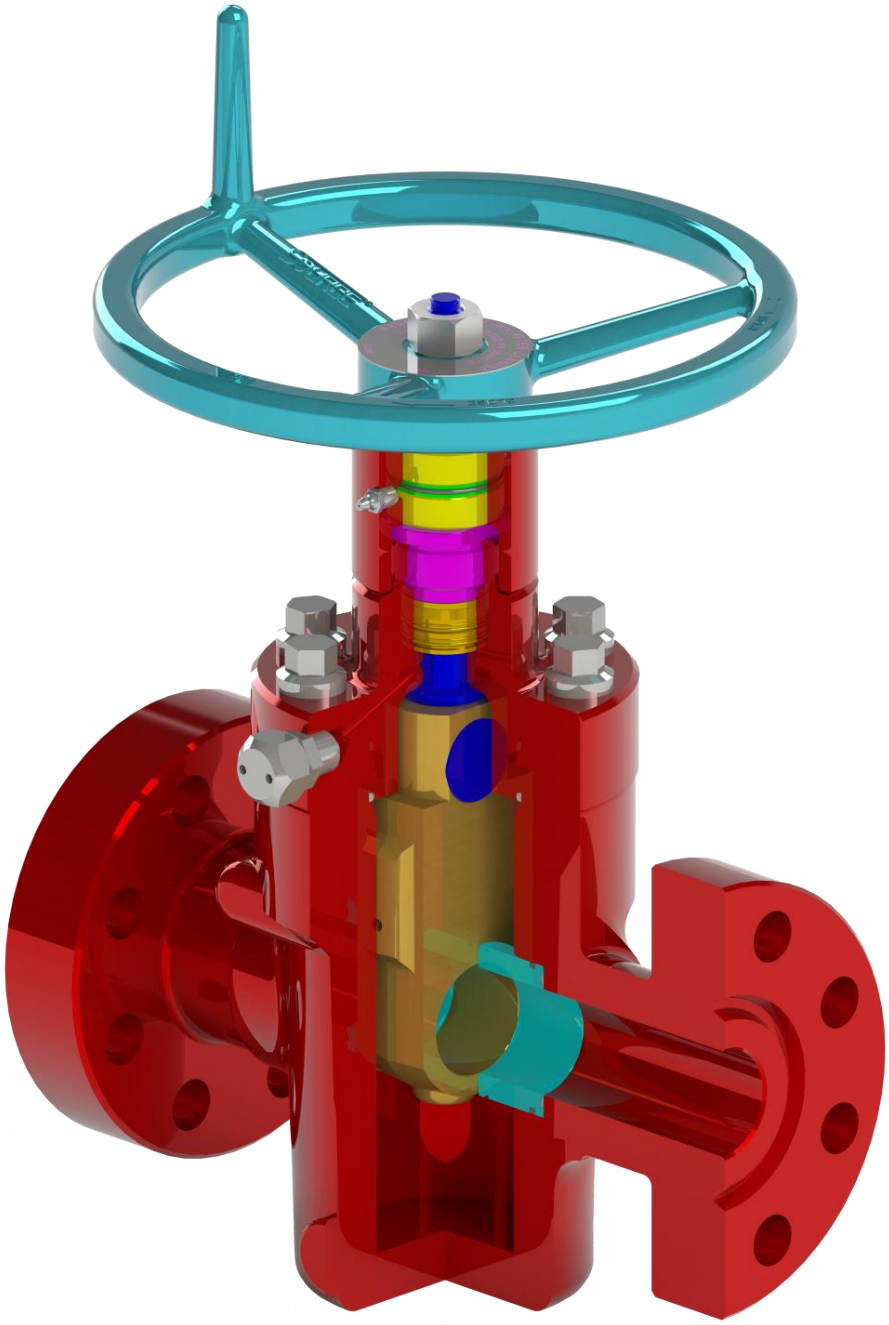
Table D.2 — Recommended torques for flange bolting (USC units)

Stud diameter	Threads per in	Studs with S_y = 80 ksi Bolt stress equal to 40 ksi			Studs with S_y = 105 ksi Bolt stress equal to 52,5 ksi			Studs with S_y = 95 ksi Bolt stress equal to 47,5 ksi		
		Tension	Torque	Torque	Tension	Torque	Torque	Tension	Torque	Torque
D	N	F	f = 0,07	f = 0,13	F	f = 0,07	f = 0,13	F	f = 0,07	f = 0,13
in	1/in	lbf	ft·lbf	ft·lbf	lbf	ft·lbf	ft·lbf	lbf	ft·lbf	ft·lbf
0,500	13	5 676	27	45	7 450	35	59	—	—	—
0,625	11	9 040	52	88	11 865	68	115	—	—	—
0,750	10	13 378	90	153	17 559	118	200	—	—	—
0,875	9	18 469	143	243	24 241	188	319	—	—	—
1,000	8	24 230	213	361	31 802	279	474	—	—	—
1,125	8	31 618	305	523	41 499	401	686	—	—	—
1,250	8	39 988	421	726	52 484	553	953	—	—	—
1,375	8	49 340	563	976	64 759	739	1 281	—	—	—
1,500	8	59 674	733	1 278	78 322	962	1 677	—	—	—
1,625	8	70 989	934	1 635	93 173	1 226	2 146	—	—	—
1,750	8	83 286	1 169	2 054	109 313	1 534	2 696	—	—	—
1,875	8	96 565	1 440	2 539	126 741	1 890	3 332	—	—	—
2,000	8	110 825	1 750	3 094	145 458	2 297	4 061	—	—	—
2,250	8	142 292	2 496	4 436	186 758	3 276	5 822	—	—	—
2,500	8	177 685	3 429	6 118	233 212	4 500	8 030	—	—	—
2,625	8	—	—	—	—	—	—	233 765	4 716	8 430
2,750	8	—	—	—	—	—	—	257 694	5 424	9 712
3,000	8	—	—	—	—	—	—	309 050	7 047	12 654
3,250	8	—	—	—	—	—	—	365 070	8 965	16 136
3,750	8	—	—	—	—	—	—	491 099	13 782	24 905
3,875	8	—	—	—	—	—	—	525 521	15 208	27 506
4,000	8	—	—	—	—	—	—	561 108	16 730	30 282

Rev.	Date	Record of Changes
NC	2014/12/25	Initial Release
01	2016/05/10	Correct typo error & Re-edit

VERSA-SLAB™-HS GATE VALVE

Operating & Service Manual



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Operating & Service Procedure

Manual VERSA-SLAB™ Gate Valve

Date: June 2016

OPS-801 Rev.06

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 recommend-ed procedure is adopted. The user is the best judge when applying this procedure base on specific equipment installation and the operating conditions.

Table Of Content

Section 1 Warnings

The VERSA-SLAB™ Gate Valve is a bi-direction non-rising stem manual operated valve incorporating a floating gate and seats design. The gate is connected to the stem through a barrel lift nut in the gate. This arrangement permits the gate to float freely and enhance a pressure assisted seal when acted on by the differential pressure across the gate. Constant contacts behind the gate and seats are maintained by action of wave springs located behind the seats and help to keep debris from accumulating into the valve cavity.

The bonnet is bolted to the valve body and pressure integrity is achieved by means of a metal ring gasket. Pressure energized U-type stem packing are used to isolate pressure in the valve cavity. The stem has a selective back seat feature to facilitate replacement of stem packing in the field when the valve cannot be removed from service.

The gate is actuated by rotation of the stem-opening (counter-clockwise rotation) and closing (clock- wise rotation). The bearing spacer is sandwiched by needle bearing assembly to provide a sturdy low operating torque gate valve.

The bonnet is equipped with a ½" grease/injection fitting for lubrication of the valve cavity and the bonnet cap has a standard grease zerk for lubrication of the stem bearing assembly.

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

Section 2 General Operation

2.1 General Description

The VERSA-SLAB™ Gate Valve means closing member (shutter) movable in the vertical direction of the channel axis of the valve, the pipe is mainly used as cutting medium effect, i.e., fully open or fully closed use. As the throttle valve is generally not used. It can be used in high temperature and high pressure, and can be used in various media.

Rotate stem clockwise to "close", counterclockwise to "open".

2.2 Operation Specification

Refer to specific assembly drawing and parts list.

Size (Bore)	Working Pressure (psi)	Breaking Torque (ft lbs)	Running Torque (ft lbs)	No. of Turns
2-1/16"	2000 ~ 5000	<20	<10	13.5
2-1/16"	10000	<35	<20	13
2-9/16"	2000 ~ 5000	<40	<25	20
2-9/16"	10000	<80	<30	16.5
3-1/8"	2000 ~ 5000	<50	<30	20
3-1/16”	10000	<100	<50	19
4-1/16"	3000 ~ 5000	<80	<35	24
4-1/16"	10000	<180	<40	24.5
5-1/8"	3000 ~ 5000	<120	<40	23
5-1/8"	10000	<240	<55	23.5

Breaking Torque denotes torque applied to open valve at full differential rated working pressure.

Running Torque denotes torque applied to operate valve after pressure is equalized across the gate.

NOTE:

It is important to back off ¼ turn after fully opening or closing valve. This is to allow the gate to freely float acting on by line pressure.

Section 3 Assembly Procedure

3.1 Installing Seat Assembly to Valve Body

a) Thoroughly clean the internal of valve body.

b) Lightly grease seat and install lip seal on the side of groove towards wave spring end of seat.

c) Coat the seat pockets in the valve body with grease.

d) Carefully press seat assembly evenly into the seat pockets, wave spring facing inside of pocket.

e) Place bonnet gasket on valve body and make up studs into the valve body.

NOTE:

For tap end stud, the shorter end is installed to valve body.

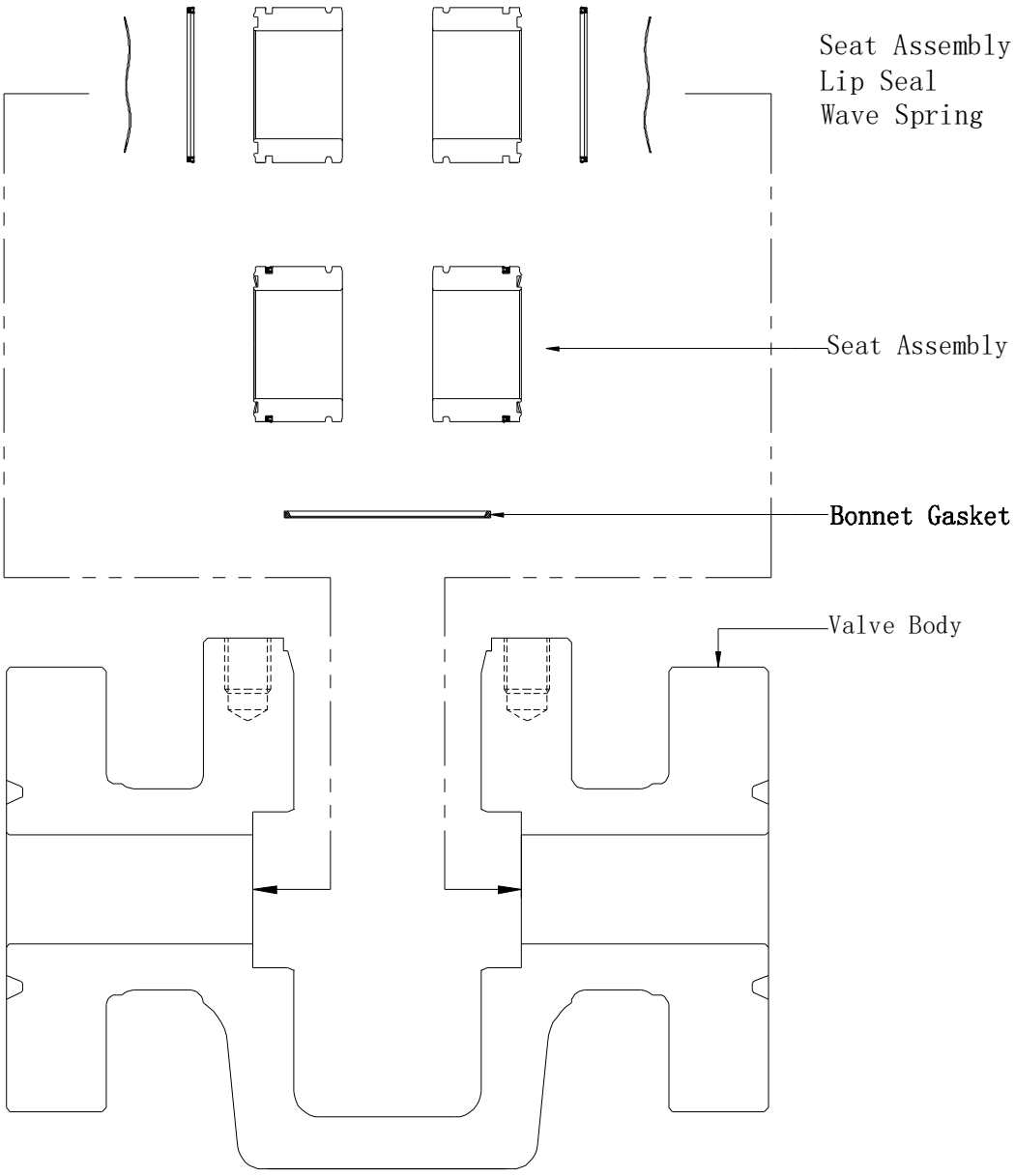


Diagram Ⅰ (Valve Body/Seat Assembly)

3.2 Installing Bonnet Assembly

⚠CAUTION:

The stem bearing assembly must be firmly lock down by the bonnet cap against the packing gland to operate properly. Any slack or clearance in the bearing spacer, bearings due to improper assembly would affect the operating torque as the needle bearings would no longer working effectively.

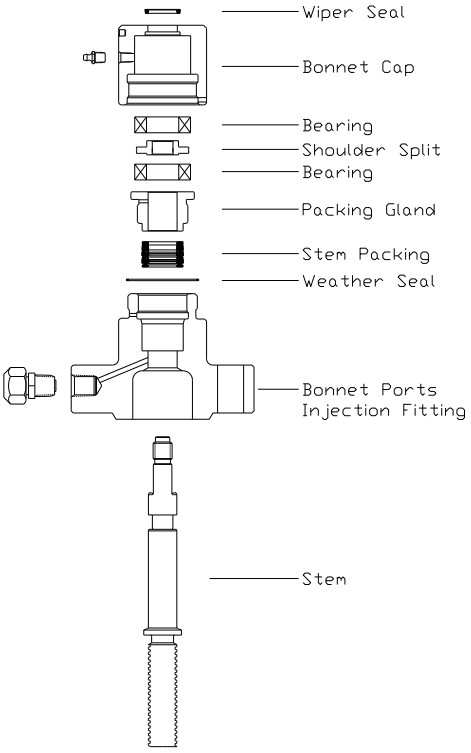
a) Lightly grease stem and install to bonnet from the bottom.

b) Lightly grease stem packing and slip over stem and evenly press them into bonnet cavity. Ensure no grease or water is trapped between to two packing. (Note: Stem Packing should be installed with U-cup side facing down into bonnet pocket)

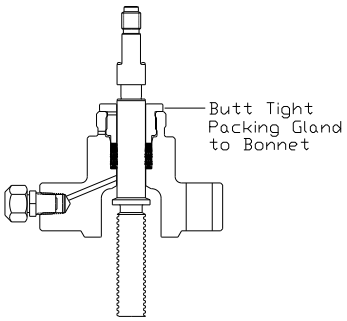
c) Install packing gland over stem and make up to bonnet. The packing gland should be sitting butt tight on top of bonnet.

d) Install bearing assembly and split shoulder over stem. Rotate stem until stem/bearing assembly sits firmly on top of packing gland.

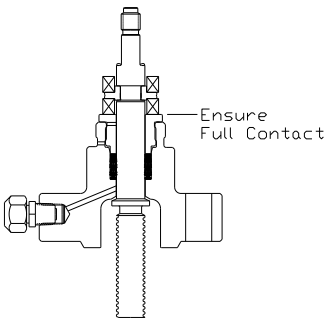
e) Put wiper seal into the bonnet cap then install them over the stem and make up snugly tight to bonnet.



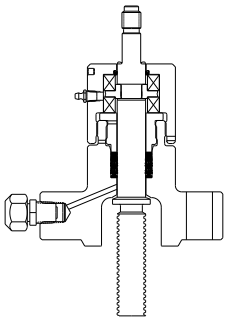
Bonnet Ports Assemmbly
Diagram II a



Install Stem Packing
Diagram II b



Install Bearing Assembly
Diagram II c



Install Bonnet Cap
Diagram II d

3.3 Install Gate to Bonnet Assembly

a) Lightly grease the barrel lift nut and insert to the gate. Carefully make up gate assembly to the stem by left hand rotation, until the stem has fully engaged the lift nut and partially penetrate the gate.

b) Lightly grease the 2 sealing faces of the gate.

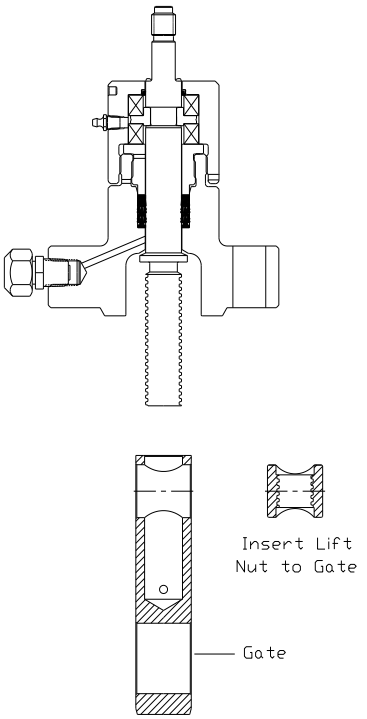
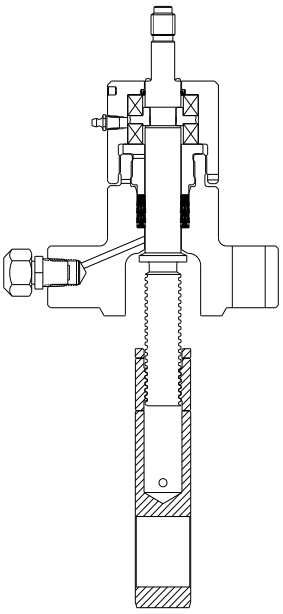


Diagram III a



Install Gate to
Bonnet Assembly
Diagram III b

3.4 Installing Bonnet/Gate Assembly to Valve Body

a) Carefully lift bonnet/gate assembly over the valve body and stab the gate in the space between the seats. A seat spreader aid may sometimes be necessary to spread the seats to make it easier for installing the gate. Once the gate has started between the seats it would easily slide all the way down until the bonnet comes into fully contact with the valve body.

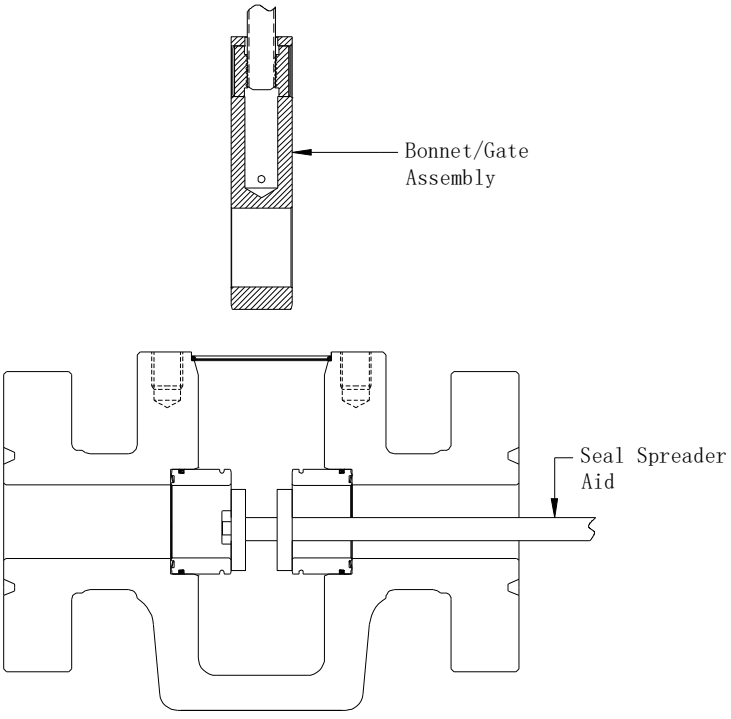


Diagram IV a

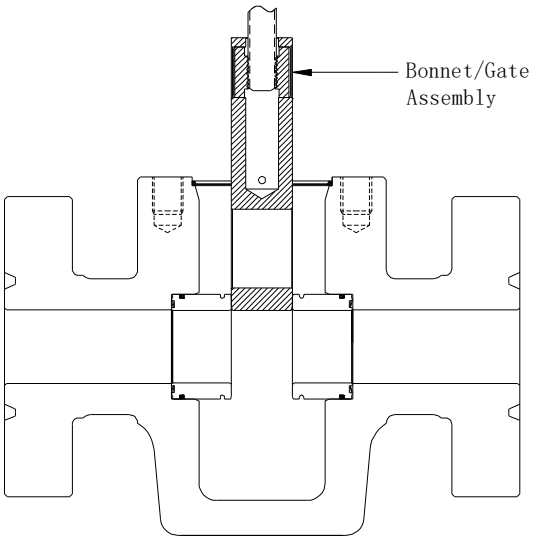


Diagram IV b

b) Orient the bonnet to locate the injection fitting at 90º to the direction of flow for easy access during field lubrication.

c) Make up four nuts in alternate position around the bonnet and operate the valve close and open to verify it is working smoothly. Make up the rest of the nuts and tighten in a crisscross manner to specified make up torque.

(Reference API 6A Table D2 Recommended Bolting Torque).

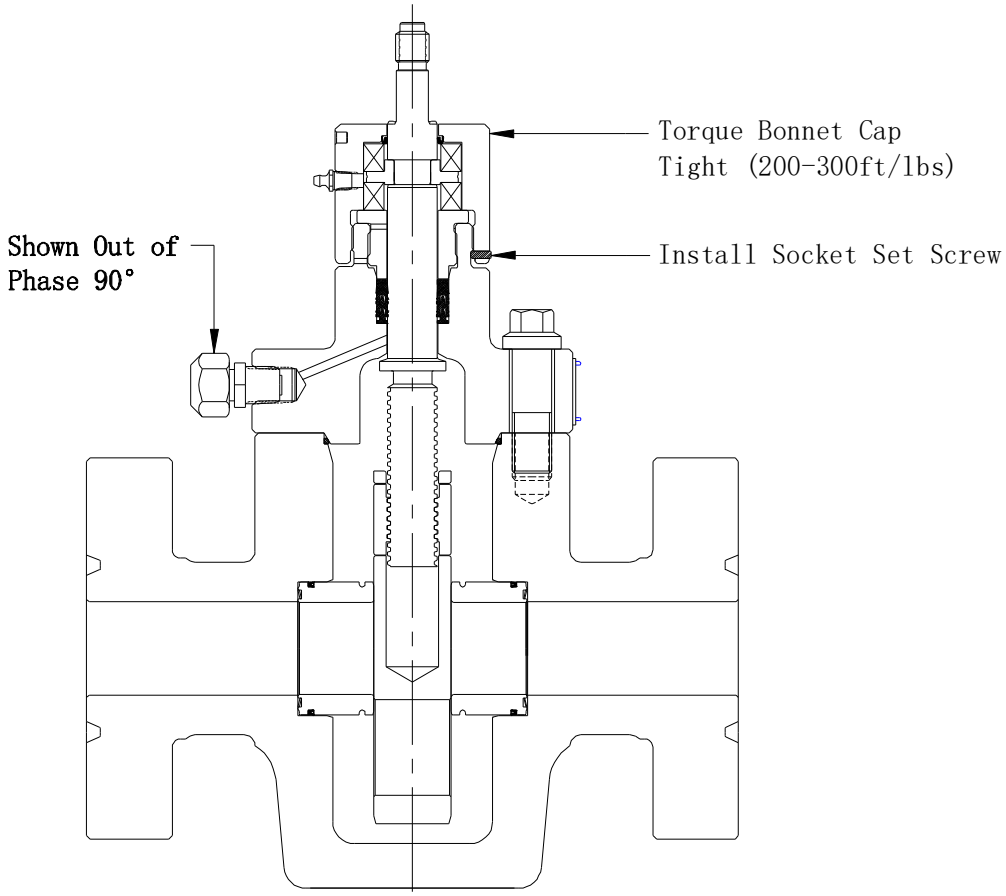


Diagram IV c

3.5 Lubrication

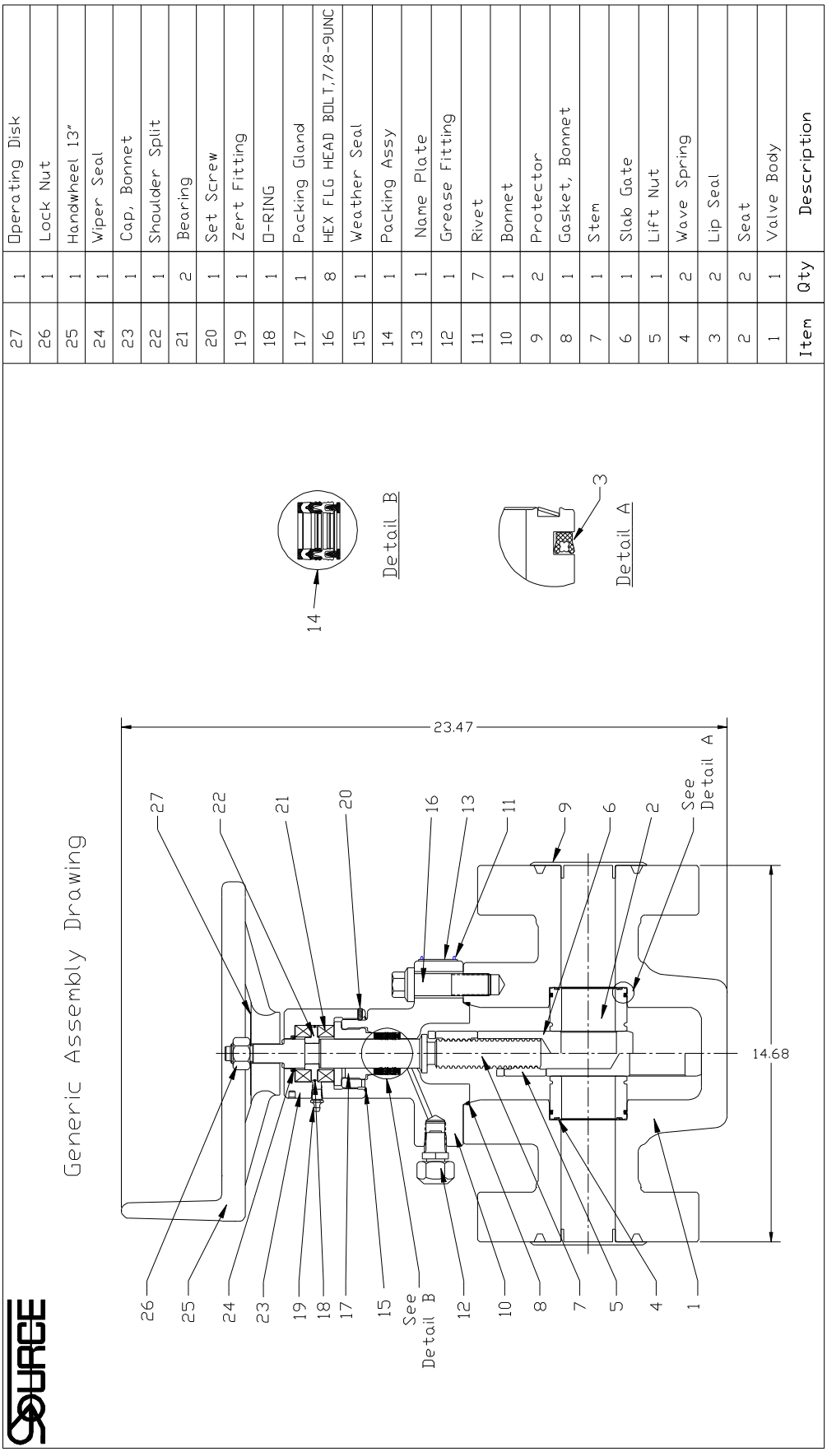
Fill the valve cavity with lubricant through the injection fitting per Table 1. After removing the grease gun, use a stinger to open the ball-check in the injection fitting to allow excessive grease to bleed off. Rotate the hand wheel to help excessive grease bleed out. Lightly grease the bearing assembly through the grease zert on the bearing cap. Finally snug tight the bonnet cap install the set screw to lock the bonnet cap down.

NOTE:

1) **Recommended procedure for disassembly basically follows the reverse steps as above.**
2) **Recommended Grease: Moly-Lith No 2 or alternative for bearing, packing seal OD & all threads (except NPT). Desco 111(HS) or alternative for sealing contact surface of gate, seat & stem.**

Assembly Drawing:

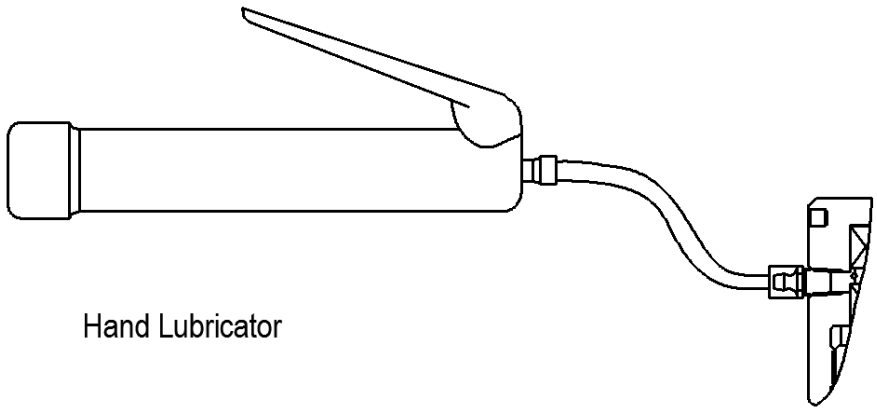
Item	Qty	Description
27	1	Operating Disk
26	1	Lock Nut
25	1	Handwheel 13"
24	1	Wiper Seal
23	1	Cap, Bonnet
22	1	Shoulder Split
21	2	Bearing
20	1	Set Screw
19	1	Zert Fitting
18	1	O-RING
17	1	Packing Gland
16	8	HEX FLG HEAD BOLT,7/8-9UNC
15	1	Weather Seal
14	1	Packing Assy
13	1	Name Plate
12	1	Grease Fitting
11	7	Rivet
10	1	Bonnet
9	2	Protector
8	1	Gasket, Bonnet
7	1	Stem
6	1	Slab Gate
5	1	Lift Nut
4	2	Wave Spring
3	2	Lip Seal
2	2	Seat
1	1	Valve Body



Section 4 Regular Field Maintenance

4.1 Stem Bearing Assembly Lubrication

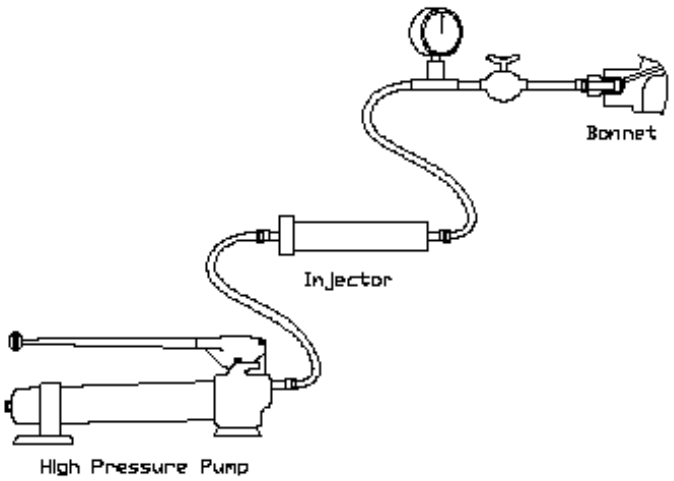
Regular lubrication of the stem bearing assembly is essential to maintain a trouble free and smooth operation of a valve. A good grade of automotive grease is generally used and is injected through the grease zert located on the bonnet cap with a hand held lubricate.



Lubrication of Stem Bearing

4.2 Valve Cavity Lubrication

The valve cavity should be lubricated on a regular basis to ensure continuous smooth operation of the valve. A general rule of thumb is to re-grease the valve cavity after about 50 cycle of operations of whenever the valve has been in dormant over a long period of time. Whenever possible lubrication should only be done after the valve is isolated from the pressure.



Lubrication of Valve Cavity
Under Line Pressure

1) Lubrication Procedure with Isolated Line Pressure

a) Close valve. Remove cap on injection fitting located on the bonnet and install stinger cap to bleed off

any pressure trapped in the valve cavity.

b) Make up hose of injection pump to bonnet injection fitting and pump the approximate displacement volume of grease as shown in Table 1 into the valve cavity.

c) Operate the valve open/close several times to distribute the grease in the valve cavity. Continue to pump until the required amount is displaced.

d) Closed the valve. Bleed pressure and remove grease pump. Re-install injection fitting cap.

Table 1

Valve Sizes	Rectangular Cavity	Round Cavity
2-1/6" 2000 to 10000 Psi	1.0 Lbs	2.0 Lbs
2-9/16" 2000 to 5000 Psi	2.0 Lbs	3.0 Lbs
2-9/16” 10000 Psi		3.0 Lbs
3-1/8" 2000 to 5000 Psi	3.0 Lbs	4.0 Lbs
3-1/16” 10000 Psi		4.0 Lbs
4-1/16" 3000 to 5000 Psi		5.0 Lbs
4-1/16" 10000 Psi		5.0 Lbs
5-1/8" 3000 to 5000 Psi		10.0 Lbs
5-1/8" 10000 Psi		10.0 Lbs

2) Lubrication Procedure with Open Line Pressure

In a situation where the line pressure cannot be isolated to perform valve cavity lubrication, a high pressure grease gun may be employed to force pressurized grease into the cavity.

a) Close valve. Slowly back off cap on injection fitting. If the ball-check in the fitting is bleeding pressure, than quickly retighten cap and abort the attempt to lubricate valve under line pressure. Otherwise, proceed lubrication as follows.

b) Install an isolation needle valve between injection fitting and the high pressure injection pump. Shut-off needle valve, pump grease pressure up to approximately 1,000 psi higher the line pressure in the valve.

c) Open needle valve to allow the pressurized grease to force open the ball-check and flow into the valve cavity. Repeat this procedure until sufficient grease is injected into the valve cavity.

d) Close needle valve, remove injection pump and replace the cap to the bonnet injection fitting.

4.3 Field Replacement of Parts

1) Replacement of Stem Packing

The VERSA-SLAB™ Gate Valve is designed with the stem back seat feature to allow replacement of stem packing while the valve is in service. The stem back seat can be performed with the valve either in the open or closed position. However, as far as possible, the back seating of the stem is done preferably with valve in closed position when field replacement of stem packing is desirable.

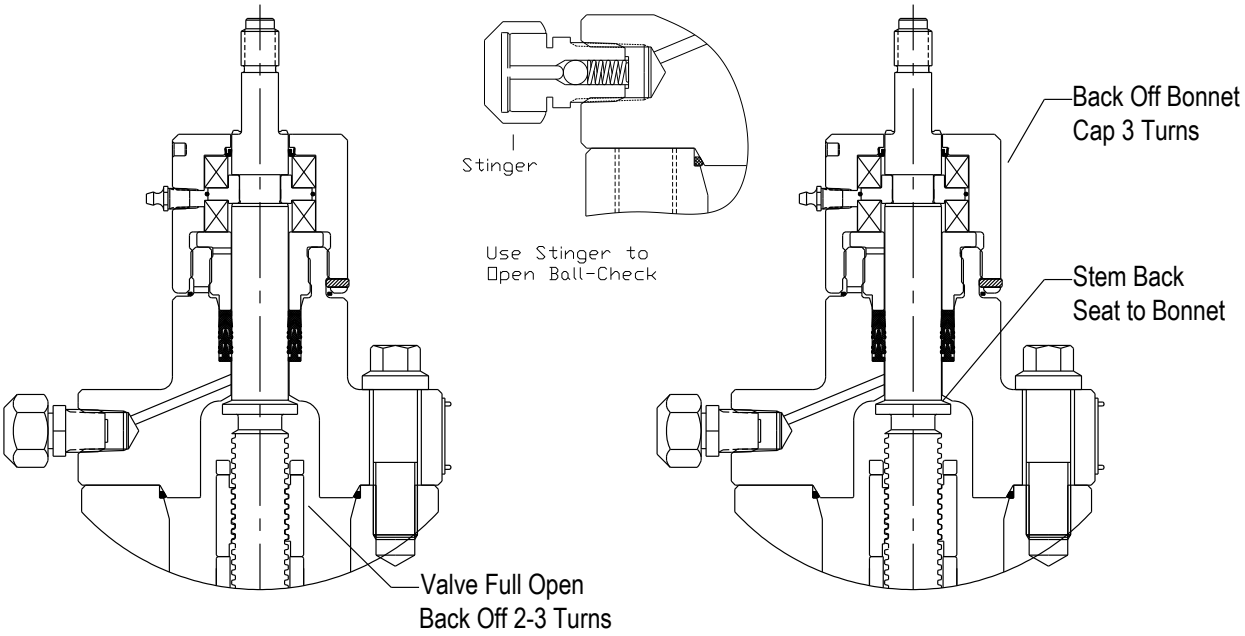


Diagram V a

Diagram V b

2) Back Seat Stem – Valve in Open Position

a) Open valve fully and rotate hand-wheel counterclockwise about 2 turns to allow sufficient clearance for the stem/gate assembly to move up against the bonnet back seat profile when the bonnet cap is back off.

b) Remove set screw on the bonnet cap. Mark location and back off bonnet cap 3 full turns. If there is sufficient line pressure in the valve the stem could be seen rising as the bonnet cap is back off. The stem would stop the upward movement once the back seat taper on the stem comes into contact with the matching profile in the bonnet. If no line pressure is present, an upward heave on the hand-wheel would similarly raise the stem.

c) Remove the cap on the injection fitting (located on the bonnet) careful not to inadvertently backing off the fitting by applying a back-up wrench if necessary. Install a cap stinger to the injection fitting and slowly make up to depress the ball-check to bleed off any pressure trapped in the packing cavity of the bonnet. If no further pressure is bleeding off than the stem back seat is verified to hold pressure.

WARNING:

In the event of continuous pressure bleeding, back off the bonnet cap another full turn in case the stem has not moved up far enough to coin a seal in the bonnet. If this still does not stop the pressure bleed off indicating the stem back seat is unable to hold pressure, quickly retighten up the bonnet cap the same number of turns back to its original marked position and re-install the set screw.
In this situation the valve must be removed from service to replace the stem packing or the line pressure must be completely isolated if the valve cannot be remove.

d) Proceed to remove hand-wheel, bonnet cap and bearing assembly. While doing so careful not to accidentally push or exert any force on the stem as it may inadvertently unseat the stem back seat. Carefully unscrew packing gland. Remove the stem packing. One easy way is to blow air or pump grease through the injection fitting to “pop” the packing out of the bonnet.

e) Install new stem packing careful to install them with the expander spring side facing down into the bonnet box. A little oil would help to squeeze the packing down. Replace packing gland. (See Assembly Procedure for more information on assembly)

⚠ **CAUTION:**

If the replacement of stem packing is perform under line pressure and stem back seat, the task should be carried out in the most efficient and swift manner to minimize exposure time.

f) Remove stinger cap and reinstall protective cap to bonnet injection fitting. Install bearing assembly and bonnet cap and set screw. (See Assembly Procedure for more information on assembly detail)

⚠ **CAUTION:**

Making up of bonnet cap will result in unseating the stem back seat and may subject stem packing to line pressure in the valve.

g) Lubricate stem bearing and valve cavity if necessary according to aforementioned recommended procedures.

3) Stem Back Seat – Valve in Closed Position

a) Close valve fully and back off ¼ turn.

b) Remove set screw on the bonnet cap. Mark location and back off bonnet cap 3 full turns. If there is sufficient line pressure in the valve the stem could be seen rising as the bonnet cap is back off. The stem would stop the upward movement once the back seat taper on the stem comes into contact with the matching profile in the bonnet. In case there is no line pressure, an upward heave on the hand-wheel would similarly raise the stem.

The rest of the procedure steps c)-g) is similar to the procedure as in Stem Back Seating in Valve Open Position.

Section 5 Recommended Spare Parts

Two forms of Versa-Slab Gate Valve Repair Kits are available to cater for regular and major refurbishing of used valves.

A mini-repair kit is for regular for replacement of all elastomeric parts.

An all-renew repair kit is for a complete rebuilt of a valve when it is deemed economical to do so. The renew repair kit consists of all the parts in a valve except valve body & bonnet, studs & nuts and hand-wheel.

Over-sized seats are available on order when the seat pockets of a valve require overbore for a new seat pocket.

Extract from API 6A Appendix

Table D.2 — Recommended torques for flange bolting (USC units)

Stud diameter	Threads per in	Studs with S_y = 80 ksi Bolt stress equal to 40 ksi			Studs with S_y = 105 ksi Bolt stress equal to 52,5 ksi			Studs with S_y = 95 ksi Bolt stress equal to 47,5 ksi		
		Tension	Torque	Torque	Tension	Torque	Torque	Tension	Torque	Torque
D	N	F	f = 0,07	f = 0,13	F	f = 0,07	f = 0,13	F	f = 0,07	f = 0,13
in	1/in	lbf	ft·lbf	ft·lbf	lbf	ft·lbf	ft·lbf	lbf	ft·lbf	ft·lbf
0,500	13	5 676	27	45	7 450	35	59	—	—	—
0,625	11	9 040	52	88	11 865	68	115	—	—	—
0,750	10	13 378	90	153	17 559	118	200	—	—	—
0,875	9	18 469	143	243	24 241	188	319	—	—	—
1,000	8	24 230	213	361	31 802	279	474	—	—	—
1,125	8	31 618	305	523	41 499	401	686	—	—	—
1,250	8	39 988	421	726	52 484	553	953	—	—	—
1,375	8	49 340	563	976	64 759	739	1 281	—	—	—
1,500	8	59 674	733	1 278	78 322	962	1 677	—	—	—
1,625	8	70 989	934	1 635	93 173	1 226	2 146	—	—	—
1,750	8	83 286	1 169	2 054	109 313	1 534	2 696	—	—	—
1,875	8	96 565	1 440	2 539	126 741	1 890	3 332	—	—	—
2,000	8	110 825	1 750	3 094	145 458	2 297	4 061	—	—	—
2,250	8	142 292	2 496	4 436	186 758	3 276	5 822	—	—	—
2,500	8	177 685	3 429	6 118	233 212	4 500	8 030	—	—	—
2,625	8	—	—	—	—	—	—	233 765	4 716	8 430
2,750	8	—	—	—	—	—	—	257 694	5 424	9 712
3,000	8	—	—	—	—	—	—	309 050	7 047	12 654
3,250	8	—	—	—	—	—	—	365 070	8 965	16 136
3,750	8	—	—	—	—	—	—	491 099	13 782	24 905
3,875	8	—	—	—	—	—	—	525 521	15 208	27 506
4,000	8	—	—	—	—	—	—	561 108	16 730	30 282

Rev.	Date	Record of Changes
D	2009/03/31	Update valve model from Versa-LS to Versa-HS
05	2015/05/10	Correct typo error & Re-edit
06	2016/06/06	Update valve size range, add recommended grease type

VERSA-SLAB™ GATE VALVE

High Pressure(10000Psi)

Operating & Service Manual

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Email: sales@source-mfg.com

Operating & Service Procedure

Manual VERSA-SLAB™ Gate Valve

High Pressure(10000Psi)

Prepared By: Zhang Xi

Reviewed by: Zhu Lin

Approved By: Liu Jie

Date: Feb. 2018

OPS-814 Rev.00

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 recommend-ed procedure is adopted. The user is the best judge when applying this procedure base on specific equipment installation and the operating conditions.

Table of Content

Section 1 Warnings

The VERSA-SLAB™ Gate Valve is a bi-direction non-rising stem manual operated valve incorporating a floating gate and seats design. The gate is connected to the stem through a barrel lift nut in the gate. This arrangement permits the gate to float freely and enhance a pressure assisted seal when acted on by the differential pressure across the gate.

The bonnet is bolted to the valve body and pressure integrity is achieved by means of a metal ring gasket. Pressure energized U-type stem packing are used to isolate high pressure in the valve cavity. The stem has a selective back seat feature to facilitate replacement of stem packing in the field when the valve cannot be removed from service.

The gate is actuated by rotation of the stem-opening (counter-clockwise rotation) and closing (clockwise rotation).

The bonnet is equipped with a ½" NPT grease/injection fitting for lubrication of the valve cavity and the bonnet cap has a standard grease zerk for lubrication of the stem bearing assembly.

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

Section 2 General Operation

2.1 General Description

The VERSA-SLAB™ Gate Valve means closing member movable in the vertical direction of the channel axis of the valve, the pipe is mainly used as cutting medium effect, i.e., fully open or fully closed use. The gate valve is generally not used to throttle flow. It can be used in high pressure and various media.

Rotate stem clockwise to "close", counterclockwise to "open".

2.2 Operation Specification

Refer to specific assembly drawing and parts list.

Size (Bore)	Working Pressure (psi)	Breaking Torque (ft lbs)	Running Torque (ft lbs)	No. of Turns
2-1/16”	10000	<60	<20	13.5
2-9/16"	10000	<80	<30	16.5
3-1/16”	10000	<120	<50	18.5
4-1/16"	10000	<180	<50	24.5
5-1/8"	10000	<240	<55	23.5

Breaking Torque denotes torque applied to open valve at full differential rated working pressure.

Running Torque denotes torque applied to operate valve after pressure is equalized across the gate.

NOTE:

It is important to back off ¼ to ½ turn after fully opening or closing valve. This is to allow the gate to freely float acting on by line pressure.

Section 3 Assembly Procedure

3.1 Installing Seat Assembly to Valve Body

a) Thoroughly clean the internal of valve body.

b) Lightly grease seat and install seat seal assembly to seat per correct direction as shown in Diagram 1

c) Coat the seat pockets in the valve body with grease.

d) Carefully fit seat assembly evenly into the seat pocket.

e) Put bonnet ring gasket into bonnet seal groove and make sure it rests in groove.

f) Screw the shorter end of studs into the body by hand.

NOTE:

For tap end stud, the shorter end is installed to valve body.

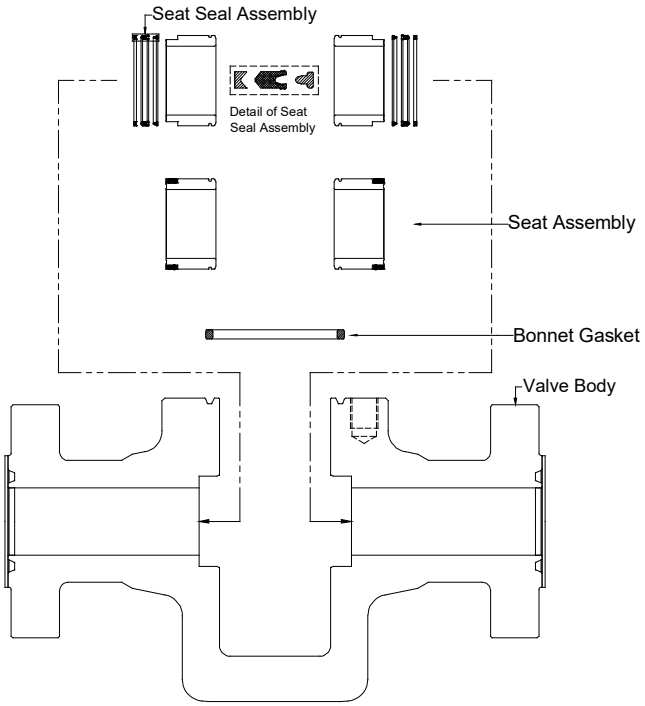


Fig. 1 (Valve Body/Seat Assembly)

Installing Bonnet Assembly

CAUTION:

The stem bearing assembly must be firmly lock down by the bonnet cap against the packing gland to operate properly.

a) Lightly grease stem and install to bonnet from the bottom.

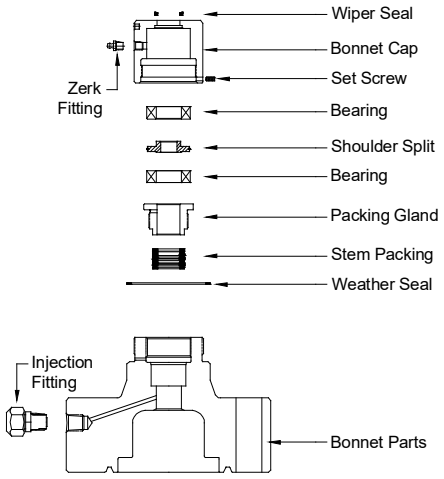
b) Lightly grease stem packing and slip over stem and evenly press them into bonnet cavity. Ensure no grease or water is trapped between to two packing.

NOTE: Stem Packing should be installed with U-cup side facing down into bonnet pocket.

c) Install packing gland over stem and make up to bonnet. The packing gland should be sitting butt tight on top of bonnet per Diagram 2 (b).

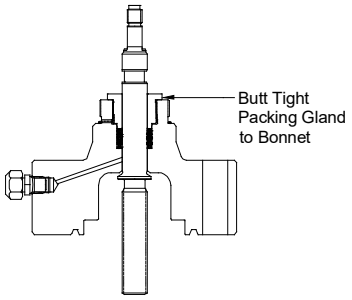
d) Install bearing assembly and split shoulders (with elastic O-ring) over stem. Rotate stem until stem/bearing assembly sits firmly on top of packing gland per Diagram 2 (c).

e) Put wiper seal into the bonnet cap then install them over the stem and make up snugly tight to bonnet per Diagram 2 (d).



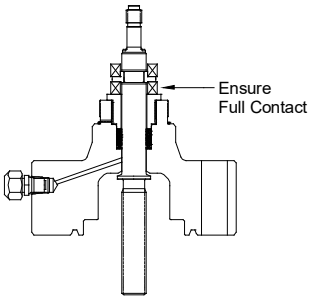
Bonnet Parts Assembly

Diagram 2 (a)



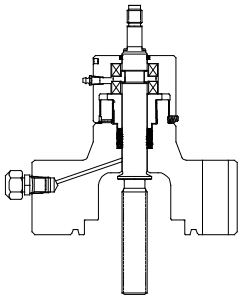
Install Stem Packing

Diagram 2 (b)



Install Bearing Assembly

Diagram 2 (c)



Install Bonnet Cap

Diagram 2 (d)

3.2 Install Gate to Bonnet Assembly

a) Lightly grease the barrel lift nut and insert to the gate. Carefully make up gate assembly to the stem by left hand rotation, until the stem has fully engaged the lift nut and partially penetrate the gate per Diagram 3 (a) & (b).

b) Lightly grease the 2 sealing faces of the gate.

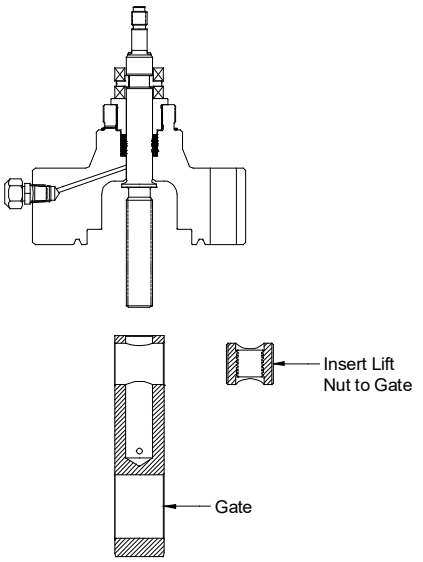
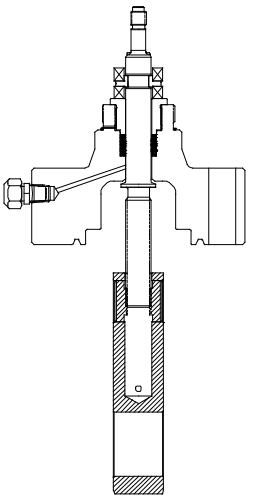


Diagram 3 (a)



Install Gate to
Bonnet Assembly

Diagram 3 (b)

3.3 Installing Bonnet/Gate Assembly to Valve Body

a) Carefully lift bonnet/gate assembly over the valve body and stab the gate in the space between the seats per Diagram 4 (a) & (b). A seat spreader aid may sometimes be necessary to spread the seats to make it easier for installing the gate. Once the gate has started between the seats it would easily slide all the way down until the bonnet comes into fully contact with the valve body.

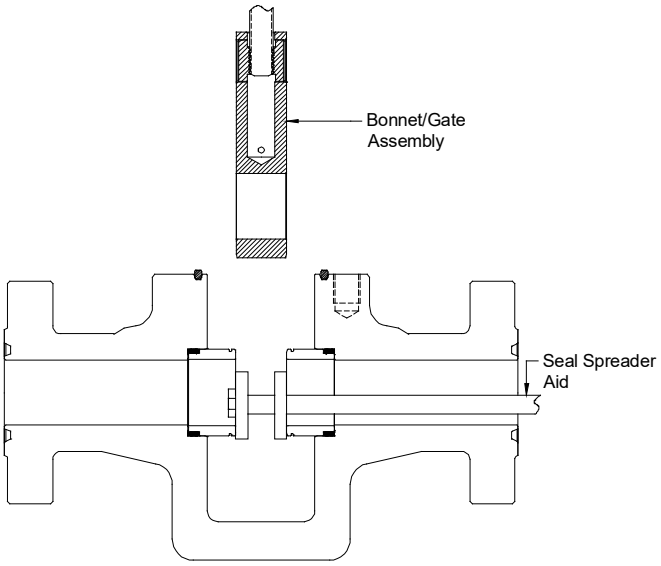


Diagram 4 (a)

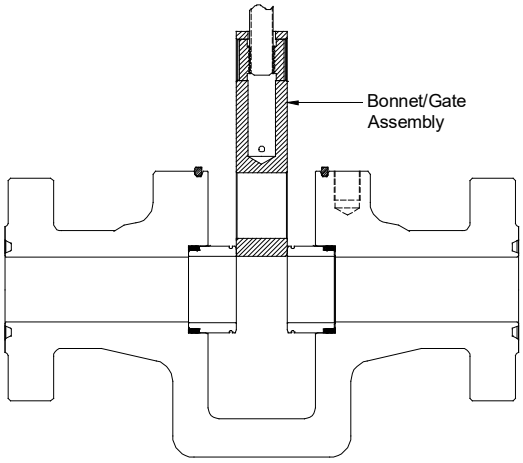


Diagram 4 (b)

b) Orient the bonnet to locate the injection fitting at 90º to the direction of flow for easy access during field lubrication per Diagram 4 (c).

c) Make up four nuts in alternate position around the bonnet and operate the valve close and open to verify it is working smoothly. Make up the rest of the nuts and tighten in a crisscross manner to specified make up torque.

(Reference API 6A Recommended Bolting Torque).

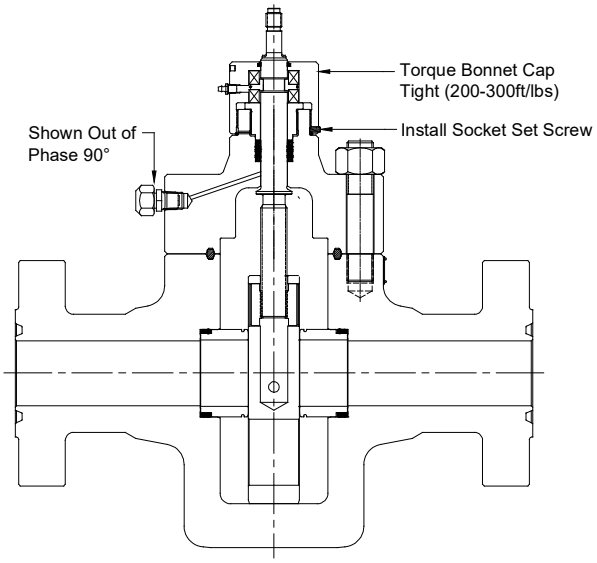


Diagram 4 (c)

3.4 Lubrication

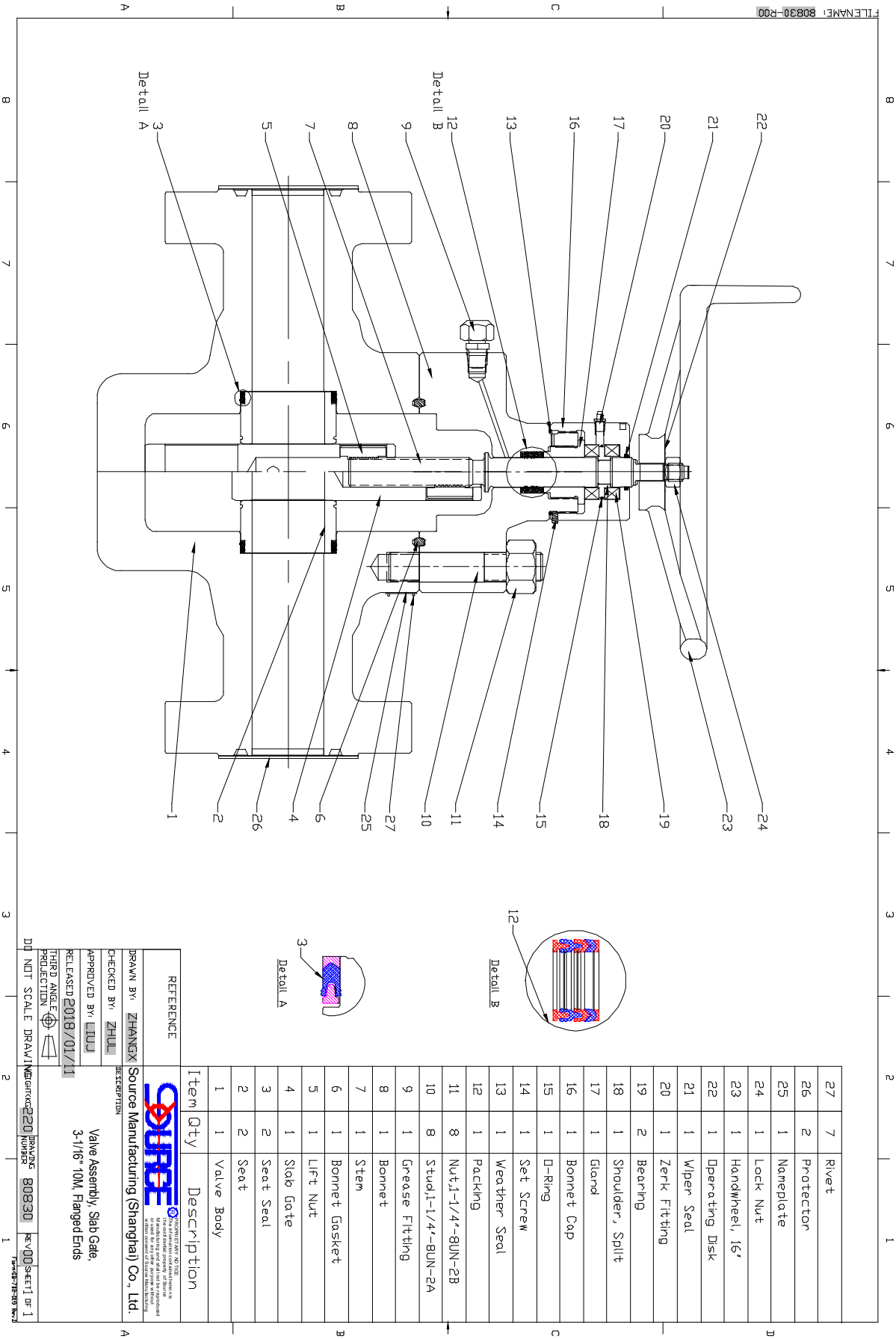
Fill the valve cavity with lubricant through the injection fitting per Table 1. After removing the grease gun, use a stinger to open the ball-check in the injection fitting to allow excessive grease to bleed off. Rotate the hand wheel to help excessive grease bleed out. Lightly grease the bearing assembly through the grease zerk on the bearing cap. Finally snug tight the bonnet cap install the set screw to lock the bonnet cap down.

NOTE:

1) **Recommended procedure for disassembly basically follows the reverse steps as above.**
2) **Recommended Grease: Moly-Lith No 2 or alternative for bearing, packing seal OD & all threads (except NPT). DESCO 111-HS or alternative for sealing contact surface of gate, seat, gasket & stem back seat.**

Assembly Drawing:

To be continued



Item	Qty	Description
1	1	Valve Body
2	2	Seat
3	2	Seat Seal
4	1	Slab Gate
5	1	Lift Nut
6	1	Bonnet Gasket
7	1	Stem
8	1	Bonnet
9	1	Grease Fitting
10	8	Stud,1-1/4"-8UN-2A
11	8	Nut,1-1/4"-8UN-2B
12	1	Packing
13	1	Weather Seal
14	1	Set Screw
15	1	O-Ring
16	1	Bonnet Cap
17	1	Gland
18	1	Shoulder, Split
19	2	Bearing
20	1	Zerk Fitting
21	1	Wiper Seal
22	1	Operating Disk
23	1	Handwheel, 16"
24	1	Lock Nut
25	1	Nameplate
26	2	Protector
27	7	Rivet

REFERENCE

DRAWN BY: ZHANGX
CHECKED BY: ZHUL
APPROVED BY: LIUJ
RELEASED 2018/01/11
THIRD ANGLE PROJECTION

DO NOT SCALE DRAWING

WEIGHT(KG) 220
DRAWING NUMBER 80830
REV 00
SHEET 1 OF 1

Source Manufacturing (Shanghai) Co., Ltd.

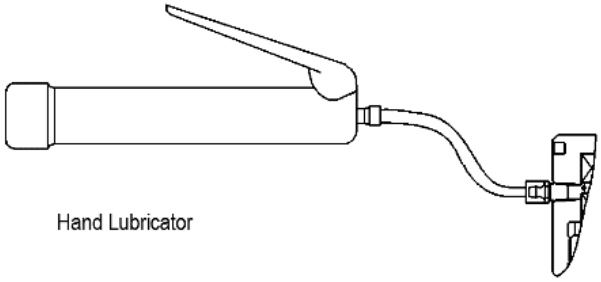
DESCRIPTION

Valve Assembly, Slab Gate,
3-1/16" 10M, Flanged Ends

Section 4 Regular Field Maintenance

4.1 Stem Bearing Assembly Lubrication

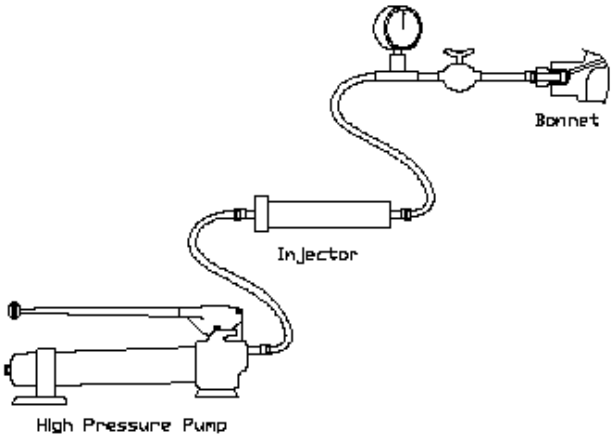
Regular lubrication of the stem bearing assembly is essential to maintain a trouble free and smooth operation of a valve. A good grade of automotive grease is generally used and is injected through the grease zerk located on the bonnet cap with a hand held lubricate.



Lubrication of Stem Bearing

4.2 Valve Cavity Lubrication

The valve cavity should be lubricated on a regular basis to ensure continuous smooth operation of the valve. A general rule of thumb is to re-grease the valve cavity after about 50 cycle of operations of whenever the valve has been in dormant over a long period of time. Whenever possible lubrication should only be done after the valve is isolated from the pressure.



Lubrication of Valve Cavity
Under Line Pressure

1) Lubrication Procedure with Isolated Line Pressure

a) Close valve. Remove cap on injection fitting located on the bonnet and install stinger cap to bleed off any pressure trapped in the valve cavity.

b) Make up hose of injection pump to bonnet injection fitting and pump the approximate displacement volume of grease as shown in Table 1 into the valve cavity.

c) Operate the valve open/close several times to distribute the grease in the valve cavity. Continue to pump until the required amount is displaced.

d) Closed the valve. Bleed pressure and remove grease pump. Re-install injection fitting cap.

Table 1

Valve Sizes	Cavity
2-1/16” 10000 Psi	2.0 Lbs
2-9/16” 10000 Psi	3.0 Lbs
3-1/16” 10000 Psi	4.0 Lbs
4-1/16” 10000 Psi	5.0 Lbs
5-1/8” 10000 Psi	10.0 Lbs

2) Lubrication Procedure with Open Line Pressure

In a situation where the line pressure cannot be isolated to perform valve cavity lubrication, a high pressure grease gun may be employed to force pressurized grease into the cavity.

a) Close valve. Slowly back off cap on injection fitting. If the ball-check in the fitting is bleeding pressure, than quickly retighten cap and abort the attempt to lubricate valve under line pressure. Otherwise, proceed lubrication as follows.

b) Install an isolation needle valve between injection fitting and the high pressure injection pump. Shut-off needle valve, pump grease pressure up to approximately 1,000 psi higher than the line pressure in the valve.

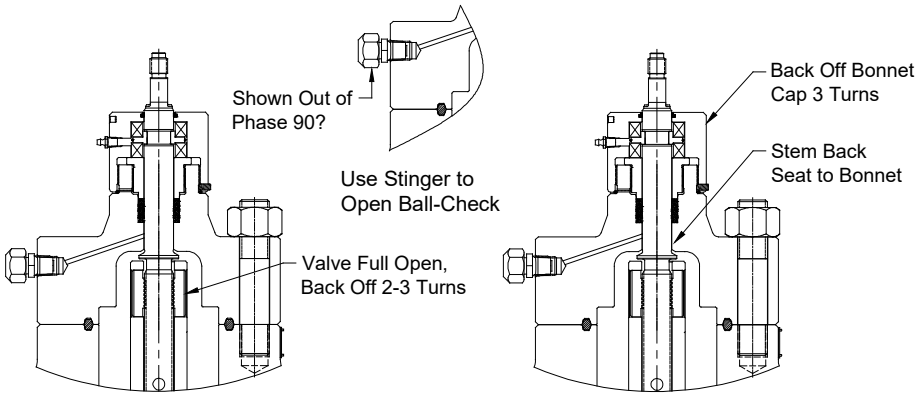
c) Open needle valve to allow the pressurized grease to force open the ball-check and flow into the valve cavity. Repeat this procedure until sufficient grease is injected into the valve cavity.

d) Close needle valve, remove injection pump and replace the cap to the bonnet injection fitting.

4.3 Field Replacement of Parts

1) Replacement of Stem Packing

The VERSA-SLAB™ Gate Valve is designed with the stem back seat feature to allow replacement of stem packing while the valve is in service. The stem back seat can be performed with the valve either in the open or closed position. However, as far as possible, the back seating of the stem is done preferably with valve in closed position when field replacement of stem packing is desirable.



2) Back Seat Stem – Valve in Open Position

a) Open valve fully and rotate hand-wheel clockwise about 2-3 turns to allow sufficient clearance for the stem/gate assembly to move up against the bonnet back seat profile per Diagram 5 (a).

b) Remove set screw on the bonnet cap. Mark location and back off bonnet cap 3 full turns. If there is sufficient line pressure in the valve the stem could be seen rising as the bonnet cap is back off. The stem would stop the upward movement once the back seat taper on the stem comes into contact with the matching profile in the bonnet per Diagram 5 (b). If no line pressure is present, an upward heave on the hand-wheel would similarly raise the stem.

c) Remove the cap on the injection fitting (located on the bonnet) careful not to inadvertently backing off the fitting by applying a back-up wrench if necessary. Install a cap stinger to the injection fitting and slowly make up to depress the ball-check to bleed off any pressure trapped in the packing cavity of the bonnet. If no further pressure is bleeding off than the stem back seat is verified to hold pressure.

WARNING:

In the event of continuous pressure bleeding, back off the bonnet cap another full turn in case the stem has not moved up far enough to coin a seal in the bonnet. If this still does not stop the pressure bleed off indicating the stem back seat is unable to hold pressure, quickly retighten up the bonnet cap the same number of turns back to its original marked position and re-install the set screw.
In this situation the valve must be removed from service to replace the stem packing or the line pressure must be completely isolated if the valve cannot be remove.

d) Proceed to remove hand-wheel, bonnet cap and bearing assembly. While doing so careful not to accidentally push or exert any force on the stem as it may inadvertently unseat the stem back seat. Carefully unscrew packing gland. Remove the stem packing. One easy way is to blow air or pump grease through the injection fitting to “pop” the packing out of the bonnet.

e) Install new stem packing careful to install them with the expander spring side facing down into the bonnet box. A little oil would help to squeeze the packing down. Replace packing gland.

(See Assembly Procedure for more information on assembly)

CAUTION:

If the replacement of stem packing is perform under line pressure and stem back seat, the task should be carried out in the most efficient and swift manner to minimize exposure time.

f) Remove stinger cap and reinstall protective cap to bonnet injection fitting. Install bearing assembly and bonnet cap and set screw. (See Assembly Procedure for more information on assembly detail)

⚠ **CAUTION:**

Making up of bonnet cap will result in unseating the stem back seat and may subject stem packing to line pressure in the valve.

g) Lubricate stem bearing and valve cavity if necessary according to aforementioned recommended procedures.

3) Stem Back Seat – Valve in Closed Position

a) Close valve fully and back off ¼ turn.

b) Remove set screw on the bonnet cap. Mark location and back off bonnet cap 3 full turns. If there is sufficient line pressure in the valve the stem could be seen rising as the bonnet cap is back off. The stem would stop the upward movement once the back seat taper on the stem comes into contact with the matching profile in the bonnet. In case there is no line pressure, an upward heave on the hand-wheel would similarly raise the stem.

The rest of the procedure steps c)-g) is similar to the procedure as in Stem Back Seating in Valve O-pen Position.

Section 5 Recommended Spare Parts

An all-renew repair kit is for a complete rebuilt of a valve when it is deemed economical to do so. The all-renew repair kit consists of all the parts in a valve except valve body & bonnet, studs & nuts and hand-wheel.

Section 6 Annex

Recommended torques extracted from API 6A

Stud Diameter	Threads per in.	Studs with S_y = 550 MPa Bolt Stress Equal to 275 MPa			Studs with S_y = 720 MPa Bolt Stress Equal to 360 MPa			Studs with S_y = 655 MPa Bolt Stress Equal to 327.5 MPa		
		Tension	Torque	Torque	Tension	Torque	Torque	Tension	Torque	Torque
D	N	F	f = 0.07	f = 0.13	F	f = 0.07	f = 0.13	F	f = 0.07	f = 0.13
in.	1/in.	kN	N-m	N-m	kN	N-m	N-m	kN	N-m	N-m
0.500	13	25	36	61	33	48	80	—	—	—
0.625	11	40	70	118	52	92	155	—	—	—
0.750	10	59	122	206	78	160	270	—	—	—
0.875	9	82	193	328	107	253	429	—	—	—
1.000	8	107	288	488	141	376	639	—	—	—
1.125	8	140	413	706	184	540	925	—	—	—
1.250	8	177	569	981	232	745	1285	—	—	—
1.375	8	219	761	1320	286	996	1727	—	—	—
1.500	8	265	991	1727	346	1297	2261	—	—	—
1.625	8	315	1263	2211	412	1653	2894	—	—	—
1.750	8	369	1581	2777	484	2069	3636	—	—	—
1.875	8	428	1947	3433	561	2549	4493	—	—	—
2.000	8	492	2366	4183	644	3097	5476	—	—	—
2.250	8	631	3375	5997	826	4418	7851	—	—	—
2.500	8	788	4635	8271	1032	6068	10,828	—	—	—
2.625	8	—	—	—	—	—	—	1040	6394	11,429
2.750	8	—	—	—	—	—	—	1146	7354	13,168
3.000	8	—	—	—	—	—	—	1375	9555	17,156
3.250	8	—	—	—	—	—	—	1624	12,154	21,878
3.750	8	—	—	—	—	—	—	2185	18,685	33,766
3.875	8	—	—	—	—	—	—	2338	20,620	37,293
4.000	8	—	—	—	—	—	—	2496	22,683	41,057

Rev.	Date	Record of Changes
00	2018/02/02	Initial release