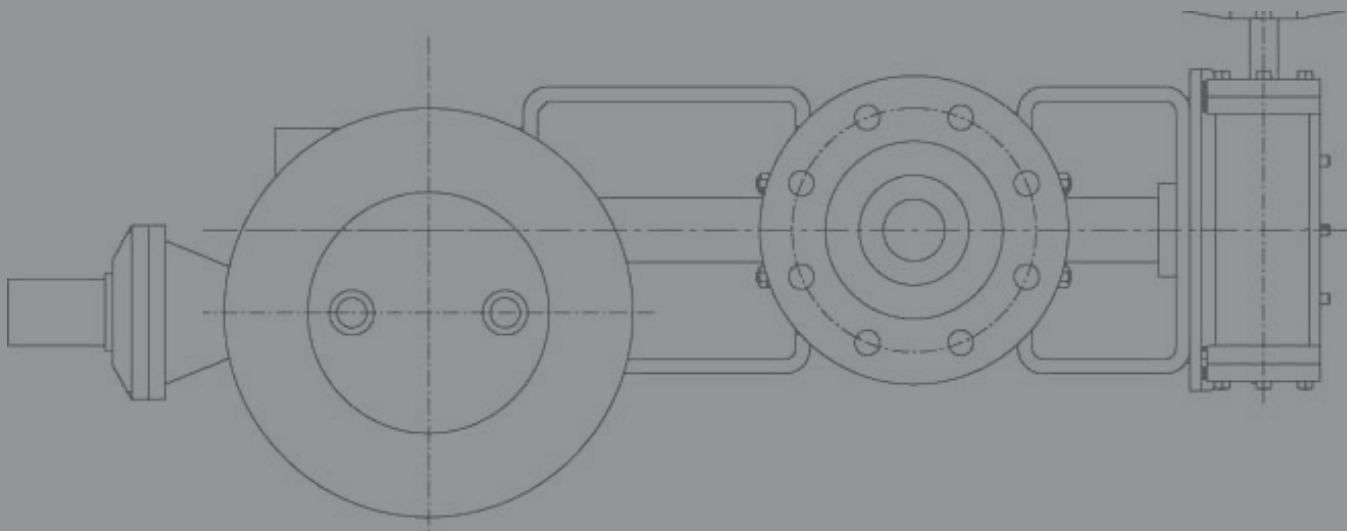
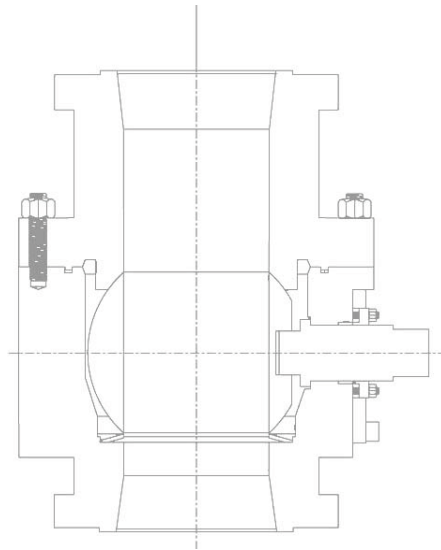


## Installation and Operations Maintenance Manual





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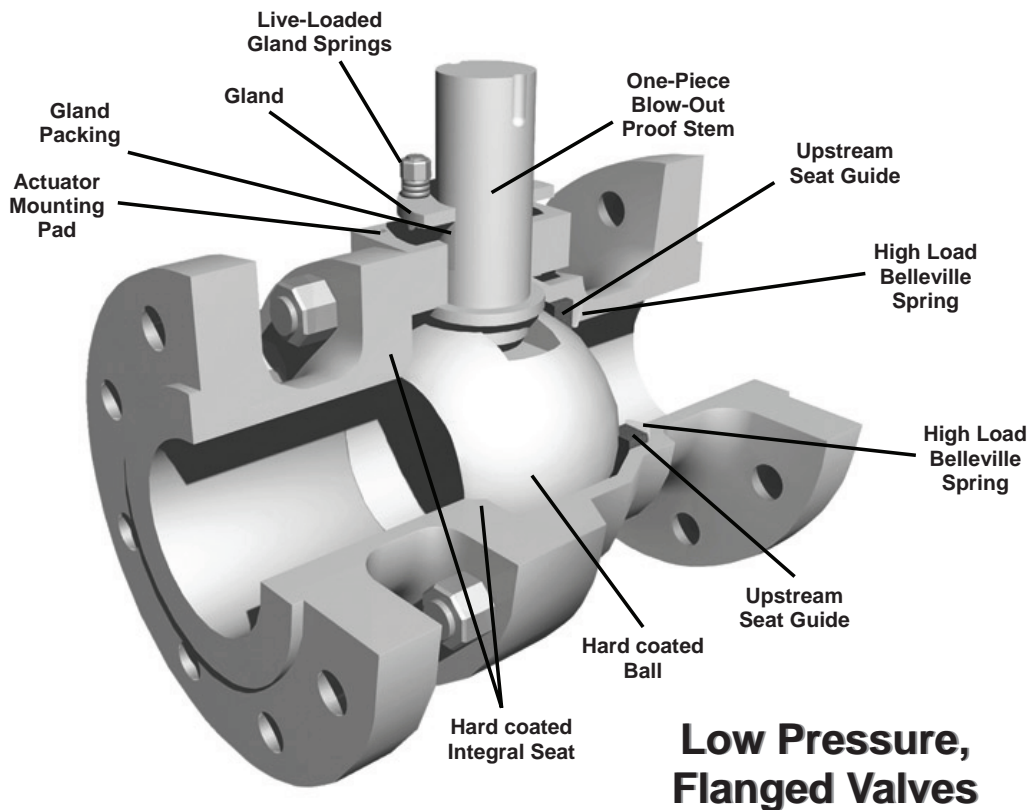
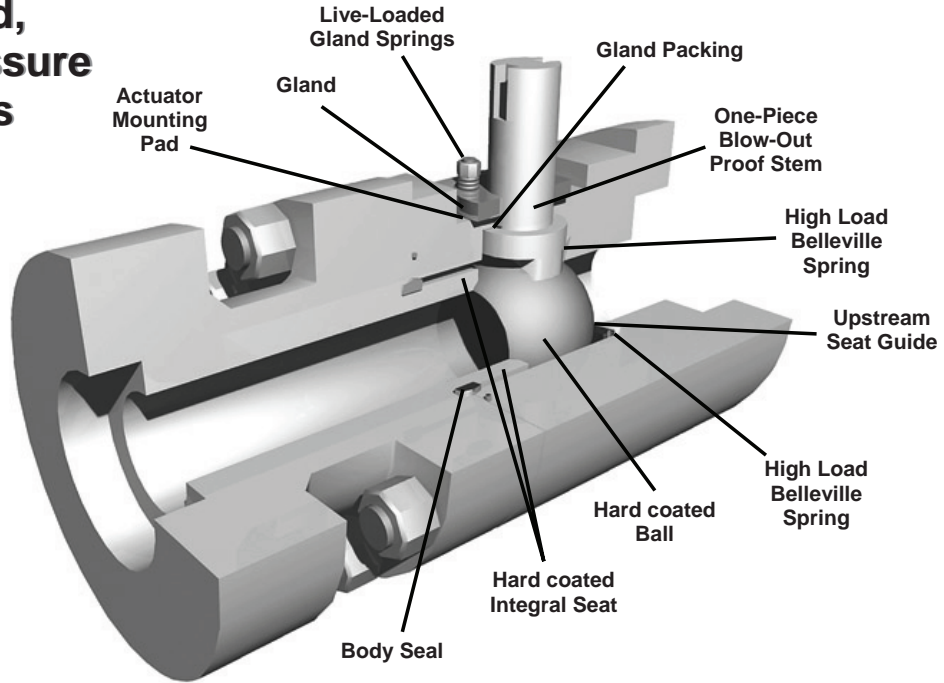
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# INTRODUCTION

The purpose of this manual is to describe procedures that will ensure safe and successful installation, operation and maintenance of the metal-seated ball valve assuming a trouble free service life. Difficulties encountered in the operation or maintenance of ValvTechnologies' valves should be directed to a ValvTechnologies, Inc. authorized repair facility or distributor, or to its Houston facility. Failure to do so may void the warranty.

## PRODUCT DESCRIPTION

### Forged, High Pressure Valves



# V1 SERIES BALL VALVE PART NUMBERING SYSTEM FOR VALVES INSTALLED DURING AND PRIOR TO 2010

**Example: B — 3 — C6 — RF — FP — LV — 2**  
1 2 3 4 5 6 7

**1**  
**VALVE TYPE**  
 A = Bi-Directional  
 B = Standard  
 C = Control Trim  
 X = Xactrol®  
 D = Double Ball Uni-Directional

**2**  
**ANSI STANDARD PRESSURE CLASS**  
 3 = 150# O = 2500#  
 5 = 300# A = 3500#  
 6 = 600# B = 4500#  
 2 = 800# C = 5000#  
 7 = 900#  
 8 = 1500#  
 9 = 2000#

**3**  
**TRIM CODE**  
 Consult Trim Code Sheet

**4**  
**TYPE END CONNECTIONS**  
 SW = Socket Weld  
 BW = Butt Weld  
 SC = Threaded (NPT)  
 BL = Blank  
 RF = Raised Face  
 RJ = Ring Type Joint  
 FF = Flat Face  
 XA = Special

**5**  
**PORT SIZE**  
 STD = Standard Port  
 FP = Full Port  
 RP = Reduced Port  
 SP = Special Port

**6**  
**ACTUATION**  
 Lever Operated  
 LV = Cast 150# - 600#  
 Forged 900# & Up  
 LC = Cast 900# & Up  
 LF = Forged 150# - 600#  
 Bare Stem  
 BS = Cast 150# - 600#  
 Forged 900# & Up  
 BC = Cast 900# & Up  
 BF = Forged 150# - 600#

**7**  
**VALVE SIZE**  
 Nominal Valve Size  
 in Inches 1/4" - 4"

# V1 SERIES BALL VALVE PART NUMBERING SYSTEM FOR VALVES INSTALLED DURING AND AFTER 2010

## Example 1 - Non-Butt Weld Valve:

**Example Part Number:** V3C6-RF-FP-L007-001QA-RDM

**Valve Description:** ¾" ANSI 150# Raised Face Flanged, Full Port Ball Valve with Lever Operator.  
Trim Code C6001

## Example 1-Part Number Breakdown for Non-Butt Weld Designs:

V	3	C6	RF	FP	L	7	1	QA	RDM
A	B	C	D	E	F	G	H	I	J

## Example 2-Butt Weld Valve:

**Example Part Number:** V7C6-BW-FP-L007-001QA-RDM

**Valve Description:** ¾" ANSI 900# Butt Weld, Full Port Ball Valve with Lever Operator  
Trim Code C6001. Per EChart 1110, Port Size is 5/8" and the end connection is prepped for ¾" Schedule 160 pipe.

## Example 2- Part Number Breakdown for Butt Weld Designs:

V	7	C6	BW	FP	L	7	001	QA	RDM
A	B	C	D	E	F	G	H	I	J

## Example 3 -Butt Weld Valve:

**Example Part Number:** V7C6-DW-FP-L007-001QA-RDM

**Valve Description:** ¾" ANSI 900# Butt Weld, Full Port Ball Valve with Lever Operator.  
Trim Code C6001. Per EChart 1110, port size is 5/8" and the end connection is prepped for ¾" Schedule 80 XS pipe.

## Example 3 - Part Number Breakdown for Butt Weld Designs:

V	7	C6	DW	FP	L	7	1	QA	RDM
A	B	C	D	E	F	G	H	I	J

### A. Valve Type

- H - Nextech® Three Piece Forged Trunnion Valve - Side Entry
- K - Check Valve
- N - Nextech® Two Piece Trunnion Valve - Side Entry
- P - Parallel Slide Gate Valve
- Q - Choke Valve
- T - Nextech® One Piece Trunnion Valve - Top Entry
- V - VI Series - Trunnionless Seat Supported Design
- X - Xactrol® (See EChart 1086)
- Z - Electronic Relief Valve (See EChart 1105)
- ERV Isolation Valve (See EChart 1126)

# V1 SERIES BALL VALVE PART NUMBERING SYSTEM FOR VALVES INSTALLED DURING AND AFTER 2010

## B. ANSI Standard Pressure Class

3	150#	W	150# - 600#
4	400#	X	900# - 2500#
5	300#	Y	3500# - 4500#
6	600#	C	API 2,000
2	800#	D	API 3,000
7	900#	E	API 5,000
8	1500#	F	API 30,000
9	2000#	F	API 10,000
0	2500#	G	API 15,000
A	3500#	H	API 20,000
B	4500#		

## C. Trim Code (See Trim Code Sheet, EChart 1049 for Nextech®) (see Trim Code Sheet, EChart 1049 for Nextech®) (see Trim Code Sheet, EChart 1048 for PSG Valve)

Only the first 2 digits of the Trim Code are entered and designate Body, Ball, and End Cap materials and coatings. For example, for trim code C6001, only the "C6" is entered.

## D. Type of End Connection (Inlet x Outlet)

AA	API 6A x API 6A	BR	Butt Weld x Raised Face
LL	Blank x Blank	BJ	Butt Weld x Ring Type Joint
?W	Butt Welds (See below for ISO pipe and EChart 1002 for all others)	BS	Butt Weld x Socket Weld
FF	Flat Face x Flat Face	BC	Butt Weld x Threaded (NPT)
GG	Grayloc Hub x Grayloc Hub	RS	Raised Face x Socket Weld
PP	Pipe Extension x Pipe Extension	SB	Socket Weld x Butt Weld
RF	Raised Face x Raised Face	SP	Socket Weld x Pipe Extension
JJ	Ring Type Joint x Ring Type Joint	SC	Socket Weld x Threaded (NPT)
SW	Socket Weld x Socket Weld	CS	Threaded (NPT) x Socket Weld
CC	Threaded (NPT) x Threaded	XX	Special x Special
RC	Raised Face x Threaded	WF	Wafer x Wafer
HH	RCon x RCon		

### Butt Weld Prepped Ends:

When the valves are designated with a Butt Weld end connection the following logic is to be used in determining the 2-digit Butt Weld code.

- First digit denotes butt weld end prep size ID and OD.
- Second digit will be "W" denoting a butt weld end prep.
- Butt Weld ends for ISO piping will be coded as follows.
- XXS - Code "A"
- Schedule 160 - Code "B"
- Schedule 120 - Code "C"
- Schedule 80 XS - Code "D"
- Schedule 40 STD - Code "E"
- For all others see EChart 1002

# V1 SERIES BALL VALVE PART NUMBERING SYSTEM FOR VALVES INSTALLED DURING AND AFTER 2010

## E. Port Size / Trim Geometry

FP	Full Port	ST	Standard Port
XX	Special Port	RP	Reduced Port

## F. Actuation

Valves are furnished Bare Stem, Lever Operated or Hand Wheel Operated. When mounting a Manual Bevel Gear, Electric, Pneumatic or Hydraulic actuator, select the Bear Stem option.

B	Bare Stem	E	Electric
L	Lever Operated	G	Gear Box
W	Hand Wheel	H	Hydraulic
		P	Pneumatic

## G. Normal Valve Size in Inches

For blank end valve use a bore size designator as follows:

Bore Size 3/8"	-00A
Bore Size 5/8"	-00B
Bore Size 1 1/16"	-00C
Bore Size 1 1/2"	-00D
Bore Size 2 1/2"	-00E
Bore Size 3 1/16"	-00F
Bore Size 3 1/2"	-00G
Bore Size 4 1/16"	-00H
Bore Size 5 1/8"	-00J
Bore Size 6 1/16"	-00K
Bore Size 7 1/8"	-00L
Bore Size 8 1/16"	-00M

## H. Material Index

(See Trim Code sheet, EChart 1053.)

Only the last 3 digits of the Trim Code are entered and designate materials and coatings for all internals. For example, for trim code C6001, only the "001" is entered.

## I. Quality Index (EChart 1099)

### J. Random for Uniqueness

Random numbers are typically 3-digit numbers.

- Starting Number - 001
- Ending Number - 999
- Stock Value - 00T
- Sale Sample Valve - 00Y

The first digit of the random number can be modified using letters as follows for specific valve configurations.

- A - Tech 17
- B - Bidirectional
- C - Inserts/Liners
- D - Outlet End Does Not Match Inlet End
- E - MCE
- G - High Cycle
- H - Hemlock\*
- K - Corrosion Resistant Lever Hardware
- L - Block & Bleed
- M - Multiple Valve
- P - Purge Ports
- S - Valve Bypass System
- V - V-Port Configuration
- W - Weld Overlay
- X - ValvXpress
- Z - Special (See Memo for Special Instruction)

### H. Hemlock\*

All Hemlock valves with 1.06" and larger will be bi-directional valves, and all Hemlock valves will require a cleaning per procedure.

**Example Part Number:**  
V7C6-CW-FP-H100-001QA-P01

### Valve Description:

10" ANSI 900# butt weld prepped for schedule 120 pipe, full port valve with hydraulic operator and purge ports.

ECharts available upon request.




# INSTALLATION


## RECEIVING & PREPARATION PROCEDURE

1. Remove shipping protection.
2. Inspect valve for transportation damage.
3. Inspect valve bore and remove any debris.
4. Cycle the valve inspecting the ball for coating damage.

## ACTUATORS


 **WARNING!** VALVES SHOULD NEVER BE USED AS A STRUCTURAL MEMBER.

 **IMPORTANT!** Valves mounted with electric actuators should be cycled to the mid-stroke position before cycling under power.


 **CAUTION!** Actuators are not to be mounted, removed, adjusted or re-installed to or from ValvTechnologies valves except by trained ValvTechnologies personnel.



## ORIENTATION

 **CAUTION!** Valves must be installed with the FLOW ARROW pointing from high to low pressure with the valve in the closed isolating position. Alternatively the high-pressure end will be labeled. The high-pressure end is defined as the end with the highest pressure, with the valve in the closed isolating position.



 **NOTE:** valves are designed for uni-directional pressure isolation (unless ordered as bi-directional) - consult the factory when reverse pressure conditions are present.

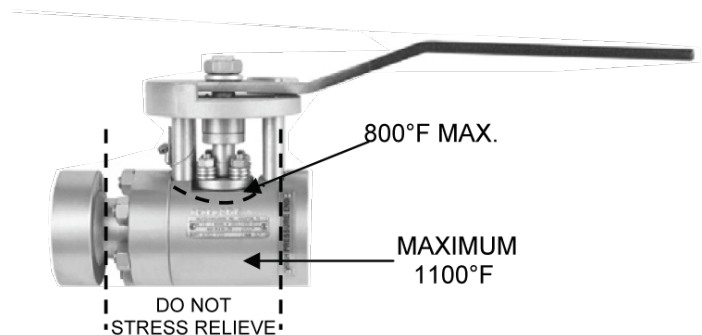
## WELDING, STRESS RELIEVING & INSULATION

 **CAUTION!** Valve must be OPEN during welding.

 **CAUTION!** Excessive temperature and incorrect insulating or stress relieving technique may damage the valve and void the warranty.



The use of radiation shields is advised if heat damage to the actuator is a concern. Care is to be taken to minimize weld slag and splatter within the valve. Do not strike arcs on the valve.



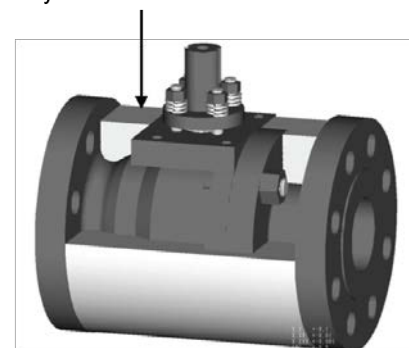
Localized Stress Relief is acceptable, do not furnace stress relieve without consulting ValvTechnologies Engineering.

 **CAUTION!** Valve insulation is prohibited during stress relieving.

Valve service insulation is advised for valves expected to experience temperature differentials greater than 400°F (205°C).

 **CAUTION!** No insulation is to be applied above the body flat.

Only insulate to this level



## POST INSULATION PROCEDURES

Piping system shall be cleaned and flushed.

Limit switch and position indicator operation should be observed as the valve is cycled several times.

**CAUTION!** Valves and valve assemblies should never be used as load bearing members or be used as part of a load bearing structure.

## OPERATION

### VALVE LUBRICATION

- ValvTechnologies' metal-seated ball valve requires NO internal lubrication.
- Re-tightening of body (with system de-pressurized) and gland packing bolting is permissible, if leakage occurs in these areas.
- Required torque values are given in Tables 1 & 2.
- The use of copper-based anti-seize grease for stud lubrication and molybdenum disulfide anti-seize grease (or equivalent) for packing lubrication is required. For nuclear applications, use of Loctite High Purity Anti-Seize is required.



TABLE 1 - BODY BOLT TORQUE VALUES

BOLT SIZE - INCHES (mm)	TORQUE ft-lb (Nm)	
	B7	B8M
5/16	12 (16)	3 (4)
3/8	20 (27)	6 (8)
7/16	35 (47)	10 (14)
1/2	50 (68)	15 (20)
9/16	75 (102)	20 (27)
5/8	100 (136)	30 (41)
3/4	175 (237)	50 (68)
7/8	500 (678)	80 (108)
1	425 (576)	120 (163)
1 1/8	600 (813)	175 (237)
1 1/4	850 (1152)	245 (332)
1 3/8	1100 (1491)	330 (447)
1 1/2	1500 (2034)	430 (583)
1 5/8	1900 (2576)	550 (746)
1 3/4	2400 (3254)	700 (949)
1 7/8	3000 (4067)	850 (1152)
2	3700 (5017)	1000 (1356)
3	11500 (15592)	3700 (5017)
3 1/2	18400 (24947)	5800 (7864)



**NOTE:** Due to the ValvTechnologies valve's metal-to-metal sealing surface operating torques are considerably higher than comparable soft seated ball valves.

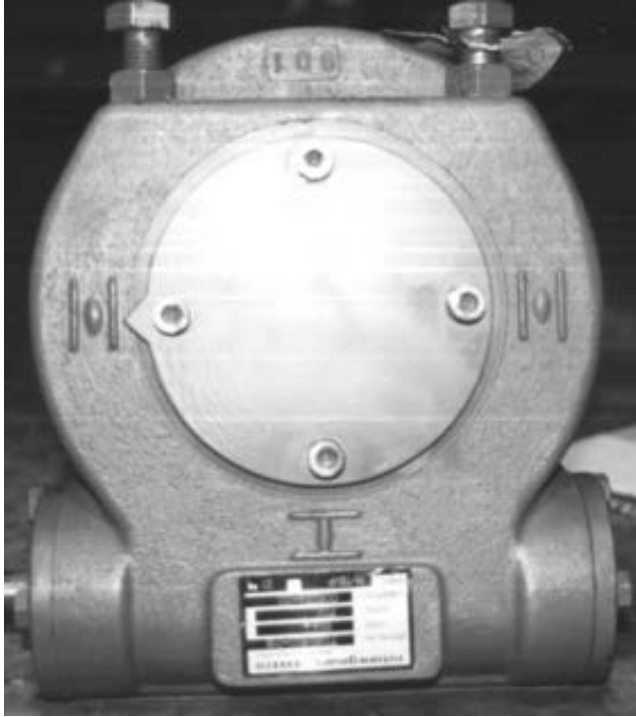
TABLE 2 - GLAND TORQUE

STUD DIAMETER	NOMINAL BALL	TORQUE VALUE in-lb (Nm)			
THREAD PITCH in (mm)	INSIDE DIAMETER in (mm)	GLAND TORQUE		NEVER EXCEED	
1/4 - 20 (6)	3/8 (10)	30	(3.4)	40	(4.5)
5/16 - 18 (8)	5/8 (16)	48	(5.4)	60	(6.8)
5/16 - 18 (8)	1 - 1/16 (27)	48	(5.4)	60	(6.8)
3/8 - 16 (10)	2 - 1/8 (54)	84	(9.5)	105	(11.9)
3/8 - 16 (10)	3 - 1/16 (78)	84	(9.5)	105	(11.9)
3/8 - 16 (10)	4 - 1/16 (103)	84	(9.5)	105	(11.9)
7/16 - 14 (11)	-	132	(14.9)	165	(18.7)
1/2 - 13 (13)	5 - 1/8 (130)	204	(23.1)	225	(25.5)
1/2 - 13 (13)	6 - 1/16 (154)	204	(23.1)	225	(25.5)
9/16 - 12 (14)	-	252	(28.5)	315	(35.6)
5/8 - 11 (16)	-	396	(44.8)	495	(56.0)



**NOTE:** Values are for B8M, Class 1 bolting.

## STEM ROTATION DIRECTION AND VALVE POSITION INDICATION



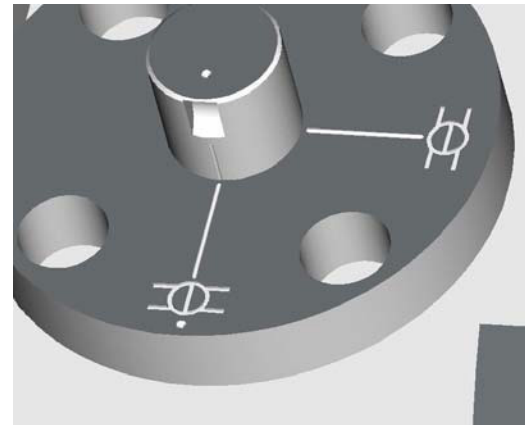
All ValvTechnologies ball valves (unless specifically stated) are operated clockwise to close and counter-clockwise to open.

Typical valve hand wheels and levers require 80 ft/lbsb. (335N) of handle force to operate.

Lever operated are shown to be open when the handle lies on the same axis as the valve bore. The valve indicates closed when the handle is at 90° to the valve bore.

The stem, gland and ball (and in some instances the drive sleeve) bear markings as shown below. The marks will line up on the left of a closed valve, when looking down on the stem and facing downstream.

On actuated and gear-operated valves an arrow shows the valve position.



## ACTUATOR OPERATION

Valve actuators must be installed, operated and maintained as per their manufacturer's written instruction. In the event of a conflict between these instructions and those contained in this manual an authorized ValvTechnologies distributor or ValvTechnologies Houston facility should be contacted.

## MAINTENANCE DISASSEMBLY



**WARNING!** DISASSEMBLY AND REPAIR OF VALVTECHNOLOGIES VALVE ASSEMBLIES BY UNAUTHORIZED PERSONNEL MAY BE HAZARDOUS AND NEGATE WARRANTIES.



**CAUTION!** During disassembly particular care should be taken not to damage mating, packing, or sealing surfaces.



**CAUTION!** Packing must be replaced if gland nuts are loose. Only approved ValvTechnologies packing shall be used.

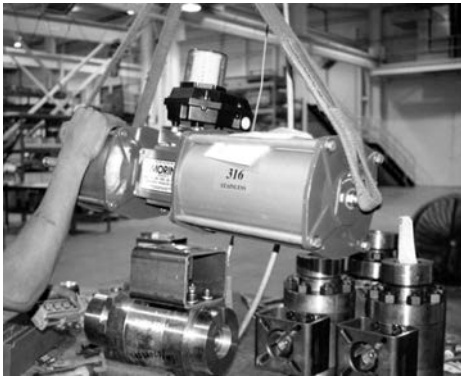
# DISASSEMBLY (CONTINUED)

1. Valve shall be cycled closed.
2. Orientation and position shall be marked on valve components, particularly the side of the ball matched to the seat or carbide insert (if applicable), prior to removal.
3. Marking should be indelible to the valve cleaning process, but should not damage the parts (i.e. NO STAMPING).



## CAUTION!

Balls are matched to end caps – these matched pairs should never be separated or interchanged.



4. Avoiding excessive force, remove the entire actuator assembly.
5. Remove body nuts and separate body and end cap.



6. Remove body seal or gasket, depending upon valve design



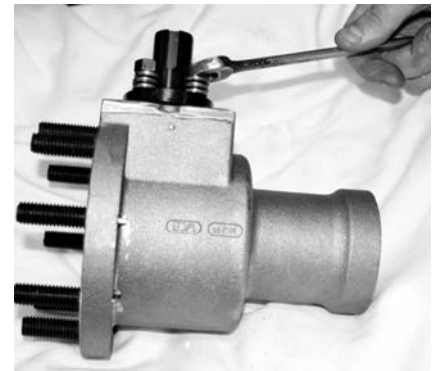
7. Remove body gasket. (if applicable)



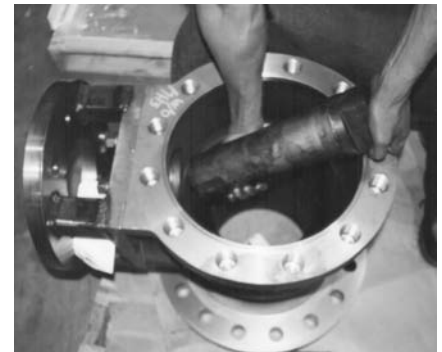
8. Remove ball, after marking orientation and protect from possible damage.



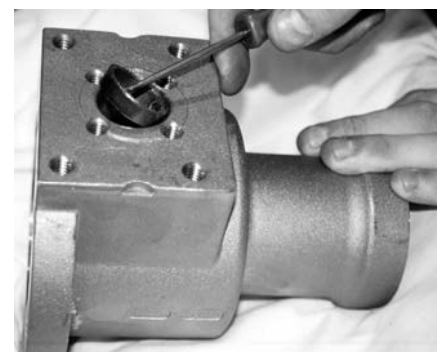
9. Remove gland nuts, gland springs and gland.



10. Remove stem.



11. Remove packing, using packing pick or equivalent.



12. Inspect ALL components, note defects and replace if required, then de-grease using a solvent in preparation for re-assembly.



**CAUTION!** Sand blasting is not permissible, as it may destroy or damage critical surfaces.



## REPAIR AND REWORK

Prior to re-assembly all the following components should be replaced or inspected and verified as acceptable:

- Packing
  - Body gasket and/or seal
  - Belleville spring—Should be replaced if deformed or collapsed below the values of Table 3.
  - Ball and seat
  - The ball is lapped to the end cap using 3-micron diamond compound.
  - Ball is moved in a figure eight motion against the end cap.
  - End cap is held and turned (at 30 r.p.m.) on a rotating table.
  - If no rotating table is available end cap is to be placed on solid, clean surface and rotate by hand during lapping.
  - The ball/end cap seal shall be tested by sliding the mating surface of the cleaned ball against the cleaned end cap sealing area. If a visible unbroken band appears the seal is acceptable
- If no damage is evident the ball may be re-lapped to the seat, using methods outlined below:**
- If ball, end cap or carbide insert (if applicable) cannot be re-lapped. The seat must be re-machined, re-coated and re-lapped to the new ball. This must be done by an approved ValvTechnologies service center.
  - The seat may be re-worked several times, as a rework face tolerance is designed into the end cap. Contact ValvTechnologies for MOB tolerance ranges.

### Other Valve Components:

- In general these may be cleaned & returned to service.
- If rework is required, consult ValvTechnologies Engineering Department.
- Studs, nuts or springs that are damaged or deteriorated must be replaced with ValvTechnologies approved components.



**TABLE 3 BELLEVILLE SPRING HEIGHTS**

NOMINAL BORE SIZE (inches)	SPRING HEIGHT – in. (mm)	
	MINIMUM	MAXIMUM
3/8	.065 (1.651)	.080 (2.032)
5/8	.110 (2.794)	.126 (3.2)
1-1/8	.135 (3.429)	.150 (3.81)
1-1/2	.135 (3.429)	.160 (4.064)
2-1/8	.220 (5.588)	.240 (6.096)
3-1/16	.265 (6.731)	.290 (7.366)
3-1/2	.350 (8.890)	.362 (9.195)
4-1/16	.320 (8.128)	.340 (8.636)
5-1/8	.430 (10.922)	.460 (11.684)
6-1/16	.500 (12.7)	.530 (13.462)
7-1/8	.400 (10.16)	.430 (10.922)
8-1/16	.460 (11.684)	.500 (12.7)
10-1/16	.640 (16.256)	.680 (17.272)
12-1/6	.760 (19.304)	.800 (20.32)
13-1/4	.790 (20.066)	.830 (21.082)
15-1/4	.890 (22.606)	.930 (23.622)
17-1/4	1.080 (27.432)	1.160 (29.464)
19-1/4	.860 (21.844)	1.020 (25.908)
21-1/4	1.390 (35.306)	1.460 (37.084)



**NOTE:** If dimensions are not within this range, then ValvTechnologies, Inc. Engineering approval is required prior to assembly.

## RE-ASSEMBLY

**CAUTION!** Only approved ValvTechnologies components should be used in the re-assembled valve.

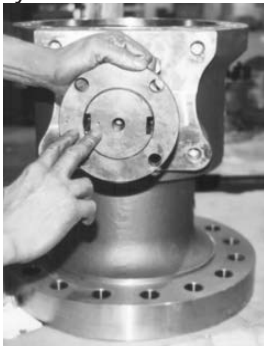
**NOTE:** It is recommended that all internal carbon steel valve parts and surfaces be coated with light, clean/new motor oil.



1. Body is placed on its inlet flange, clamped hub or welded end with the body cavity facing up.

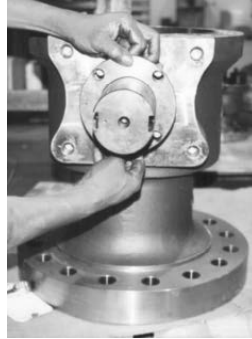


2. Stem shall be inserted through the stem hole from the body cavity side.



3. Stem is to be oriented so that tongue flats are parallel to bore.

**NOTE:** The stems' packing contact areas shall be coated with Molybdenum Disulfide Anti-Seize Grease. For nuclear applications, use of Loctite High Purity Anti-Seize is required.



4. Replace stem packing & gland.

**NOTE:** Mark on gland will be on the left of the valve.

5. Install the gland springs with their conical ends facing each other. Gland springs are hand tightened.

**NOTE:** Always coat both ends of gland nuts with a copper-based anti-seize lubricant to achieve correct stud tension and corrosion protection.

**NOTE:** Mark on top of stem should be on the left of the valve, when looking down on the stem and facing downstream. For nuclear applications, use of Loctite High Purity Anti-Seize is required.



6. Force the stem against the body by using a stem jack.
7. Uniformly tighten packing gland nuts to the specified torque value (see Table 2).

**NOTE:** A stem jack is a double nut stud or a soft (plastic or brass) object.

### Installing Actuator

8. Assemble actuator, lever and/or mounting bracket as necessary. Actuator and valve must both be in the closed position.

**CAUTION!** Great care must be taken when reinstalling an actuator. The stem **MUST** be prevented from being driven into the ball.



9. All operator adapter plates supplied by ValvTechnologies have a machined hole in the middle of the plate. When this plate is mounted to the valve, it should be concentric with the shaft before the bolts are tightened holding the mounting plate to the valve. After tightening the bolts, the concentricity should again be checked. Any misalignment of the operator to the valve may cause binding in the operator, which may cause damage to either the valve or the operator.

**CAUTION!** If the operator drive does not readily slip onto the valve, the stem, key and if necessary, drive sleeve should be inspected for burrs, etc.

**CAUTION!** Only ValvTechnologies approved personnel should mount actuators. The valve **MUST** be tested after the actuator mounting process to verify zero leakage.

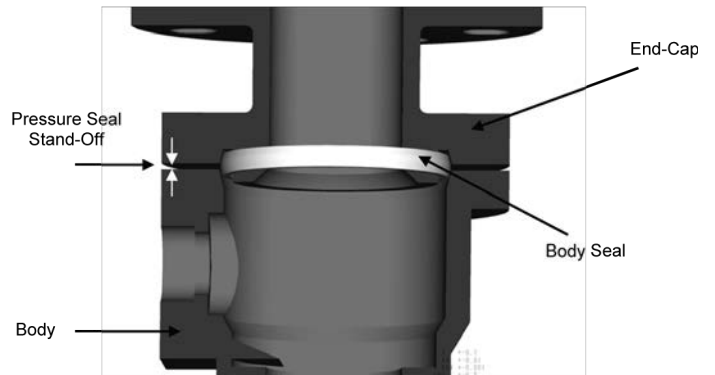
- 10. Remove Stem Jack.
- 11. Set operator closed stop with ball precisely in closed orientation.
- 12. Cycle the valve several times and re-torque the packing gland nuts.

13. Measure Critical Assembly Fit Dimensions

**NOTE:** This measurement is only required on valves with a metal body seal.

**Pressure Seal Standoff**

- 14. Place body with end cap end up. Carefully align pressure seal parallel with body face. Very carefully place the end cap atop the body and pressure seal. All must be horizontal
- 15. Check the body gap (pressure seal standoff). See Table 4. If the gap is out of tolerance, an oversized body may be used.




**TABLE 4 - ASSEMBLY STAND OFF OF PRESSURE SEAL (without ball) (PRESSURE SEAL VALVES ONLY)**

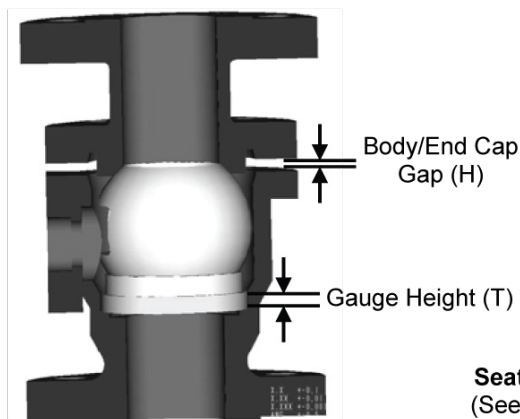
NOMINAL BALL BORE (I.D.) – in. (mm)	STAND OFF – in. (mm)	
	MINIMUM	MAXIMUM
3/8 (10)	.020 (.508)	.040 (1.016)
5/8 (16)	.023 (.584)	.041 (1.0414)
1-1/16 (27)	.041 (1.0414)	.068 (1.727)
1-1/2 (38)	.045 (1.143)	.068 (1.727)
2-1/8 (54)	.048 (1.219)	.071 (1.803)
3-1/16 (78)	.078 (1.981)	.105 (2.667)
4-1/16 (103)	.095 (2.413)	.125 (3.175)
5-1/8 (130)	.120 (3.048)	.145 (3.683)
6-1/16 (154)	.145 (3.683)	.178 (4.521)
8-1/16 (205)	.180 (4.572)	.210 (5.334)
10-1/16 (256)	.230 (5.842)	.260 (6.604)
12-1/16 (306)	.275 (6.985)	.310 (7.874)
15-1/4 (387)	.305 (7.747)	.345 (8.763)
17-1/4 (438)	.330 (8.382)	.370 (9.398)
19-1/4 (489)	.350 (8.89)	.390 (9.906)
21-1/4 (540)	.380 (9.652)	.430 (10.922)

**NOTE:** If standards are not in this range, then ValvTechnologies Engineering approval is required prior to assembly.

## Lock-Up Gap for Large Bore Valves

 **NOTE:** For small bore (5/8", 1-1/16" and 2-1/8"), low pressure (150# - 300#) valves, this measurement is not taken directly, but is calculated after measuring the spring standoff.

16. Place the upstream seat into the valve body with radius facing the opening, end cap end.
17. Insert the ball into the body, over the stem and onto the upstream seat.
18. Place the end cap carefully on the body and line up (parallel) with the body. Measure the lock-up gap (seat/ball gap without a spring).

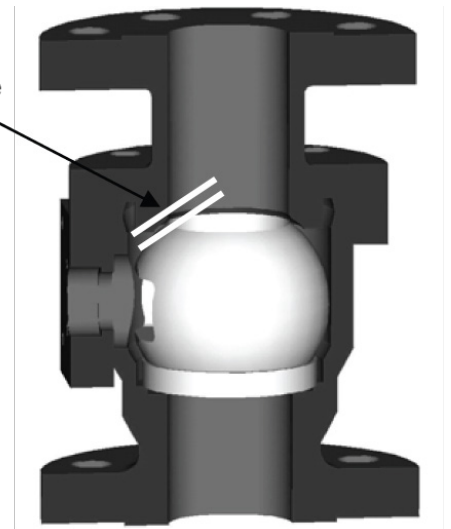


Lock-Up Gap (With Gauge)


$$\text{Seat/Ball Gap} = T - H$$

(See Table 5 for limits)

Max. Feeler Gauge Thickness (F)




Lock-Up Gap  
 $\text{Seat/Ball Gap} = F \times 1.4$   
(See Table 5 for limits)

 **NOTE:** If this measurement cannot be taken directly because of access, use alternative method, shown to the left.

## Belleville Spring Standoff

19. Measure Belleville spring height. Refer to Table 3, for acceptable height range. If height is out of specification, replace with a new spring.

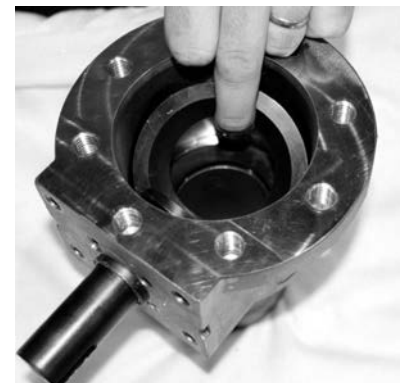
 **NOTE:** Some spring height is always lost due to "set" during first use. ValvTechnologies, Inc. recommends that the spring always be replaced during an overhaul.



20. Remove the end cap, ball and seat.



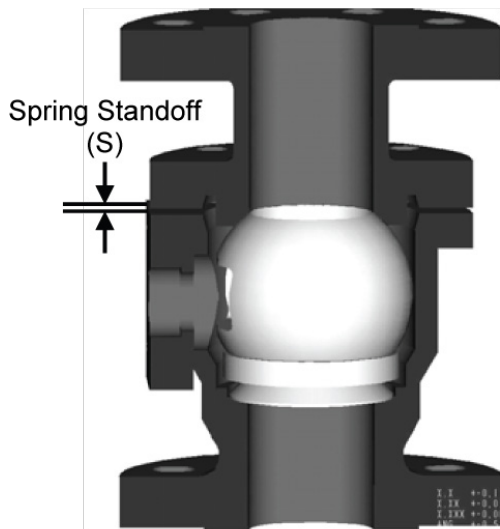
21. Insert the Belleville Spring with the large end resting in the body pocket.



22. Insert the upstream seat loose with the curved seat facing you, away from the Belleville Spring.

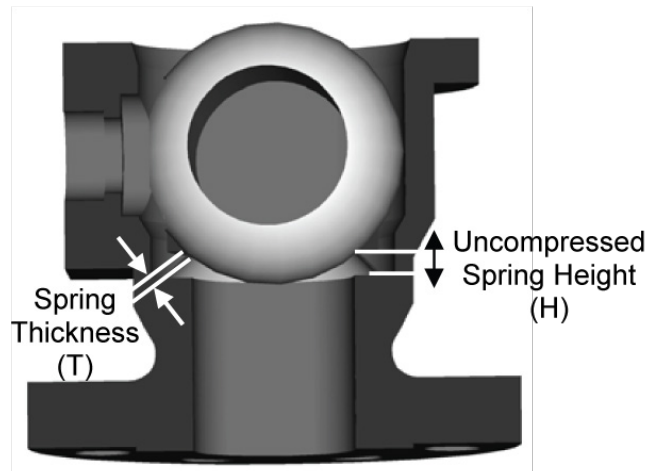


23. Insert the ball with the mated lapped end facing away from the upstream seat.
24. Gently place end cap atop the body, maintaining end cap to body face parallel as end cap is lowered onto body.
25. Using feeler gauges, measure Belleville Spring standoff between the end cap and body.



Spring Standoff Gap

Spring Standoff = S  
(See Table 6 for limits)



Lock-Up Gap for 5/8", 1-1/16"  
& 2-1/8" Bore Valves

Seat/Ball Gap = H-T-Spring Standoff (S)  
(See Table 5 for limits)



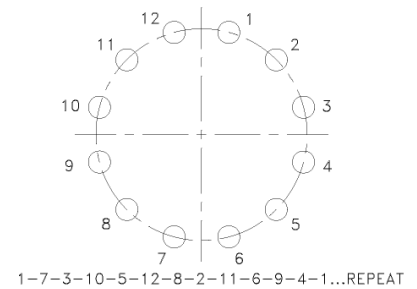
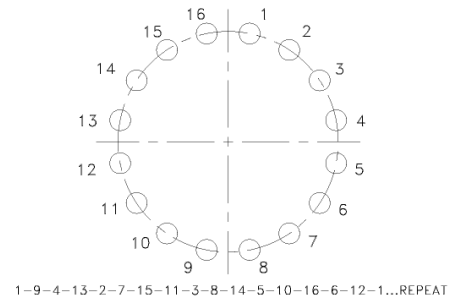
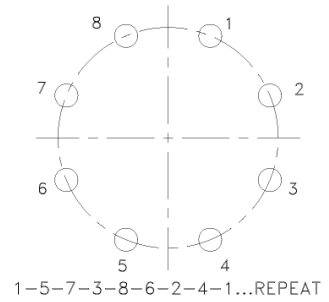
**NOTE:** To obtain an accurate spring stand off measurement, place one set of gauges 180° away from the other and use stacks of approximately equal thickness. Measure the two stacks together and divide by two for the average gap "g". Check the value of "g" against Table 5.

TABLE 5 - SEAT/BALL GAP WITHOUT SPRING

NOMINAL BALL BORE (I.D.) – in. (mm)	SEAT/BALL GAP – in. (mm)	
	MINIMUM	MAXIMUM
3/8 (10)	N/A	.069 (1.753)
5/8 (16)	N/A	.087 (2.210)
1-1/8 (29)	N/A	.075 (1.905)
1-1/2 (38)	.032 (.813)	.046 (1.168)
2-1/8 (150#-300#) (54)	N/A	N/A
2-1/8 (600#-4500#) (54)	.040 (1.016)	.056 (1.422)
3-1/16 (78)	.053 (1.346)	.067 (1.702)
3-1/2 (90)	.033 (.838)	.046 (1.168)
4-1/16 (103)	.043 (1.092)	.056 (1.422)
5-1/8 (130)	.037 (.9398)	.052 (1.321)
6-1/16 (154)	.057 (1.448)	.079 (2.007)
7-1/8 (181)	.040 (1.016)	.053 (1.346)
8-1/16 (205)	.066 (1.676)	.084 (2.134)
10-1/16 (256)	.053 (1.346)	.065 (1.651)
12-1/16 (306)	.064 (1.626)	.083 (2.108)
13-1/4 (337)	.085 (2.159)	.100 (2.54)
15-1/4 (387)	.105 (2.667)	.120 (3.048)
17-1/4 (438)	.130 (3.302)	.145 (3.683)
19-1/4 (489)	.135 (3.429)	.165 (4.191)
21-1/4 (540)	.190 (4.826)	.210 (5.334)

## Complete Assembly

26. Remove the end cap and insert the body gasket/seal.
27. Re-check/re-inspect the sealing faces on ball, body and end cap to ensure they were not damaged during handling.
28. Replace all damaged body studs. Apply Copper-Based Anti-Seize Grease high temperature compound to the threads. For nuclear applications, use of Loctite High Purity Anti-Seize is required.
29. Replace Belleville spring, upstream seat and ball. Ensure the mated side is facing the end cap in the valve body.

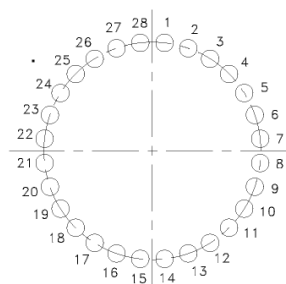
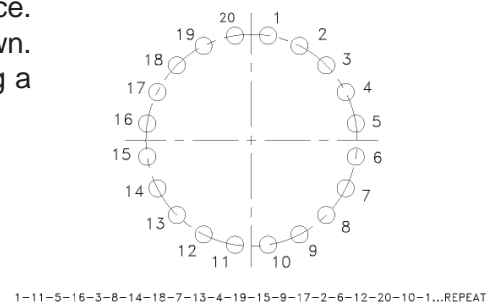


30. Insert the new ValvTechnologies body seal or gasket into the body, being certain that the top surface is precisely parallel with the body face.
31. Tighten the body studs/nuts evenly, observing the body gasket pull-down. Using gradually increasing torque levels, tighten opposite bolts using a star-like pattern until the body and end cap are pulled face-to face.

**CAUTION!** Never turn a nut more than 1/4 turn without moving to a different body nut.

32. During the entire initial pull-down the two faces should remain precisely parallel. Failure to do so may result in a faulty seal. Torque in a star pattern to 1/3 of torque value listed in Table 1. Then torque in a star pattern to 2/3 of torque value listed in Table 1. Then repeat again at the full torque value of Table 1. For valves larger than 10 inches, repeat the last torque values (full torque).

**NOTE:** THE STAR PATTERN IS EXTREMELY IMPORTANT.



1-15-22-8-4-18-25-11-3-20-27-13-6-16-23-9-19-2-10-17-24-5-14-26-7-12-28-21-1...REPEAT

33. Cycle the valve manually to verify that it is functioning correctly.
34. Re-torque the packing gland bolts evenly to the values given in Table 2.

# TESTING

1. Valves may be tested in accordance with ValvTechnologies' Test Procedure, A-TTP 010.
2. When performing the seat test, the pressure must be applied on the upstream side. The arrow on the valve (or the label indicating the high pressure end) will indicate the direction in which pressure should be applied.



**NOTE:** Bi-directional valves must be tested with consideration for the required reverse pressure sealing. Prior to any testing of bi-directional valves, a ValvTechnologies approved service center should be consulted to gain the correct test procedure and test pressure.

## TROUBLE SHOOTING

MALFUNCTION	POSSIBLE CAUSE	REMEDIAL ACTION
<b>Valve will not rotate or operate</b>	1) Actuator has failed 2) Valve packed with debris 3) Stem key has sheared 4) Ball seat gap incorrect	1) Replace or repair actuator 2) Cycle & flush valve to remove debris 3) Determine cause of shearing & correct/replace keys 4) Call Factory
<b>Stem Packing Leaking</b>	1) Gland bolts loose 2) Packing damaged or missing 3) Seal misaligned	1) Tighten gland bolts 2) Shut down system & replace packing 3) Replace & properly align
<b>Body Gasket Leaking</b>	1) Body Bolts loose 2) Body gasket damaged 3) Body gasket seating faces in body or end piece damaged	1) Tighten body bolts 2) Remove valve from service & replace body gasket 3) Return parts to ValvTechnologies for rework
<b>Valve Ball/Seat Leaking</b>	1) Valve not fully closed 2) Debris trapped in valve 3) Seat or ball damaged	1) Close the valve 2) Cycle & flush to remove debris. 3) Mate lap in field if possible; otherwise, send for re-work.

## PARTS INVENTORY PLANNING

In order to maintain the highest level of safety as well as minimize cost while maximizing plant efficiency the following guidelines have been established for part inventory levels:

### PARTS CLASSIFICATION

CLASS	PARTS USAGE	VALVE AVAILABILITY
A	Most Frequent	70%
B	Less Frequent	85%
C	Seldom Replaced	90%
D	Rarely Replaced	95%
E	Typically ever Replaced	100%

Refer to the Recommended Spare Parts List for V1 Series Ball Valves below.\*

### RECOMMENDED SPARE PARTS FOR V1 SERIES BALL VALVES

CLASS	PART DESCRIPTION	QTY/SAME TYPE & SIZE	PERCENT COVERAGE
A	Gland Packing Gland Load Springs	1/3	70%
B	Body Gasket (Metal) Belleville Spring	1/5	85%
C	End Cap / Integral Seat Ball Upstream Seat	1/10	90%
D	Drive Sleeve   Stem   Gland	1/15	95%
E	Yoke Pillers Bridge Thrust Bearing Body Studs & Nuts	1/20	100%

\* All non-standard spare part lists will be provided upon request during processing of order.

# V Series

## Installation and Operations Maintenance Manual

# VALVTECHNOLOGIES

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