



## **Flo-Tite Tri-Star Series**

### **Models 400 / 500 Series (Fire Safe Design)**

### **3-Piece Ball Valves -1500 WOG**

## **Installation, Operation and Maintenance Manual**

Note: Before using a valve, read the entire IOM carefully and make sure you have a clear understanding of all information included.

This manual describes the procedures for the safe and efficient installation, operation and maintenance of Flo-Tite Full Tri-Star Series. **Failure to follow the procedures in this manual may result in Flo-Tite warranties being voided.** Problems with the operation and maintenance of these valves should be directed to the nearest Flo-Tite Representative.

The Flo-Tite 400/500 Series is designed as a split body, three-piece construction, to allow ease of access for maintenance of the valve ball and seat without special tools. This line of valves utilizes the “free floating” ball principle. The ball is not fixed but is free to move with the line pressure. As a result, these valves are capable of tight shut-off with the flow in either direction or dead-ended, regardless of the position of the valve in the line. The downstream seat, which is opposite the pressurized side, of a closed valve, must carry the load exerted by the line pressure on the ball, while the upstream seat is subject to little load or wear. For this reason, it is sometimes possible to increase useful seat life by turning the valve end-for-end in the pipeline.

### **INSTALLATION:**

#### **A. Receiving and Preparation Procedure**

- A1. Remove shipping protection
- A2. Inspect the valve(s) for transportation damage\*
- A3. Inspect the valve bore and remove any debris
- A4. Cycle the valve and inspect the valve for smooth operation, size permitting
- A5. As shipped from the factory, valves may contain a silicone based lubricant. This is for break-in and may be removed if it is objectionable for a particular application by disassembling and solvent washing.

\*If transportation damage is found, immediately take pictures for record purposes and contact the inbound carrier to submit a claim.

#### **B. Installation Procedure**

B1. General – The valve may be fitted in any position in the pipeline. Prior to installing the valve, the pipe on either side of the intended installation should be checked to be free of dirt, debris, weld slag, etc. to prevent damage to the seats, seals, and surface of the ball. The piping must also be free of tension or compression.

**WARNING** – Never use the valve as a pipe support or structural member.

## B2. Installation of the Flo-Tite Full Port Models 400 / 500 Series 3-Piece Ball Valves -1500 WOG Multi-Choice Connections.

Valves with screwed ends should be treated as a single unit and should not be dismantled when installing into the pipeline. Before installing the valve, ensure that the threads on the mating pipe are free from excessive grit, dirt or burrs. Use thread sealant compatible with system media to apply mating threads. Apply wrench only on the hexagon end of the valve cap. In some applications, screwed valves are back-welded on site. These valves must be disassembled as per instructions for Weld-End Valves.

**Caution** – Tightening by using the valve body or handle can seriously damage the valve.

### C. OPERATION:

C1. Manual operation of the valve is accomplished by turning the handle  $\frac{1}{4}$  turn (90 degrees).

\*The valve is open when the handle is “in-line” with the valve or pipeline. The valve is closed when the handle is “across” or perpendicular to the valve or pipeline.

C2. Flo-Tite 400 / 500 Series valves can also be operated with either manual gears, electric or pneumatic actuators. For instructions on installation and operation, refer to the IOM for the correct operator.

C3. Flo-Tite 400 / 500 Series valves may include one of several different styles of limit switches and positioners. Please refer to the appropriate IOM for each device.

### MAINTENANCE:

**CAUTION** – Ball valves can trap fluid in the ball cavity when closed. Be prepared to capture and manage any liquid retained in the valve body when disassembling the valve.

**WARNING** – If the valve has been in hazardous fluid service, review applicable MSDS sheet and decontaminate the valve before disassembly. All persons involved with the disassembly should wear personal protective equipment such as aprons, gloves, face shield, etc. to prevent personal injury.

Access to the valve internals starts with relieving pressure in the pipeline. Turn the valve handle to the 45 degree, half open, position and flush the line, when applicable, to remove any hazardous material from the line. Consult the metal tag attached to the valve body to determine the correct seat and seal materials. Repair kits can be ordered from the local Flo-Tite Representative. This should be done prior to any disassembly work.

**CAUTION** - Valves with actuators, limit switches or positioners should have these devices disassembled from the valve prior to disassembling of the valve.

**WARNING**- Use extreme caution disconnecting any electrical and/or pneumatic sources to the valve to protect against personal injury. Isolate the valve actuator prior to disconnecting.

#### Replacing body seats and seals-

Place the handle in the fully open position. Remove three cap screws and loosen the fourth on one side. Repeat on the opposite side with the corresponding cap screws. The center body should “roll” out. The body seals and valve seats can be removed and replaced with each end cap. Note – It may be necessary to allow for some pipe flex or spread to completely remove the center body from the ends once all bolts are removed.

### Replacing stem seals-

With the valve in the closed position, carefully remove the ball and place on a clean shop rag to prevent damage to the ball or allow the buildup of any debris. Remove the handle nut, handle and stem nut. Gently tap the top of the stem with a non-metallic hammer to allow the stem to move into the body cavity. A lock washer, Belleville washers, packing gland sleeve and packing will now be free to come out of the packing gland (Note: A packing pick may be required to remove some of the packings). The stem can carefully be removed from the body to replace the thrust bearing and guide seal.

### **CAUTION-**

1. Ensure that the anti-static spring is retained in the stem as the stem is removed and again when the stem is re-inserted.
2. Carefully note the sequence that all internal pieces come apart as it is mandatory that they are reinstalled in the same sequence.

### Visual Inspection-

Clean and inspect all metal parts. It is not necessary to replace the ball and stem unless the seating surfaces have been damaged by abrasion or corrosion. Flo-Tite strongly recommends that all seats, seals, and packing be replaced whenever a valve is disassembled for reconditioning. This is the surest protection against subsequent leakage after reassembly. Replacement parts are sold in kit form. Refer to the metal tag attached to the side of the valve body to identify the specific sealing materials used. Kits can be obtained via the local Flo-Tite Distributor. Replacement parts should be purchased prior to valve disassembly. Required information

to purchase replacement parts include:

- a. Line size
- b. Model designation
- c. Seat/seal materials – see stamping on a metal tag attached to the valve body.

### Valve Reassembly -

**Note- the valve may be reassembled and operated dry when no lubricants are allowed in the system; however, a light lubricant on the ball and stem will aid in assembly or reduce initial operating torque. The lubricant used must be compatible with the intended system fluid.**

Replace the stem in the reverse order from above based on valve size, including reattaching the handle. Turn the handle to the closed position. This will align the stem tang and the ball slot. Slide the ball into position. Turn the handle to the open position to help hold the ball in place. Install seats and seals in the end caps with the spherical curvature facing the ball. “Roll” the body back up making sure the seats and seals in the end caps are secure and in the correct position. Replace the three cap screws on each side and hand tighten. Final tightening should be done in a star pattern. Cap screws should be tightened per below.

Packing, packing gland sleeve, Belleville washers, lock washer and gland nut can be assembled. The gland nut should only be hand tightened to prevent over compression of the packing. The pipeline needs to be re-pressurized slowly to prevent any water hammer. Any stem leakage can be corrected by tightening the stem nut one flat at a time.

**Note: Make sure ball is in closed position before tightening up the end connections.**

**WARNING- Over tightening the stem nut will lead to over-compression of the packing, cause premature wear of the packing and require additional force to operate the valve.**

### Mounting Actuators –

Flo-Tite has designed the 400 / 500 Series valves with top-works that is compatible with the requirements of the ISO-5211 bolting flange. This makes the valve compatible for mounting actuators from multiple manufacturers. Flo-Tite's own *Air-Con* pneumatic actuators and *Pro Torque* electric actuators are easily adaptable to the 400 / 500 Series valve series. Please refer to the specific actuator supplier's IOM directions for installation directions.

**Repair Kits –**

Repair kits typically consist of replaceable seats, body seals, and packing seals. Refer to the unit nameplate, as shown below, to confirm what materials are currently installed. Contact your local Flo-Tite Representative to order and receive the kits prior to any maintenance work.

VALVE - SOFT PARTS							
SEAT		STEM SEALS		BODY SEAL		O-RINGS	
TFM	F	TFM	F	TFM	F	VITON	V
CTFM	Y	CTFM	Y	CTFM	Y	EPDM	E
PTFE	T	RTFM	X	PTFE	T	PTFE	T
RPTFE	R	PTFE	T	RPTFE	R	BUNA	B
50/50	S	RPTFE	R	50/50	S	NONE	N
UHMWPE	U	50/50	S	UHMWPE	U		
PEEK	P	UHMWPE	U	PEEK	P		
Cavity Filled	C	PEEK	P	Graphite	G		
Metal	M	Graphite	G	Kel-F	K		
Kel-F	K						

**Standard Seated Valve Torque (In-Lb)**

Model	1/4"	3/8"	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"
400/500	53	53	69	88	116	188	390	480

**Flo-Tite's marking system follows MSS SP-25-1998**

**Valve Markings-** Cast into valve bodies include the following; Flo-Tite Name, Model Numbers, Body Material, Valve Size, & WOG Pressure Rating

All Flo-Tite valves have metal nameplates spot welded to the valve body.

**Standard Trim Soft Parts**

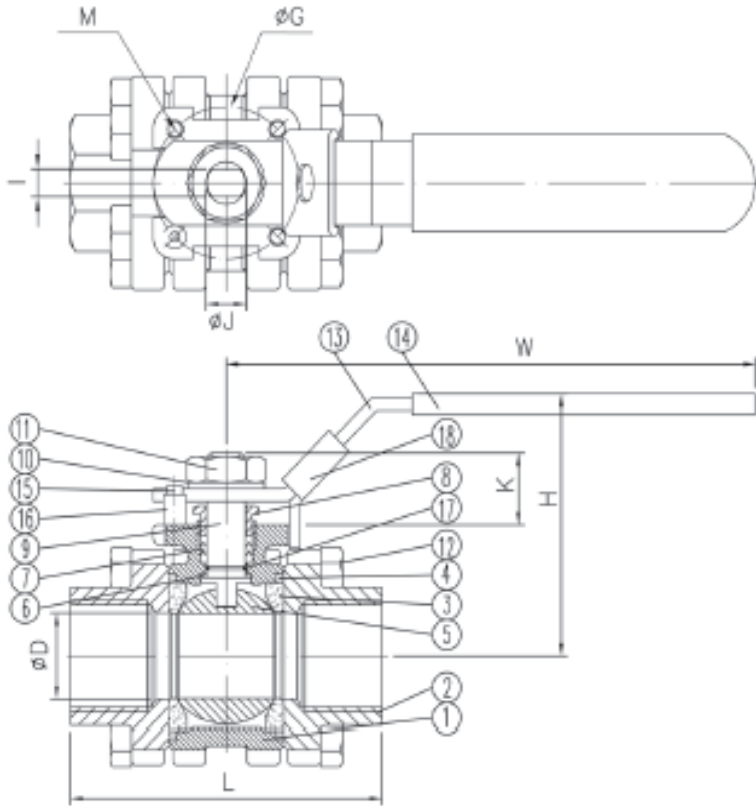


Please carefully review all important procedures in this manual. If anything is unclear, please feel free to contact Flo-Tite directly.

# DESIGN & TECHNICAL DATA

## 3PC Tri-Star Series

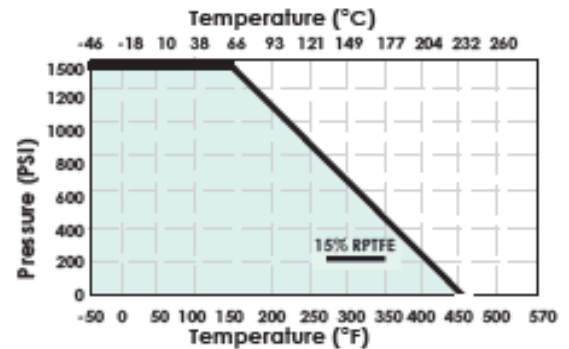
1500 WOG / Full Port



### Models Numbers :

<b>510SS</b>	<b>NPT</b>	<b>- 316SS</b>
<b>520SS</b>	<b>SW</b>	<b>- 316SS</b>
<b>410CS</b>	<b>NPT</b>	<b>- WCB</b>
<b>420CS</b>	<b>SW</b>	<b>- WCB</b>

### PRESSURE & TEMPERATURE DATA



### MATERIALS LIST:

NO.	PART NAME	510SS MODEL	410CS MODEL
1	BODY	ASTM A351-CF8M	ASTM A216-WCB
2	END CAP	ASTM A351-CF8M	ASTM A216-WCB
3	SEAT *	RPTFE	RPTFE
4	GASKET *	RPTFE/Graphite	RPTFE/Graphite
5	BALL	ASTM A351-CF8M/316	ASTM A351-CF8/304
6	THRUST WASHER	RPTFE	RPTFE
7	STEM PACKING *	RPTFE/Graphite	RPTFE/Graphite
8	GLAND	AISI 304	AISI 304
9	STEM	ASTM A276-316	ASTM A276-304
10	HANDLE WASHER	AISI 304	AISI 304
11	HANDLE NUT	AISI 304	AISI 304
12	CAP SCREW	AISI 304	CARBON STEEL
13	HANDLE	AISI 304	ZINC PLATED STEEL
14	HANDLE COVER	PVC	PVC
15	STOP SCREW	AISI 304	CARBON STEEL
16	NUT	AISI 304	CARBON STEEL
17	O-RING	VITON	VITON
18	LOCKING DEVICE	304SS	304SS

\* Parts included in repair kits

### DIMENSIONS:

SIZE		ØD		ØG		H		I		ØJ		K		L		W		M	TORQUE		WEIGHT		ISO PAD
inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm		inch	CV	lbs.		
1/4"	8	0.41	10.5	1.42	36	2.17	55	0.20	5	0.31	8	0.35	9	2.56	65	5.31	135	M5	53	7	0.93	F03	
3/8"	10	0.49	12.5	1.42	36	2.17	55	0.20	5	0.31	8	0.35	9	2.56	65	5.31	135	M5	53	10	0.95	F03	
1/2"	15	0.59	15	1.42	36	2.35	59.8	0.20	5	0.31	8	0.45	11.5	2.76	70	5.31	135	M5	69	15	1.32	F03	
3/4"	20	0.79	20	1.42	36	2.46	62.5	0.24	6	0.39	10	0.59	15	3.15	80	5.31	135	M5	88	40	1.96	F03	
1"	25	1.00	25	1.65	42	2.72	69	0.31	8	0.47	12	0.83	18	3.54	90	6.50	165	M5	116	70	2.76	F04	
1 1/4"	32	1.26	32	1.65	42	3.09	78.5	0.31	8	0.47	12	0.83	18	4.13	105	6.50	165	M5	188	120	4.39	F04	
1 1/2"	40	1.50	38	1.97	50	3.59	91.3	0.31	8	0.55	14	0.79	20	4.72	120	6.89	175	M6	390	200	6.15	F05	
2"	50	1.97	50	1.97	50	3.96	100.5	0.31	8	0.55	14	0.79	20	5.28	134	8.66	220	M6	490	370	9.37	F05	

### SPECIFICATION STANDARDS:

- All valves shell and seat tested to ANSI/ASME B16.34 & API 598
- Federal specification WWV-35, Type II
- End Connections  
Threaded ASME B1.20.1 FNPT  
Socket Weld ASME B16.11
- All materials comply with applicable ASTM material specifications
- Safety lock handle, meets requirements of OSHA 1910-147
- 1500 PSIG WOG, Cold non-shock  
150 PSIG Saturated steam
- Fire safe design available C/F



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