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INSTALLATION AND MAINTENANCE INSTRUCTIONS **Figure XS150**

FABRI-VALVE® BI-DIRECTIONAL HIGH PERFORMANCE KNIFE GATE VALVE

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1. GENERAL

This instruction manual contains important information regarding the installation, maintenance, and operation of the ITT Fabri-Valve XS150 knife gate valve. Please read the instructions carefully and save them for future reference.

2. WARNING

Valves and valve actuators supplied by ITT Engineered Valves are designed and manufactured using good workmanship and materials, and they meet the applicable industry standards. XS150 valves are available with components of various materials, and they should be used only in appropriate services. Misapplication of the product may result in injuries or property damage. It is important to select the proper materials for each component to obtain the maximum performance for the specific application. Examples of misapplication or misuse of a valve or valve actuator includes use in an application that exceeds the pressure / temperature rating, or failure to maintain the equipment as recommended.

SAFETY FIRST! For your safety ask the following questions before removing the valve from the pipeline, and before any disassembly:

- **WHAT'S IN THE LINE?**
Be sure you know what fluid is in the line. If there is any doubt, double check with the proper supervisor.
- **ARE YOU PROTECTED?**
Wear protective clothing and equipment normally required to avoid injury from the particular fluid in the line.
- **IS THE LINE DEPRESSURIZED?**
Depressurize the line and drain the system fluid before you open a pipeline.
- **CHECK THE TAG.**
Refer to the tag attached to each valve for the pressure-temperature rating. DO NOT use a valve at service conditions that exceed the rating on the nameplate.

3. STORAGE

If the valve is to be stored for an extended period of time before installation, the valve should be stored in accordance with ITT's Long Term Storage Procedure.

In general, the valve should be stored in a vertical position and in a cool, clean area to prevent damaging effects on the chest and gate seal.

4. INSTALLATION

IMPORTANT: Read the **WARNING** Section.

NOTE: Any flange or pipeline welding should be done prior to installation of the valves. If this is impossible, protective covering or shields must be placed in the pipeline between the valve and the area being welded prior to welding. Not only must the valve be protected against weld slag, but also against any excessive heat, which could cause seat damage. It is essential that all weld slag, rods, debris, tools, etc., be removed from the pipeline before valves are installed or cycled.

- 4.1 The valve should be tightened between flanges using appropriate gaskets¹ and fasteners for the service, in compliance with applicable piping codes and standards.
- 4.2 Bolt the valve to the mating flange using proper size bolts and/or studs. If stainless bolts or studs are used, lubricate threads to prevent galling. Recommended fasteners are listed in Table 1.

| Size | | Fastener Diameter & Thread | Total No. of Fasteners (Note 2) | No. Tapped Holes in Valve Chest (Note 3) | Stud Bolt Length (min) | Machine Bolt Length (min) |
|--------|-----|----------------------------|---------------------------------|--|------------------------|---------------------------|
| Inches | DN | | | | | |
| 2 | 50 | 5/8-11 UNC | 8 | 4 | 3.25" | 1.50" |
| 3 | 80 | 5/8-11 UNC | 8 | 4 | 3.75" | 1.75" |
| 4 | 100 | 5/8-11 UNC | 16 | 4 | 3.75" | 1.75" |
| 6 | 150 | 3/4-10 UNC | 16 | 4 | 2.75" | 1.75" |
| 8 | 200 | 3/4-10 UNC | 16 | 4 | 4.25" | 2.00" |
| 10 | 250 | 7/8-9 UNC | 24 | 8 | 4.75" | 2.25" |
| 12 | 300 | 7/8-9 UNC | 24 | 8 | 4.75" | 2.25" |
| 14 | 350 | 1-8 UNC | 24 | 8 | 5.25" | 2.50" |
| 16 | 400 | 1-8 UNC | 32 | 12 | 5.50" | 3.00" |
| 18 | 450 | 1-1/8-7 UNC | 32 | 12 | 6.00" | 3.00" |
| 20 | 500 | 1-1/8-7 UNC | 40 | 16 | 6.25" | 3.25" |
| 24 | 600 | 1-1/4-7 UNC | 40 | 16 | 7.00" | 3.25" |

NOTE 1: The bolt and stud lengths in Table 1 are **based on three assumptions:**

- 1/16" compressed gasket thickness *and*
- Mating flange thickness based on ANSI B16.5 flat faced, Class 150 flanges *and*
- Using one ANSI/ASME B18.22.1 Type A Plain Washer, Series N per bolt or stud.

If raised face flanges or gaskets with a different compressed thickness are utilized, the fastener **lengths MUST be adjusted** to maintain the desired thread engagement. Increase or decrease fastener lengths as necessary.²

NOTE 2: "Dead End" Service - When valves are connected to only a single flange, and a mating flange is not installed, fasteners are required only on one side of the body (half of the quantities listed.)

NOTE 3: It is recommended that stud bolts be used as mating flange fasteners. The use of machine bolts with the tapped holes in the valve's chest is **NOT recommended**. Tolerance variations in machine bolt length, flange thickness or gasket thickness could result in:

- insufficient machine bolt thread engagement *or*
- the machine bolt could "bottom out" before full gasket compression.

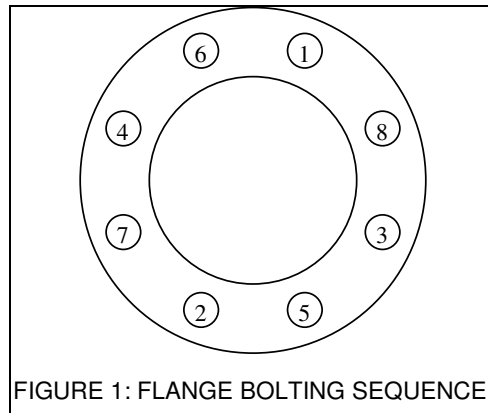
WARNING: If a machine bolt, which has "bottomed out", is tighten further to obtain proper gasket compression, the machine bolt may yield a portion of the valve body. The result may be body contact with the gate and cycling problems.

¹ Material and size

² An inexpensive method to decrease thread engagement is washers. Refer to your piping policies to determine if washers are an approved alternative.

4. INSTALLATION (continued)

- 4.3 When tightening flange bolts, work from side to side in an alternating sequence to ensure even compression of the gasket. The type of gasket, line pressure, type of bolt and bolt lubrication, determines the torque required. See Figure 1



- 4.4 If there is seepage past the chest seal upon installation, the valve may have been subject to wide temperature variations during shipment. Leak tight performance can be restored by the simple packing adjustment procedure in the Maintenance Section.
NOTE: All valves are pressure and seat tested before shipment.
- 4.5 If the valve is installed in horizontal position and an actuator is included with the valve, support of the actuator may be required. Consult the factory for technical advice.
- 4.6 Air operated valves must be supplied with clean, dry, regulated air.

CAUTION: VALVES THAT ARE SUPPLIED WITH CYLINDERS ARE SIZED FOR A SPECIFIED AIR PRESSURE. EXCESSIVE AIR PRESSURE MAY CAUSE DAMAGE TO THE VALVE AND/OR CYLINDER. AIR REGULATORS AND AIR FILTERS ARE AVAILABLE FROM YOUR ITT DISTRIBUTOR.

CAUTION: THE "CLOSED POSITION" STOP IS SET AT THE FACTORY TO PROVIDE TIGHT SHUTOFF. DO NOT OVERRIDE. "OVER-CLOSING" THE VALVE MAY CAUSE THE GATE TO OVER-COMPRESS THE SEAT AND DAMAGE THE SEAT.

5. MAINTENANCE

IMPORTANT: Read the **WARNING** Section.

5.1 GENERAL

Occasionally, the XS150's chest seal may require an adjustment. To adjust the XS150's chest seal, inject small amounts of the packing material through each of the injection holes until the leak stops. Inject just enough packing to stop leakage. Over packing the chest seal may cause undue pressure against the gate making the valve difficult to operate and cause rapid chest seal wear. If possible, stroke the valve a few times before injecting packing.

5.2 PACKING ADJUSTMENT (Injectable)

1. The packing adjustments to the XS150 can be made while the valve is under working pressure. Read the entire warning below.

WARNING: SAFETY FIRST. Special precautions must be taken before removing the packing bolts. Wear protective CLOTHING and protective EQUIPMENT normally required to avoid injury from the particular fluid in the line. Wear protective clothing and protective equipment that safeguards eyes, face, hands, all skin, and lungs. If there is any doubt, contact the proper supervisor immediately.

2. Determine the location of the leak and slowly remove the packing injection bolt that is closest to the leak. Read the entire warning below.

WARNING: SAFETY FIRST. Remove the packing screws VERY slowly and watch for any signs indicating leakage past the packing bolt. If any leakage past the packing bolt is observed when the bolt is being removed, quickly screw the bolt back to its full depth. The pipeline will need to be de-pressurized before the valve's chest seal can be repacked.

3. Inject small amounts of packing by placing it in the hole and slowly pushing it into the valve.

NOTE: A simple re-packing tool will be required for packing the valve. This packing tool can easily be fabricated on the job site. Use a piece of rod or a round shank screw driver with the end cut off or a 3/16" Allen wrench to force the packing into the lateral seal. (The tool diameter should be approximately 0.21") The shank length of the tool should be at least 5" long. If you make the tool yourself, grind a small chamfer on the end of the tool to prevent damaging the threads in the injection holes.

4. Replace the packing injection bolt and tighten until snug. Inspect for leaks. If leaks continue, repeat step 3 until the leak stops. Care should be taken not to over fill the lateral seal with packing as this could lead to premature failure due to wear against the gate.

5.3 LUBRICATION (STEM & STEMNUT)

The stem and stemnut are lubricated at the factory before shipment. However, these parts should be lubricated periodically to prevent wear and to minimize operating forces. Some recommended lubricants are:

- CHEVRON INDUSTRIAL GREASE-MEDIUM
- TEXACO MOLYTEX GREASE #2
- MOLY XL 47-F2-75
- FEL-PRO C5-A COMPOUND

5.4 VALVES WITH ELECTRIC ACTUATORS

Valves with electric motors should be set up as positioned torque closed.

5.5 SEAL REPLACEMENT

1. Remove the entire valve (including topworks from the pipeline).
2. Secure the valve in the vertical position to a fixture, workbench, or table that is anchored to the floor.
NOTE: An overhead hoist is helpful especially on larger size valves.
3. Remove topworks by removing yoke fasteners and gate clamp fasteners.
4. Remove the gate from the valve. Clean the gate and smooth any marred or rough surfaces by using a scotch-brite pad. It should be free of grooves and scratches. Set the gate aside until re-assembly.
5. Loosen, but do not remove the body clamping bolts at this time. The threads of the body clamping bolts should still be engaged to hold the body halves together.
6. Move the valve to a workbench and remove the body clamping bolts to separate the body halves.
NOTE: Body clamping bolts are located on both sides of the valve. Care should be taken when turning the valve body over to remove the clamping bolts on the opposite side of the valve.
7. Remove the old seal.
8. Clean and inspect the body interior for any damage or abnormalities. Look for sharp edges that may cut the seal. Smooth out as necessary.
9. Inspect the new seal.
NOTE: The chest seal comes pre-packed.
10. There is no specific upstream/downstream orientation of the seal. Press new seal into the grooves of one body half.
11. Insert gate scrapers above and below the upper chest seal in the channel provided.
NOTE: Two gate scrapers are required per body half.
12. Line up the bottom edge of the two body halves and slowly press body halves together. Inspect to make sure that the seal has been properly seated in the mating grooves of both body halves.
13. Apply Loctite to the clamping bolts. Insert clamping bolts into bolt holes and engage approximately one thread on each bolt. Do not tighten clamping bolts at this time.
14. Apply an approved silicone lubricant to the gate (both sides, the leading edge and both gate faces - from the start of the radius to the tip).
NOTE: The lubricant used must be compatible with the flow media.

5.5 SEAL REPLACEMENT (continued)

15. Insert gate through the top of the valve until the gate tip is even with the top of the valve port. The gate should slide easily into the upper seal. If excessive resistance is met, determine the cause before continuing the gate installation. Failure to do this may result in damage to the seal.
16. Tighten body-clamping bolts, working from side to side to avoid uneven compression of the seal. Tighten in an alternating sequence.
17. Place the valve in the vertical position and clamp in place.
18. Install the yoke & operator (cylinder, handwheel, bevel gear, etc.). Do not fasten the gate clamp to the gate. Using the operator to push the gate into the seal. While leaving the gate in the closed position, retract the actuator to the open position.
19. Repack the valve by using the packing replacement procedures (See Section 5.2).
20. On handwheel actuated valves, reconnect the non-rising stemnut back to the gate by using the non-rising stemnut fasteners. There is no stroke adjustment necessary for handwheel actuated valves. Proceed to step 21.
On cylinder actuated valves, insert the gate clamp bolt(s) through the gate clamp to secure the gate into place. Adjust the stroke per Section 6, then continue at step 21.
On bevel gear actuated valves, reconnect the gate clamp back to the gate by using the gate clamp fasteners. Adjust the stroke per Section 6, then continue at step 21.
21. Adjust the packing for tight shutoff when the valve is installed and pressurized to operating pressure. See Section 5.2.
22. Maintenance manuals for cylinders, electric motors, and other accessories are available from the factory.

6. SETTING VALVE STROKE

Bevel gear actuated valves.

- The valve is in the *proper closed position*, when the lock-out pin can be inserted into the lower lock-out hole and can pass over the TOP of the gate.
- Adjust the top stroke limiter to achieve the proper closed position (above).
- Avoid over-compressing the seal during closure.

Cylinder actuated valves

- The valve is in the *proper closed position*, when the lock-out pin can be inserted into the lower lock-out hole and can pass over the TOP of the gate.
- Adjust the gate's closed position by screwing the gate clamp in or out of the cylinder rod.
- Tighten ALL fasteners, including gate clamp fasteners and jam nut on cylinder rod.
- Avoid over-compressing the seal during closure.

CAUTION: FAILURE TO ADJUST CLOSED POSITION PROPERLY MAY CAUSE LEAKAGE, DAMAGE, OR PREMATURE FAILURE OF SEAL.

7. SERVICE / SPARE PARTS

| Size | | Seal Material One Piece Perimeter & Chest Seal | | | Packing | Scraper* |
|--------|-----|---|--------|--------|---------|----------|
| Inches | DN | Aflas | Viton | EPDM | | Phenolic |
| 2 | 50 | 155512 | 155524 | 155500 | 137375 | 155596 |
| 3 | 80 | 155513 | 155525 | 155501 | " | 155597 |
| 4 | 100 | 155514 | 155526 | 155502 | " | 155598 |
| 6 | 150 | 155515 | 155527 | 155503 | " | 155599 |
| 8 | 200 | 155516 | 155528 | 155504 | " | 155600 |
| 10 | 250 | 155517 | 155529 | 155505 | " | 155601 |
| 12 | 300 | 155518 | 155530 | 155506 | " | 155602 |
| 14 | 350 | 155519 | 155531 | 155507 | " | 155604 |
| 16 | 400 | 155520 | 155532 | 155508 | " | 155605 |
| 18 | 450 | 155521 | 155533 | 155509 | " | 166606 |
| 20 | 500 | 155522 | 155534 | 155510 | " | 155607 |
| 24 | 600 | 155523 | 155535 | 155511 | " | 155608 |

* Four required per valve

8. EXPLODED VIEW

| PARTS LIST | | | |
|------------|------------------------------------|--------------------------|--------------|
| ITEM | DESCRIPTION | MATERIAL | |
| | | S' SERIES | R' SERIES |
| 1 | BODY HALF | AS SPECIFIED BY CUSTOMER | |
| 2 | GATE | AS SPECIFIED BY CUSTOMER | |
| 3 | GATE SCRAPPERS | PHENOLIC | |
| 4 | GATE SEAL/ INJECTABLE PACKING SEAL | EPDM, VITON OR AFLAS | |
| 5 | STEM | 304SS | |
| 6 | YOKE HALF | 304SS | CARBON STEEL |
| 7 | HANDWHEEL | CAST IRON | |
| 8 | NON-RISING STEMNUT (NRS) | ACID RESISTANT BRONZE | |
| 9A | DRIVE NUT | BRONZE/SS | BRONZE |
| 9B | WAVE SPRING | STAINLESS STEEL | |
| 9C | RETAINING WASHER | STAINLESS STEEL | |
| 9D | RETAINER NUT | STAINLESS STEEL | PLATED STEEL |
| 10 | DRIVE NUT HUB | 304SS | CARBON STEEL |
| 11 | NRS STEMNUT FASTENERS | STAINLESS STEEL | PLATED STEEL |
| 12A | YOKER BOLTS | STAINLESS STEEL | PLATED STEEL |
| 12B | YOKE HEX NUTS | STAINLESS STEEL | PLATED STEEL |
| 13 | GREASE FITTING | PLATED STEEL | |
| 14 | SERIAL NUMBER TAG | STAINLESS STEEL | |
| 15A | DRIVE NUT HUB BOLTS | STAINLESS STEEL | PLATED STEEL |
| 15B | DRIVE NUT HUB HEX NUTS | STAINLESS STEEL | PLATED STEEL |
| 16 | LOCK OUT PIN | 17-4PH SS | |
| 17 | TRAVEL STOP | STAINLESS STEEL | |
| 18 | INJECTABLE PACKING BOLTS | STAINLESS STEEL | |
| 19A | BODY HALF BOLT (SOCKET HEAD) | STAINLESS STEEL | |
| 19B | BODY HALF BOLT (CAP HEAD) | STAINLESS STEEL | |
| 19C | BODY HALF FLAT WASHER | STAINLESS STEEL | |
| 20 | GATE GUIDE (CHEST) | GLASS FILLED TFE | |

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