

Maintenance and Repair to Section D, Series FT Relief Valves.

Closed Cap

- References:
- a. ASME Boiler and Pressure Vessel Code, Section VIII.
 - b. National Board of Boiler and Pressure Vessel Inspectors Publication, NB-23, NBIC, National Board Inspection Code.

*The following instructions are intended to be a guide in the repair and testing of the **FT** series safety relief valves. Any repair work performed on a valve manufactured to meet the requirements of reference (a), as signified by the ASME "UV" symbol stamped upon the tag, must be performed by personnel knowledgeable of the specifications of references (a) and (b).*

1 Preparation.

- 1.1 Remove the valve from service.
- 1.2 Note the information on tag.
- 1.3 Review the drawing and material list.
- 1.4 Ensure that all necessary materials and replacement parts are in hand and in good condition.
- 1.5 All repair work should be accomplished in a clean environment.

2 Disassembly.

- 2.1 Refer to assembly drawing or to catalog section diagram for parts nomenclature.
- 2.2 Hold the valve vertically in a vise by clamping on the exposed flats of the **BASE**, with the **CAP** up.
- 2.3 Remove the cap seal wire. *Note: Breaking seal wire voids warranty.*
- 2.4 Remove the **CAP**.
- 2.5 Loosen the **ADJUSTING LOCKNUT**.
- 2.6 Turn the **ADJUSTING SCREW** counterclockwise to relieve spring tension.

- 2.6.1 While unscrewing the **ADJUSTING SCREW**, count and record the number of turns and flats required to release all spring tension. This will give an approximate set point when resetting the opening pressure.
- 2.7 Loosen the **BONNET** from the **BODY** by using a smooth-jaw pipe wrench on the bonnet flats.
 - 2.7.1 You may have to hold the **BODY** from turning with the bonnet with another wrench or similar tool.
 - 2.7.2 Be ready to hold the **GUIDE STEM** and spring assembly as you lift the **BONNET**. Allowing these parts to fall will probably cause damage, requiring replacement.
- 2.8 Place the **GUIDE STEM** and spring assembly aside in clean layout area.
- 2.9 Remove the **BALL** from the recess in the **SPINDLE** and place in clean storage.
- 2.10 Remove the **SPINDLE GUIDE** from the **BODY** and place in clean storage.
- 2.11 Unscrew the **BODY** from the **BASE**.
 - 2.11.1 As you lift the **BODY**, be careful not to knock the **SPINDLE** assembly from the **SEAT**.
- 2.12 Carefully remove the **SPINDLE** assembly and set aside in clean layout area.
- 2.13 Remove the **SEAT** from the **BASE**.
- 2.14 Remove all O-rings and discard.
 - 2.14.1 There are seven (7) O-rings on this valve assembly. All must be replaced to ensure a proper seal after completing the repair.
- 2.15 Disassemble the **SPINDLE** disk assembly.
 - 2.15.1 Do not place the **SPINDLE** in a vise! Doing so will damage the sliding surface.
 - 2.15.2 With a 3/16" Allen hex wrench, remove the **DISK SCREW**.
 - 2.15.3 Remove the **O-RING RETAINER**.
 - 2.15.4 The **DISK** has a 3/8"-16 internal thread to assist in removal. Use a 3/8" bolt to force the **DISK** from the **SPINDLE**. Place in clean layout area.

2.15.5 Remove the **SEAT O-RING** and discard.

2.15.6 Remove the **DISK SEAL** O-ring and discard.

3 **Inspection and Preparation for Reassembly.**

- 3.1 All original parts should be carefully cleaned and inspected prior to reassembly, including:
 - 3.1.1 **CAP** - clean and check the threads for damage.
 - 3.1.2 **BONNET** - clean and check all threads for damage.
 - 3.1.3 **ADJUSTING SCREW** - clean the threads and check for excessive corrosion.
 - 3.1.4 **UPPER ADAPTER** - clean and check for excessive corrosion.
 - 3.1.5 **SPRING** - check for signs of corrosion or wear, such as severe pitting, cracks, etc.
 - 3.1.6 **GUIDE STEM** - ensure this piece is tightly threaded into the **LOWER ADAPTER**.
 - 3.1.7 **LOWER ADAPTER** - clean and check for excessive corrosion.
 - 3.1.8 **BALL** - clean and check for extreme damage.
 - 3.1.9 **SPINDLE GUIDE** - Clean and check for excessive wear. Clean the guiding surface inside the bore. Use a light lubricating spray to assist the motion of the spindle.
 - 3.1.10 **SPINDLE** - clean and check for damage. Note especially the condition of the upper sliding surface and the area inside the spindle for the disk seal.
 - 3.1.11 **BODY** - clean thoroughly and check for excessive corrosion and damage that could possibly cause the valve to fail. Ensure the threads are clean and free from damage.
 - 3.1.12 **BASE** - clean thoroughly and check for excessive corrosion or other damage.
- 3.2 Inspect the new parts prior to reassembly.

- 3.2.1 O-rings - check that the new O-rings are in good condition.
- 3.2.2 Lapped parts - check that the lapped **DISK** and **SEAT** are intact.
- 3.2.3 **O-RING RETAINER** - check for any apparent damage.

4 **Reassembly.**

- 4.1 Layout the parts to be reassembled on a clean surface.
- 4.2 Refer to the drawing or catalog section for a diagram of the assembly.
- 4.3 Place the **BASE** in a vise with the inlet connection down.
- 4.4 Install the **BODY SEAL** O-ring over the base-to-body threads.
- 4.5 Place the new **SEAT SEAL** O-rings over the new **SEAT** threads.
- 4.6 Tighten the new **SEAT** into the **BASE**. *Do not damage the lapped seating surface in any way!*
- 4.7 Reassemble the **SPINDLE** assembly.
 - 4.7.1 Place the new **DISK SEAL** O-ring into the spindle disk holder.
 - 4.7.2 Install the new **DISK**. *Use caution to avoid damage to the lapped seat of the disk.*
 - 4.7.3 Place the new **SEAT O-RING** onto the new **O-RING RETAINER**.
 - 4.7.4 Set the **O-RING RETAINER** in place on the disk. Apply a liquid thread securing agent, such as "Loctite", to the threads of the **DISK SCREW** and install using a 3/16" hex wrench.
- 4.8 Thread the **BODY** onto the **BASE** and tighten with a smooth-jawed pipe wrench.
- 4.9 Put the **SPINDLE** assembly in place on the **SEAT**, being careful to avoid damaging the lapped surfaces.
- 4.10 You *may* apply a light lubrication to the sliding surface of the **SPINDLE**.
- 4.11 Carefully place the **SPINDLE GUIDE** over the **SPINDLE** and tighten the **SPINDLE GUIDE** into the **BODY**.

- 4.12 Apply a light lubricant to the recess on top of the **SPINDLE** and install the **BALL**.
 - 4.13 Place the new **BONNET SEAL** O-ring over the body-to-bonnet threads.
 - 4.14 Reassemble the **GUIDE STEM** and **SPRING** assembly.
 - 4.14.1 Ensure that the **STEM LOCKNUT** is securely tightened into the **LOWER ADAPTER**.
 - 4.14.2 Position the **SPRING** over the **GUIDE STEM**, securely onto the **LOWER ADAPTER**.
 - 4.14.3 Install the **UPPER ADAPTER** on the **GUIDE STEM** and secure into the **SPRING**.
 - 4.15 Place the **GUIDE STEM** assembly onto the **BALL** and hold while replacing the bonnet.
 - 4.16 Thread the **BONNET** on to the **BODY**, ensuring that the **GUIDE STEM** passes through the opening at the top for the **ADJUSTING SCREW**.
 - 4.17 Tighten the **BONNET** to the **BODY**.
 - 4.18 Install the new **CAP SEAL** O-ring in place over the bonnet-to-cap threads.
 - 4.19 Install the **ADJUSTING SCREW** (with the **ADJUSTING LOCKNUT** in place) and tighten until the **ADJUSTING SCREW** just contacts the **UPPER ADAPTER**.
 - 4.20 If the set pressure of the valve will remain the same as prior to the repair, tighten the **ADJUSTING SCREW** the same number of turns and flats as previously recorded.
 - 4.21 Secure the **ADJUSTING LOCKNUT**, but do not overly tighten.
 - 4.22 Loosely screw the **CAP** in place.
 - 4.23 Remove the valve from the vise and prepare for setting the opening pressure.
- 5 **Setting the opening pressure.** *Note: Valve testing must be performed by trained personnel in compliance with applicable Code or regulations.*

- 5.1 Set the opening pressure of the valve on a suitable test stand using fluid compatible with the intended service of the valve.
- 5.2 Raise and lower the test pressure beneath the valve while making adjustments to the **ADJUSTING SCREW**.
 - 5.2.1 Turning the **ADJUSTING SCREW** clockwise raises the opening pressure.
 - 5.2.2 Turning the **ADJUSTING SCREW** counter-clockwise lowers the opening pressure.
- 5.3 The set pressure must coincide with stamped pressure on the name plate.
- 5.4 The **ADJUSTING LOCKNUT** on the **ADJUSTING SCREW** must be tightened to prevent changes in set pressure.
- 5.5 Replace and tighten **CAP**.
- 5.6 Replace seal wire and crimp lead.
- 5.7 Verify that all fluid has been drained from the valve and that there is no debris or foreign material (i.e. thread tape, etc.) in the valve inlet or outlet.

6 **Place the valve back in service.**