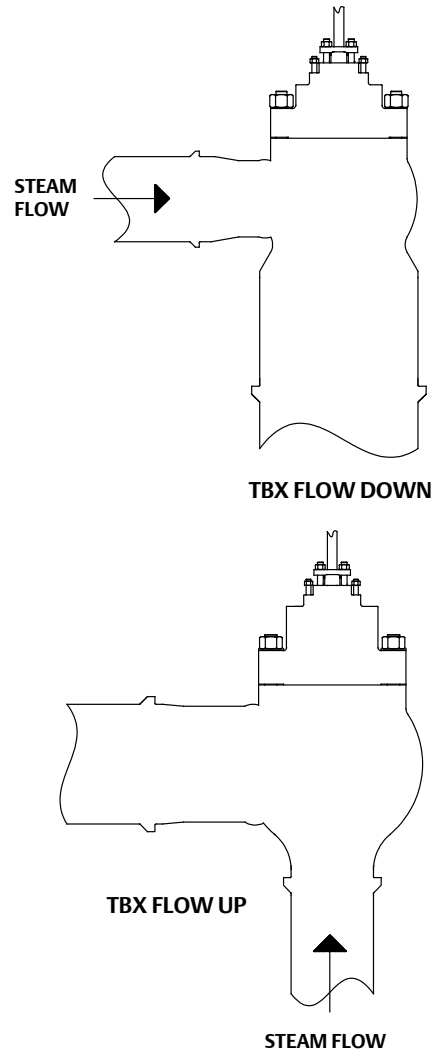


Fisher® TBX Blowdown Fixture

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Figure 1. Fisher TBX Constructions



Introduction

Scope of Manual

This instruction manual includes installation and operation information for the Fisher TBX Blowdown Fixture for flow up and flow down TBX valves. Piping blowdown is very important to successful plant startup and trouble free operation. The plan for piping blowdown should be undertaken by professionals familiar with all aspects of blowdown operation. This manual is not intended to cover all details required for successful piping system cleaning.



Some instructions are different between the TBX flow up and TBX flow down valve constructions. Figure 1 can be used to help identify which instructions apply. Inlet steam flow is perpendicular to the valve stem and actuator on a TBX flow down and parallel to the valve stem and actuator on a TBX flow up.

Key numbers identified for valve disassembly are shown in the specific valve instruction manual. Refer to separate instruction manuals for instructions covering the exact valve, actuator, and accessories associated with the blowdown fixture.

Do not install, operate, or maintain a TBX Blowdown Fixture without being fully trained and qualified in valve, actuator, and accessory installation, operation, and maintenance. **To avoid personal injury or property damage, it is important to carefully read, understand, and follow all the contents of this manual, including all safety cautions and warnings.** If you have any questions about these instructions, contact your Emerson Process Management sales office before proceeding.

Description

The TBX Blowdown Fixture provides a convenient way to clean piping upstream of the valve while taking care not to damage internal valve parts.

Educational Services

For information on available courses for the Fisher TBX Blowdown Fixture, as well as a variety of other products, contact:

Emerson Process Management
Educational Services, Registration
P.O. Box 190; 301 S. 1st Ave.
Marshalltown, IA 50158-2823
Phone: 800-338-8158 or
Phone: 641-754-3771
FAX: 641-754-3431
e-mail: education@emerson.com

Principle of Operation

The Blowdown Fixture replaces the valve plug and cage and allows steam flow from the upstream piping to be directed through the valve body and out the valve outlet and downstream piping.

Maintenance

WARNING

To avoid personal injury or property damage from release of pressurized process media, ensure that the system is completely depressurized and appropriate safety measures have been taken prior to carrying out any of the following maintenance procedures. Only trained competent individuals with the proper equipment should attempt to disassemble and install a Blowdown Fixture, and reassemble a TBX valve.

- Do not remove the actuator from the desuperheater while the valve is still pressurized.

- Always wear protective gloves, clothing, and eyewear when performing any maintenance operations to avoid personal injury.
 - Disconnect any operating lines providing air pressure, electric power or a control signal to the actuator. Be sure the actuator cannot suddenly open or close the valve.
 - Use bypass valves or completely shut off the process to isolate the valve from process pressure. Relieve process pressure on both sides of the valve. Drain the process media from both sides of the valve.
 - Vent the power actuator loading pressure and relieve any actuator spring precompression.
 - Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.
 - The valve packing box may contain process fluids that are pressurized, *even when the valve has been removed from the pipeline*. Process fluids may spray out under pressure when removing the packing hardware or packing rings, or when loosening the packing box pipe plug.
 - Check with your process or safety engineer for any additional measures that must be taken to protect against process media.
-

Valve Disassembly

The following valve disassembly steps are intended as a quick reference only. Refer to the TBX instruction manual, D103172X012, for key numbers and further detail regarding valve disassembly.

Actuator Removal

The following actuator disassembly steps are intended as a quick reference only. Refer to the appropriate actuator instruction manual for further detail on actuator removal.

1. Release the actuator seat load by either manually stroking the valve or applying the appropriate instrument signal. The stem connector may be removed once the plug is off of the valve seat.
2. If an instrument signal has been used to stroke the plug off the seat, remove the signal only after removing the stem connector.
3. Isolate and disconnect the operating lines from the actuator.
4. Loosen the yoke fasteners and remove the actuator from the valve.

Packing Box

Unbolt the packing stud nuts, (key 68), and remove the packing flange (key 66) and packing follower, (key 65) (reference the appropriate instruction manual for key numbers). Remove as much packing as possible from the packing box.

CAUTION

Extreme care should be taken to avoid scratching the stem or the packing box.

Bonnet and Trim

1. Loosen the bonnet stud nuts, (key 55) using an even and opposing pattern (for example, if the first nut loosened is at the 1 o'clock position, the next nut to be loosened would be at the 7 o'clock position). This will prevent uneven loading of the bonnet studs, which may cause binding.

Individual nuts should not be completely loosened while the remaining nuts are tight. It is suggested that at least two stages of loosening be used to avoid overloading the last few remaining studs.

2. Remove the bonnet (key 6) from the valve with uni-axial pull. If the bonnet seems to bind in the valve body, check the alignment of the hoist or pulling mechanism. Deviation from an axial pull of the parts may result in galling or bending of the stem (key 23). The bonnet may be lightly tapped back into alignment with a soft face mallet. The stem and plug should be pushed back into the valve body while the bonnet is being removed. Once the bonnet is removed, dislodge any remaining packing rings from the packing box.

CAUTION

Do not attempt to overpower any binding, as damage to the guide surfaces may result.

3. Remove the packing ring (key 63) from the bottom of the packing box. Lightly sand the inside of the packing box with 60 or 80 grit paper to remove any adherent packing material. Final cleanup should be made with 160 grit or finer paper.
4. Inspect the bonnet guiding surfaces and gasket mating surfaces. Light damage on the guiding surface may be repaired with an emery cloth or other suitable material. Damage to the gasket mating surface may require bonnet replacement to avoid leakage.
5. Remove the plug assembly (key 22, 23, and 53) as a single unit by grasping the valve stem (key 23) and pulling the assembly from the body cavity. The plug assembly contains sensitive guiding and sealing surfaces on its outside diameter and care must be taken in its handling. The plug should be temporarily stored on a clean wooden or cloth surface.
6. Remove the cage (key 21) from the valve body. Remove and discard the upper and lower cage gaskets (key 43). Reference the TBX valve instruction manual for guidance in performing this disassembly. The cage contains sensitive guiding surfaces on its outside diameter and care must be taken during handling. The cage should be temporarily stored on a clean wooden or cloth surface.
7. Clean and inspect the guiding and sealing surfaces of the plug assembly. For balanced plug designs, inspect the piston ring (key 45) and Bore Seal ring (key 46) for signs of excess wear or damage and replace if necessary. The piston ring is a two piece design with an outer seal ring and an inner expander ring. The outer ring diameter should be expanded beyond the diameter of the plug in its free state. It can be shifted within its groove to inspect for uneven wear around its circumference. The piston ring should require some compression when installing the plug into the cage. Lack of required compression indicates that the piston ring has worn or relaxed and should be replaced. Vertical marks in the axial orientation also indicates wear that requires replacement of the ring. The Bore Seal ring has a C-shaped cross section with the open portion of the C-shape facing the stem side of the plug for flow-up designs and the open portion of the C-shape facing the seating surface of the plug for flow-down designs. Any uneven marks around the circumference of the ring or any flattening of the ring shape at its outside diameter are indications of wear and require replacement. Contact your Emerson Process Management sales office for Bore Seal ring replacement.
8. Clean and inspect the inside diameter surfaces of the cage. The entire length of the cage inside diameter is either a sealing and/or guiding surface and any measurable wear requires that the cage be replaced.
9. **Flow up construction only:** The seat ring remains retained inside the valve body. Clean and inspect the angled seating surface. Any detectable damage around the circumference of the seating surface is an indication of wear and requires reconditioning to ensure seating performance. Contact your Emerson Process Management sales office for specific instructions on reconditioning the seating surface.
10. **Flow down construction only:** The bolted seat ring and lower cage must be removed. Loosen the seat ring bolts, (key 76) using an even and opposing pattern (for example, if the first nut loosened is at the 1 o'clock position, the next nut to be loosened would be at the 7 o'clock position). This will prevent uneven loading of the seat ring studs, which may cause binding. Individual bolts should not be completely loosened while the remaining bolts are tight. It is suggested that at least two stages of loosening be used to avoid overloading the last few remaining studs. Reference the TBX instruction manual (D103172X012) for instructions on removing the bolted seat ring and lower

cage (key 79). Discard lower cage gaskets (key 75). The bolted seat ring and lower cage contain sensitive guiding and gasket surfaces on its outside diameter and care must be taken in their handling. The seat ring and lower cage should be temporarily stored on a clean wooden or cloth surface.

11. Remove all used gaskets and foreign matter from the interior of the valve and from the inlet and outlet openings. Remove any foreign matter that may be in the valve trim. Inspect all valve body guiding and sealing surfaces for any signs of wear.

Visual Inspection

Visually inspect the interior of the valve for abnormal wear, signs of erosion, or scoring if the valve has been in service. All scores and scratches should be removed by grinding or filing to remove any interference of the clearance zones between the internal bores and the mating parts. The affected area should be sanded with 100 grit or finer paper. Do not attempt to completely remove the score, only the interference should be removed and sanded.

The gasket surfaces of the valve body and bonnet should be inspected to verify that they are not damaged and are free of imbedded gasket material.

Installation of the Blowdown Plug

Inspect the valve to ensure that all parts and gaskets have been removed and the valve body is free from foreign debris. For TBX flow up constructions, lubricate the inside and outside of the seat lip and the upper valve body bore and counterbore. For TBX flow down constructions, lubricate the lower body bore where the bolted seat and lower cage guide are located and the upper valve body bore and counterbore. Install the trim as noted below and illustrated in the Blowdown Fixture drawings, figures 2, 3, and 4.

1. Place the lower cage gasket (key 43) into the valve body.
2. Insert the Blowdown Plug (key 3) into the valve body, making sure that the gasket remains properly placed. Note that the Blowdown Plug must extend to and engage with the seat ring. If there is any question regarding the proper seating of the Blowdown Plug inside the valve body, the following measurements can be taken for confirmation. Measure the thickness of the Blowdown Plug flange at its largest diameter. Measure the depth of the mating counterbore where the Blowdown Plug flange engages into the valve body. When assembled with a new cage gasket, the resulting depth from the top of the valve body to the top of the Blowdown Plug flange should be the difference in these two measured values, minus an additional 0.045 inch to allow for the uncompressed gasket.
3. **Flow down construction only:** Insert the Blowdown Plug (key 3) into the valve body, making sure the gasket remains properly placed.

Table 1. Recommended Bonnet Stud Torque⁽¹⁾

Bolt Size, Inch	Threads Per Inch	Recommended Bolt Torque, lbf•ft ⁽²⁾
1	8	405
1-1/8	8	550
1-1/4	8	730
1-3/8	8	980
1-1/2	8	1290
1-5/8	8	1650
1-3/4	8	2070
1-7/8	8	2560
2	8	3130
2-1/4	8	4490

1. Torque values for lubricated threads.
2. Torques for studs with heavy hex nuts.

4. Place the upper cage gasket (key 43) on top of the flange of the Blowdown Plug.
5. Lubricate the bonnet studs (key 54) and lower the bonnet (key 6) onto the valve body, making sure that the upper cage gasket remains in the gasket containment groove.

6. Lubricate and tighten the bonnet fasteners as recommended in the TBX valve instruction manual. Torque values are also shown in table 1 of this document.

CAUTION

Failure to comply with good body-to-bonnet bolting practices and the torque values shown in table 1 or in the appropriate valve instruction manual may result in damage to the valve.

Piping Blowdown with the Blowdown Fixture Installed

⚠ WARNING

To avoid personal injury or property damage from blown out debris, take appropriate measures to stay clear of the outlet of the blowdown piping during the following procedure.

Note

The following steps are not intended to be complete instructions for performing a proper system blowdown. They are intended only to address the basic issues required for proper piping blowdown.

1. Perform piping blowdown according to plant startup procedures. Normal blowdown procedures should incorporate piping velocities in excess of those anticipated during maximum system operation. Piping should be blown down until two subsequent checks of a target placed at the outlet of the blowdown piping indicate that all debris has been removed from the piping.
2. At the completion of the blowdown procedure, secure and depressurize the system.

Disassembly of the Blowdown Fixture

1. Loosen the bonnet nuts, (key 55) using an even and opposing pattern (for example, if the first nut loosened is at the 1 o'clock position, the next nut to be loosened would be at the 7 o'clock position). This will prevent uneven loading of the bonnet flange studs which may cause binding.

Individual nuts should not be completely loosened while the remaining nuts are tight. It is suggested that at least two stages of loosening be used to avoid overloading the last few remaining studs.

2. Remove the bonnet (key 6) from the valve with uni-axial pull. If the bonnet seems to bind in the valve body, check the alignment of the hoist or pulling mechanism. Deviation from an axial pull of the parts may result in galling or bending of the stem.

CAUTION

Do not attempt to over-power any binding, as damage to the guide surfaces may result.

3. Remove and discard the upper cage gasket (key 43).
4. Remove the Blowdown Plug (key 3) from the valve body cavity using the integral eyebolt holes in the blowdown plug.

5. Remove and discard the lower cage gasket (key 43).

CAUTION

To avoid compromising the service life of the TBX valve body and/or trim, do not reuse the Blowdown Fixture gaskets for valve reassembly.

Cleaning

After removal of the Blowdown Plug, the interior of the valve body should be rinsed with clean water or repeatedly wiped with clean towels until the surfaces are clean to the touch. All internal parts should be cleaned prior to reassembly.

Reassembly

Refer to the TBX valve instruction manual for guidance in reassembling the valve.

Ordering Information

Information required to order a TBX Blowdown Fixture.

- Valve Serial Number
- Valve Tag Number
- Customer Order Number
- Valve Model Number

Blowdown Fixture Design Conditions

- Flushing Fluid
- Flushing Fluid Pressure
- Flushing Fluid Temperature
- Material (carbon steel unless otherwise specified)

⚠ WARNING

Use only genuine Fisher replacement parts. Components that are not supplied by Emerson Process Management should not, under any circumstances, be used in any Fisher valve, because they may void your warranty, might adversely affect the performance of the valve, and could cause personal injury and property damage.

Figure 2. Fisher TBX Flow Up Welded Seat Ring Blowdown Fixture

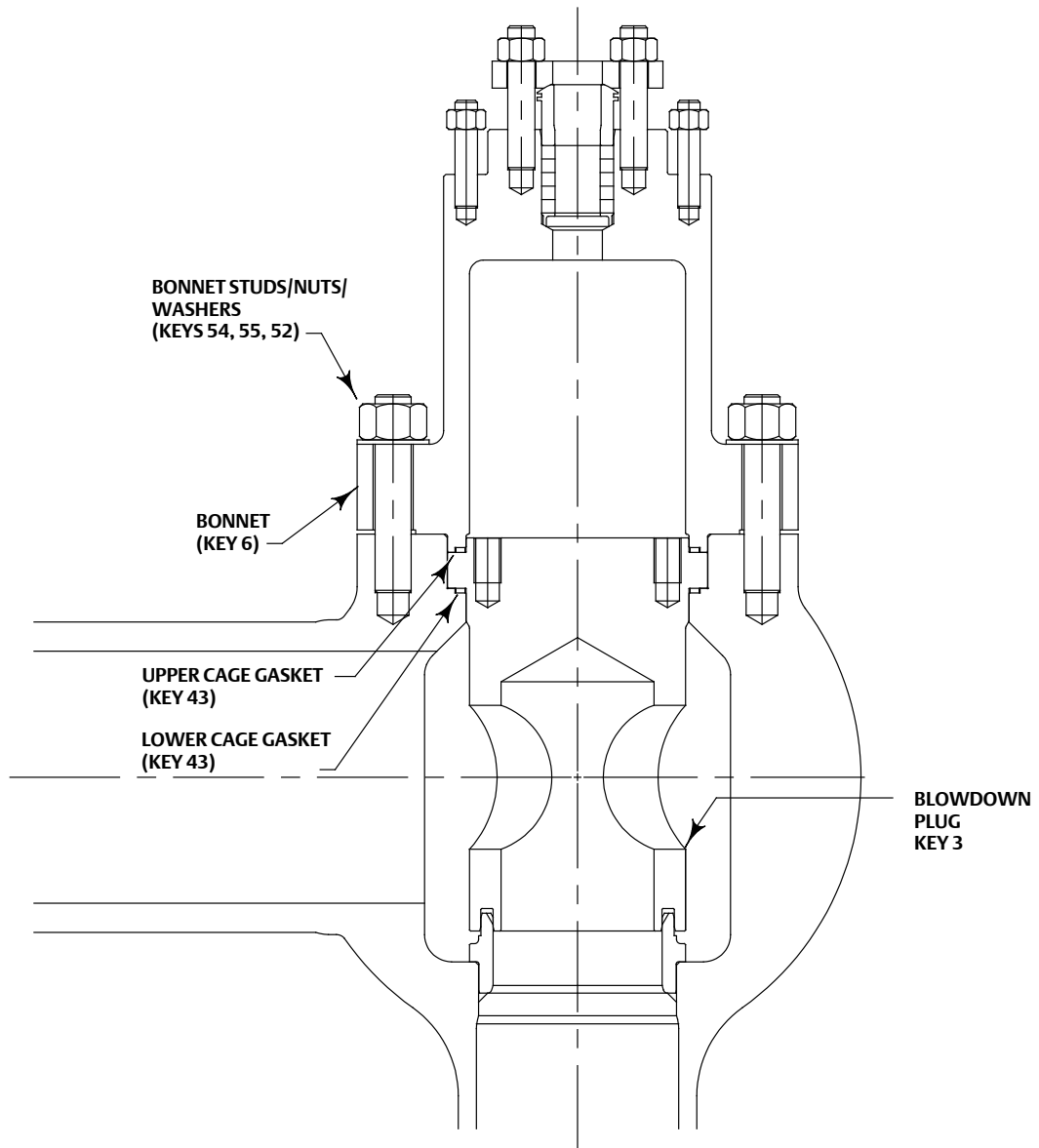


Figure 3. Fisher TBX Flow Up Bolted Seat Ring Blowdown Fixture

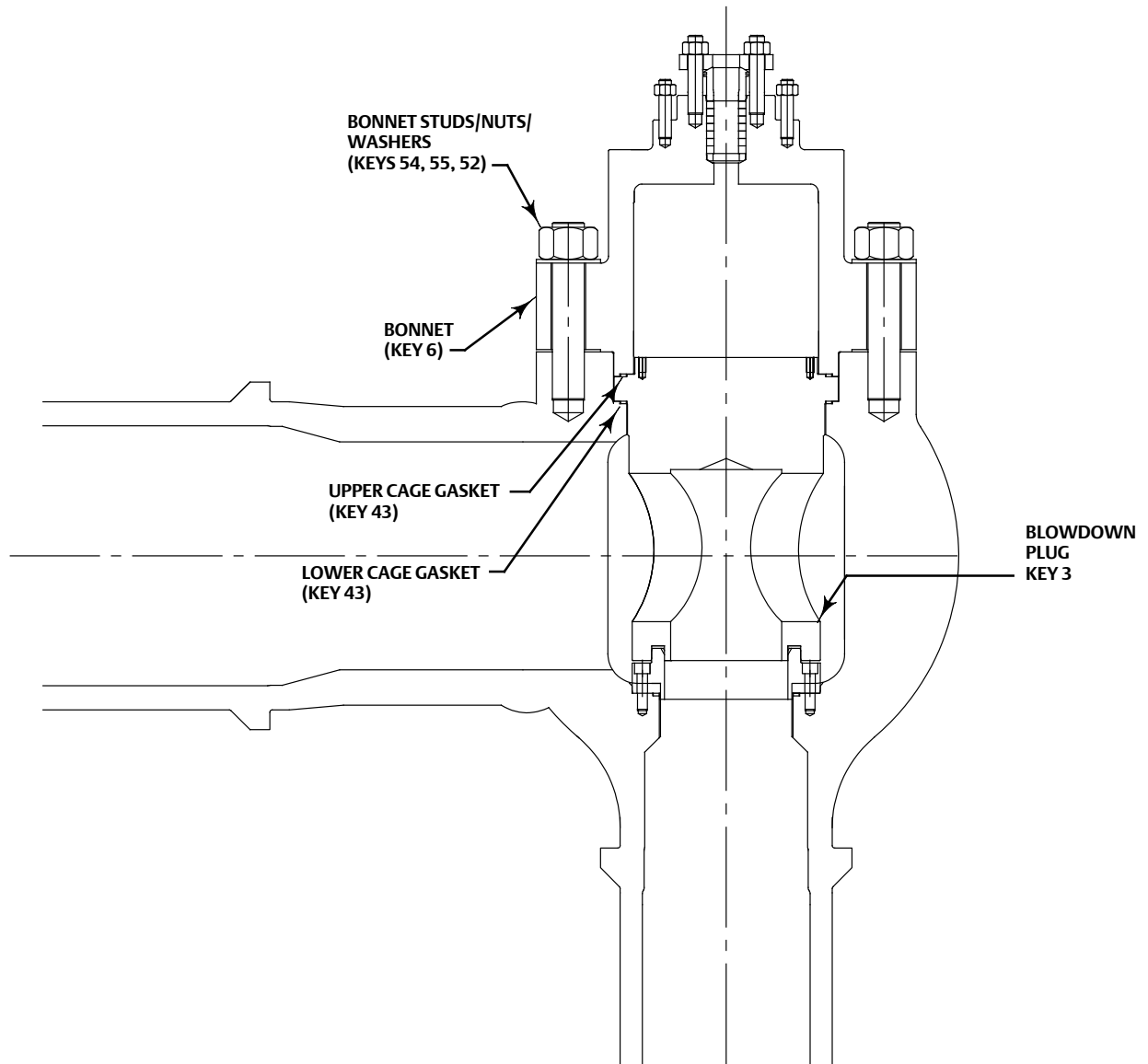
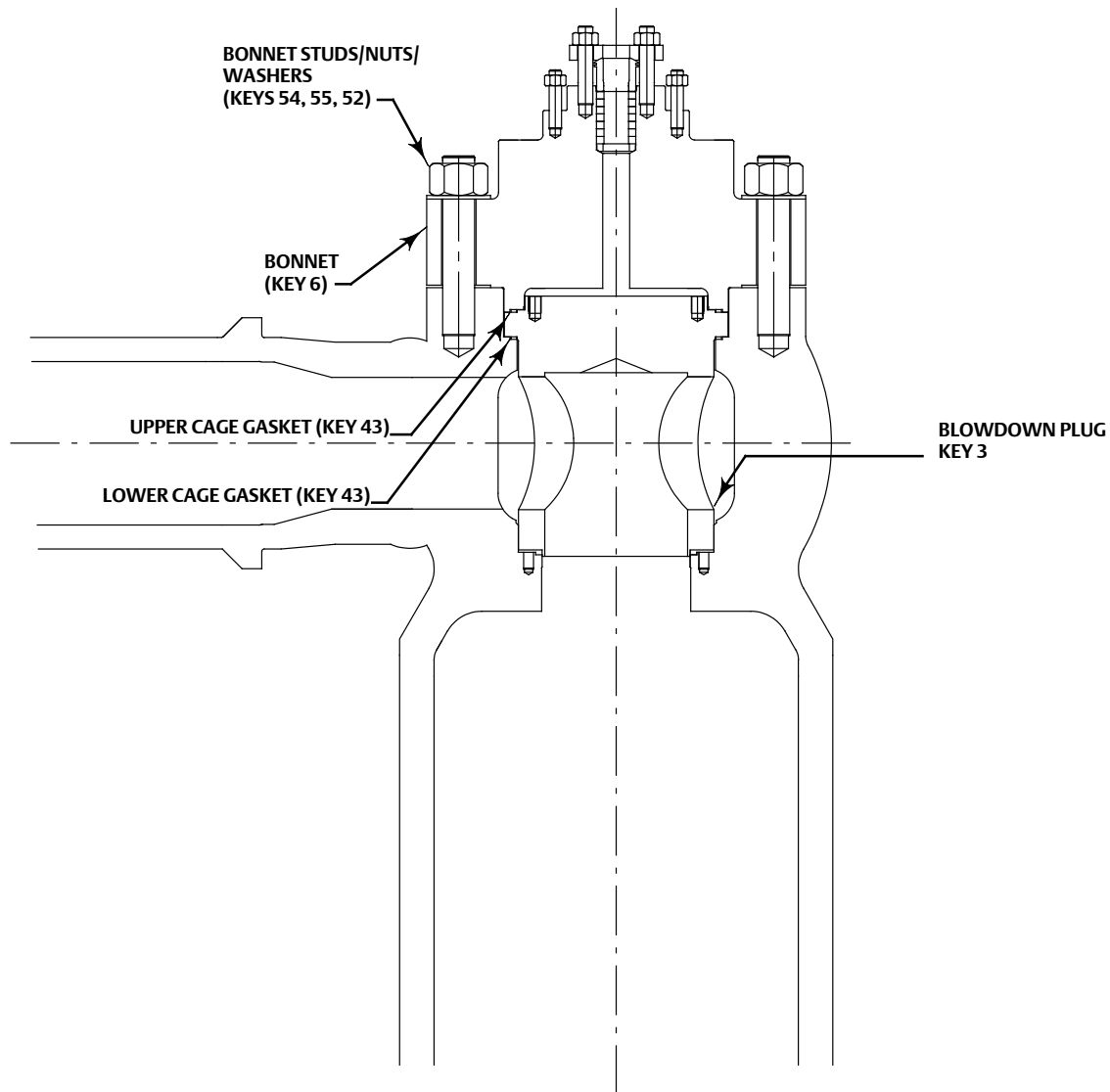


Figure 4. Fisher TBX Flow Down Blowdown Fixture



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