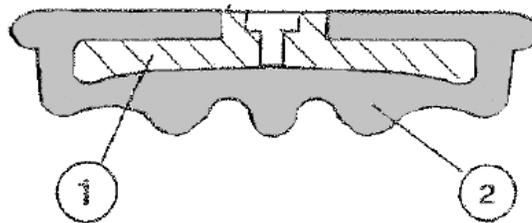




Installation of John Crane Type 73 Inflatable Mechanical Seal

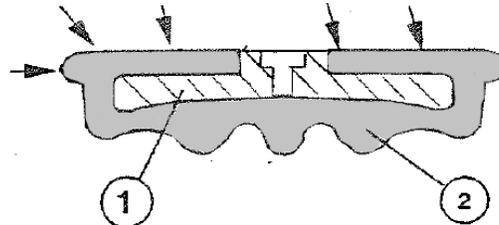
1. Carefully read all instructions and notes before installation.
2. Bench Pre-assembly:
 - a. Insert the support ring (item #1) inside the inflatable boot (item #2) to form inflatable seal assembly (if not already factory preassembled).



Step 1.

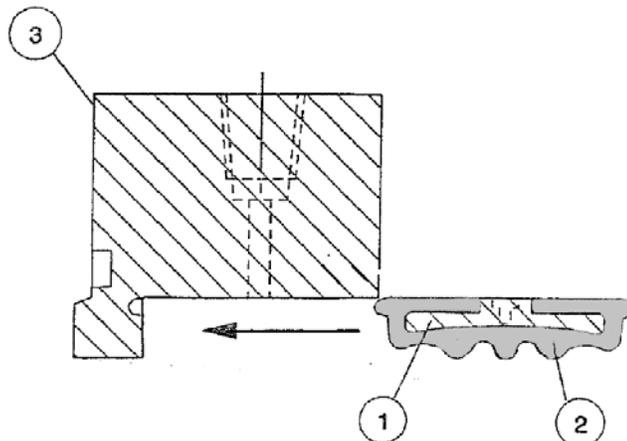
- b. Moderately lubricate the OD of the inflatable boot (item #2) with silicone grease.

LUBRICATE THIS AREA



Step 2

- c. Slide the inflatable seal assembly in the housing bore, assembly must fit flush against back of housing bore. To achieve this, use back plate to push inflatable seal assembly into proper position.

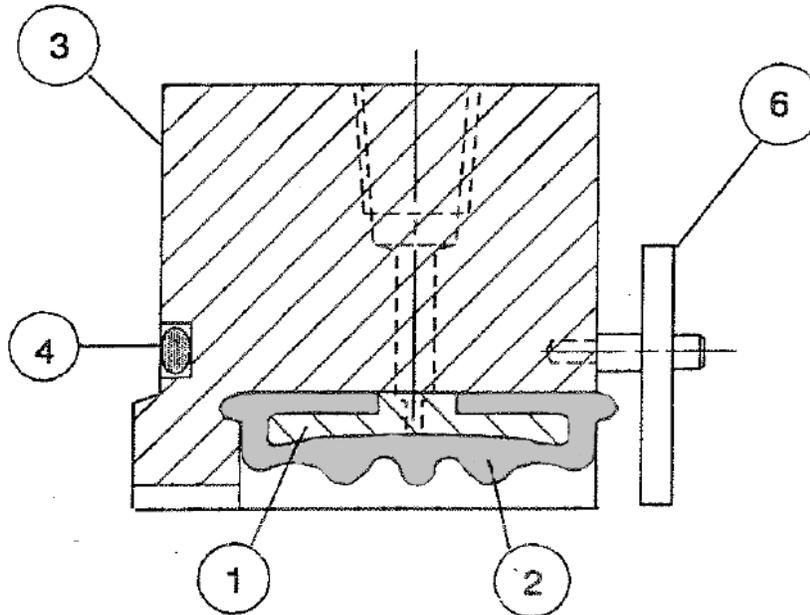


Step 3



Installation of John Crane Type 73 Inflatable Mechanical Seal

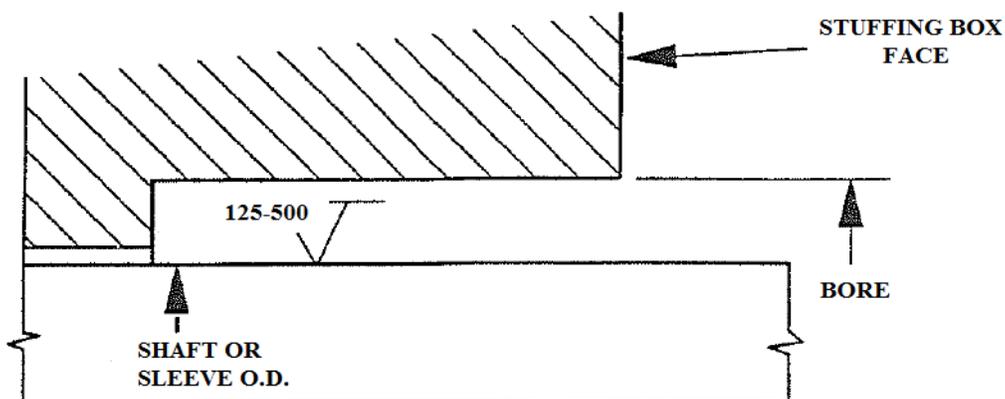
- d. Attach centering clips to housing with socket head shoulder screws provided. (Note: This step will not be applicable if the housing has a shoulder pilot that self centers in stuffing box bore.)



Step 4

3. Clean shaft/sleeve and stuffing box face of any burrs and/or rough surfaces. Surface finishes of up to 500 RMS for shaft/sleeve are acceptable (Figure 1).

Figure 1
Check dimensions and finishes



Note: If seal can be placed on a shaft after bearings are in place, complete equipment alignment and measurement on next page the return to step 4.



Installation of John Crane Type 73 Inflatable Mechanical Seal

- Slide inflatable seal components and any non-split mechanical seal components around shaft in the order and direction shown in diagram below (Figure 2).

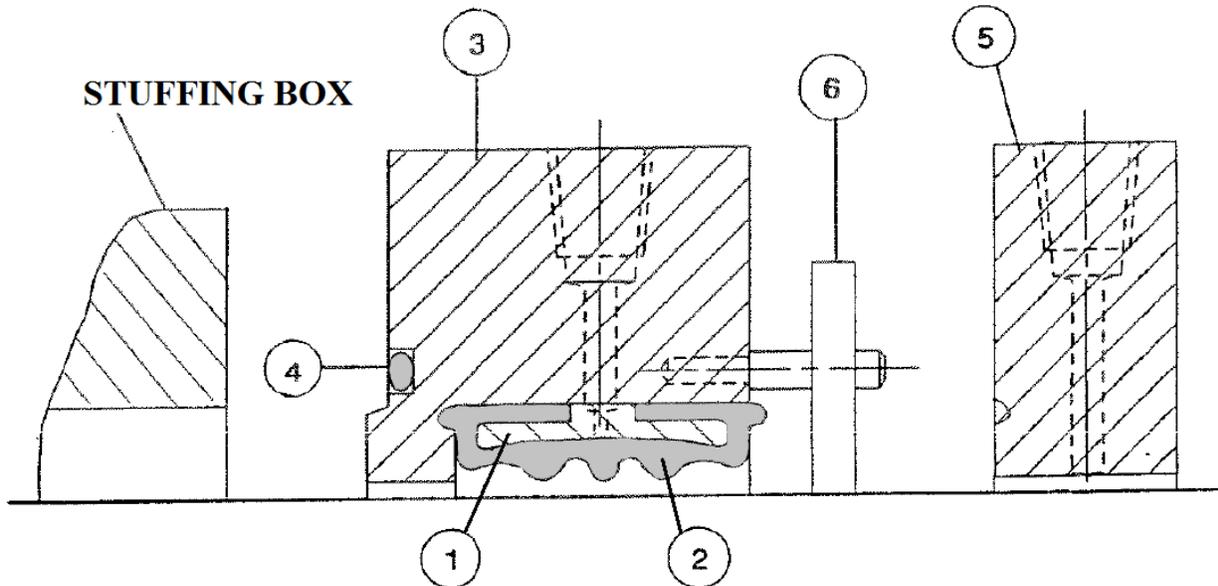


Figure 2

- Align shaft/sleeve to final operating position in accordance with equipment manufacturer's specifications.
- Measure radial shaft movement and runout. A maximum radial movement of 0.124" TIR and runout of 0.020" TIR is acceptable (Figure 3).

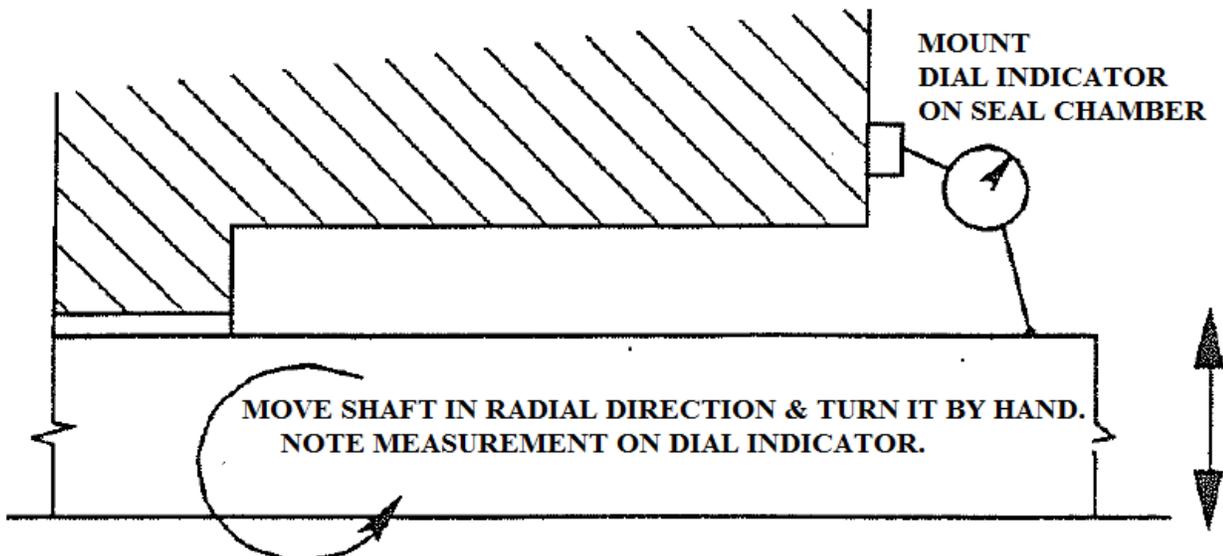


Figure 3

**Maximum radial shaft movement & runout
(0.124" T.I.R. Max radial movement & 0.20" T.I.R. Max runout)**



Installation of John Crane Type 73 Inflatable Mechanical Seal

7. Check stuffing box face waviness. Maximum allowed is 0.30" TIR (Figure 4.)

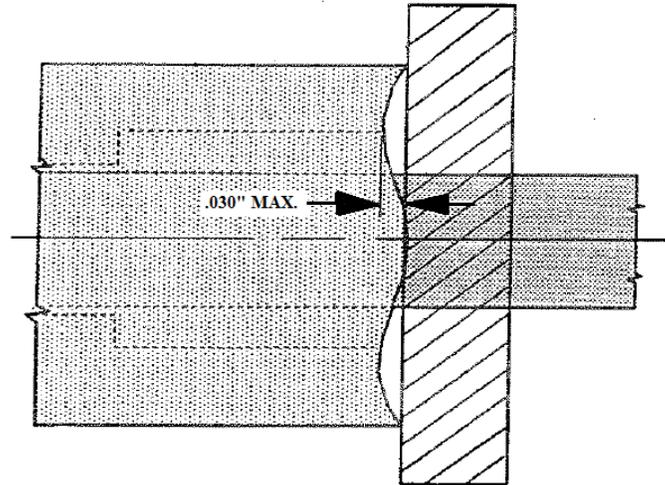


Figure 4
Check stuffing box face waviness
(0.030" T.I.R. max)

8. Insert "O" ring/gasket (Item #4, figure 2 & 6) in groove on back of housing (Item #3). Spread a thin film of RTV sealant on the stuffing box face where it will come in contact with "O" ring/gasket. If the surface where "O" ring/gasket contacts the stuffing box is unknown, apply RTV sealant to the "O" ring/gasket.
9. Slide the housing, containing the support ring-inflatable boot assembly over mounting studs until it is flush against stuffing box face. Use centering gauges (Item #6, Figure 2) to adjust concentricity (Figure 5). Tighten housing to stuffing box and remove centering gauges.

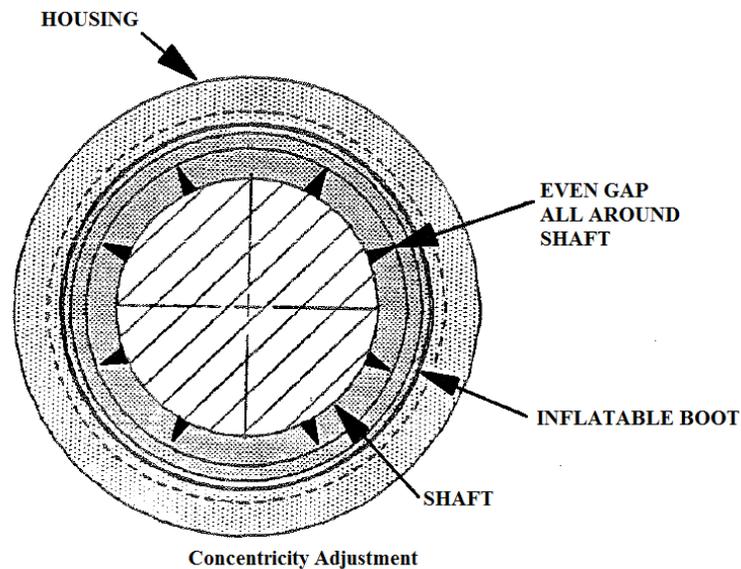
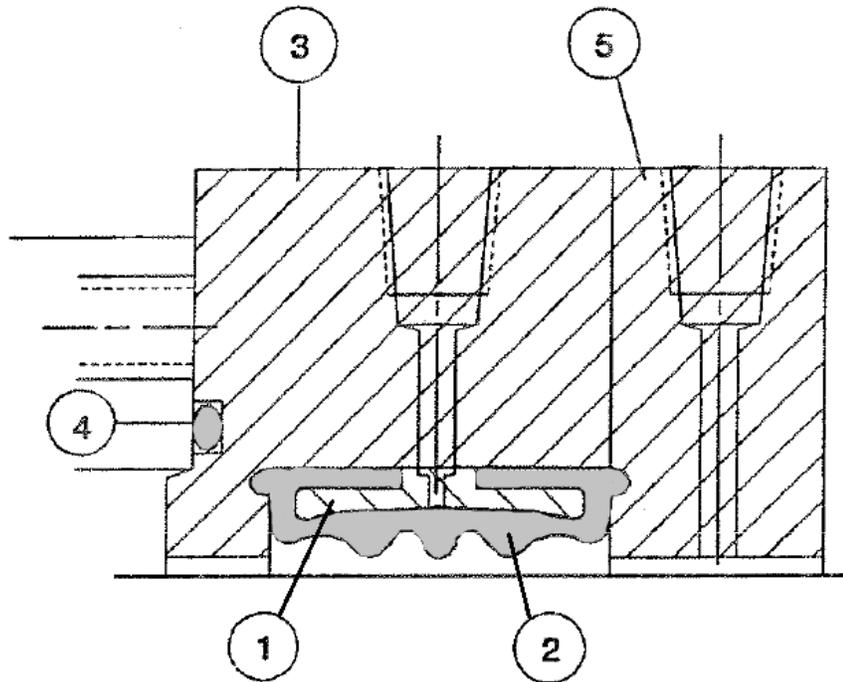


Figure 5



Installation of John Crane Type 73 Inflatable Mechanical Seal

10. Slide the back plate (item#5) against the housing and fully tighten cap screws.



Complete Inflatable Seal

Figure 6

11. Proceed with mounting the dynamic sealing device (if applicable) against the back plate by following the standard installation procedures for that device, for example, when installing a type 37 split seal, proceed with the installation using the face of back plate as stuffing box face.

This completes the installation of the seal.

Proceed to the next page for the Piping and Inflation Recommendations.



Installation of John Crane Type 73 Inflatable Mechanical Seal Piping and Inflation Recommendations

This section will cover two aspects of the John Crane Type 73 Inflatable seal. First, the piping and equipment recommendations to test and operate the seal. Second, the testing procedure to ensure that the inflatable seal and the mechanical seal (if applicable) are operating satisfactorily.

I. Piping & Equipment Recommendations for Testing and Operation

A. Piping Recommendations

The piping plan shown on the following page illustrates the typical means of connecting an inflatable seal used in conjunction with a mechanical seal.

NOTE: the inflatable seal can be used without a mechanical seal but both will be shown together for this section's discussion.

Other piping means may be used as the customer or conditions dictate such as the use of plugs instead of valves V1 and V3. Or pressure controllable mediums (e.g. – a gas bottle having its own regulator) for inflation or flushing instead of using additional pressure regulators, R1 and R2, as shown. However this piping plan will be used for this sections discussion.

B. Equipment Recommendations

1. Inflation Medium:

Typically compressed air is used as the inflation medium. However, other mediums such as carbon dioxide, nitrogen, water, hydraulic fluid, etc. can be used so long as it is compatible with the choice of elastomer for the inflatable boot. Also, keep in mind that the equipment's shaft is never to be rotated while the boot is inflated.

2. Inflation Medium Source:

The inflation medium can come from many sources such as plant air line, water lines, portable compressed gas bottles, hand pumps, hydraulic pumps, mobile compressors, etc. Since the inflatable seal can be inflated and then valved off for an indefinite period of time, while the shaft is not rotating, the inflation medium source does not need to be dedicated to that site. Any source is acceptable so long as a minimum of 50 psig higher than the operating stuffing box pressure can be achieved.

3. Flushing Medium (If applicable):

The flushing medium is only required if the inflatable seal is used with a mechanical seal or packing. It is not needed for an inflatable seal used by itself. The flushing medium will be mixing with the process fluid and there for must be compatible with that fluid. Also it must be clean or filtered as is usual for all sealing applications. Typically the flushing medium is water. Other mediums can be used as the situation or conditions dictate. Make sure flushing medium is compatible with inflatable seal materials.

4. Flushing Medium Source (If applicable):

The source of the flushing medium can be varied such as a dedicated water supply line or from a pumps discharge. Keep in mind the reason for the flushing medium is to keep the primary seal cool and free of debris. The source therefore must be maintained at approximately 5-20 psig higher than the operating stuffing box pressure during primary seal operation.



Installation of John Crane Type 73 Inflatable Mechanical Seal Piping and Inflation Recommendations

II. Testing Procedure

This testing procedure section is divided into three sections:

- A. Testing the Inflatable Seal.
- B. Testing the Mechanical Seal (if applicable).
- C. Testing the Inflatable seal with full stuffing box pressure.

Please refer to the Piping Recommendation diagram on page 10 for all three procedures.

A. Testing the Inflatable Seal

This is to be done after the installation of just the inflatable seal.

Caution: The shaft of the equipment is not to be rotated during test.

1. Ensure valves V1 and V2 and pressure regulator R are closed.
2. Fully open valve V2.
3. Slowly open pressure regulator R1 on the inflation medium until pressure gauge P1 reads a minimum of 50 psig higher than the operating stuffing box pressure.

Example: If the operating stuffing box pressure is going to be 20 psig, then inflate the seal to 70 psig.

4. Close valve V2.

There should be no visible leakage or pressure drop evident on P1, of the inflation medium. If so proceed to step 5.

Note: If leakage does occur or there is a pressure drop, open and close valve V2 several times. The inflatable boot may not have been fully seated during installation and this process should seat it properly. If leakage continues follow steps 5 and 6, remove the inflatable boot and check for damage. Then either reinstall the original boot if it looks undamaged or install a new boot and retest.

5. Close pressure regulator R1.
6. Open valve V1 to depressurize the system.

B. Testing the Mechanical Seal (if applicable).

If a mechanical seal has been installed after the inflatable seal has been installed and tested, then it too should be pressure checked prior to operation.

Caution: the shaft of the equipment is not to be rotated during test.

1. Ensure valves V1, V2, V3, and V4 and pressure regulators R1 and R2 are closed.
2. Fully open valve V2.
3. Slowly open pressure regulator R1 on the inflation medium until pressure gauge P1 reads a minimum of 50 psig higher than the operating stuffing box pressure.
4. Close valve V2.



Installation of John Crane Type 73 Inflatable Mechanical Seal Piping and Inflation Recommendations

5. Fully open valve V4.
6. Slowly open pressure regulator R2 on the flushing medium until pressure gauge P2 reads approximately the operating stuffing box pressure.

Note: Only during this test is the flushing medium pressure to equal the operating stuffing box pressure. During primary seal operation the flushing medium pressure is to be 5-20 psig higher than the operating stuffing box pressure.

7. Close valve V4.
8. Visually inspect the mechanical seal for leakage or check pressure gauge P2 for any pressure drop. Ensure that any leakage or pressure is within the design limits of the mechanical seal.
9. Close Valve V3 to depressurize the mechanical seal.
10. Close pressure regulator R1.
11. Open valve V1 to depressurize system.

C. Testing the Inflatable Seal Under Full Stuffing Box Pressure

Once the inflatable and primary seals have been tested and proven, the inflatable should be checked once more under actual operating conditions or full stuffing box pressure. This is to be performed when the tank or equipment is fully filled or pressurized.

Caution: The shaft of the equipment is not to be rotated during test.

1. Ensure valves V1, V2, V3, and V4 and pressure regulators R1 and R2 are closed.
2. Fully open valve V2.
3. Slowly open pressure regulator R1 on the inflation medium until pressure gauge P1 reads a minimum of 50 psig higher than the stuffing box pressure.
4. Slowly open valve V3 on the inflatable seal back plate. There should be a small amount of leakage at first as the cavity between the inflatable and the primary seal drains. After that all leakage should cease indicating that the inflatable seal is holding back the fluid within the tank or equipment. If so proceed to step 5.

Note: If leakage out of valve V3 continues close V3 and V2 and deflate the boot by opening V1. A small piece of debris may have become wedged beneath the boot allowing fluid past it. Reinflate the boot by closing valve V2. Proceed with step 4 again. If leakage still continues after repeating this procedure several times then the tank or equipment must be drained and the seals removed and inspected for damage.

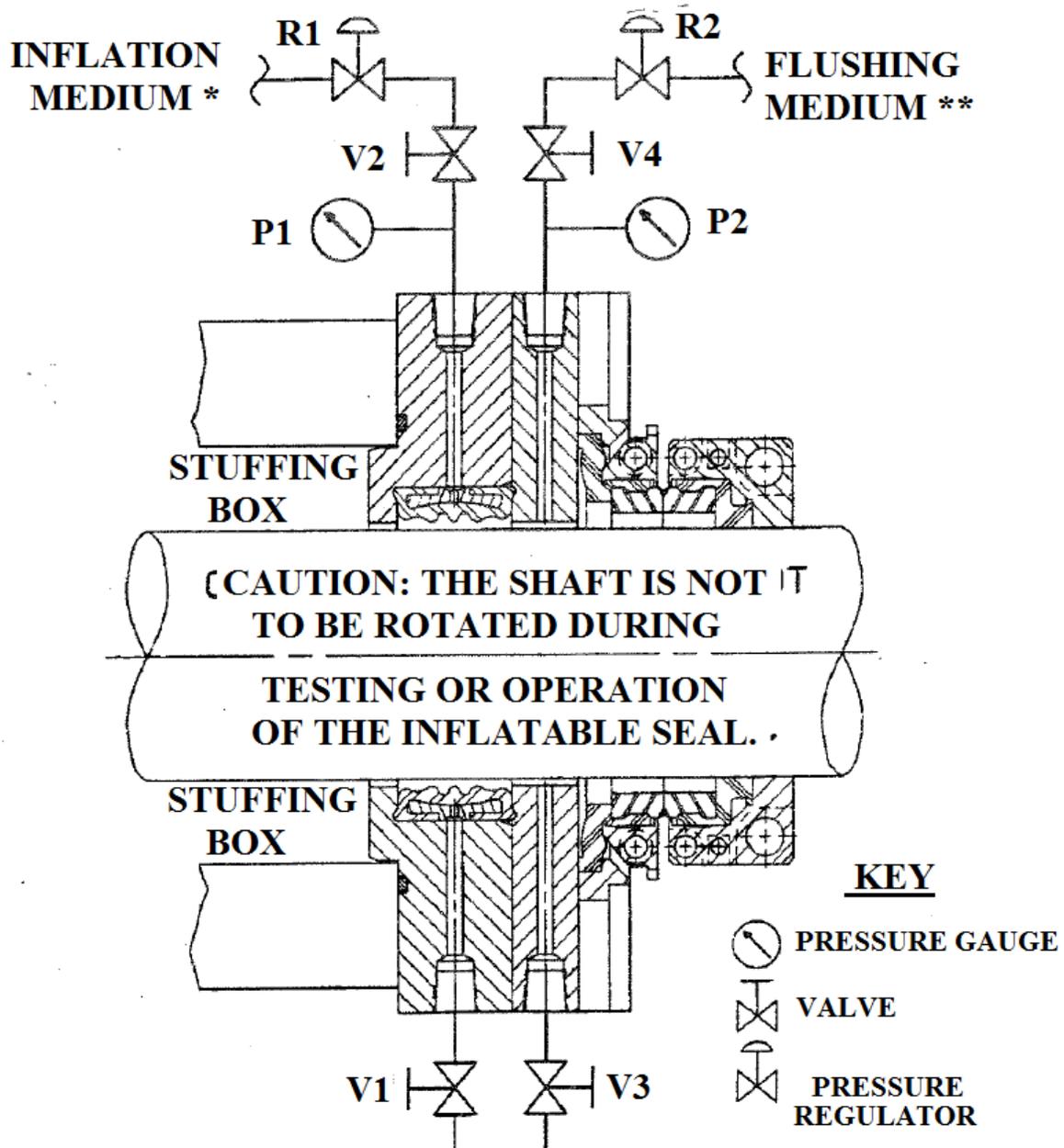
5. Close valves V2 and V3.
6. Close pressure regulator R1.
7. Open valve V1 to depressurize system.

The equipment is now ready for normal operation. The flushing medium can now be supplied at 5-20 psig higher than the operating stuffing box pressure. Now the inflatable seal is to be used only as an emergency backup for a primary seal failure. **Remember the inflatable seal is never to be inflated while the equipments shaft is rotating!**



Installation of John Crane Type 73 Inflatable Mechanical Seal
 Piping and Inflation Recommendations

Piping Recommendation for Testing & Operation



*Must be a minimum of 50 PSIG higher than operating stuffing box pressure.
 **Must be approximately 5-20 PSIG higher than operating stuffing box pressure.