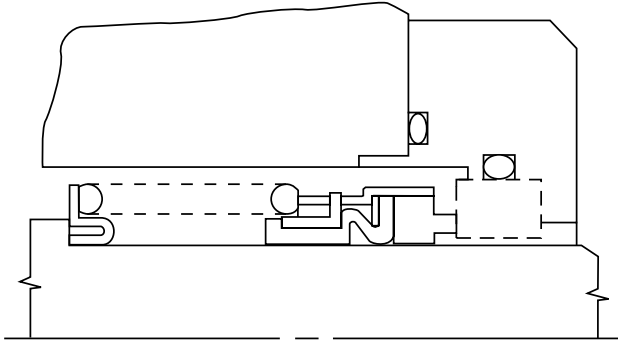




Type 1 Elastomer Bellows Instruction Manual



Foreword

These instructions are provided to familiarize the user with the seal and its designated use. The instructions must be read and applied whenever work is done on the seal, and must be kept available for future reference.

ATTENTION These instructions are for the installation and operation of a seal as used in rotating equipment and will help to avoid danger and increase reliability. The information required may change with other types of equipment or installation arrangements. These instructions must be read in conjunction with the instruction manuals for both the pump and any ancillary equipment.

If the seal is to be used for an application other than that originally intended or outside the recommended performance limits, John Crane must be contacted before its installation and use.

Any warranty may be affected by improper handling, installation, or use of this seal. Contact the Company for information as to exclusive product warranty and limitations of liability.

If questions or problems arise, contact your local John Crane Sales/Service Engineer or the original equipment manufacturer, as appropriate.

ATTENTION John Crane mechanical seals are precision products and must be handled appropriately. Take particular care to avoid damage to lapped sealing faces and to flexible sealing rings. Do not excessively compress the seal before or during installation.

Safety Instructions

- The following designations are used in the installation instructions to highlight instructions of particular importance.

NOTE: Refers to special information on how to install or operate the seal most efficiently.

ATTENTION Refers to special information or instructions directed toward the prevention of damage to the seal or its surroundings.



Refers to mandatory instructions designed to prevent personal injury or extensive damage to the seal or its surroundings.

- Installation, removal, and maintenance of the seal must be carried out only by qualified personnel who have read and understood these installation instructions.
- The seal is designed exclusively for sealing rotating shafts. The manufacturer cannot be held liable for use of the seal for purposes other than this.
- The seal must only be used in technically perfect condition, and must be operated within the recommended performance limits stated in the published Technical Data Sheet and the instructions in this manual. Copies of the Technical Data Sheet are available from John Crane.

- If the pumped fluid is hazardous or toxic, appropriate precautions must be taken to ensure that any seal leakage is adequately contained. Further information on sealing hazardous or toxic fluids should be obtained from John Crane prior to seal installation.
- Fluorocarbon components should never be burned or incinerated as the fumes and residues are highly toxic. If fluorocarbons are accidentally heated above 400°C/750°F, they can decompose. Therefore, protective gloves should be worn as hydrofluoric acid may be present.
- PTFE components should never be burned or incinerated as the fumes are highly toxic.

Before Starting the Equipment

- Check the pump at the coupling for proper alignment of the driver or motor.
- Ensure that the gland plate nuts/bolts are securely tightened according to the pump manual instructions, and that all screws are securely fastened.
- Complete the assembly of the pump, and turn the shaft (by hand if possible) to ensure free rotation.
- Consult all available equipment operating instructions to check for correctness of all piping and connections, particularly regarding seal recirculation/flush, heating or cooling requirements, and services external to the seal.

ATTENTION This mechanical seal is designed to operate in a liquid so the heat energy it creates is adequately removed. Therefore, the following check should be carried out not only after seal installation, but also after any period of equipment inactivity.

- Check that the seal chamber fluid lines are open and free of any obstruction, and ensure that the seal chamber is properly vented and filled with liquid - refer to the pump instruction manual.

- Check the correct setting and operation of all alarm systems connected to the sealing system.

ATTENTION Dry-running — often indicated by a squealing noise from the seal area — will cause overheating and scoring or other damage to the sealing surfaces, resulting in excessive leakage or a much shortened seal life.



Before start-up, ensure that all personnel and assembly equipment have been moved to a safe distance so there is no contact with rotating parts on the pump, seal, coupling, or motor.

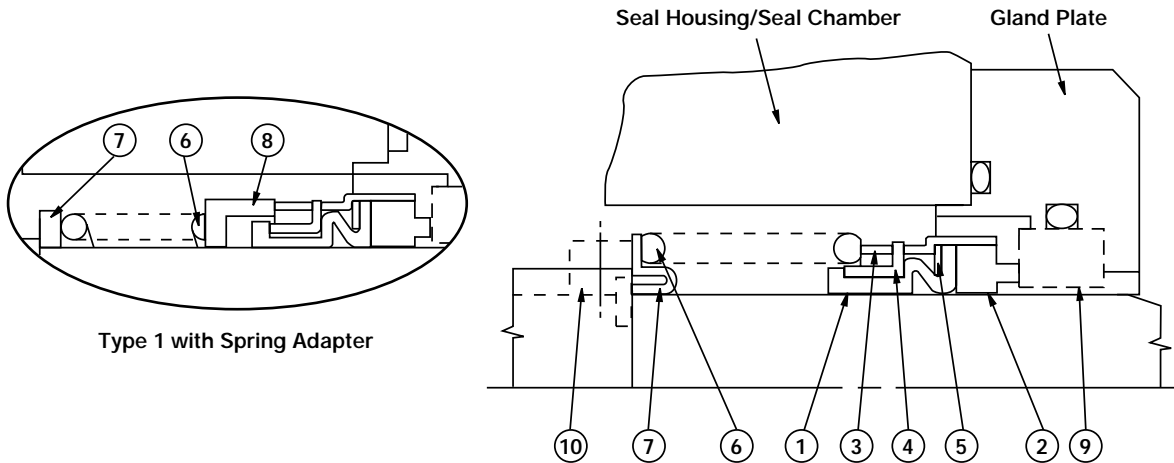
General Instructions

1. Study the Engineering seal layout drawing to confirm the proper seal arrangement for the pump being used. The Type 1 seal is designed for versatility and can be assembled in various ways. The following instructions describe the standard configurations.
2. To assure satisfactory operation, handle seal with care. Take particular caution to see that the lapped sealing faces are not scratched or damaged.

Typical Type 1 Seal Arrangement

Part Name	
1 Bellows	6 Spring
2 Face/Primary Ring	7 Spring Holder
3 Retainer	8 Spring Adapter
4 Drive Band	9 Seat/Mating Ring
5 Disc	10 Collar

Typical Type 1 Seal Arrangement



Checking the Equipment

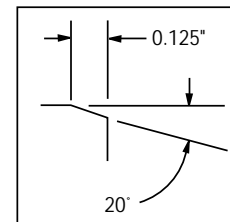
Successful operation and life of this seal is dependent on acceptable equipment dimensions, alignments, and finishes. Before installation of the seal, the following checks should be made with respect to the seal housing and the shaft, especially (where marked *) at the seal position. The usual equipment to measure these features would include a micrometer and dial indicator.

Shaft/Sleeve Outside Diameter*	Refer to Dimension Tables
Seal Chamber Bore Diameter	Refer to Dimension Tables
Shaft/Sleeve Finish*	1.00" to 3.125" dia./63 Ra/1.6µm 3.125" dia. & up/32 Ra
Shaft/Sleeve Ovality/Out-of-Roundness*	<0.1mm/0.004"
Shaft/Sleeve Run-Out*	<0.08mm/0.003" FIM <1800 rpm <0.05mm/0.002" FIM >1800 rpm
Concentricity of the Seal Chamber to the Shaft/Sleeve	<0.15mm/0.006" FIM

NOTE: If the measured dimensions exceed the values given, correct the equipment to meet the specifications before installing the seal. If the seal is installed on a sleeve, the sleeve must be liquid- and pressure-tight through its bore. The thickness of the gland plate must be sufficient to retain the service pressure without distortion.

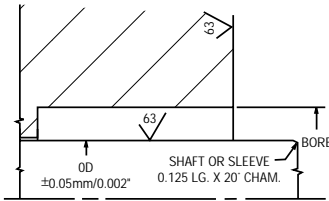
Lead-On Chamfer

For ease of installation, the lead-on edge of the shaft or sleeve should be chamfered as shown. Remove all sharp edges from the shaft or sleeve.

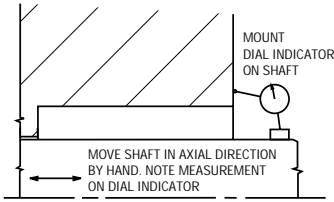


Preparing the Equipment

1. Check seal chamber dimensions and finishes.

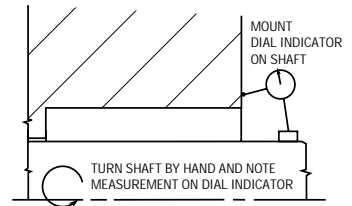


2. Measure shaft end play/axial float (<0.08mm/0.003\" FIM max.).



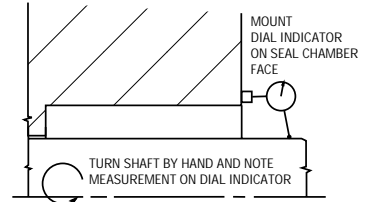
3. Determine squareness of seal chamber face to shaft:

- Rotating Mating Ring - 0.13mm/0.005\" FIM max.
- Rotating Seal Head - 0.05mm/0.002\" FIM max.



4. Measure shaft runout (0.05mm/0.002\" FIM max.).

NOTE: If measured dimensions exceed those values given, correct the equipment to meet specifications prior to seal installation.



Installing the Seal

Before starting the installation, read the following instructions carefully, both to be aware of special information and because the fitting sequence may be different depending on the construction of the pump.

NOTE: It is essential to use a suitable lubricant when fitting the seal. The recommended lubricants for elastomeric bellows are soft hand soap and water, or glycerine; do not use washing-up liquid, liquid soaps, or hand cleaning gels. Light mineral oil may be used sparingly with most elastomers.

ATTENTION Do not use hydrocarbon-based liquids on ethylene propylene bellows, and do not use grease (including silicone grease) on any elastomer bellows.

1. Remove the protective packaging from the seal; check for any damage, and wipe clean.

ATTENTION Check that the seal face is located in the retainer with the lapped face outwards, and take care that the face does not drop out of the retainer when handling and fitting the seal.

2. Fit the seat/mating ring into the gland plate as described in the appropriate seat instruction manual. Check that the gland plate o-ring or gasket is in position and will not be displaced during fitting, and then position the gland plate on the shaft clear of the seal location.

ATTENTION Installation of the seal unit to its working length should be completed within 15 minutes to ensure that the elastomer bellows is correctly positioned before the neck of the bellows grips the shaft.

3. Clean the shaft. Lightly lubricate the shaft and neck of the bellows.
4. Carefully slide the seal along the shaft beyond the seal location mark. Position as shown in the installation dimension and secure the abutment collar, then slide the seal unit back against the abutment. Check that the drive ring dogs are correctly engaged, and that the spring, spring holder and spring adapter (if supplied) are correctly located.

NOTE: Fit the seal by applying a steady pressure directly to the tail of the bellows, preferably using a close-fitting shaft sleeve with the seal spring, holder and adapter temporarily removed.

5. Wipe the lapped surface of the seal face/primary ring perfectly clean and dry. Install the seal housing; locate the gland plate squarely on the fixing studs, and pull on the plate to compress the seal spring as necessary to fit the retaining nuts.
6. Tighten the nuts sequentially to the torque recommended by the pump instruction manual. Do not overtighten.

Decommissioning the Equipment

1. Ensure that the pump is electrically isolated.



If the equipment has been used on toxic or hazardous fluids, ensure that the equipment is correctly decontaminated and made safe prior to commencing work. Remember that fluid is often trapped during draining and may be present inside the seal chamber. The pump instruction manual should be consulted to check for any special precautions.

2. Ensure that the pump is isolated by the appropriate valves. Check that the fluid is drained and pressure fully released.

Removing the Seal

1. Referring to the pump instruction manual, dismantle the equipment sufficiently to expose the gland plate and seal housing.
2. Evenly slacken and remove the gland plate nuts, and carefully slide the plate off the studs.
3. Remove the seal housing, clean and oil the shaft, and then complete the removal of the seal and the gland plate assembly, in the reverse order to installation.

NOTE: Although the original seal position may be marked on the shaft or sleeve as a reference point before seal removal, the location must be checked even if the same seal and seat/mating ring specification is intended as a replacement.

A seal unit should always be serviced after removal from duty. It is recommended that used seals are returned to a John Crane Service Centre, since rebuilding to as-new specification must be carried out by qualified personnel.



It is the responsibility of the equipment user to ensure that any parts being sent to a third party have appropriate safe-handling instructions externally attached to the package.

Operation and Maintenance

Although the seals should be looked at regularly for signs of leakage, a correctly selected mechanical seal will normally run for long periods without attention and it should not be disturbed unnecessarily.

If leakage does occur, it should be attended to as soon as possible because the leakage could become a hazard. It should be noted that, while the leakage may be due to worn seal faces, damaged bellows or o-rings, it could also be because of some change in duty conditions or some change in the equipment such as worn bearings or increased vibration.

Check carefully for the root cause for leakage when the equipment is stripped.

No maintenance of a seal is possible while installed. Therefore, it is recommended that a spare seal unit and mating ring be held in stock to allow immediate replacement of a removed seal.

It is recommended that used seals are returned to a John Crane Seal Rebuilding Center, as rebuilding to as-new specifications must be carried out by qualified personnel.



It is the responsibility of the equipment user to ensure that any parts being sent to a third party have appropriate safe handling instructions externally attached to the package.

Quality Assurance

This seal has been assembled in accordance with John Crane Quality Assurance Standards and with proper maintenance and use will give safe and reliable operation to the maximum recommended performance as shown in any relevant approved John Crane publication.

Storage and Transport

Instructions for the handling, packaging, storage and transport of seal units and seats/mating rings are given in the John Crane Instruction Sheet ref. I-Storage, available on request.



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For your nearest John Crane facility, please contact one of the locations above.

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