5. 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.

6. 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. Protective gloves should be worn as hydrofluoric acid may be present.

7. PTFE components should never be burned or incinerated as the fumes are highly toxic.

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 John Crane for information as to exclusive product warranty and limitations of liability.

If questions or problems arise, contact your local John Crane representative or the original equipment manufacturer, as appropriate.

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.

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

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 2 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 2 Seal Arrangement

<table>
<thead>
<tr>
<th>Part Name</th>
<th>1 Bellows</th>
<th>2 Face/Primary Ring</th>
<th>3 Retainer</th>
<th>4 Disc</th>
<th>5 Drive Band</th>
<th>6 Spring</th>
<th>7 Spring Holder</th>
<th>8 Seat/Mating Ring</th>
<th>9 Collar</th>
</tr>
</thead>
</table>

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 dimensional checks should be made with respect to the seal housing/shaft alignments, finish and lead-on. Normal equipment to measure these features would include a micrometer and dial indicator.

| Shaft/Sleeve Outside Diameter (OD) | Refer to Dimension Tables |
| Seal Chamber Bore Diameter       | Refer to Dimension Tables |
| Shaft/Sleeve Finish under the Seal Unit | 1.00" to 3.125" dia./63µin Ra/1.6µm Ra |
| Shaft/Sleeve Ovality/Out-of-Roundness | <.05mm/.002" |
| Concentricity of the Seal Chamber to the Shaft/Sleeve | <0.15mm/0.006" FIM |
| Shaft/Sleeve Run-out with respect to the Seal Chamber | <0.08mm/0.003" FIM ≤1800 rpm |
|                                          | <0.05mm/.002" FIM >1800 rpm |

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.

Preparing the Equipment

1. Check seal chamber dimensions and finishes.

2. Measure shaft end play/axial float (<0.13mm/.005" 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 (with respect to seal chamber - see above table).

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.

Decommissioning the Equipment
1. Ensure that the pump is electrically isolated.

ATTENTION: 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 location, since rebuilding to as-new specification must be carried out by qualified personnel.

ATTENTION: 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 may 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. 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 service location, as rebuilding to as-new specifications must be carried out by qualified personnel.

ATTENTION: 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 Storage, available on request.
If the products featured will be used in a potentially dangerous and/or hazardous process, your John Crane representative should be consulted prior to their selection and use. In the interest of continuous development, John Crane Companies reserve the right to alter designs and specifications without prior notice. It is dangerous to smoke while handling products made from PTFE. Old and new PTFE products must not be incinerated. ISO 9001 and ISO14001 Certified, details available on request.

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