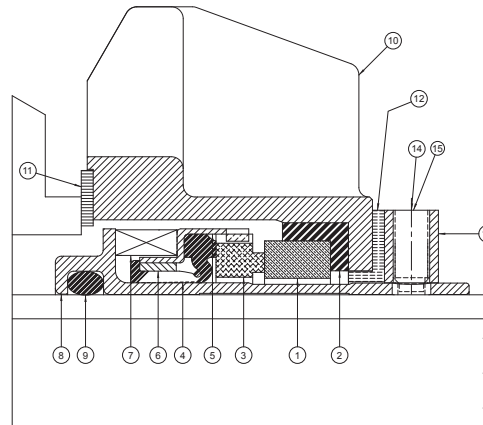


## SINGLE-USE ELASTOMER BELLOWS SEAL

Installation, Operation and Maintenance Instructions

### Typical Type 4111 arrangement

- |                  |                       |
|------------------|-----------------------|
| 1 – Mating ring  | 10 – Gland plate      |
| 2 – Cup          | 11 – Gasket           |
| 3 – Primary ring | 12 – Spacer           |
| 4 – Bellows      | 13 – Collar           |
| 5 – Retainer     | 14 – Soc set screw    |
| 6 – Drive band   | 15 – Dog pt set screw |
| 7 – Spring       |                       |
| 8 – Sleeve       |                       |
| 9 – O-ring       |                       |



### 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 operation 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 for 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

1. 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 towards 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 in accordance with its designated use set out in these installation instructions.
- 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

1. Check the pump at the coupling for proper alignment of the driver or motor.
2. Ensure the gland plate nuts/bolts are securely tightened according to the pump manual instructions, and that all screws are securely fastened. See Installing the Seal section on page 4.
3. Complete the assembly of the pump and turn the shaft (by hand if possible) to ensure free function.
4. 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.

5. 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.

**ATTENTION**

This 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.**

**WARNING**

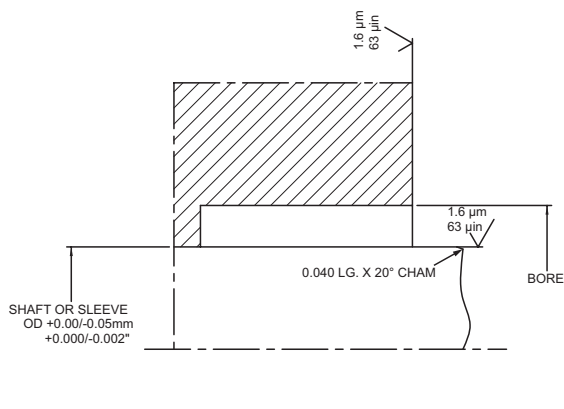
Seal installation should be handled only by qualified personnel. If question arise, contact the local John Crane Sales/Service Engineer. Improper use and/or installation of this product could result in injury to the person and/or harmful emission to the environment, and may affect any warranty on the product. Please contact the company for information as to exclusive product warranty and limitations of liability.

### General Instructions

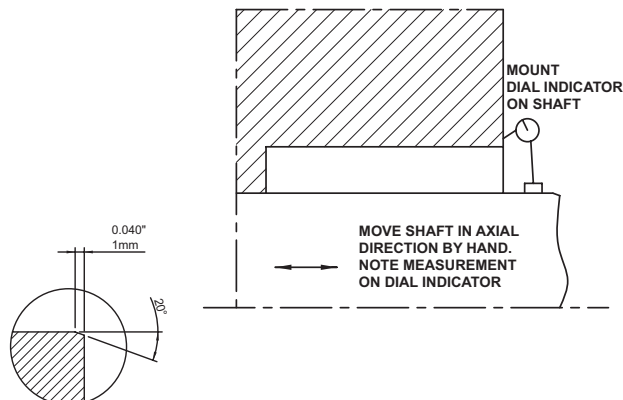
1. Study the engineering layout drawing to confirm the proper seal arrangement for the pump being used. The following instructions describe the standard configuration.
2. To assure satisfactory operation, handle seal with care. Take particular caution to see that the lapped sealing faces are not scratched or marred.

### Preparing the Equipment

#### 1. Check seal chamber dimension and finishes



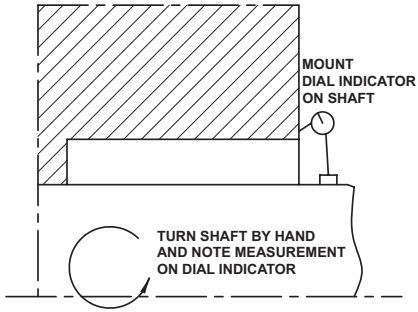
#### 2. Measure axial end play: 0.08 mm FIM / 0.003" FIM



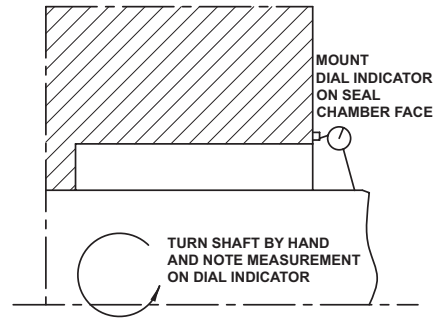
## SINGLE-USE ELASTOMER BELLOWS SEAL

Installation, Operation and Maintenance Instructions

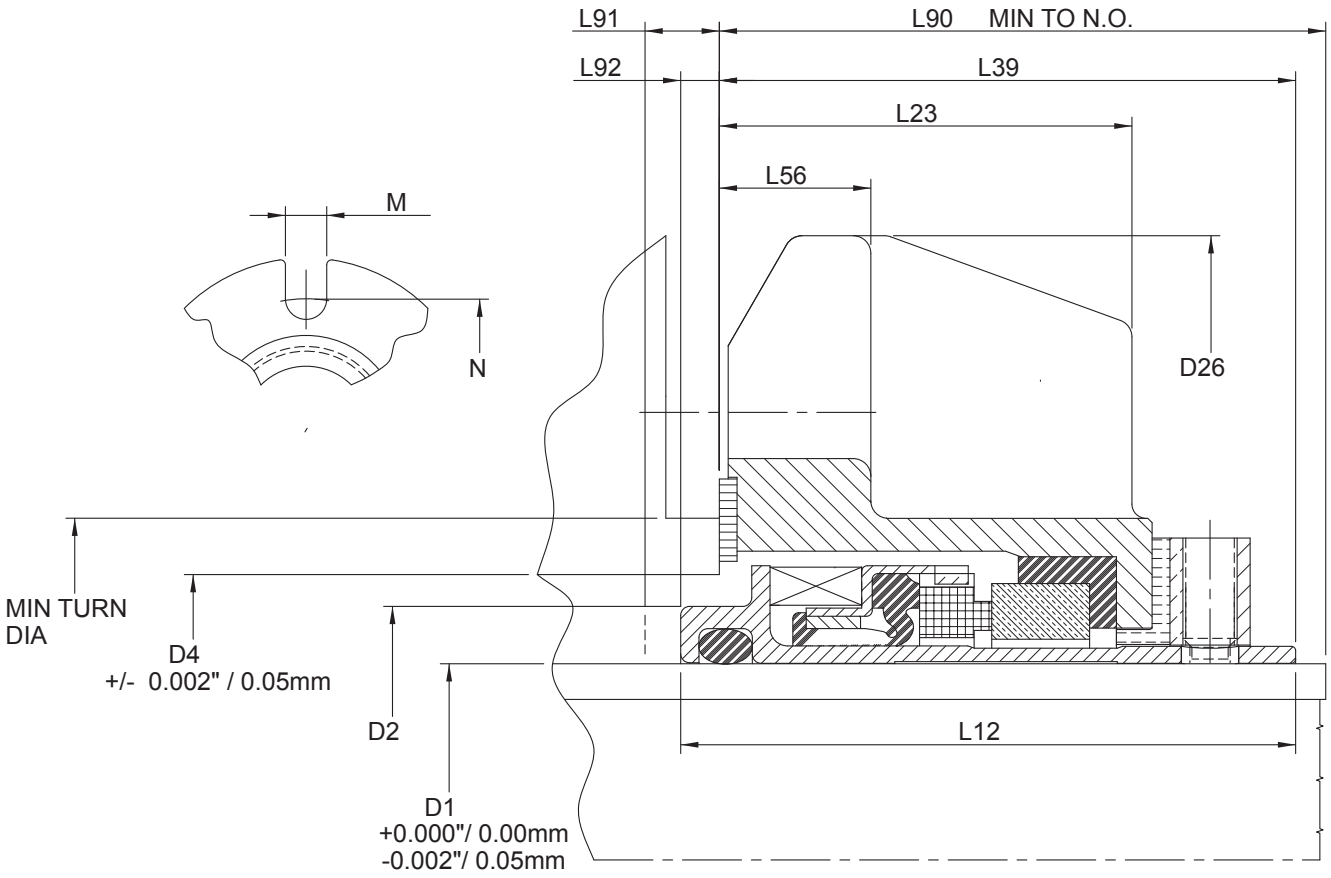
3. Determine squareness of seal chamber face to shaft:  
0.12 MM FIM / 0.005" FIM



4. Measure shaft runout: 0.05 MM FIM / 0.002" FIM



### Type 4111 Installation Dimensions



### Type 4111 Dimensional Information

Seal size	D1	D2	Inch size range (all dimensions in inches)							L90	L91	L92	M	N
			D4	Min turn	D26	L12	L23	L39	L56					
1.375 in	1.375	1.777	2.000	2.343	4.375	2.155	1.446	2.019	0.531	2.125	0.260	0.135	0.525	3.338
1.750 in	1.750	2.176	2.480	2.843	5.250	2.229	1.487	2.112	0.593	2.187	0.242	0.117	0.563	3.875
1.875 in	1.875	2.300	2.625	2.968	5.250	2.229	1.487	2.112	0.593	2.187	0.242	0.117	0.563	3.875

Seal size	D1	D2	Metric size range (all dimensions in mm)							L90	L91	L92	M	N
			D4	Min turn	D26	L12	L23	L39	L56					
35 mm	35.00	45.14	50.80	59.51	111.13	54.74	36.73	51.28	13.49	53.98	6.60	3.43	13.34	84.79
45 mm	45.00	55.27	62.99	72.21	133.35	56.62	37.77	53.64	15.06	55.55	6.15	2.97	14.30	98.43
48 mm	48.00	58.42	66.68	75.39	133.35	56.62	37.77	53.64	15.06	55.55	6.15	2.97	14.30	98.43

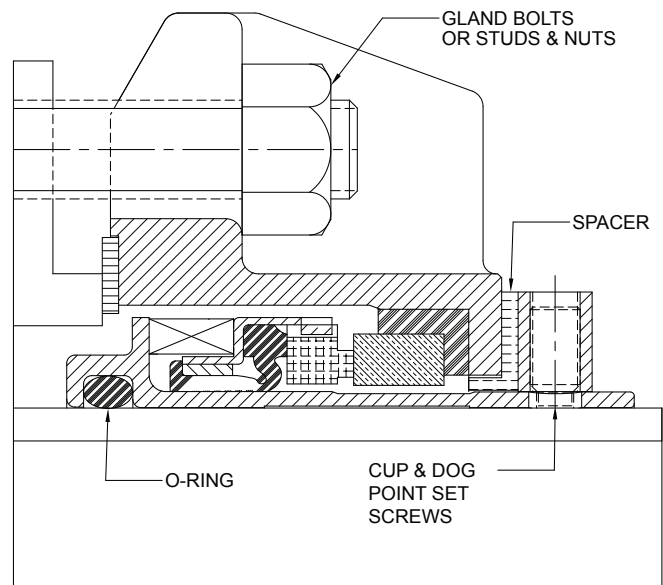
### Installing the Seal

- Before starting the installation, read the following instructions carefully.
- Remove the seal from its packing, inspect for any damage, and wipe clean.
- The equipment should be clean and meet the specifications noted in the "Preparing the Equipment" section. Lubricate sleeve O-ring with lubricant recommended in the chart below. Lubricate shaft sparingly. Lubricate gland plate bolts/nuts as required.
- Make sure the gland plate (Type 4111) is properly positioned, and that collar set screws do not extend past sleeve ID. Slide complete cartridge seal assembly onto shaft. Position gland plate appropriately to align with pump studs if applicable or pump mounting holes. Slide the cartridge onto studs until gasket is flush against the face of seal chamber. Hand tighten gland plate bolts/nuts.
- Reassemble the pump and make all necessary impeller adjustments.
- Continue tightening gland plate bolts/nuts in an alternating pattern until secure (1/4 turns, 180° apart), with appropriate torque as required. Do not over-stress or distort gland plate.
- Tighten 4 cup point set screws evenly (1/4 turns, 180° apart), securing cartridge seal to shaft with appropriate torque as required. Do NOT tighten 2 dog point set screws aligned by collar scribe lines.
- Leave the spacer in place. No need to remove.
- It is recommended that the seal cavity be vented through the pump's lantern ring connection located at top dead center.

ELASTOMER	LUBRICANT
Fluoroelastomer (i.e. Viton™)	Vegetable oil, animal oil, mineral-hydrocarbon oils, soap solution, Parker 'Super O-Lube', silicone grease
Ethylene propylene	Vegetable oil, Polywater™, soap solution, glycerine, propylene glycol, silicone grease
Perfluoroelastomer (i.e. Kalrez™)	Vegetable oil, animal oil, mineral-hydrocarbon oils

**NOTE:** Always use a lubricant that is compatible with your machinery and product. Use lubricant sparingly, only enough to install seal with ease.

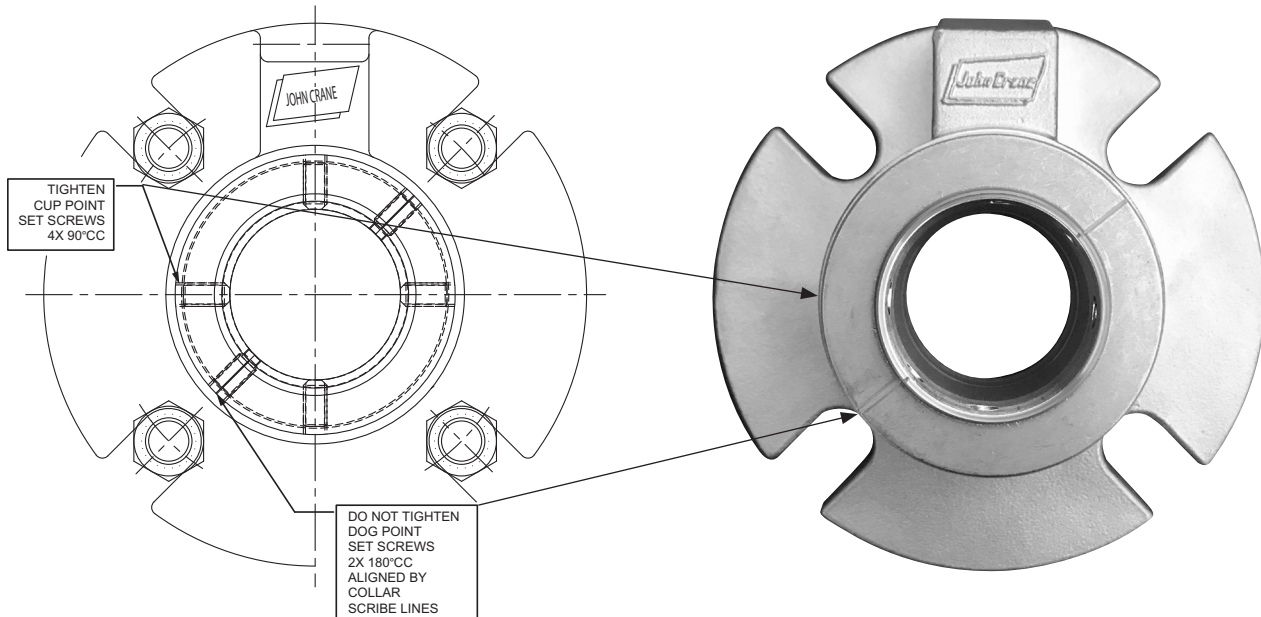
Viton and Kalrez are registered trademarks of Dupont. Polywater is a registered trademark of American Polyware Co.



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### 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 fluids are often trapped during draining and may exist outside the seal. 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 is fully released.

### Maintenance

No maintenance of a seal is possible while installed. It is recommended that a spare seal unit be held in stock to allow immediate replacement of a removed seal.

It is recommended that used seals are returned to a John Crane 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.

Materials of Construction	
Primary ring	Carbon or silicon carbide
Mating ring	Silicon carbide
Cartridge hardware	316 stainless steel
Secondary seals	Fluoroelastomer
Operating Limits	
Pressure	Up to 10.3 bar(g)/150 psi(g)
Temperature	-40°C to 107°C/-40°F to 225°F
Speed	Up to 3,600 rpm

# TYPE 4111

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 Singapore  
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