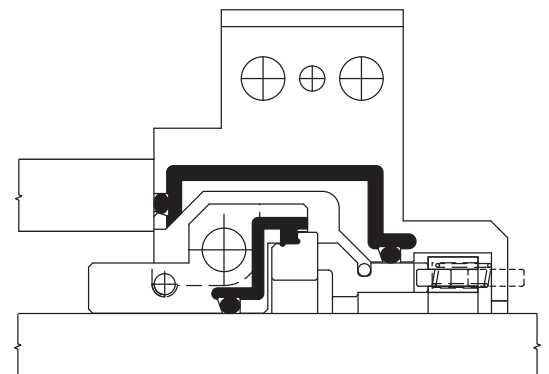


## WET/DRY RUNNING CARTRIDGE SPLIT SEAL

Installation, Operation &amp; Maintenance Instructions

### 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 rotating equipment 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.

**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 towards 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 in accordance with its designated use set out in these installation instructions. Any modifications will void any and all warranties.

- The Type 3740 seal is not intended to be used in hazardous or toxic processes. If the process is either hazardous or toxic, please contact your local John Crane representative for a more appropriate seal recommendation.
- 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.

### Before Starting the Equipment

- Check the pump at the coupling for proper alignment of the driver or motor.
- Ensure that the gland plate is bolted securely as described in Install Gland Plate Assembly - Step 3, number 12. on page 5.
- 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** The Type 3740 wet running seal is designed to operate in a liquid so the heat energy it creates is adequately removed. The following check should be carried out not only after seal installation, but also after any period of equipment inactivity.

- For the Type 3740 wet running split seal, 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** Dry-running the Type 3740 wet running split seal will cause overheating and scoring or other damage to the sealing surfaces, resulting in excessive leakage or a much shortened seal life.



**Before startup, 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 questions arise, contact the local John Crane representative. Improper use and/or installation of this product could result in injury to the person and/or harmful emissions 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.

## WET/DRY RUNNING CARTRIDGE SPLIT SEAL

Installation, Operation & Maintenance Instructions

### Install Mating Ring Adapter Assembly - Step 1

1. Remove the mating ring adapter assembly halves from the packaging.

**ATTENTION** Do not fit the mating ring adapter assembly halves together before actual installation. Damage to the mating ring split joints may occur.

**NOTE:** Ensure the set screws are not threaded past the inside diameter of the mating ring adapter assembly halves as they will interfere with the shaft during installation.

**NOTE:** Ensure the mating ring halves are properly assembled in the mating ring adapter assembly halves. The mating ring halves should be engaged with the sealing element strip as shown in Figure 1 and 2A.

**Mating Ring Half** The mating ring halves may be adjusted if necessary by pushing on the mating ring halves as shown in Figures 2A and 2B.

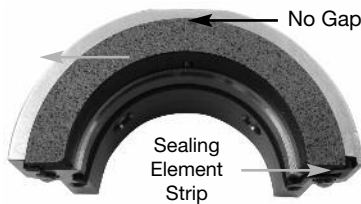


Figure 1

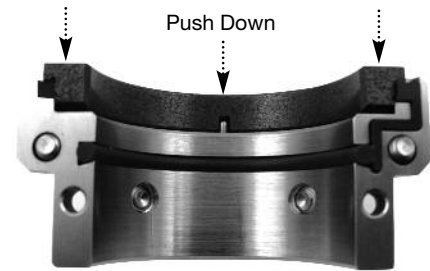


Figure 2A

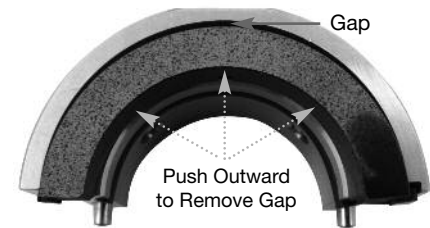


Figure 2B

**NOTE:** Ensure the gasket and opposite side O-ring and strip free ends of the sealing element are properly extended as shown in Figure 3. They can be pushed in or out to adjust if necessary.

### Install Mating Ring Adapter Assembly - Step 1 (cont.)

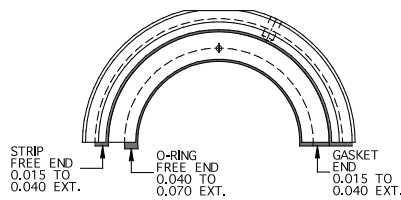


Figure 3

2. Lightly lubricate the exposed inside diameter surface of the shaft O-ring with the provided lubricant on each mating ring adapter assembly half. Figure 4.

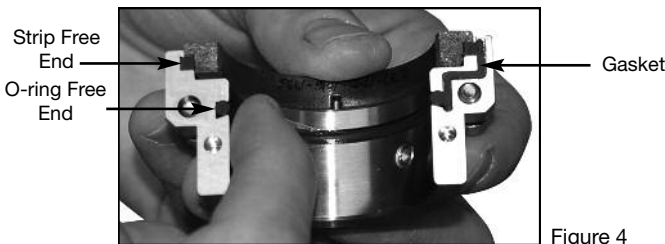
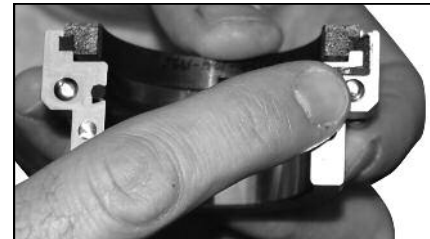


Figure 4

3. Lightly lubricate the exposed surfaces of the gasket and the opposite side O-ring and strip free ends of the sealing element with the provided lubricant on each mating ring adapter assembly half. Figure 5.



**ATTENTION** Be careful not to apply lubricant to the mating ring split ends. Figure 5

4. Place the mating ring adapter assembly halves around the shaft with the mating ring pointing away from the equipment's seal chamber. Bring the halves together to begin engagement of the alignment pins. Evenly tighten the cap screws until approximately a 1/32"/0.8mm gap exists at each split joint. Figure 6.

### Install Mating Ring Adapter Assembly - Step 1 (cont.)



Figure 6

5. Slide the mating ring adapter assembly on the shaft toward the seal chamber until the setting spacers contact the seal chamber face. Figure 7.



Figure 7

6. Continue evenly tightening the cap screws until the mating ring halves begin to contact. Check that the mating ring split joints are aligned at the lapped sealing surface. If a step exists, push on the high side of the step to correct. Figure 8.



Figure 8

**NOTE:** Seal faces are flat to within 0.000035"/0.00089mm. As with any split seal, assuring the seal face halves are properly aligned is extremely important to assure optimal performance.

**WET/DRY RUNNING CARTRIDGE SPLIT SEAL**

Installation, Operation &amp; Maintenance Instructions

**Install Mating Ring Adapter Assembly - Step 1 (cont.)**

7. Fully tighten the cap screws and again check the mating ring split joints for steps at the lapped sealing surface and the outside diameter (OD). If a step exists at the lapped sealing surface or outside diameter (OD), push on the high side of the step to correct. A setting spacer may be temporarily removed and used to push against the high side of a step at the outside diameter (OD). Figure 9.

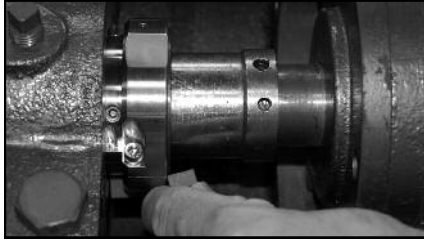


Figure 9

Using setting spacer to push on high side of mating ring diameter (OD) step.

8. Ensure the setting spacers are contacting the seal chamber face then evenly tighten the set screws. Figure 10.



Figure 10

9. Remove the two plastic setting spacers from the mating ring adapter assembly using the small provided screwdriver.
10. Clean the mating ring sealing surface with the provided alcohol pads. Figure 11.



Figure 11

**Install Mating Ring Adapter Assembly - Step 1 (cont.)**

**NOTE:** The completed mating ring adapter assembly should look like Figure 12.



Figure 12

**Install Primary Ring Assembly - Step 2**

1. Remove the primary ring halves and retaining ring from the packaging.

**ATTENTION** Do not fit the primary ring halves together before actual installation. Damage to the primary ring split joints may occur.

2. Place the primary ring halves around the shaft, with the sealing surface facing the mating ring adapter assembly, and bring the halves together. (Note: Placing the primary ring halves against the mating ring face while bringing the halves together will help to steady the primary ring halves and make aligning the split joints easier). Figure 13.



Figure 13

3. While holding the primary ring halves together with the split joints aligned, center the retaining ring over one of the split joints of the primary ring and slide it into the groove on the primary ring diameter (OD). Figure 14. Check the primary ring split joints for steps at the lapped sealing surface and diameter (OD). Adjust the split joint alignment if necessary.



Figure 14

**NOTE:** Seal faces are flat to within 0.000035"/0.00089mm. As with any split seal, assuring the seal face halves are properly aligned is extremely important to assure optimal performance.

## WET/DRY RUNNING CARTRIDGE SPLIT SEAL

Installation, Operation & Maintenance Instructions

### Install Primary Ring Assembly - Step 2 (cont.)

4. Apply a thin, even film of lubricate to the O-ring contact surface of the primary ring with the provided lubricant. Figure 15.



Figure 15

5. Clean the primary ring sealing surface with the provided alcohol pads. Slide the primary ring face against the mating ring face. Figure 16.



Figure 16

- NOTE:** The completed primary ring assembly should look like Figure 17



Figure 17

### Install Gland Plate Assembly - Step 3

1. Remove the gland plate assembly halves from the packaging.

- NOTE:** Ensure the ends of the primary ring O-rings and gland face O-rings are properly extended as shown in Figure 18. Also ensure even extensions on both ends. They can be pushed in or out to adjust if necessary.

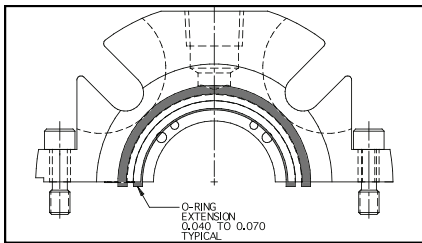


Figure 18

2. Plug any unused flush connection taps with the provided pipe plugs.

3. Lightly lubricate the exposed surfaces of the split joint gasket and the O-ring free ends with the provided lubricant on each gland plate assembly half. Figure 19.



Figure 19

- ATTENTION** Do not lubricate the exposed inside diameter surface of the primary ring O-ring or the exposed face surface of the gland face O-ring.

4. Locate the white alignment marks at the primary ring split joints so that they will line up with the gland plate assembly split surfaces when the first half of the gland plate assembly is installed.

- EXAMPLE:** If it is preferred to place the first gland plate assembly half around the shaft so that the split joints are at the 3 and 9 o'clock positions, locate the primary ring white alignment marks at the 3 and 9 o'clock positions.

### Install Gland Plate Assembly - Step 3 (cont.)

5. Bring the first half of the gland plate assembly, with the gland face O-ring facing the equipment's seal chamber, around the rotating assembly and primary ring assembly so that the gland plate inside diameter angled lip gently engages and goes around the beveled edge of the rotating assembly. Lightly pull the gland plate assembly half outboard so that the angled lip surface fully contacts the beveled edge of the rotating assembly. Figure 20.

6. While holding the exposed half of the primary ring assembly, bring the gland plate assembly half toward the primary ring ensuring the gland plate assembly split surfaces align with the primary ring white alignment marks. Figure 20.



Figure 20

- NOTE:** With the split surfaces and white alignment marks aligned, the gland plate assembly anti-rotation pin will be closely aligned with the primary ring slot and should easily engage.

7. Lightly push the opposite exposed half of the primary ring inward towards the gland plate assembly inside diameter (ID) and try to slightly rotate in either direction to verify engagement of the anti-rotation pin. The anti-rotation pin is properly engaged when the primary ring will not rotate relative to the gland plate assembly half.
8. Bring the second half of the gland plate assembly around the shaft and towards the first half to engage the alignment pins. Figure 21.



Figure 21

## WET/DRY RUNNING CARTRIDGE SPLIT SEAL

Installation, Operation &amp; Maintenance Instructions

### Install Gland Plate Assembly - Step 3 (cont.)

**NOTE:** Be careful to bring the two halves together with even gaps at each split joint. Bringing the halves together with uneven gaps that vary by more than 1/8"/3.2mm, may prevent proper engagement of the second gland plate assembly half anti-rotation pin and result in damage to the primary ring.

- Evenly tighten the cap screws until approximately a 1/8"/3.2mm gap exists at each split joint, while feeling for any resistance that may be due to an improperly aligned gland plate anti-rotation pin. Continue evenly tightening the cap screws until the split joints are contacting and the cap screws are only snug. Avoid fully tightening the cap screws at this point as this will cause the gland assembly to tilt/rock from side to side and may result in damage to the primary ring split surfaces. Figure 22.

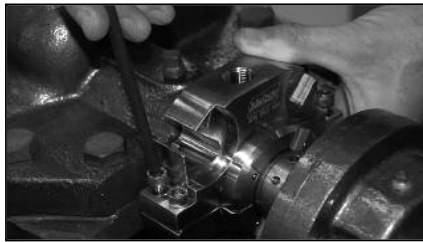


Figure 22

- Install the seal mounting bolts (typically not supplied). Evenly tighten the bolts but do not fully tighten at this time. Tighten the bolts until the gland plate assembly begins to contact the seal chamber and then back off bolts one-quarter turn. Figure 23.

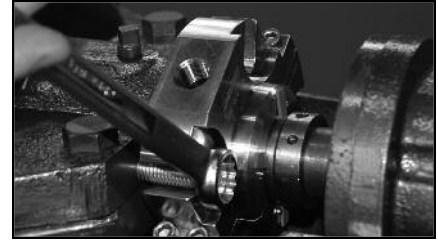


Figure 23

### Install Gland Plate Assembly - Step 3 (cont.)

- Fully tighten the gland plate assembly cap screws. Figure 24.

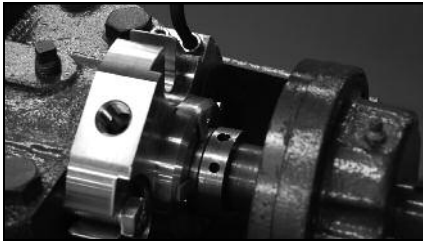


Figure 24

- Remove the four plastic centering spacers from the outboard end of the gland plate using the small provided screwdriver. Figure 25.



Figure 25

- Evenly tighten the seal mounting bolts ensuring metal-to-metal contact between the gland plate assembly and seal chamber face is made. Do not over tighten the bolts. Doing so may cause gland plate distortion which could result in excessive leakage.

- Connect seal flush and/or vent connections to the seal gland plate if required.
- NOTE:** The completed seal installation should look like Figure 26.

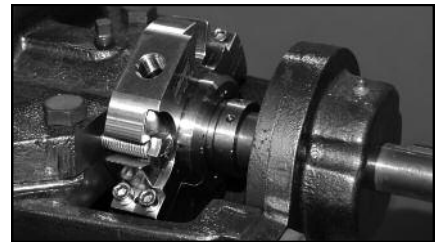


Figure 26

### Troubleshooting Tips

- If there is leakage between the gland plate halves, do not tighten the seal mounting bolts further. Slightly back off each mounting bolt and retighten the gland plate cap screws in Step 3, #11.
- If there is leakage between the seal gland plate and equipment box face, slightly tighten each seal mounting bolt.
- Some leakage may occur between the seal faces upon startup. If leakage is less than 30 drops a minute this should improve as the faces 'run in'. If leakage is greater than 30 drops a minute, then the seal, equipment and / or the operating conditions should be examined to determine the probable cause for the leakage. If the seal installation is determined to be the root cause of the leakage, then it should be inspected for nicked or cut O-rings, misaligned seal face halves, chipped or cracked seal faces, or any other issues that may cause the leakage.

## WET/DRY RUNNING CARTRIDGE SPLIT SEAL

Installation, Operation &amp; Maintenance Instructions

### Ordering Information

1. Cartridge Seal size = solid shaft or sleeve outside diameter (OD).
2. Select 3740 cartridge split seal arrangement.
3. For other material combinations or size considerations, consult your local John Crane representative.

### 3740 Wet Running Operating Limits

Pressure:	Up to 20.7 barg/300 psig continuously with pressure excursions up to 31.0 barg/450 psig
Temperature:	Up to 121°C/250°F
Shaft Speed:	Up to 17.8 m/s / 3,500 fpm
Runout:	Up to 1.52mm/0.060" TIR

### Materials of Construction - Standard

Seal Faces	Carbon vs. Silicon Carbide Silicon Carbide vs. Silicon Carbide
Metallurgy	316 Stainless Steel
Springs	Alloy C-276
Retaining Ring	Alloy X-750
Elastomers	Fluorocarbon Ethylene Propylene Rubber (EPR)

### 3740D Dry Running Operating Limits

Pressure:	Vacuum to 5.5 barg/80 psig
Temperature:	Up to 121°C/250°F
Shaft Speed:	Up to 2.0 m/s / 400 fpm
Runout:	Up to 3.81mm/0.150" TIR

### Decommissioning the Equipment

1. Ensure that the equipment is electrically isolated.



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

2. Ensure that the equipment is isolated by the appropriate valves. Check that the fluid is drained or the gases are vented and the pressure is fully released.

### Maintenance

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

Type 3740 can be returned to a John Crane service location, as rebuilding to as-new specifications must be carried out by qualified personnel. Otherwise, repair kits are available for field repair.



**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.

# TYPE 3740/3740D

## WET/DRY RUNNING CARTRIDGE SPLIT SEAL

Installation, Operation & Maintenance Instructions

**WET/DRY RUNNING CARTRIDGE SPLIT SEAL**

Installation, Operation &amp; Maintenance Instructions



<b>North America</b>	<b>Europe</b>	<b>Latin America</b>	<b>Middle East &amp; Africa</b>	<b>Asia Pacific</b>
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Fax: 1-847-967-3915	Fax: 44-1753-224224	Fax: 55-11-3371-2599	Fax: 971-488-62830	Fax: 65-6518-1803

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