

### Foreword

These instructions are provided to familiarise the user with the seal and its designated use. These 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 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.

**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 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 a qualified person who has 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 recommended performance limits in accordance with its designated use set out in these 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 750°F/400°C, they can decompose. Protective gloves should be worn as hydrofluoric acid may be present.
- PTFE compounds should never be burned or incinerated as the fumes are highly toxic.

### Before Starting the Unit

- 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.

**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 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 questions arise, contact your local John Crane Sales/Service Engineer. 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.

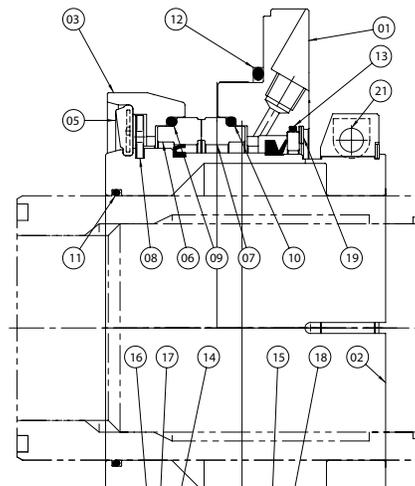
### General Instructions

- Examine the engineering layout drawing to confirm the proper seal arrangement for the pump being used. Be sure to read all instructions carefully before installing seal.
- To assure satisfactory operation, handle seal with care. Take particular caution to see that the lapped sealing faces are not scratched or marred.

Table 1

|                          |                             |
|--------------------------|-----------------------------|
| 01. Gland Plate          | 13. O-ring                  |
| 02. Shaft Sleeve         | 14. U-cup                   |
| 03. Primary Ring Carrier | 15. V-ring                  |
| 04. Drive Collar         | 16. Pin                     |
| 05. Cone Spring          | 17. O-ring                  |
| 06. Primary Ring         | 18. Quench Seal Mating Ring |
| 07. Mating Ring          | 19. Spiral Retaining Ring   |
| 08. Drive Disc           | 20. Spiral Retaining Ring   |
| 09. O-ring               | 21. Soc. HD. Capscrew       |
| 10. O-ring               | 22. Setting Piece           |
| 11. O-ring               | 23. Hex. HD. Screw          |
| 12. O-ring               | 24. Hex. HD. Screw          |

### Typical Type 5840 Slurry Seal



### Type 5840 Slurry Seal Cartridge Assembly

The Type 5840 is typically supplied as a fully assembled cartridge seal. If this is the case, proceed to the "Installing the Seal" section. Otherwise, follow the assembly instructions below.

- NOTE:** These assembly instructions are based on the standard Type 5840 designs. Please refer to the specific seal assembly drawing for the exact design that has been supplied.
- NOTE:** Elastomeric O-rings can be damaged or destroyed if care is not taken. Prior to assembly of O-ring into groove, make sure groove is clean and free of foreign materials. Lubricate both groove and O-ring prior to installation with DuPont Krytox FG24 grease.
- Lubricate the leading edge of the inboard end of the shaft sleeve and the cone spring. Push the cone spring onto the sleeve (from the inboard end), in the correct orientation. The cone spring should be pushed on with equal force applied across its back face, to avoid distortion of the component. A useful tool for this task is the primary ring carrier.
  - Lubricate O-ring and fit to mating ring.
  - Slide mating ring assembly into gland plate assembly, ensuring that the pin is aligned with the slot in the mating ring and press into place.
  - Lubricate O-ring and fit to primary ring.
  - Slide primary ring assembly into the primary ring carrier assembly ensuring that the pin is aligned with the slot in the mating ring and press into place.
  - Turn the sleeve onto its Inboard end and place the 3 off drive discs (in alternate positions) into the recesses provided.
  - Carefully feed the primary ring carrier assembly over the sleeve and onto the cone spring. Take care to ensure the three slots in the primary ring carrier assembly align with the three drive discs.
  - Slide the U-cup over the sleeve and into the bore of the primary ring ensuring the open end of the U-cup is facing outboard. The U-cup will 'snap' into position when it locates into the sleeve recess.
- NOTE:** Use only a blunt tool to push the U-cup fully into position, to avoid elastomer damage.
- Clean both the primary and mating faces with a suitable solvent to remove all traces of grease.
  - If installing the Type 5840 with a quench assembly, lightly grease the quench seal mating ring O-ring and fit it to the gland plate assembly. Then continue on to step 12. Otherwise proceed to step 11.

- Lower the gland plate assembly with mating ring over the sleeve to bring the two sealing rings together, then proceed to step 16.
  - For seal assemblies including a quench seal: Lower the gland plate assembly with mating ring over the sleeve to bring together the two sealing rings.
  - Stretch the V-ring over the sleeve, ensuring the lip of the V-ring faces outboard of the seal. The V-ring can be manipulated by hand along the sleeve until it sits into its dedicated recess in the sleeve. Pay special attention to the axial position of the V-ring. Ensure that the outboard edge of the V-ring butts up against the outboard edge of the sleeves recess.
  - Clean the running surface of the quench seal mating ring with solvent and then place over the sleeve. Press the ring by hand until full contact is made with the abutment surface.
  - Feed the spiral retaining ring into its recess in the gland plate chasing it around by hand until the complete spiral retaining ring snaps into its recess.
  - Insert spiral retaining ring into its recess on the outboard end of the sleeve, using the 'technique' described in 15.
  - Place the drive collar segments around the sleeve, and loosely tighten the socket head cap screws through the bolts, maintaining equal gaps between the segments of the drive collar.
- NOTE:** Maintain the collar segments against the external spiral retaining ring to allow sufficient space to insert the setting pieces. Ensure that the retaining ring is fully located within the undercut of the drive collar.
- Place the three identical setting pieces between the gland plate and drive collar at an equal distance from each other, ensuring the holes align with those in the gland plate.
- NOTE:** The lugs on the setting pieces should fit within the gland plate bore. Centralising of the sleeve relative to the gland plate bore
- Evenly screw down (by hand); the three hex head screws through the setting pieces into the gland plate, ensuring the setting piece lugs are seated properly within the gland plate bore.
- Fully tighten the 3 off hex head screws to set the Type 5840 to its correct working length.

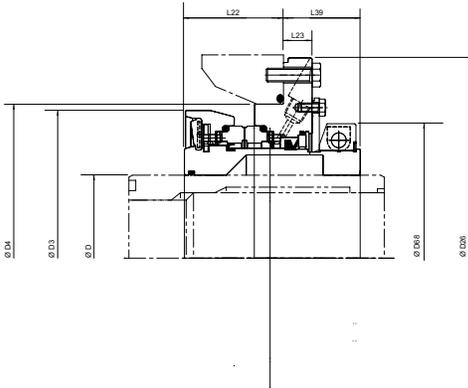
### Type 5840 Typical Arrangement/Dimensional Data - Externally Mounted

#### Metric Dimensions

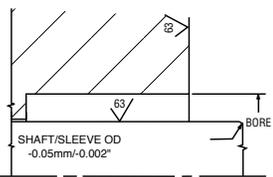
| Group | D         | D3  | D4  | D26 | D41      | D68 | L22 | L23 | L39 | Cap HD Screw Dia | Cap HD Torque | Set Screw Dia | Set Screw Torque |
|-------|-----------|-----|-----|-----|----------|-----|-----|-----|-----|------------------|---------------|---------------|------------------|
| 1     | 35 - 51   | 99  | -   | 140 | 1/4" NPT | 63  | 42  | 24  | 37  | -                | -             | M6            | 7.5 Nm           |
| 2     | 51 - 82.5 | 136 | 163 | 217 | 1/4" NPT | 113 | 55  | 25  | 45  | -                | -             | M8            | 18 Nm            |
| 3     | 80 - 105  | 170 | 185 | 243 | 1/4" NPT | 154 | 70  | 21  | 59  | M12              | 135 Nm        | -             | -                |
| 4     | 105 - 135 | 204 | 210 | 288 | 3/8" NPT | 196 | 70  | 27  | 67  | M12              | 135 Nm        | -             | -                |
| 5     | 135 - 180 | 258 | 270 | 350 | 3/8" NPT | 235 | 87  | 25  | 67  | M12              | 135 Nm        | -             | -                |
| 6     | 180 - 220 | 310 | 327 | 428 | 3/8" NPT | 290 | 101 | 30  | 72  | M12              | 135 Nm        | -             | -                |

#### Imperial Dimensions

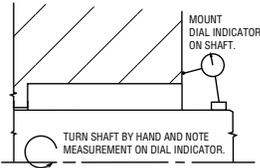
| Group | D             | D3    | D4    | D26   | D41       | D68   | L22  | L23  | L39  | Cap HD Screw Dia | Cap HD Torque | Set Screw Dia | Set Screw Torque |
|-------|---------------|-------|-------|-------|-----------|-------|------|------|------|------------------|---------------|---------------|------------------|
| 1     | 1.375 - 2.000 | 3.90  | -     | 4.96  | 1/4" NPT  | 2.48  | 1.65 | 0.96 | 1.46 | -                | -             | 1/4"          | 5.5 ft/lb        |
| 2     | 2.000 - 3.250 | 5.35  | 6.42  | 8.54  | 1/4" NPT  | 4.45  | 2.15 | 0.98 | 1.77 | -                | -             | 5/16"         | 13.2 ft/lb       |
| 3     | 3.250 - 4.125 | 6.69  | 7.28  | 9.57  | 1/4" NPT  | 6.06  | 2.74 | 0.83 | 2.32 | 1/2"             | 100 ft/lb     | -             | -                |
| 4     | 4.125 - 5.313 | 8.03  | 8.27  | 11.34 | 3/8" NPT  | 7.72  | 2.74 | 1.06 | 2.64 | 1/2"             | 100 ft/lb     | -             | -                |
| 5     | 5.313 - 7.063 | 10.16 | 10.63 | 13.78 | 3/8" BSPT | 9.25  | 3.41 | 0.98 | 2.64 | 1/2"             | 100 ft/lb     | -             | -                |
| 6     | 7.063 - 8.625 | 12.20 | 12.89 | 16.85 | 3/8" BSPT | 11.42 | 3.98 | 1.18 | 2.83 | 1/2"             | 100 ft/lb     | -             | -                |



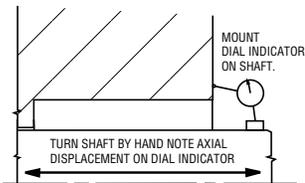
### Preparing the Equipment



- Check seal chamber dimensions and finishes.

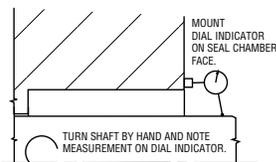


- Determine squareness of seal adapter plate to shaft (0.010"/0.25mm T.I.R. max).



- Measure axial end play (0.016"/0.40mm max).

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



- Measure shaft runout (0.005"/0.13mm T.I.R. max).

### Installing the Seal

Before starting the installation, read the following instructions carefully.

Although the Type 5840/5840 USP seals are robust in design, incorrect assembly, fitting or handling, may damage them.

It is therefore recommended that either a John Crane representative, or a suitably trained person, with reference to these fitting instructions, fit the seal.

#### Description of the Type 5840/5840 USP Cartridge Seals

John Crane mechanical seals are precision engineered and designed to perform to the highest standards.

The Type 5840 seal range are cartridge type seal units and as such, fitting procedures are significantly simplified. These instructions should be read carefully and followed in order that optimum performance is obtained from the seal.

There are two ports tapped into the gland plate. The standard Type 5840 utilises these as a Quench option. The Type 5840 USP uses the ports for its supply of Barrier fluid (from a static head source) for upstream pumping via the grooved geometry of the primary ring.

The standard connections are N.P.T. Should alternative thread forms be desired a suitable adapter must be fitted.

The drive system is derived from the friction between sleeve and shaft. The two drive collars that compress the sleeve to the shaft have to be accurately positioned and torqued to ensure reliable operation of the seal.

The Type 5840/5840 USP cartridges are supplied at the correct working length, defined by the Setting Pieces around the Sleeve and Gland Plate.

### Preparation for Fitting the Cartridge

Remove the cartridge from the packing in a clean area and ensure the contents include:

- All components to assembly drawing
- Assembly drawing
- Installation Instructions I-5840
- Suitable Lubricant.

Contact John Crane if any of these items are missing.

Check that the code on the paperwork agrees with the code on the seal plate.

Visibly check the Cartridge seal:

- Exterior for any signs of transit damage
- Is clean
- Plastic transit plugs are fitted
- Remove and replace plastic plug to check port for debris.

If there is any evidence of damage the seal should be returned to John Crane for repair.

**ATTENTION** Verify that the direction of pump shaft rotation matches that marked on the seal (Type 5840 USP only).

Check that all machinery abutments, sealing and fitting surfaces are clean and free from debris and burrs.

Check all machinery dimensions relevant to the seal installation.

The equipment should be clean and meet the specifications noted in the "Preparing the Equipment" section.

| Elastometer   | Lubricant   |
|---|---|
| Fluoroelastomer<br>(i.e. Viton™)  | Vegetable Oil, Animal Oil, Mineral-Hydrocarbon Oils, Soap Solution, Parker 'Super-O-Lube', Silicon Grease |
| Ethylene Propylene  | Vegetable Oil, Polywater™, Soap Solution, Glycerine, Propylene Glycol, Silicon Grease                     |
| Perfluoroelastomer<br>(i.e. Isolast™)   | Vegetable Oil, Animal Oil, Mineral-Hydrocarbon Oils   |
| <p><b>NOTE:</b> Always use a lubricant that is compatible with your machinery and product.<br/>Use lubricant sparingly, only enough to install seal with ease.</p> <p>Viton is a registered trademark of DuPont.<br/>Polywater is a registered trademark of American Polywater Co.<br/>Isolast is a registered trademark of John Crane.</p> |   |

### Maintenance

No maintenance of a seal is possible while installed. Therefore, 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 service location, 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.**

### Pump Shaft Adjustment for Impeller Wear

1. Install setting spacers so they engage fully into the groove in the cartridge sleeve and tighten setting spacer screws.
2. Loosen all the screws of the drive collar or locking collar sufficient to allow free movement of the pump shaft/sleeve.
3. Perform impeller adjustment in accordance with pump manufacturer's instructions.
4. Evenly tighten all drive collar or locking collar screws to their correct torque, as per the assembly drawing.
5. Loosen the setting spacers' screws and either position spacers so they are clear of the cartridge sleeve or remove and store appropriately.

### Quenching Recommendation

Once a week for at least five minutes during operation, and for ten minutes before startup and after shutdown, with clean process water at 2–4 bar.

### After the Equipment has Run

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 fluid is often trapped during draining and may exist outside the seal. The pump instruction manual should be consulted to check 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.

### 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.

### Material of Construction – Standard

|                      |                        |
|----------------------|------------------------|
| Primary Ring:        | Silicon Carbide        |
| Mating Ring:         | Silicon Carbide        |
| Wetted Hardware:     | Duplex Stainless Steel |
| Non-wetted Hardware: | 316 Stainless Steel    |
| Secondary Seals:     | TFE/P Elastomer        |

### Operating Limits

|              |  |
|--------------|--|
| Pressure:    | 300 psi(g)/21 bar(g)   |
| Temperature: | Up to 167°F/75°C without quench<br>Up to 248°F/120°C with quench |
| Speed:       | Up to 3000 fpm/15 m/s  |



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