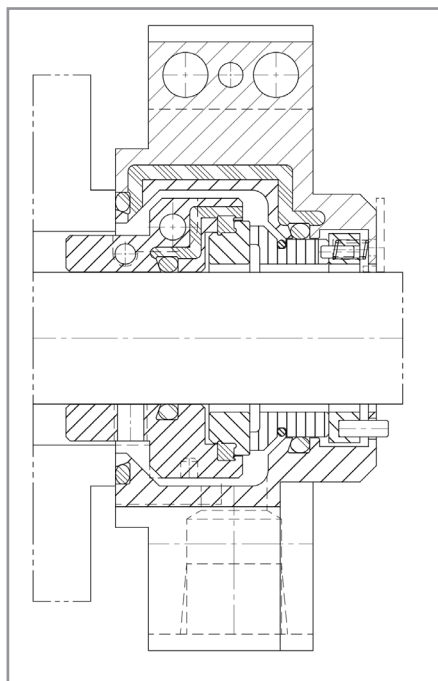


## CARTRIDGE SPLIT SEAL

Installation, Operation & Maintenance Instructions



### Foreword

These instructions are provided to familiarise 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 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 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.**

2. Installation, removal and maintenance of the seal must be carried out only by qualified personnel who have read and understood these installation instructions.
3. 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.
4. 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.
5. The Type 3740/3740D seals are not intended to be used in hazardous or toxic processes. If the process is either hazardous or toxic, please consult John Crane Sales/ Service Engineer for an appropriate seal recommendation.
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.



# TYPE 3740/3740D

## CARTRIDGE SPLIT SEAL

Installation, Operation & Maintenance Instructions

### Before starting the equipment

1. Check the equipment at the coupling for proper alignment of the driver or motor.
2. Ensure that the Gland Plate is bolted securely as described in Step 3.12 (Install Gland Plate Assembly).
3. Complete the assembly of the equipment and turn the shaft (by hand if possible) to ensure free rotation.
4. Consult all available equipment operating instructions to check for the 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 mechanical 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.

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 equipment instruction manual.

**ATTENTION** Except for dry-running seals, which are designed to operate without liquid (Type 3740D), wet-running seals that are operated without adequate liquid lubrication will often give rise to a squealing noise from the seal area and result in overheating, scoring, and other damage to the sealing surfaces, causing excessive emissions and a reduced 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 equipment, 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 the exclusive product warranty and limitations of liability.

### Operating conditions

The following are the operating limits of the Type 3740 & 3740D seals. The selection of materials used in the construction of the seal should be made with regard to their temperature, chemical resistance and compatibility with the liquid being sealed.

#### Pressure Limits

Dry Running (3740D):	Up to 5.5 Barg (80 PSIG)
Wet Running (3740):	Up to 21 Barg (300 PSIG) continuously Up to 31 Barg (450 PSIG) with pressure excursions

#### Temperature Limits

Dry-running (3740D):	Up to 135° C (275° F)
Wet-running (3740):	Up to 120° C (250° F)

#### Speed Limits

Dry-running (3740D):	400 FPM (2 m/s)
Wet-running (3740):	3,500 FPM (17.8 m/s)

#### General instructions

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



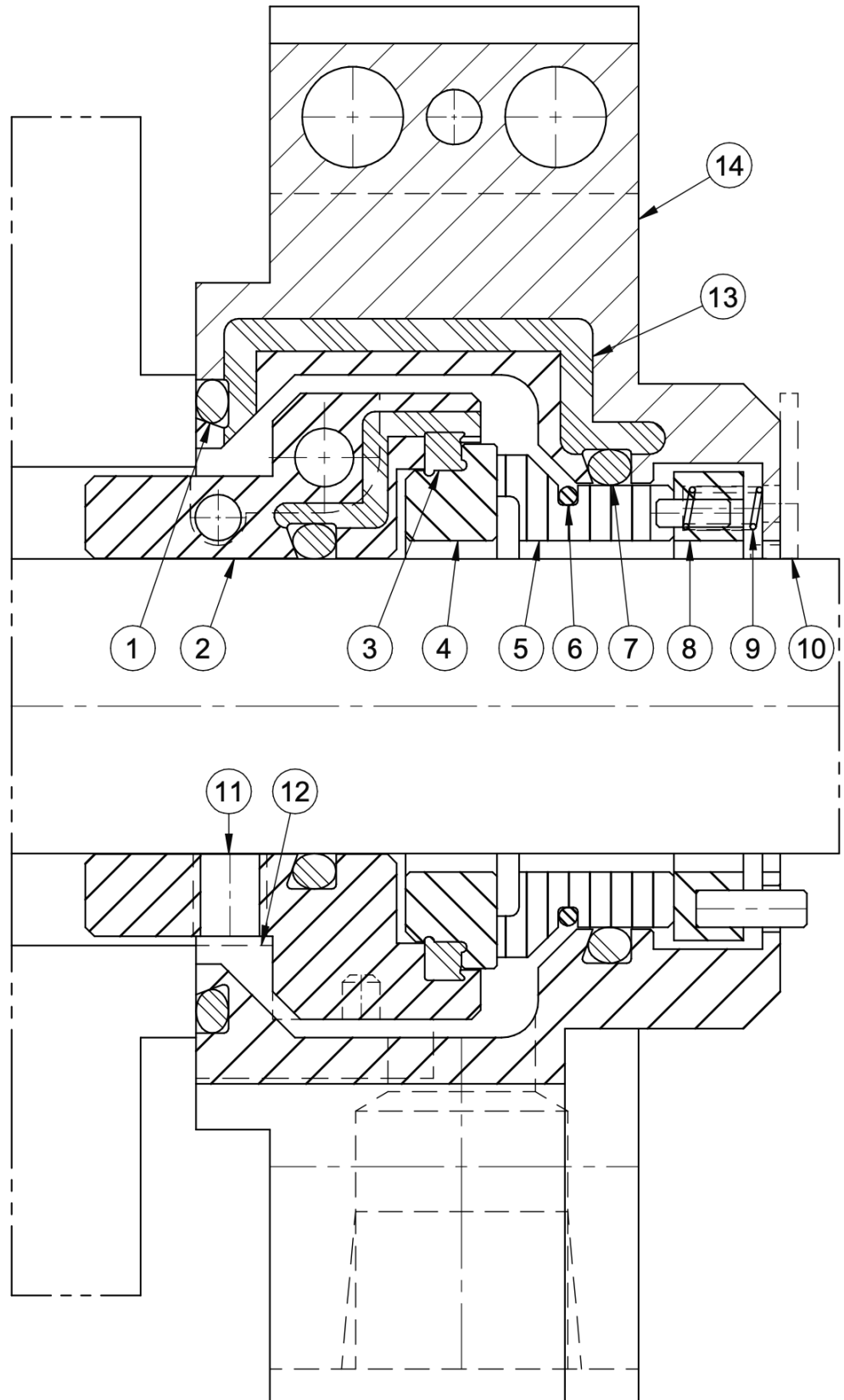
# TYPE 3740/3740D

## CARTRIDGE SPLIT SEAL

Installation, Operation & Maintenance Instructions

### Typical arrangement Type 3740 / 3740D

- 1 - O-ring (split)
- 2 - Mating ring adapter assy.
- 3 - Sealing element
- 4 - Mating ring
- 5 - Primary ting
- 6 - Retaining ting
- 7 - O-ring (split)
- 8 - Spring adapter assy set
- 9 - Spring
- 10 - Centering spacer
- 11 - Set screw
- 12 - Setting spacer
- 13 - Gasket
- 14 - Gland plate assy.





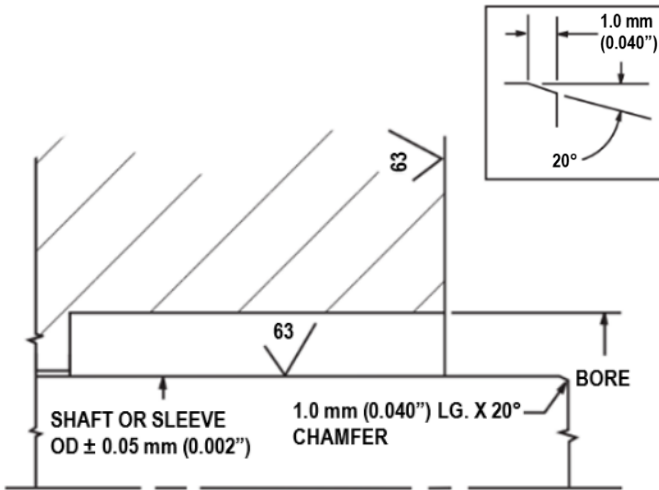
# TYPE 3740/3740D

## CARTRIDGE SPLIT SEAL

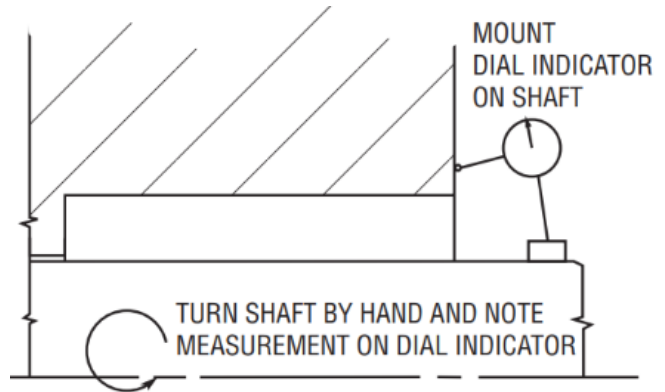
Installation, Operation & Maintenance Instructions

### Preparing the equipment

1. Check seal chamber dimensions and finishes.



3. Determine squareness of seal chamber face to shaft 0.05 mm per 25.4 mm of shaft (0.002" per inch of shaft) Max.



2. Measure axial end play.

#### Type 3740

- 35-60 mm (1.375-2.375") ± 0.50 mm (0.020") Max.
- 62-89 mm (2.437-3.500") ± 0.76 mm (0.030") Max.
- 90-150 mm (3.625-6.000") ± 1.27 mm (0.050") Max.

#### Type 3740D

- 38.1-63.5 mm (1.500-2.250") ± 0.50 mm (0.020") Max.
- 63.5-152.4 mm (2.500-6.000") ± 1.27 mm (0.050") Max.

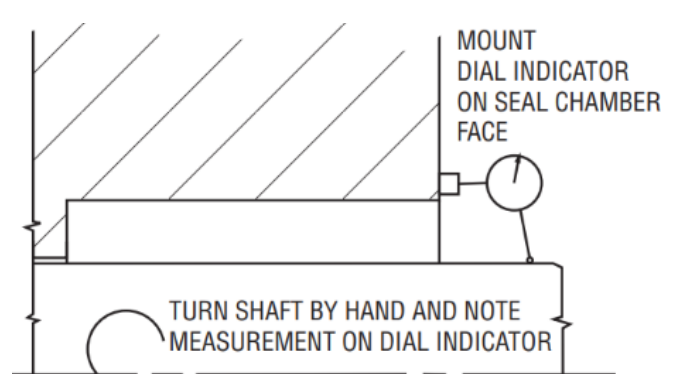
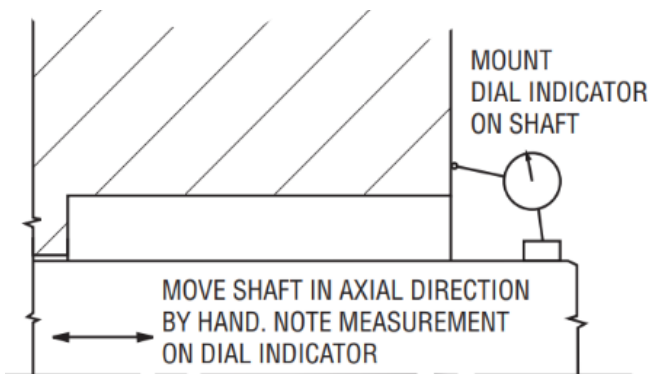
4. Measure shaft runout.

#### Type 3740

- 35-89 mm (1.375-3.500") = 1.52 mm (0.060") TIR Max.
- 90-150 mm (3.625-6.000") = 2.54 mm (0.100") TIR Max.

#### Type 3740D

- 38.1-63.5 mm (1.500-2.250") = 1.52 mm (0.060") TIR Max.
- 63.5-89 mm (2.500-3.500") = 2.54 mm (0.100") TIR Max.
- 95.25-152.4 mm (3.750-6.000") = 3.81 mm (0.150") TIR Max.



#### NOTE

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

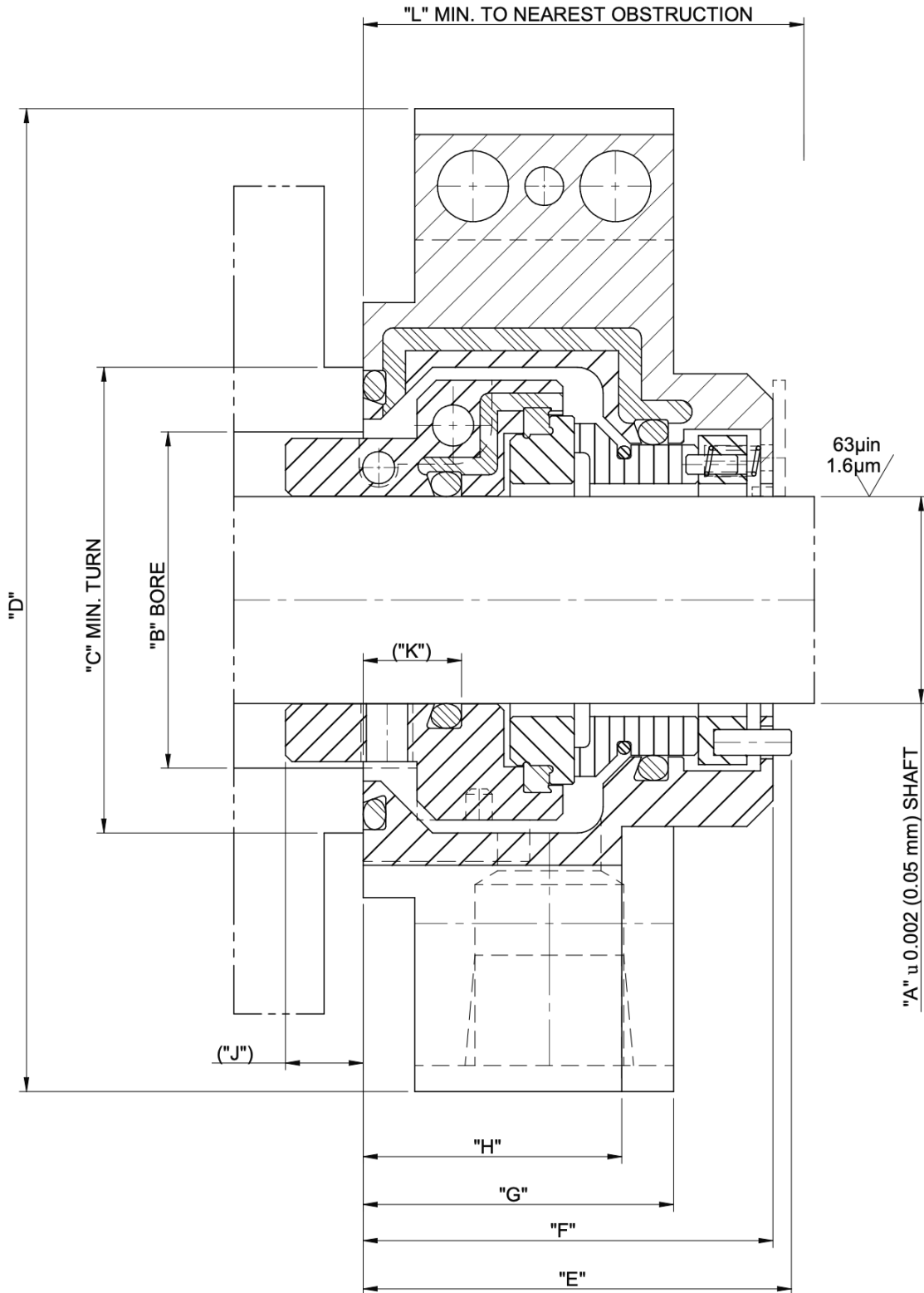


# TYPE 3740/3740D

## CARTRIDGE SPLIT SEAL

Installation, Operation & Maintenance Instructions

### Typical installation of Type 3740 / 3740D





# TYPE 3740/3740D

## CARTRIDGE SPLIT SEAL

Installation, Operation & Maintenance Instructions

### Typical installation of Type 3740 / 3740D (imperial shaft sizes)

SEAL SIZE	SIZE CODE	A	B		C MIN.	D	E	F	G	H	J	K	L MIN.
			MIN.	MAX.									
1.375	0345	1.375	2.000	2.625	2.750	5.250	2.070	1.980	1.500	1.250	0.375	0.475	2.130
1.437	0364	1.437	2.125	2.500	2.750	5.250	2.070	1.980	1.500	1.250	0.375	0.475	2.130
1.500	0381	1.500	2.125	2.500	2.750	5.250	2.070	1.980	1.500	1.250	0.375	0.475	2.130
1.625	0412	1.625	2.250	2.625	2.875	5.500	2.070	1.980	1.500	1.250	0.375	0.475	2.130
1.687	0428	1.687	2.375	2.750	3.000	5.500	2.070	1.980	1.500	1.250	0.375	0.475	2.130
1.750	0444	1.750	2.375	2.750	3.000	5.500	2.070	1.980	1.500	1.250	0.375	0.475	2.130
1.875	0476	1.875	2.500	2.875	3.125	5.500	2.070	1.980	1.500	1.250	0.375	0.475	2.130
1.937	0491	1.937	2.625	3.000	3.250	5.750	2.070	1.980	1.500	1.250	0.375	0.475	2.130
2.000	0508	2.000	2.625	3.000	3.250	5.750	2.070	1.980	1.500	1.250	0.375	0.475	2.130
2.125	0539	2.125	2.750	3.125	3.375	6.250	2.070	1.980	1.500	1.250	0.375	0.475	2.130
2.187	0555	2.187	3.000	3.375	3.625	6.250	2.070	1.980	1.500	1.250	0.375	0.475	2.130
2.250	0571	2.250	3.000	3.375	3.625	6.250	2.070	1.980	1.500	1.250	0.375	0.475	2.130
2.375	0603	2.375	3.000	3.500	3.750	6.250	2.070	1.980	1.500	1.375	0.365	0.545	2.350
2.437	0618	2.437	3.250	3.750	4.000	6.750	2.290	2.185	1.625	1.375	0.365	0.545	2.350
2.500	0635	2.500	3.250	3.750	4.000	6.750	2.290	2.185	1.625	1.375	0.365	0.545	2.350
2.625	0666	2.625	3.500	3.905	4.155	7.000	2.290	2.185	1.625	1.375	0.365	0.545	2.350
2.687	0682	2.687	3.500	3.905	4.155	7.000	2.290	2.185	1.625	1.375	0.365	0.545	2.350
2.750	0698	2.750	3.500	3.905	4.155	7.000	2.290	2.185	1.625	1.375	0.365	0.545	2.350
2.875	0730	2.875	3.750	4.188	4.438	7.500	2.290	2.185	1.625	1.375	0.365	0.545	2.350
2.937	0745	2.937	3.750	4.375	4.625	7.500	2.290	2.185	1.625	1.375	0.365	0.545	2.350
3.000	0762	3.000	3.750	4.375	4.625	7.500	2.290	2.185	1.625	1.530	0.485	0.640	2.840
3.125	0793	3.125	3.875	4.313	4.563	7.750	2.290	2.185	1.625	1.530	0.485	0.640	2.840
3.187	0809	3.187	4.000	4.500	4.750	7.750	2.290	2.185	1.625	1.530	0.485	0.640	2.840
3.250	0825	3.250	4.000	4.500	4.750	7.750	2.290	2.185	1.625	1.530	0.485	0.640	2.840
3.375	0857	3.375	4.250	4.750	5.000	8.000	2.290	2.185	1.625	1.530	0.485	0.640	2.840
3.500	0889	3.500	4.250	4.750	5.000	8.000	2.290	2.185	1.625	1.530	0.485	0.640	2.840
3.625	0920	3.625	4.500	5.188	5.438	9.000	2.750	2.625	1.850	1.530	0.485	0.640	2.840
3.687	0936	3.687	4.500	5.188	5.438	9.000	2.750	2.625	1.850	1.530	0.485	0.640	2.840
3.750	0952	3.750	4.500	5.188	5.438	9.000	2.750	2.625	1.850	1.530	0.485	0.640	2.840
3.875	0984	3.875	4.750	5.438	5.688	9.000	2.750	2.625	1.850	1.530	0.485	0.640	2.840
3.937	1000	3.937	4.750	5.438	5.688	9.000	2.750	2.625	1.850	1.530	0.485	0.640	2.840
4.000	1016	4.000	4.750	5.438	5.688	9.000	2.750	2.625	1.850	1.530	0.485	0.640	2.840
4.125	1047	4.125	5.000	5.688	5.938	9.500	2.750	2.625	1.850	1.530	0.485	0.640	2.840
4.250	1079	4.250	5.000	5.688	5.938	9.500	2.750	2.625	1.850	1.530	0.485	0.640	2.840
4.375	1111	4.375	5.250	5.938	6.188	9.500	2.750	2.625	1.850	1.530	0.485	0.640	2.840
4.500	1143	4.500	5.250	5.938	6.188	9.500	2.750	2.625	1.850	1.530	0.485	0.640	2.840
4.750	1206	4.750	5.500	6.188	6.438	10.000	2.750	2.625	1.850	1.530	0.485	0.640	2.840
5.000	1270	5.000	5.750	6.438	6.688	10.000	2.750	2.625	1.850	1.530	0.485	0.640	2.840
5.125	1301	5.125	6.000	6.813	7.063	11.500	2.750	2.625	1.850	1.530	0.485	0.640	2.840
5.250	1333	5.250	6.000	6.813	7.063	11.500	2.750	2.625	1.850	1.530	0.485	0.640	2.840
5.375	1365	5.375	6.250	6.938	7.188	11.500	2.750	2.625	1.850	1.530	0.485	0.640	2.840
5.500	1397	5.500	6.250	6.938	7.188	11.500	2.750	2.625	1.850	1.530	0.485	0.640	2.840
5.750	1460	5.750	6.500	7.188	7.438	11.500	2.750	2.625	1.850	1.530	0.485	0.640	2.840
5.875	1492	5.875	6.750	7.438	7.688	11.500	2.750	2.625	1.850	1.530	0.485	0.640	2.840
6.000	1524	6.000	6.750	7.438	7.688	11.500	2.750	2.625	1.850	1.530	0.485	0.640	2.840



# TYPE 3740/3740D

## CARTRIDGE SPLIT SEAL

Installation, Operation & Maintenance Instructions

### Typical installation of Type 3740 / 3740D (metric shaft sizes)

SEAL SIZE (MM)	SEAL SIZE (INCH)	SIZE CODE	A	B		C MIN.	D	E	F	G	H	J	K	L MIN.
				MIN.	MAX.									
40	1.575	0400	40.00	57.15	70.61	76.96	139.70	52.58	50.29	38.10	31.75	9.53	12.07	54.10
45	1.772	0450	45.00	60.33	69.85	76.20	139.70	52.58	50.29	38.10	31.75	9.53	12.07	54.10
50	1.969	0500	50.00	66.68	76.20	82.55	146.05	52.58	50.29	38.10	31.75	9.53	12.07	54.10
55	2.165	0550	55.00	74.63	85.73	92.08	158.75	52.58	50.29	38.10	31.75	9.53	12.07	54.10
60	2.362	0600	60.00	76.20	88.90	95.25	158.75	52.58	50.29	38.10	31.75	9.53	12.07	54.10
65	2.559	0650	65.00	88.90	99.19	105.54	177.80	58.17	55.50	41.28	34.93	9.27	13.84	59.69
70	2.756	0700	70.00	88.90	99.19	105.54	177.80	58.17	55.50	41.28	34.93	9.27	13.84	59.69
75	2.953	0750	75.00	95.25	111.13	117.48	190.50	58.17	55.50	41.28	34.93	9.27	13.84	59.69
80	3.150	0800	80.00	98.43	110.31	116.66	196.85	58.17	55.50	41.28	34.93	9.27	13.84	59.69
85	3.346	0850	85.00	107.95	123.19	129.54	203.20	58.17	55.50	41.28	34.93	9.27	13.84	59.69
90	3.543	0900	90.00	114.30	132.59	138.94	228.60	69.85	66.68	46.99	38.86	12.32	16.26	72.14
95	3.740	0950	95.00	114.30	132.59	138.94	228.60	69.85	66.68	46.99	38.86	12.32	16.26	72.14
100	3.937	1000	100.00	120.65	138.13	144.48	228.60	69.85	66.68	46.99	38.86	12.32	16.26	72.14
105	4.134	1050	105.00	127.00	144.48	150.83	241.30	69.85	66.68	46.99	38.86	12.32	16.26	72.14
110	4.331	1100	110.00	133.35	150.83	157.18	241.30	69.85	66.68	46.99	38.86	12.32	16.26	72.14
115	4.528	1150	115.00	133.35	152.40	158.75	241.30	69.85	66.68	46.99	38.86	12.32	16.26	72.14
120	4.724	1200	120.00	139.70	157.18	163.53	254.00	69.85	66.68	46.99	38.86	12.32	16.26	72.14
125	4.921	1250	125.00	146.05	163.53	169.88	254.00	69.85	66.68	46.99	38.86	12.32	16.26	72.14
130	5.118	1300	130.00	152.40	173.05	179.40	292.10	69.85	66.68	46.99	38.86	12.32	16.26	72.14
135	5.315	1350	135.00	158.75	180.16	186.51	292.10	69.85	66.68	46.99	38.86	12.32	16.26	72.14
140	5.512	1400	140.00	158.75	176.23	182.58	292.10	69.85	66.68	46.99	38.86	12.32	16.26	72.14
145	5.709	1450	145.00	165.10	182.58	188.93	292.10	69.85	66.68	46.99	38.86	12.32	16.26	72.14
150	5.906	1500	150.00	171.45	188.93	195.28	292.10	69.85	66.68	46.99	38.86	12.32	16.26	72.14



# TYPE 3740/3740D

## CARTRIDGE SPLIT SEAL

Installation, Operation & Maintenance Instructions

### Step 1 – Install mating ring adapter assembly

**NOTE** For an unsplit Mating Ring, see the optional section at the end of this document for the installation procedure.

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 may cause split joints to 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. 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

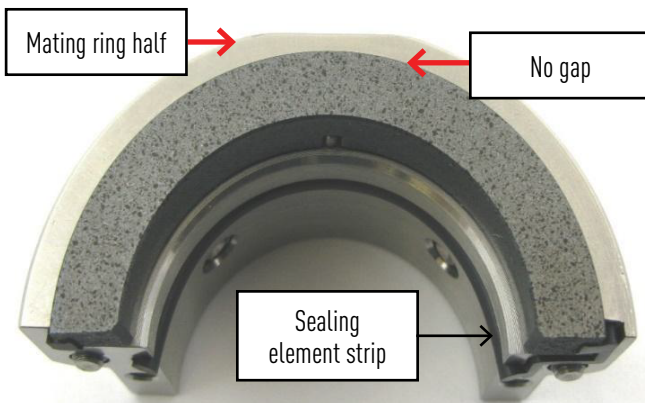


Figure 2B

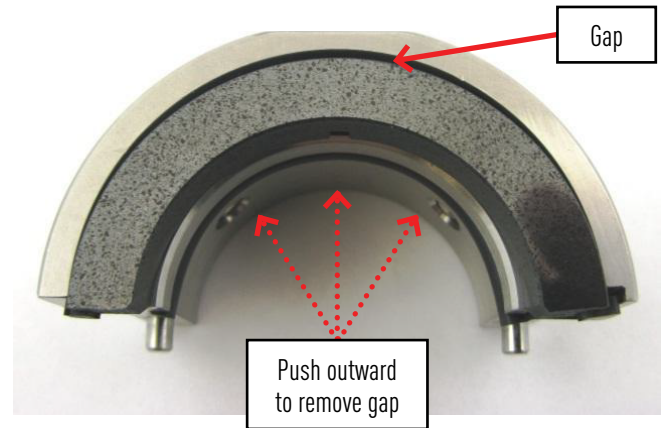
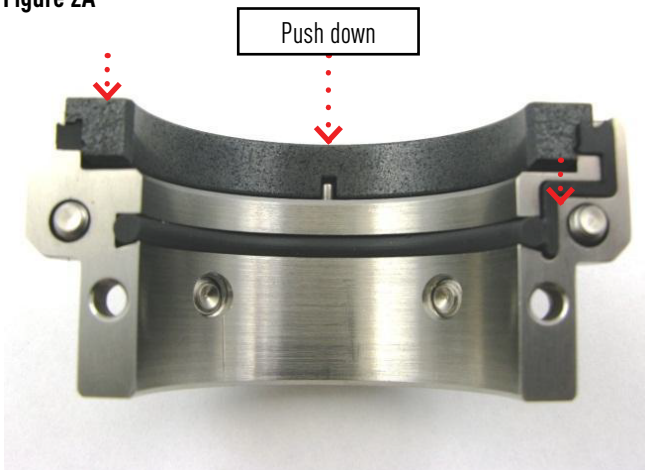


Figure 2A





# TYPE 3740/3740D

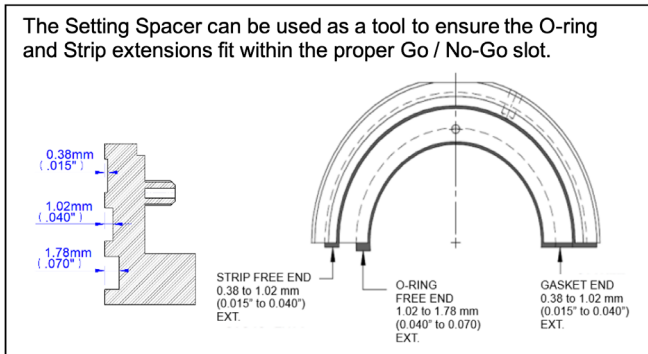
## CARTRIDGE SPLIT SEAL

### Installation, Operation & Maintenance Instructions

#### Step 1 – Install mating ring adapter assembly (cont.)

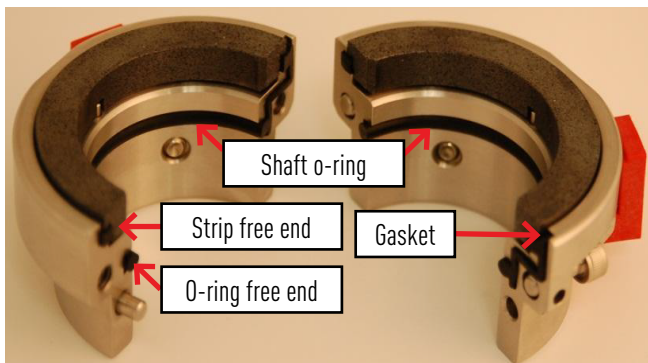
**NOTE** Ensure the gasket and opposite side O-ring and strip free ends of the Sealing Element are properly extended as shown in Figure 3. They can be pushed in or out to adjust if necessary.

Figure 3



2. Lightly lubricate the exposed inside diameter surface of the shaft O-ring on each Mating Ring Adapter assembly half as shown in 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 on each Mating Ring Adapter assembly half as shown in Figure 5.

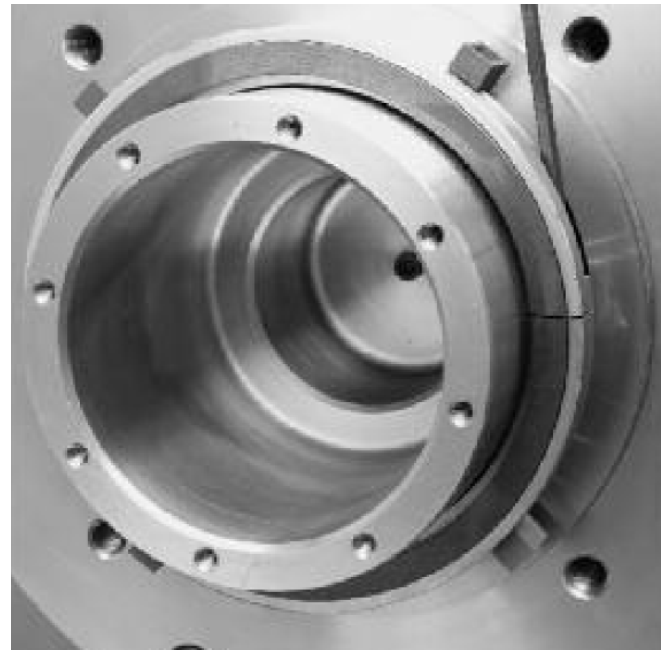
Figure 5



**ATTENTION** Be careful not to apply lubricant to the Mating Ring split ends.

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 0.8 mm (0.031") gap exists at each split joint. Figure 6.

Figure 6



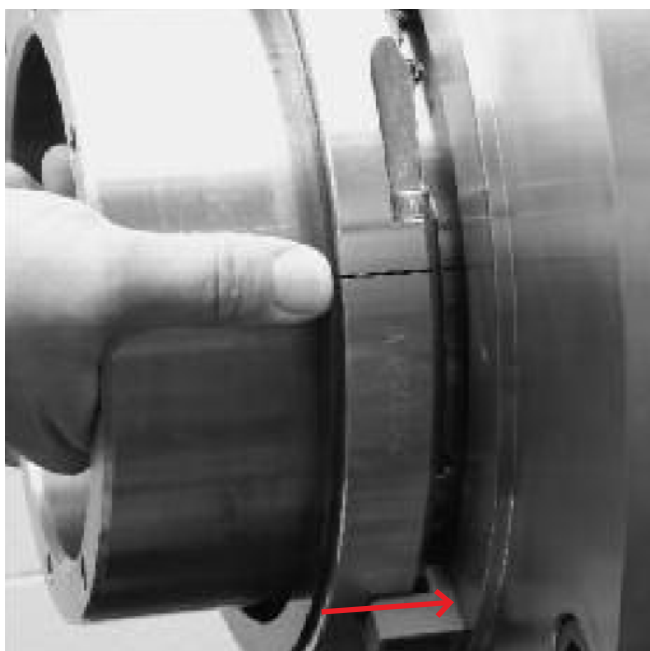
## CARTRIDGE SPLIT SEAL

### Installation, Operation & Maintenance Instructions

#### Step 1 – Install mating ring adapter assembly (cont.)

- 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



- 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 0.00089 mm (0.000035"). As with any split seal, ensuring the seal face halves are properly aligned is extremely important to ensure optimal performance.

- Fully tighten the Cap Screws and again check the Mating Ring split joints for steps at the lapped sealing surface and outside diameter. See Table 1 (page 16) for the recommended torque value. If a step exists at the lapped sealing surface or outside diameter, loosen the Cap Screws and repeat Number 6. A Setting Spacer may be temporarily removed and used to push against the high side of a step at the outside diameter. Figure 9.

Figure 9



- Ensure the Setting Spacers are contacting the seal chamber face, then evenly tighten the Set Screws. Figure 10.

Figure 10



- Remove the two plastic Setting Spacers from the Mating Ring Adapter assembly using a small screwdriver.



# TYPE 3740/3740D

## CARTRIDGE SPLIT SEAL

Installation, Operation & Maintenance Instructions

### Step 1 – Install mating ring adapter assembly (cont.)

10. Clean the Mating Ring sealing surface with alcohol pads. Figure 11.

Figure 11



**NOTE** The completed Mating Ring Adapter assembly should look like Figure 12.

Figure 12



### Step 2 – Install primary ring assembly

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, centre the Retaining ring over one of the split joints of the Primary Ring and slide it into the groove on the Primary Ring outside diameter as shown in Figure 14. Check the Primary Ring split joints for steps at the lapped sealing surface and outside diameter. Adjust the split joint alignment if necessary.

Figure 14



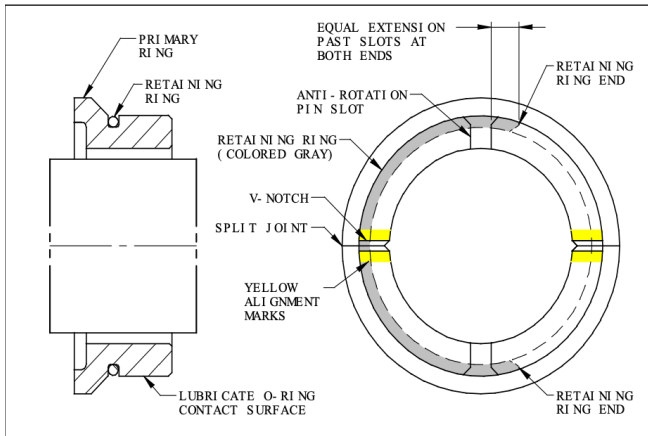
## CARTRIDGE SPLIT SEAL

Installation, Operation & Maintenance Instructions

### Step 2 – Install primary ring assembly (cont.)

4. Check that the Retaining Ring is roughly centred over the split joint, with approximately one-half on each side of the split joint. Adjust by sliding (rotating) within the groove if necessary. If an adjustment is required, push on either end of the Retaining Ring with a screwdriver. Check and re-adjust the split joint alignment if necessary. Figure 15.

Figure 15



**NOTE** Seal faces are flat to within 0.00089 mm (0.000035"). As with any split seal, ensuring the seal face halves are properly aligned is extremely important to ensure optimal performance.

5. Apply a thin, even film of lubricant to the O-ring contact surface of the Primary Ring as shown in Figure 16.

Figure 16



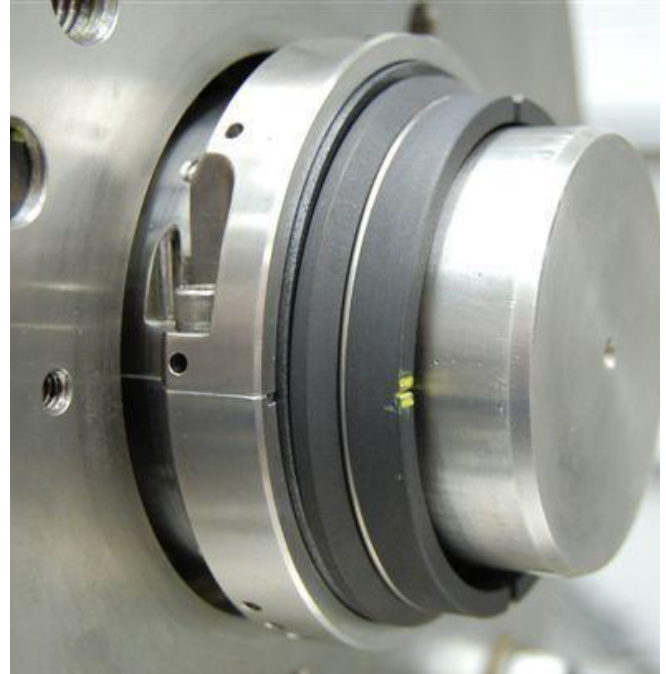
6. Clean the Primary Ring sealing surface with alcohol pads. Slide the Primary Ring face against the Mating Ring face. Figure 17.

Figure 17



7. The completed Primary Ring assembly should look like Figure 18.

Figure 18





# TYPE 3740/3740D

## CARTRIDGE SPLIT SEAL

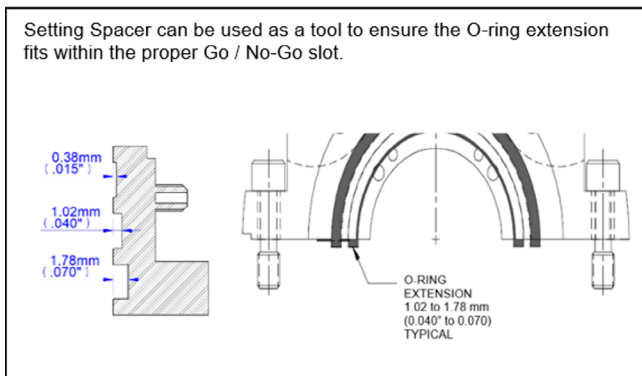
### Installation, Operation & Maintenance Instructions

#### Step 3 – Install gland plate assembly

1. Remove the Gland Plate assembly halves from the packaging.

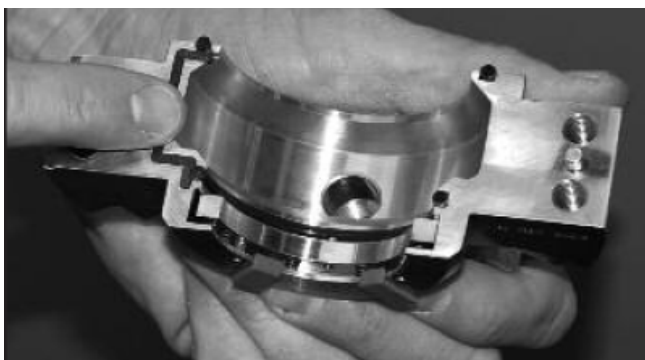
**NOTE** Ensure the ends of the Primary Ring O-rings and Gland face O-rings are properly extended as shown in Figure 19. Also, ensure even extensions on both ends. They can be pushed in or out to adjust if necessary.

Figure 19



2. Plug any unused flush ports in the Gland halves with the plugs provided.
3. Lightly lubricate the exposed surfaces of the split joint Gasket and the O-ring free ends with lubricant on each Gland Plate assembly half. Figure 20.

Figure 20



**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.

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 bevelled edge of the rotating assembly. Lightly pull the Gland Plate assembly half outboard so that the angled lip surface fully contacts the bevelled edge of the rotating assembly. Figure 21.

Figure 21



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 21.

**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 toward the Gland Plate assembly ID and try to slightly rotate the Primary Ring 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.



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## CARTRIDGE SPLIT SEAL

### Installation, Operation & Maintenance Instructions

#### Step 3 – Install gland plate assembly (cont.)

- Bring the second half of the Gland Plate assembly around the shaft and towards the first half to engage the alignment pins. Figure 22.

Figure 22



#### 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 3.2 mm (0.125") may prevent proper engagement of the second Gland Plate assembly half anti-rotation pin and result in damage to the Primary Ring. To ensure proper alignment of the O-rings, bring the halves together and close the gap by hand before tightening the Cap Screws. Ensure that the Centring Spacers are still installed on the Gland Plate.

- Evenly tighten the Cap Screws in a star pattern, starting with the Cap Screw closest to the Primary Ring O-ring, until approximately a 3.2 mm (0.125") 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 in a star pattern until the split joints are contacting.

**ATTENTION** 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 23.

Figure 23



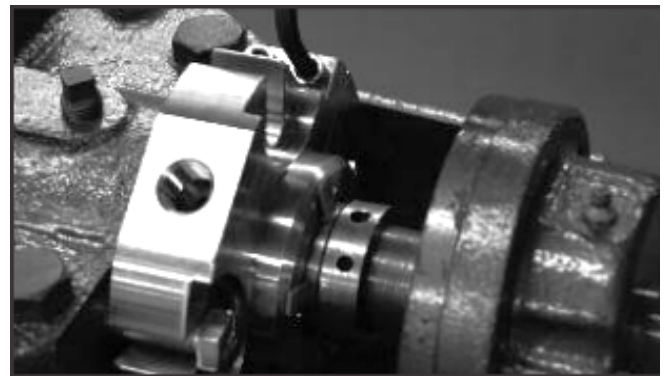
- Install the seal mounting bolts (typically not supplied). Evenly tighten the bolts in a star pattern, but do not fully tighten at this time. Tighten the bolts until the Gland Plate face O-ring makes contact with the seal chamber. Figure 24.

Figure 24



- Fully tighten the Gland Plate assembly Cap Screws in a star pattern. Figure 25. See Table 1 (page 16) for the recommended torque value.

Figure 25





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## CARTRIDGE SPLIT SEAL

Installation, Operation & Maintenance Instructions

### Step 3 – Install gland plate assembly (cont.)

12. Evenly tighten the seal mounting bolts in a star pattern until light metal-to-metal contact is made between the Gland Plate assembly and the seal chamber face. Tighten each bolt an additional quarter-turn to complete the installation.

**Do not overtighten the bolts. Doing so may cause Gland Plate distortion, which could result in excessive leakage.**

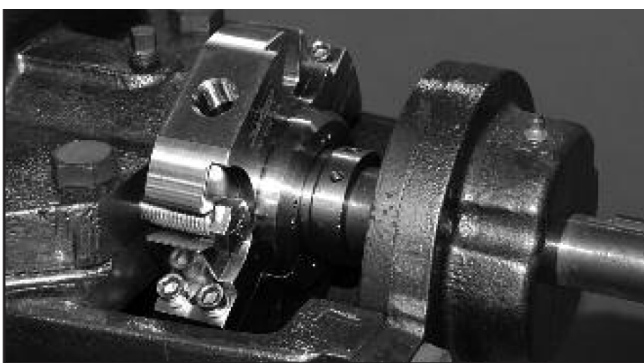
13. Remove the four plastic Centring Spacers from the outboard end of the Gland Plate using a screwdriver. Figure 26.

Figure 26



14. Connect seal flush and/or vent connections to the seal Gland Plate if required.
15. The completed seal installation should look like Figure 27.

Figure 27



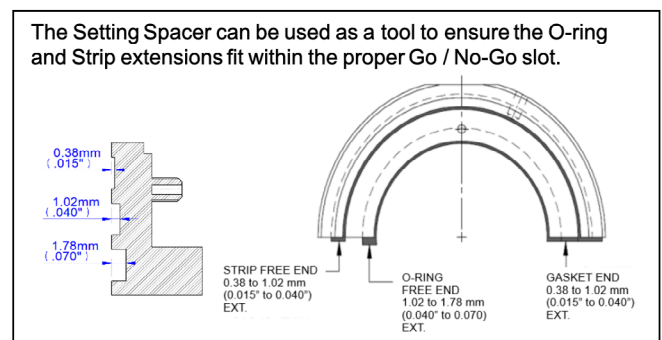
### Optional – Install unsplit mating ring into mating adapter assembly

1. If required, install elastomers into the Mating Ring Adapter assembly halves. Begin at the gasketed surface, working around the adapter half, ensuring there is no excess protrusion.

#### NOTE

Ensure the gasket and opposite side O-ring and strip free ends of the Sealing Element are properly extended as shown in Figure 28. They can be pushed in or out to adjust if necessary.

Figure 28



2. Lightly lubricate the exposed inside diameter surface of the shaft O-ring on each Mating Ring Adapter assembly half.
3. Lightly lubricate the exposed surfaces of the gasket and the opposite side O-ring and strip free ends of the Sealing Element on each Mating Ring Adapter assembly half.
4. Assemble the Mating Ring Adapter halves and tighten the Cap Screws, leaving a small gap at the adapter splits to allow for easy installation of the Mating Ring.
5. Mark a line on the inside diameter of the Mating Ring Adapter half in line with the pin.
6. Place the unsplit Mating Ring on a clean flat surface with the pin slots facing up.

**ATTENTION** Be careful not to damage the sealing face of the Mating Ring.

7. Flip the Mating Ring Adapter over with the pin facing downward and slowly lower it onto the Mating Ring while aligning the Mating Ring pin slot with the pin alignment mark previously made.



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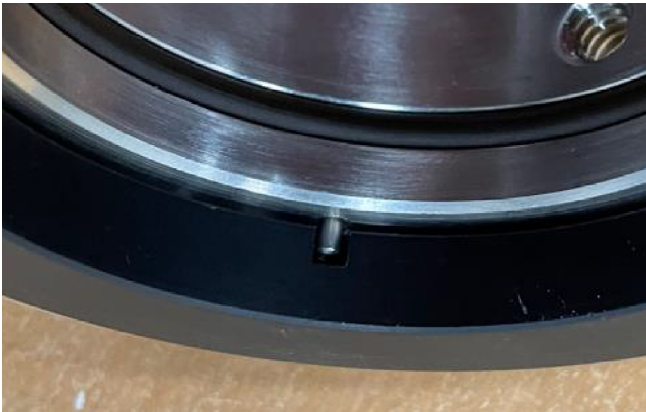
## CARTRIDGE SPLIT SEAL

Installation, Operation & Maintenance Instructions

### Optional – Install unsplit mating ring into mating adapter assembly (cont.)

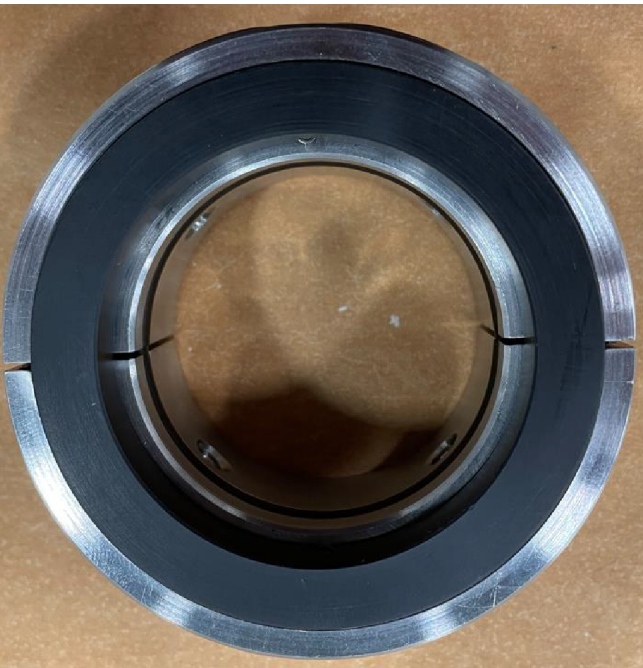
- Once aligned, evenly press the Mating Ring Adapter onto the Mating Ring and pop it into place. Ensure the Mating Ring is fully seated and engaged with the pin. Figure 29.

Figure 29



- See Figure 30 for completed assembly.

Figure 30



- Leaving the gaps in the adapter, lubricate the O-ring and install the Setting Spacers. Gently slide the assembly onto the shaft, applying even pressure on the seal face to prevent cracking. Once the Setting Spacers contact the seal chamber, fully tighten the Mating Ring Adapter Cap Screws. See Table 1 for the recommended torque value.
- Clean the Mating Ring sealing surface with alcohol pads.
- Clean the Primary Ring sealing surface with alcohol pads. Slide the Primary Ring face against the Mating Ring face. Since the Primary Ring is not split, the Retaining Ring is not required, but optional.
- Follow Step 3 – Install Gland Plate Assembly procedures to complete the installation.

### 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 re-tighten the Gland Plate assembly Cap Screws per Step 3.11 (Install Gland Plate Assembly).
- If there is leakage between the Gland Plate and the equipment box, face slightly tighten each seal mounting bolt.
- Some leakage may occur between the seal faces upon start-up. If leakage is less than 30 drops per minute, this should improve as the faces "run in." If leakage is greater than 30 drops per 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.
- When statically testing the seal, varying the pressure and rotating the shaft enough for the faces to run-in a bit can significantly improve leakage.

Table 1 – Fastener tightening torque

Part description	Seal size, inch (mm)	Cap screw size, inch	Torque, in-lb (Nm)
Gland plate halves	1.375 to 6.000 (35 to 152)	5/16-18	80 (9)
Mating ring adapter	1.375 to 2.375 (35 to 60)	#10-32	14.3 (1.6)
	2.437 to 3.500 (62 to 89)	1/4-20	34 (3.8)
	3.625 to 6.000 (92 to 152)	5/16-18	70 (7.9)



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## CARTRIDGE SPLIT SEAL

Installation, Operation & Maintenance Instructions

### Decommissioning the equipment

1. Ensure that the vessel 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 equipment instruction manual should be consulted to check for any special precautions.**

2. Ensure that the vessel 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. 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 be returned to a John Crane Seal Rebuilding Centre, as rebuilding to as-new specifications must be carried out by qualified personnel.



**It is the responsibility of the equipment operator 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's 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.

Please visit [www.johncrane.com](http://www.johncrane.com) for material options and operating limits.



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