

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 single seal running against a seal/mating ring of appropriate material and design as used in rotating equipment, typically a pump. The instructions will help to avoid danger and increase reliability. The information required may change with other types of equipment or installation arrangement, and this manual must be read in conjunction with the instruction manuals supplied with the seal, 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, contact John Crane before installation.

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 and seal/mating rings 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 this instruction manual 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.

2. Installation and removal of the seal must be carried out only by qualified personnel who have read and understood this instruction manual.

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 in conjunction with a suitable seal/mating ring, and must be operated within the recommended performance limits in accordance with its designated use and the instructions set out in the manual.
5. If the pumped fluid is hazardous or toxic, appropriate precautions must be taken to ensure that any seal leakage is adequately contained. Further information on sealing hazardous or toxic fluids should be obtained from John Crane prior to seal installation.
6. PTFE and fluorocarbon components should never be burned or incinerated as the fumes are highly toxic. If fluorocarbons are accidentally heated above 750°F/400°C they can decompose and protective gloves must be worn when handling as hydrofluoric acid may be present.

Storage and transport

Instructions for the handling, packaging, storage and transport of seal units and seals/mating rings are given in the John Crane Instruction Sheet ref. 1-Storage-E, available on request

Checking the equipment

Successful operation and life of this seal is dependent on acceptable equipment dimensions, alignments and finishes. Before installation of the seal the following checks should be made with respect to the seal housing and the shaft, especially (where marked †) at the seal position. The usual equipment to measure these features would include a micrometer and dial indicator.

| | |
|--|--|
| Shaft/sleeve outside diameter † | Refer to dimensional data table |
| Seal chamber bore diameter | Refer to dimensional data table |
| Shaft/sleeve finish † | 0.3 to 0.6 µm Ra (polished) |
| Shaft/sleeve ovality/ out-of-roundness | <0.05 mm/0.002 in |
| Shaft end play/axial float | <0.08 mm/0.003 in F.I.M. |
| Shaft/sleeve lead-on | Refer to lead-on chamfer |
| Shaft/sleeve run-out † | <0.08 mm/0.003 in F.I.M. ≤ 1800 rpm <0.05 mm/0.002 in F.I.M. > 1800 rpm |
| Seal housing end face squareness to shaft/sleeve | Refer to housing squareness to shaft graph |
| Concentricity of the seal chamber† bore to the shaft/sleeve | < 0.15 mm / 0.006 in. F.I.M. |

NOTE

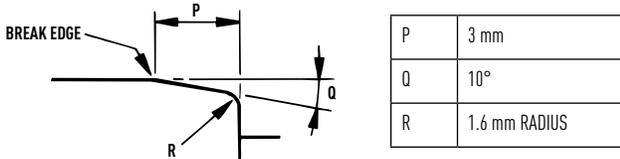
If the measured dimensions exceed the values given, correct the equipment to meet the specifications before installing the seal. If the seal is installed on a sleeve, the sleeve must be liquid- and pressure-light through its bore. The thickness of the gland plate must be sufficient to retain the service pressure without distortion.

MECHANICAL SEAL

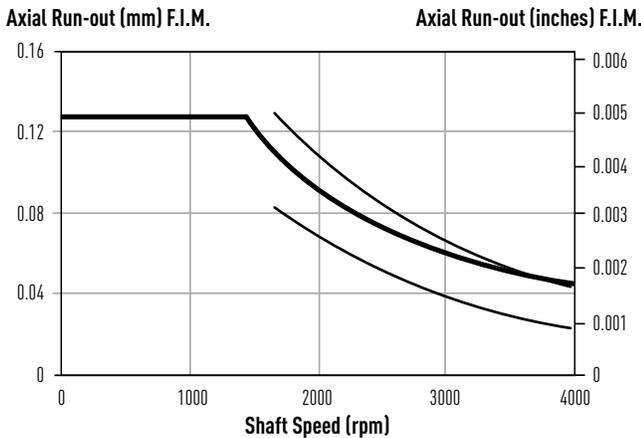
Installation, operation and maintenance instructions

LEAD-ON CHAMFER

For ease of installation, the lead-on edge of the shaft or sleeve should be chamfered as shown. Remove all sharp edges and set screw burrs that could damage the wedge during fitting.



HOUSING SQUARENESS TO SHAFT



Operating conditions

The Type 58U is a general duty, elastomer O-ring, multiple spring mechanical seal supplied in metric sizes for use in pumps and other rotary shaft equipment.

These instructions apply to the seal as installed in a pump and lubricated by the pumped fluid in accordance with the application information contained in the John Crane Seal Selection Manual, ref. R-SSM-E, or any other relevant approved John Crane seal selection literature or process. Typical operating limits are shown below.

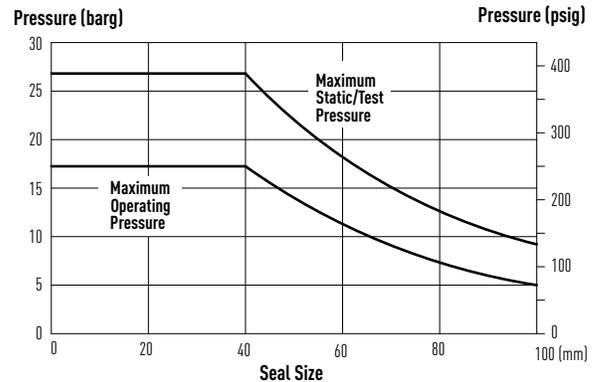
The selection of materials used in the construction of a seal should be made with regard to their temperature and chemical resistance/compatibility with the liquid being pumped.

Temperature limits: -40° to 500°F/-40° to 260°C
(Depending on the materials used)

Pressure limits: Operating: Up to 245 psig/17 barg
Hydrostatic: Up to 390 psig/27 barg
(Refer to Pressure/Velocity (PV) Limits graph)

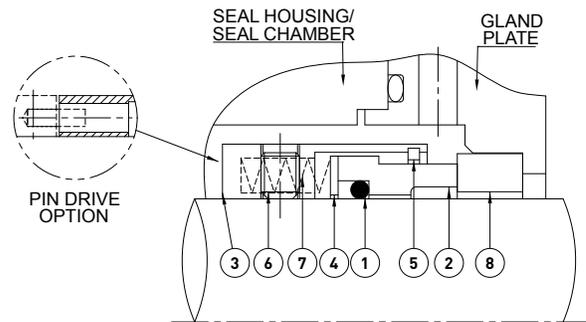
Speed limits: Up to 5,000 fpm/25 m/s

PRESSURE/VELOCITY (PV) LIMITS



The maximum operating pressures shown apply under the following conditions: carbon graphite face/primary ring running against a silicon carbide or tungsten carbide seat/mating ring at 1800 rpm, with a lubricating sealed fluid at 175°F/80°C.

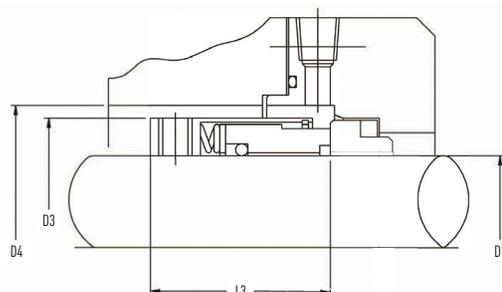
Typical seal arrangement



| Part name | | Part name | |
|-----------|-------------------|-----------|---------------------------------|
| 1 | O-ring | 5 | Snap ring |
| 2 | Face/primary ring | 6 | Set screw |
| 3 | Retainer | 7 | Spring |
| 4 | Thrust ring | 8 | Seat/mating ring and seat ring* |

*Refer to seat/mating ring instruction manual.

Seal installation dimensions



Dimensional data (mm)

| Seal size (mm) | Seal size code | D1 | D3 | D4 | L3 |
|----------------|----------------|-----|-----|-----|------|
| 14 | 0140 | 14 | 24 | 26 | 23.0 |
| 16 | 0160 | 16 | 26 | 28 | 23.0 |
| 18 | 0180 | 18 | 32 | 34 | 24.0 |
| 20 | 0200 | 20 | 34 | 36 | 24.0 |
| 22 | 0220 | 22 | 36 | 38 | 24.0 |
| 24 | 0240 | 24 | 38 | 40 | 26.7 |
| 25 | 0250 | 25 | 39 | 41 | 27.0 |
| 28 | 0280 | 28 | 42 | 44 | 30.0 |
| 30 | 0300 | 30 | 44 | 46 | 30.5 |
| 32 | 0320 | 32 | 46 | 48 | 30.5 |
| 33 | 0330 | 33 | 47 | 49 | 30.5 |
| 35 | 0350 | 35 | 49 | 51 | 30.5 |
| 38 | 0380 | 38 | 54 | 58 | 32.0 |
| 40 | 0400 | 40 | 56 | 60 | 32.0 |
| 43 | 0430 | 43 | 59 | 63 | 32.0 |
| 45 | 0450 | 45 | 61 | 65 | 32.0 |
| 48 | 0480 | 48 | 64 | 68 | 32.0 |
| 50 | 0500 | 50 | 66 | 70 | 34.0 |
| 53 | 0530 | 53 | 69 | 73 | 34.0 |
| 55 | 0550 | 55 | 71 | 75 | 34.0 |
| 58 | 0580 | 58 | 78 | 83 | 39.0 |
| 60 | 0600 | 60 | 80 | 85 | 39.0 |
| 63 | 0630 | 63 | 83 | 88 | 39.0 |
| 65 | 0650 | 65 | 85 | 90 | 39.0 |
| 68 | 0680 | 68 | 88 | 93 | 39.0 |
| 70 | 0700 | 70 | 90 | 95 | 45.5 |
| 75 | 0750 | 75 | 95 | 104 | 45.5 |
| 80 | 0800 | 80 | 104 | 109 | 45.0 |
| 85 | 0850 | 85 | 109 | 114 | 45.0 |
| 90 | 0900 | 90 | 114 | 119 | 50.0 |
| 95 | 0950 | 95 | 119 | 124 | 50.0 |
| 100 | 1000 | 100 | 124 | 129 | 50.0 |

Setting the seal

The seal must be installed to its correct working length L3, therefore it is essential that the back of the seal retainer is correctly positioned on the shaft. If the seal is to be pin-driven by an adjustable collar, it is the position of the ring or collar that must be verified. Setting procedure is described with respect to the shaft, but is equally applicable to a fitted sleeve.

ATTENTION If L3 is overlength, the seal will be undercompressed and will leak. If L3 is underlength, the seal will be overcompressed and this will cause dry-running and high wear of the seal faces.

Find the true seal position as follows:

1. Refer to the appropriate seat/mating ring instruction manual to obtain dimension "X" from the face of the gland plate to the seat mating surface (Figure 1).
2. With the shaft in its working position, mark the surface at "Y" in line with the seal housing end face and mark the shaft again at "Z" the obtained distance away from the face position (Figure 2). This second mark is a datum for the seal working length L3.
3. From the dimension table, find the dimension L3 for the size of the seal being fitted, and measure the distance back from position "Z" (Figure 3). The new marked position is the point on the shaft where the back of the seal is to be located.

FIGURE 1

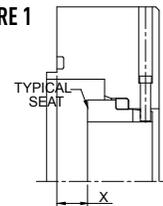


FIGURE 2

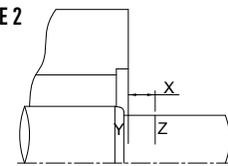
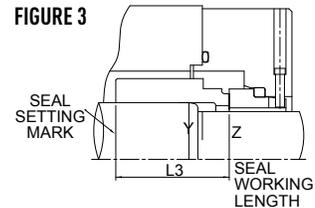


FIGURE 3



Installing the seal

Before starting the installation, read the following instructions carefully, both to be aware of special information, and because the fitting sequence may be different depending on the construction of the pump. The instructions assume fitting onto a plain shaft from the impeller end of a dismantled pump.

1. Remove the protective packaging from the seal, check for damage and wipe clean. Save package labels for future reference.
2. Fit the seal/mating ring into the gland plate as described in the seal instruction manual. Check that the gland plate O-ring or gasket is clean, undamaged and in place, and then position the gland plate on the shaft, clear of the seal location; avoid impact with the shaft.

NOTE Use a suitable lubricant when fitting the seal. The recommended lubricants for an elastomer O-ring are soft hand soap and water, glycerine, or silicone grease: do not use washing-up liquid, liquid soaps, or hand cleaning gels. Light mineral oil may be used with most elastomers.

ATTENTION Do not use hydrocarbon-based liquids on ethylene propylene elastomers.

3. Clean and sparingly lubricate the shaft.

NOTE As an alternative to the standard set screw drive, the seal may be driven by a pin set in a separate drive collar or abutment.

4. **Pin-driven seals:** Remove and discard all the set screws from the retainer. Fit the seal unit onto shaft to abut the drive collar, positively engaging the drive pin.

Set screw driven seals: Adjust the set screws until clear of the retainer bore. Fit the seal unit onto the shaft, and accurately align the back of the retainer with the seal setting mark. Lightly tighten the set screws to hold the seal in position, then continue to tighten the screws evenly and progressively to the torque recommended in the torque table.

ATTENTION Accurate torque settings will avoid set screw damage and eliminate seal movement in operation.

5. Wipe the lapped surfaces of the seal and seat/mating ring perfectly clean and dry. Install the seal housing; then locate the gland plate squarely on the fixing studs, and pull on the plate to compress the seal as necessary to fit the retaining nuts.

6. Recheck that the gland plate O-ring or gasket is in position, then tighten the nuts as advised by the pump instruction manual. Do not overtighten.

NOTE If the seal is visible after installation, a working length check can be made. The setting is correct if the rear surface of the thrust ring, as seen through the holes in the retainer, is lined up with the line cut in the retainer wall.

RECOMMENDED TORQUES FOR SET SCREWS

The values given below are the recommended maximum torques for stainless steel (001) cup point set screws.

| Seal size (mm) | Set screw size | Torque | |
|-----------------------|----------------|--------|----------|
| | | (Nm) | (lbf ft) |
| 14 to 16 M4 2 1.5 | 0140 | 14 | 24 |
| 18 to 35 M5 3 2.2 | 0160 | 16 | 26 |
| 38 to 55 M8 11 8.1 | 0180 | 18 | 32 |
| 58 to 100 M10 16 12.0 | 0200 | 20 | 34 |

Maintenance

During operation, periodic inspection of the seal should be carried out. A measure of seal condition is the level of leakage, and as no maintenance is possible while installed, the seal should be replaced when leakage becomes unacceptable. It is recommended that a spare seal unit and seat/mating ring are held in stock to allow immediate replacement of a removed seal.

Before commissioning the equipment

1. Check that the gland plate nuts are securely tightened.
2. Complete the assembly of the pump, and turn the shaft (by hand, if possible) to ensure free rotation.
3. Connect the suction and discharge pipework, and then check the pump/driver shaft alignment at the coupling before connection.
4. Consult all available equipment instruction manuals to check for correctness of all auxiliary piping and connections, particularly 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 that the heat energy it creates is adequately removed, and therefore the following check should be carried out, not only after seal installation, but also following a period of pump shutdown.

5. Check that the seal chamber fluid lines are open and free of any obstruction, and ensure that the seal chamber is filled with fluid and fully vented.

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 a much shortened seal life.

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 that fluid is often trapped during draining and may be present inside the seal chamber. The pump instruction manual should be consulted to check for any special precautions.

2. Ensure that the pump is isolated by the appropriate valves. Check that the fluid is drained and pressure fully released.



TYPE 58U

MECHANICAL SEAL

Installation, operation and maintenance instructions

Removing the seal

NOTE Dismantle with care; some seal components may be suitable for reconditioning after duty, if otherwise undamaged.

1. Referring to the pump instruction manual, dismantle the equipment sufficiently to expose the gland plate and seal housing.
2. Evenly slacken and remove the gland plate nuts, and carefully slide the plate off the studs to rest on the shaft.
3. Remove the seal housing, clean and oil the shaft, and then complete the removal of the seal and the gland plate assembly, in the reverse order to installation.

NOTE Although the original seal position may be marked on the shaft as a reference point before seal removal, the location must be checked even if the same seal and seat/mating ring specification is intended as a replacement

A seal unit should always be serviced after removal from duty. It is recommended that used seals are returned to the John Crane Service Center, since rebuilding to as-new specification 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.



North America
United States of America
Tel: 1-847-967-2400

Europe
United Kingdom
Tel: 44-1753-224000

Latin America
Brazil
Tel: 55-11-3371-2500

Middle East & Africa
United Arab Emirates
Tel: 971-481-27800

Asia Pacific
Singapore
Tel: 65-6518-1800

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