



I-32-E

John Crane Type 32 Mechanical Seal Instruction Manual

Foreword

This instruction manual is 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 single seal running against a seat/mating ring of appropriate material and design as used in rotating equipment; 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 manual supplied with the seat/mating ring and the instruction manuals for both the vessel 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 the Company for information as to exclusive product warranty and limitations of liability.

If questions or problems arise, contact your local John Crane Sales/Service Engineer or the original equipment manufacturer, as appropriate.

ATTENTION John Crane mechanical seals and seats/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 seat/mating ring, and must be operated within the recommended performance limits in accordance with its designated use and the instructions set out in this manual.

5. If the vessel 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 installation.

6. PTFE and fluorocarbon components should never be burned or incinerated as the fumes are highly toxic. If fluorocarbons are accidentally heated above 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 seats/mating rings are given in the John Crane Instruction Sheet ref. I-Storage-E, available on request.

Operating Conditions

The Type 32 is an elastomer O-ring, multiple spring, hydraulically balanced, dry running seal supplied in metric and inch sizes for outside mounting.

These instructions apply to the seal as installed in a top entry mixer, agitator, or reactor vessel, in accordance with the application information contained in the John Crane Seal Specification Sheet ref. S-32-E, and any John Crane seal selection literature or process. Typical operating limits are shown below.

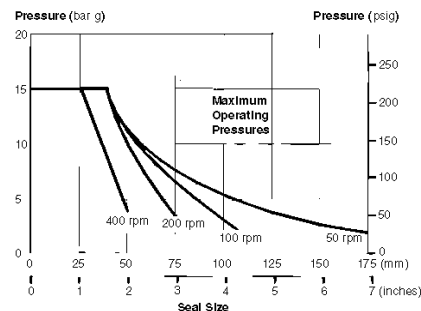
The selection of materials used in the construction of a seal should be made with regard to their temperature and chemical resistance/compatibility with the product.

Temperature Limits: -45°C to +150°C / -50°F to +300°F depending on the materials used

Pressure Limits: Full vacuum to 15 bar g / 225 psig (refer to PV graph)

Speed Limits: Up to 2 m/s / 400 fpm

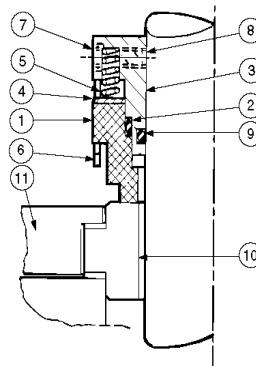
Type 32 Pressure/Velocity (PV) Limits



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, with the sealed fluid at 80°C / 175°F.

Maximum static/test pressures should be taken as the relevant maximum operating pressure multiplied by a factor of 1.5.

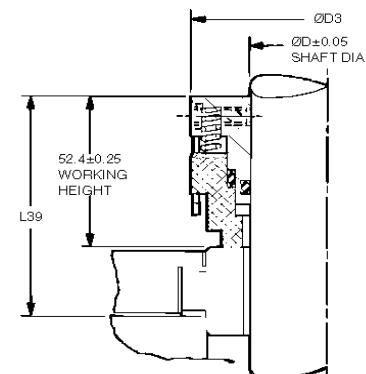
Typical Type 32 Seal Arrangement



Part Name	
1	Face/Primary Ring
2	O-Ring
3	Retainer
4	Thrust Ring
5	Spring
6	T-Bar
7	Cap Head Screw
8	Set Screw
9	O-Ring
10	Seat/Mating Ring and Gaskets*
11	Gland Plate

*Refer to seat/mating ring instruction manual

Type 32 Seal Installation Dimensions



Metric Range Dimensional Data (mm)

Seal Size (mm)	Seal Size Code	D	D3	L39
25	0250	25	63.5	†
28	0280	28	66.7	†
30	0300	30	69.9	†
32	0320	32	69.9	†
33	0330	33	73.0	†
35	0350	35	73.0	†
38	0380	38	76.2	†
40	0400	40	79.4	72.9
43	0430	43	82.6	73.0
45	0450	45	85.7	73.0
50	0500	50	88.9	77.8
53	0530	53	92.1	77.8
55	0550	55	95.3	78.4
58	0580	58	98.4	77.8
60	0600	60	98.4	77.8
63	0630	63	101.6	77.8
65	0650	65	104.8	78.4
68	0680	68	108.0	77.8
70	0700	70	108.0	77.8
75	0750	75	114.3	77.8

Metric Range Dimensional Data (mm) (Cont.)

Seal Size (mm)	Seal Size Code	D	D3	L39
80	0800	80	120.7	77.8
85	0850	85	123.8	77.8
90	0900	90	130.2	78.4
95	0950	95	133.4	77.8
100	1000	100	139.7	80.4
105	1050	105	142.9	77.8
110	1100	110	149.2	77.8
115	1150	115	155.6	79.4
120	1200	120	158.8	79.4
125	1250	125	165.1	79.4
130	1300	130	168.3	79.4
135	1350	135	174.6	79.4
140	1400	140	181.0	79.4
145	1450	145	184.2	79.4
150	1500	150	190.5	79.4
155	1550	155	193.7	79.4
160	1600	160	200.0	79.4
165	1650	165	203.2	79.4
170	1700	170	209.6	79.4
175	1750	175	215.9	†

Inch Range Dimensional Data (mm)

Seal Size (inches)	Seal Size Code	D	D3	L39
1.000	0254	25.40	63.5	†
1.125	0285	28.58	66.7	†
1.250	0317	31.75	69.9	†
1.375	0349	34.93	73.0	†
1.500	0381	38.10	76.2	†
1.625	0412	41.28	79.4	72.9
1.750	0444	44.45	82.6	73.0
1.875	0476	47.63	85.7	73.0
2.000	0508	50.80	88.9	77.8
2.125	0539	53.98	92.1	77.8
2.250	0571	57.15	95.3	78.4
2.375	0603	60.33	98.4	77.8
2.500	0635	63.50	101.6	77.8
2.625	0666	66.68	104.8	78.4
2.750	0698	69.85	108.0	77.8
2.875	0730	73.03	111.1	77.8
3.000	0762	76.20	114.3	77.8
3.125	0793	79.38	117.5	77.8
3.250	0825	82.55	120.7	77.8
3.375	0857	85.73	123.8	77.8

Inch Range Dimensional Data (mm) (Cont.)

Seal Size (inches)	Seal Size Code	D	D3	L39
3.500	0889	88.90	127.0	77.8
3.625	0920	92.08	130.2	78.4
3.750	0952	95.25	133.4	77.8
3.875	0984	98.43	136.5	77.8
4.000	1016	101.60	139.7	80.4
4.125	1047	104.78	142.9	77.8
4.250	1079	107.95	146.1	77.8
4.375	1111	111.13	149.2	77.8
4.500	1143	114.30	152.4	79.4
4.625	1174	117.48	155.6	79.4
4.750	1206	120.65	158.8	79.4
4.875	1238	123.83	161.9	79.4
5.000	1270	127.00	165.1	79.4
5.125	1301	130.18	168.3	79.4
5.250	1333	133.35	171.5	79.4
5.375	1365	136.53	174.6	79.4
5.500	1397	139.70	177.8	79.4
5.625	1428	142.88	181.0	79.4
5.750	1460	146.05	184.2	79.4
5.875	1492	149.23	187.3	79.4

Inch Range Dimensional Data (mm) (Cont.)

Seal Size (inches)	Seal Size Code	D	D3	L39
6.000	1524	152.40	190.5	79.4
6.125	1555	155.58	193.7	79.4
6.250	1587	158.75	196.9	79.4
6.375	1619	161.93	200.0	79.4
6.500	1651	165.10	203.2	79.4
6.625	1682	168.28	206.4	79.4
6.750	1714	171.45	209.6	79.4
6.875	1746	174.63	212.7	†
7.000	1778	177.80	215.9	†

† For these dimensions contact your John Crane Sales/Service Engineer

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Checking the Equipment

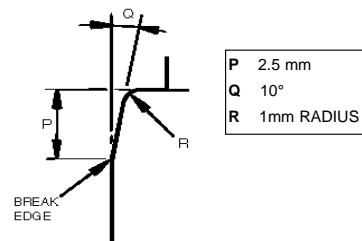
Successful operation and life of this seal is dependent on acceptable equipment dimensions, alignments, and finishes. Before installation of the seal, the following checks should be made with respect to the seal housing and the shaft, especially (where marked †) at the seal position. The usual equipment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

Shaft/Sleeve Outside Diameter †	Refer to Dimension Tables
Shaft/Sleeve Finish †	0.2 to 1.2 µm Ra
Shaft/Sleeve Ovality/Out-of-Roundness †	< 0.05 mm / 0.002 in.
Shaft End Play/Axial Float	± 1.60 mm / 0.063 in.
Shaft/Sleeve Run-Out †	< 3.81 mm / 0.150 in. F.I.M.
Shaft/Sleeve Lead-On	Refer to Lead-On Chamfer
Seal Housing End Face Squareness to Shaft/Sleeve	< 0.80 mm / 0.031 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-tight through its bore. The thickness of the gland plate must be sufficient to retain the service pressure without distortion.

Lead-On Chamfer

For ease of installation, the lead-on edge of the shaft or sleeve should be chamfered as shown.



Setting the Seal

The seal must be installed to its correct working height within the tolerance allowed - refer to the installation dimension diagram. The procedure is the same for a shaft and a fitted sleeve.

ATTENTION If the working height is exceeded, the seal will be undercompressed and may leak: If the working height is reduced, the seal will be overcompressed and this may cause high wear of the seal faces.

1. Find the true seal position as follows:

a) **Before the installation of the seat/mating ring.** From the dimension tables find the dimension L39 for the size of seal being fitted, and measure this distance from the seal housing/vessel face and mark the shaft; or,

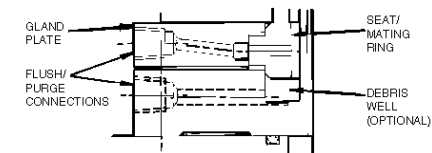
b) **After installation of the seat/mating ring.** Using the standard working height dimension, measure this distance from the face of the seat/mating ring and mark the shaft.

The marked position is the point on the shaft where the back of the seal is to be located.

Debris Well Option

Where the process liquid or gas must be protected from contamination by face wear particles, a debris well is available as an option. In conjunction with the gland plate and seat/mating ring, the debris well forms a cavity to isolate and contain face debris; tapped connections allow flushing of the cavity during the cleaning cycle.

The debris well is secured by the gland plate, and is therefore installed as part of the seat/mating ring installation sequence - refer to the equipment and seal instruction manuals. Note that the inclusion of a debris well will affect seal setting procedure 1a.



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 vessel.

1. Remove the protective packaging from the seal; check for damage, and wipe clean.
2. Fit the seat/mating ring and the gland plate as described in the seal instruction manual. Incorporate the debris well at this stage, if required.

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.
4. Wipe the lapped surfaces of the seal and seat/mating ring perfectly clean.

ATTENTION Particular care should be taken when passing the seal over shaft shoulders to avoid impact and consequent damage to the stepped bore of the seal face/primary ring.

5. Adjust the set screws until clear of the retainer bore. Slide the seal unit onto the shaft until the seal face rests on the seat/mating ring; then compress the seal until the back of the retainer is in line with the seal setting mark, and, using the Allen key provided, tighten the set screws sufficiently to hold the seal in the setting position. Check that the seal is accurately positioned, 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.

Recommended Torques for Set Screws

Seal Size Code	Set Screw Size	Torque	
		Nm	lbf ft
0250 to 0857	1/4 - 20 UNC	6	4.5
0889 to 1778	5/16 - 24 UNC	12	9.0

The torque values given above are for stainless steel (001) cup point set screws.

Before Commissioning the Equipment

1. Check the unit at the coupling for correct alignment of the motor or driver.
2. Complete the assembly of the equipment, and turn the shaft (by hand, if possible) to ensure free rotation.

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.

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 that fluid is often trapped during draining and may be present inside the seal unit. 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 product is drained and pressure fully released.

Removing the Seal

1. Referring to the vessel instruction manual, dismantle the equipment sufficiently to expose the seal.
2. Remove the seal, and then, if necessary, complete the removal of the gland plate and seat/mating ring in the reverse order to installation.

NOTE: Although the original seal position may be marked on the shaft or sleeve 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 a John Crane Service Centre, 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.

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If the products featured will be used in a potentially dangerous and/or hazardous process, your John Crane representative should be consulted prior to their selection and use. In the interest of continuous development, John Crane Companies reserve the right to alter designs and specifications without prior notice.

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