

O-RING PUSHER SEAL

Installation, Operation & Maintenance Instructions

1. Foreword

This instruction manual contains standard, generic data and should be used with the seal family installation instructions. These instructions must be read and applied whenever work is done on the seal and must be kept available for future reference.

These instructions are for the installation and operation of a seal as used in rotating machines and will help to avoid danger and increase reliability. Before use with other types of machines John Crane should be consulted. These instructions must be read in conjunction with the instruction manuals for both the machine and any ancillary equipment.

If the seal is to be used for an application other than that originally intended or outside its 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 arise, contact your local John Crane Sales/Service Engineer or the original equipment manufacturer, as appropriate. John Crane mechanical seal are precision products and must be handled appropriately. Take particular care to avoid damage to lapped sealing faces

2. Safety

1. The following symbols are used to highlight instructions of particular importance

NOTE Refers to special information on how to install or operate the seal most efficiently

ATTENTION Special instructions or information to avoid damage to the seal or its surroundings



Danger Mandatory instructions designed to prevent personal injury or extensive damage.



Environmental Note

2. Installation, removal and maintenance of the seal must only be carried out 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 be used in technically perfect condition and must be operated within the recommended performance limits and in accordance with its designated use set out in this manual.
5. If the process fluid is hazardous or toxic, appropriate precautions must be taken to ensure that any seal emissions are adequately contained. Further information on sealing hazardous or toxic fluids should be obtained from John Crane prior to seal installation.

6. Fluorocarbon components should never be burned or incinerated, as the fumes and residues are highly toxic. If fluorocarbons are heated above 400°C/750°F they can decompose, therefore, personal protective equipment (PPE) should be worn as hydrofluoric acid may be present.

7. PTFE components should never be burned or incinerated as the fumes are highly toxic. It is dangerous to smoke while handling products made from PTFE.

Follow the relevant local guidelines for the safe and proper environmental disposal of assembly lubricants, supplied fluids and scrapped components.

3. Hazardous Environments

ATTENTION Every working practice which compromises safety must be avoided.

In the event of an operating problem the machine must be switched off immediately and made safe! Problems must be solved promptly.

Minor emissions will occur during normal seal operation. Depending on the duty, this emission can appear as a gas, a liquid or a solid. For emissions that are hazardous or toxic and a safe collection system is required.

Hot surfaces have to be protected against accidental contact.

In order to avoid unforeseen hazards do not make unauthorised changes to the sealed fluid, the specific duty or the seal parts.

Some mechanical seals are used in conjunction with an ancillary support system; this is clarified either by the flush plan description on the seal arrangement drawing or by contacting John Crane (also see Section 11). It is important for the safe function of the seal that the support system is assembled and incorporated into the machine before operation. This manual should be read in conjunction with the appropriate documentation for auxiliary systems and rotating machinery.

ATTENTION Alarm systems are often included in the ancillary support system and the operator must ensure appropriate action is taken promptly in the event of an alarm.

Maintenance with steel tools must be avoided in the presence of substances classed as explosive group IIc according to EN 60079-0:2012+A11:2013.

If the machine is being used in a EN 60079-0:2012+A11:2013 Zone 21 or 22, regular cleaning of dust from exterior surfaces is required.

O-RING PUSHER SEAL

Installation, Operation & Maintenance Instructions

4. Declaration of Incorporation (2006/42/EC)

For each standard product supplied into the EU a Technical File is required and a Technical Record Sheet, satisfying the needs of 2006/42/EC. When requested, a Declaration of Incorporation (for which a Technical File exists) will be raised and signed by a John Crane appointed representative.

5. Transportation and Storage

Transport and store the seal in its original packaging. To ensure seals remain in good condition they should be stored in the following environment:

1. Dry and dust-free
2. Ventilated at room temperature
3. Protected from direct effects of heat and ultraviolet light
4. All the elastomers used in the mechanical seal have a minimum shelf life of 5 years except for butyl rubber which has a minimum shelf life of 2 years. We recommend that the elastomers be replaced at these intervals. It is also recommended that the elastomer replacement be carried out by John Crane personnel.

If used seal parts are to be shipped they must be cleaned and decontaminated before shipping. It is the responsibility of the machine user to ensure that any parts being shipped have appropriate safe-handling instructions externally attached to the package. Without this information there will be a refusal to handle the goods. If required a decontamination/transportation certificate is available from John Crane. Refer to document EDS1001.

For additional information on transportation and storage, contact your local John Crane facility and request a copy of document I-Storage.

If any machine with an installed component seal has been stored with preservatives, before putting it back into operation the seal must be removed, cleaned and dried. Particular attention must be applied to the cleanliness of the faces and condition of the elastomers. For an installed cartridge seal we recommend returning the complete cartridge to John Crane for cleaning.

ATTENTION Ensure preservatives and cleaning agents do not affect the elastomers.

ATTENTION Once the seal is fitted on the machine and the position is set using setting devices do not re-engage them for transportation and storage.

6. Seal Installation

Refer to the appropriate seal family installation instructions.

Do not excessively compress the seal before or during installation.

7. Before Starting the Machine

1. Check the machine at the coupling for proper alignment of the driver.
2. Ensure that the gland plate nuts/bolts are securely tightened according to the machine manual instructions and that all screws are securely fastened.
3. Assemble the machine, ensure any setting spacers are removed from the seal and turn the shaft (by hand if possible) to ensure free rotation.
4. Consult all available machine instruction manuals to check for correctness of all piping and connections, particularly regarding seal recirculation, heating or cooling requirements and services external to the seal. See Section 11. Ensure all unused ports are correctly plugged.

ATTENTION Mechanical seals are normally designed to operate in a liquid so that the heat energy they create is adequately removed. Therefore, the following check should be carried out not only after seal installation but also after any period of machine inactivity.

5. Check that the seal chamber pipe work is open and free of any obstruction, and for liquid lubricated seals ensure that the seal chamber is properly vented and filled with liquid - refer to the machine instruction manual. See also Section 11.

ATTENTION Except for dry running or gas lubricated seals which are designed to operate without liquid, wet seals that are operated without adequate liquid lubrication will often give rise to a squealing noise from the seal area and result in overheating and scoring or 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 machine, seal, coupling or driver.

ATTENTION Seal installation should be handled only by qualified personnel. If questions arise, contact the 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 John Crane for information as to exclusive product warranty and limitations of liability.

O-RING PUSHER SEAL

Installation, Operation & Maintenance Instructions

8. Maintenance

For each standard product supplied into the EU a Technical File is required and a Technical Record Sheet, satisfying the needs of 2006/42/EC. When requested, a Declaration of Incorporation (for which a Technical File exists) will be raised and signed by a John Crane appointed representative.

5. Transportation and Storage

During operation, periodic visual external inspection of the seal should be carried out. A measure of seal condition is the level of emission of the process or barrier fluid and as no maintenance is possible while installed, the seal should be replaced when emissions become unacceptable. It is recommended that a spare seal be held in inventory to allow immediate replacement of a removed seal.

ATTENTION: Machine adjustments that involve axial movement of the shaft may cause damage to the seal while installed. Before attempting impeller clearance adjustment with a cartridge seal, refit the spacers then loosen all the drive collar socket set screws. With the shaft in its new working position, tighten with new socket set screws and remove the spacers. Keep the spacers for future use.

For a component seal (non-cartridge), remove the seal, adjust the impeller clearance then re-fit the seal at its correct working length.

DECOMMISSIONING THE MACHINE

1. Ensure that the machine is made safe to work on by using a secured isolation under the sole control of the person(s) working on the machine and which includes the following:
 - the driver is fully isolated from the machine using an appropriate secured isolation method;
 - any pressure is safely and fully released;
 - any liquid is safely drained;
 - any gas safely vented;
 - any chemicals are safely and fully removed;
 - any other energy storage is safely and fully released;
 - the isolation is proved to be effective at the point of work before work is commenced.



If the machine has been used on toxic or hazardous fluids, ensure that the machine 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 machine instruction manual should be consulted to check for any special precautions.



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 machine, seal, coupling or driver.

REMOVING THE SEAL

NOTE: Remove from the machine with care, the seal may be suitable for reconditioning after service, if otherwise undamaged.

1. Referring to the machine instruction manual, dismantle the machine sufficiently to expose the seal and the seal housing.

ATTENTION: For a cartridge seal, the setting spacers must be refitted before starting the removal procedure.

2. Deburr, clean and lubricate the shaft over which the seal will pass and remove the seal unit in the reverse order to installation.

A mechanical seal must always be serviced after removal from the machine. In order to maximise reliability and minimise safety risks, it is strongly recommended that used seals are returned to John Crane for rebuilding to as-new specification (essential for non-contacting gas seals). Alternatively ask for John Crane service personnel to visit site. For seal dismantling and assembly instructions, refer to John Crane. See "Transportation and Storage" section regarding shipping.

NOTE: It is recommended that a low pressure integrity test is carried out after repair and before installation on the machine.

SPARE PARTS

Only John Crane spare parts should be used to recondition seals.

It is advisable to stock on site sufficient spare seal cartridges or the replacement parts shown on the installation drawing or as advised by John Crane to allow immediate replacement of the seal in the machine. The order codes for spare parts can be found in the parts list on the installation drawing or from John Crane directly. In the case of non-contacting gas seals, only complete cartridges should be stored.

The following data is necessary for spare part orders:

Part number; Quantity

O-RING PUSHER SEAL

Installation, Operation & Maintenance Instructions

8. Maintenance

During operation, periodic visual external inspection of the seal should be carried out. A measure of seal condition is the level of emission of the process or barrier fluid and as no maintenance is possible while installed, the seal should be replaced when emissions become unacceptable. It is recommended that a spare seal be held in inventory to allow immediate replacement of a removed seal.

ATTENTION: Machine adjustments that involve axial movement of the shaft may cause damage to the seal while installed. Before attempting impeller clearance adjustment with a cartridge seal, refit the spacers then loosen all the drive collar socket set screws. With the shaft in its new working position, tighten with new socket set screws and remove the spacers. Keep the spacers for future use.

For a component seal (non-cartridge), remove the seal, adjust the impeller clearance then re-fit the seal at its correct working length.

DECOMMISSIONING THE MACHINE

1. Ensure that the machine is made safe to work on by using a secured isolation under the sole control of the person(s) working on the machine and which includes the following:
 - the driver is fully isolated from the machine using an appropriate secured isolation method;
 - any pressure is safely and fully released;
 - any liquid is safely drained;
 - any gas safely vented;
 - any chemicals are safely and fully removed;
 - any other energy storage is safely and fully released;
 - the isolation is proved to be effective at the point of work before work is commenced.



If the machine has been used on toxic or hazardous fluids, ensure that the machine 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 machine instruction manual should be consulted to check for any special precautions.

REMOVING THE SEAL

NOTE: Remove from the machine with care, the seal may be suitable for reconditioning after service, if otherwise undamaged.

1. Referring to the machine instruction manual, dismantle the machine sufficiently to expose the seal and the seal housing.

ATTENTION: For a cartridge seal, the setting spacers must be refitted before starting the removal procedure.

2. Deburr, clean and lubricate the shaft over which the seal will pass and remove the seal unit in the reverse order to installation.

A mechanical seal must always be serviced after removal from the machine. In order to maximise reliability and minimise safety risks, it is strongly recommended that used seals are returned to John Crane for rebuilding to as-new specification (essential for non-contacting gas seals). Alternatively ask for John Crane service personnel to visit site. For seal dismantling and assembly instructions, refer to John Crane. See "Transportation and Storage" section regarding shipping.

NOTE: It is recommended that a low pressure integrity test is carried out after repair and before installation on the machine.

SPARE PARTS

Only John Crane spare parts should be used to recondition seals.

It is advisable to stock on site sufficient spare seal cartridges or the replacement parts shown on the installation drawing or as advised by John Crane to allow immediate replacement of the seal in the machine. The order codes for spare parts can be found in the parts list on the installation drawing or from John Crane directly. In the case of non-contacting gas seals, only complete cartridges should be stored.

The following data is necessary for spare part orders:

Part number; Quantity

9. Environmental aspects

COMPANY POLICY EXTRACT

"It is the policy of John Crane to manage its business activities in an environmentally responsible manner, comply with all relevant laws and regulations, prevent pollution, and continually improve its environmental performance, certification to the latest issue of ISO 14001 ensures compliance."

John Crane adopts the 'Design For the Environment' (DFE) principle in making this product. Using this product will benefit the environment directly by:

- Preserving valuable material resources through recycling of raw materials, the use of environmentally friendly packaging materials, the re-use of these high quality durable seals due to their ability to be refurbished and minimised transportation using world wide manufacturing and service centres .
- Reducing waste of precious resources through decreasing the risk of leakage
- Reducing energy consumption through seal selection using total life costs
- Preventing pollution through controlling harmful emissions to the atmosphere

RECYCLING PRODUCT REFURBISHMENT

This product has been designed for potential reuse. Depending on its post operation condition the seal may be repaired or rebuilt for further use. The metal components can generally be reused. The primary & mating rings may be re-lapped and reused. Drive screws and springs are replaced. O-rings must be replaced. Please consult John Crane for assessment of seal condition and its potential reconditioning.

DISPOSAL

When the product is considered to be beyond economical repair and potential reuse, it should be disposed of by environmentally beneficial means. The product can be disassembled with ease but appropriate personal protective equipment (PPE) should be worn to prevent contact with any harmful residue that may be inside the seal.

SCRAPPED COMPONENTS

These should be handled with extra care due to possible contamination. They should be recycled through approved local industrial recycling plants.

SPECIAL MATERIALS

Follow the local relevant guidelines for the environmentally friendly disposal of assembly lubricants, supplied fluids and scrapped components. Please refer to Section 2, Safety.

PACKAGING

All packaging materials used are made from recyclable, environmentally friendly materials. When in doubt or for further information and advice on this subject, please consult John Crane.

10. Quality assurance

This seal has been assembled in accordance with John Crane Quality Assurance Standards and with proper machine maintenance and use will give safe and reliable operation to the maximum recommended performance as shown in any relevant approved John Crane publication.

11. Mechanical seal piping plans

To create the optimum environment for the mechanical seal it is usually necessary to add piping and sometimes extra equipment.

For advice on a specific application please contact John Crane.

For liquid lubricated seals, venting of air trapped around the seal faces is essential for correct seal operation. For horizontal machines the best method of automatically achieving this is a piping connection at top dead centre (TDC). For vertical machines a piping connection above the seal faces is required.

12. Website

These instructions and other seal information can be found at www.johncrane.com

FITTING LUBRICANTS

Elastomers & PTFE	Lubricant
General Applications	Soft hand soap/water solution, glycerine (glycerol)
Food, Pharmaceutical or similar	Consult machine manufacturer
Pump Gas Seals	DuPont Krytox GPL 206

NOTE:

Always use a lubricant that is compatible with the machine and any ancillary machine and sealed product. Use lubricant sparingly.

O-RING PUSHER SEAL

Installation, Operation & Maintenance Instructions

Introduction

This document covers fitting of the mechanical seal to rotating machinery and should be kept for future reference. It should be used with the Generic Seal Instruction Manual IOMGEN/Eng (download from www.johncrane.com) and any Instruction Manuals supplied with the rotating equipment and any ancillary machinery.

The mechanical seal contains precision lapped components which have been designed to minimise process fluid emission when selected, fitted and used correctly.



If the process fluid is toxic or hazardous, appropriate precautions must be taken to contain any emission.



Never burn any of the rubber or plastic parts of the mechanical seal. Toxic fumes may be generated.

ATTENTION

The machine operation conditions must not exceed the published operating limits of the mechanical seal.

ATTENTION

Take care when handling the mechanical seal as it contains precision lapped parts.

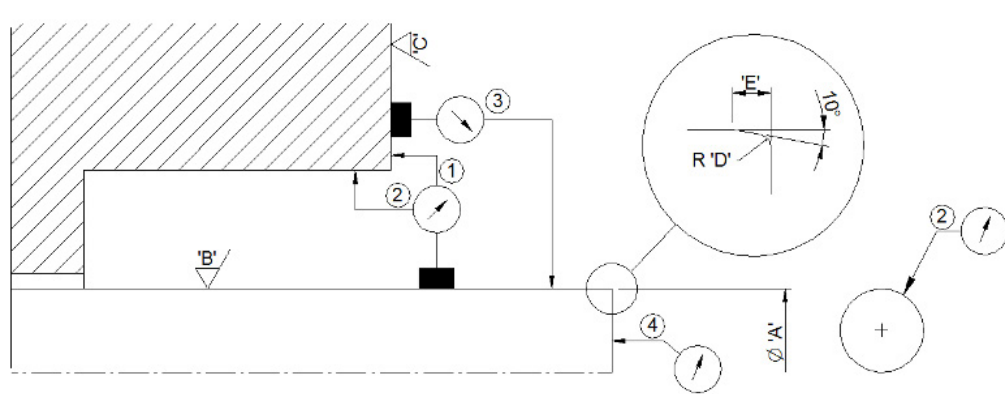
NOTE

Operating limits and all dimensions can be found at: www.johncrane.com

The operating limits will depend on the materials used.

Checking the machine

FIGURE 1



Shaft Seal Size

A. +0.00/-0.05 mm
+0.000/-0.002 in

B. 0.2 - 0.5 µm Ra
8 - 20 µin Ra

C. 1.6 µm Ra
63 µin Ra

D. 1 mm / 0.040 in

E. 1.5 mm / 0.060 in

1	2	3	4
Squareness of shaft to seal chamber face	Concentricity seal chamber bore to shaft	Shaft runout	Shaft end of play
0.08mm FIM	0.13mm FIM	0.05 mm FIM	0.13 mm FIM
0.03 in FIM	0.005 inch FIM	0.002 inch FIM	0.005 inch FIM



TYPE 28SCB, 28SC, 28LD

7

O-RING PUSHER SEAL

Installation, Operation & Maintenance Instructions

Tightening torque

Socket set screws. All dimensions in mm				
Tightening torques (μ 0.125 lubricated)				
Thread size	Size code	Socket setscrew (ASTM A453-Gr 660C)	Socket setscrew 316	Socket setscrew (high tensile steel 14.9)
		0649	0550	0236
		Nm	Nm	Nm
M4	61040700000	-	1.5	2.3
M5	61050800000	-	3	4.5
M6	61061000000	6	4	7.5
M8	61081250000	15	11	18
M10	61101500000	30	16	36
M12	61121750000	50	40	60
01/04-20	11252000000	6	7.91	9.83
5/16-18	11311800000	-	14.69	18.64
03/08-16	11371600000	-	25.99	32.77
7/16-14	11431400000	-	31.64	48.58
01/02-13	11501300000	-	56.49	70.05

Socket Set Screws. All dimensions in inches				
Tightening torques (μ 0.125 lubricated)				
Thread size	Size code	Socket setscrew (ASTM A453-Gr 660C)	Socket setscrew 316	Socket setscrew (high tensile steel 14.9)
		0649	0550	0236
		Nm	Nm	Nm
M4	61040700000	-	1.1	1.7
M5	61050800000	-	2.2	3.3
M6	61061000000	4.4	3	5.5
M8	61081250000	11.1	8.1	13.3
M10	61101500000	22.1	11.8	26.6
M12	61121750000	36.9	29.5	44.3
01/04-20	11252000000	4.4	5.83	7.25
5/16-18	11311800000	-	10.83	13.75
03/08-16	11371600000	-	19.17	24.17
7/16-14	11431400000	-	23.33	35.83
01/02-13	11501300000	-	41.67	51.67

O-RING PUSHER SEAL

Installation, Operation & Maintenance Instructions

Installation Instructions

Before installing the mechanical seal read the instructions carefully. Keep for future use. Seal installation must only be carried out by a suitably qualified person.

1. Check machine as shown in Fig 1.
2. Check that machine is clean.
3. Unpack seal, inspect for damage, wipe clean.
4. To install the seal at its correct working height, refer to relevant seal illustration as shown on Figures 10-12 Typical Arrangement/Dimensional Data.
5. Obtain dimension 'X' from seal chamber face to mating ring. Use published data (layout drawing) or measurement.
6. With machine shaft or sleeve locked in its correct position, mark line 'Y' on shaft or sleeve in line with seal chamber face.
7. Mark shaft or sleeve with second line 'Z' a distance 'X' from line at 'Y'.
8. Obtain working length 'L3' and for a balanced seal the 'L65' dimension for seal type and size from Figures 10-12 Typical Arrangement/Dimensional Data.
9. Mark shaft or sleeve with line 'V' a distance 'L3' from line 'Z'.
10. For a balanced seal ensure shaft or sleeve shoulder position 'L65' is correct.
11. Lubricate shaft or sleeve with a recommended lubricant. See lubricant table for Pump Gas Seals in IOMGEN/Eng.
12. Slide seal onto shaft or sleeve until back of seal is level with line 'V'. Tighten socket set screws evenly to torque shown in Table 1. If seal is pin driven, discard socket set screws and engage pin in correct retainer holes.
13. Lubricate supplied mating ring O-Ring with a recommended lubricant. See lubricant table for Pump Gas Seals in IOMGEN/Eng. Carefully fit mating ring into gland plate.
14. Clean sealing surfaces of the primary ring and mating ring.
15. Fit gland plate and evenly tighten fasteners to the torque recommended by machine manufacturer.
16. If possible, turn machine shaft by hand to ensure free rotation with no shaft binding.
17. Complete the required piping to the seal. See Figures 5-7 for guidance. Do not use excessive sealant or PTFE tape when making pipework connections. Unused tapped connections must be safely plugged before seal operation.
18. Ensure machine seal chamber and seal gland plate are safely vented before starting the machine. This should be achieved through self-venting pipework.
19. Once fitted, no adjustment is possible during the life of the mechanical seal.

When the mechanical seal requires replacement, John Crane can supply a new or reconditioned seal to the original specification.

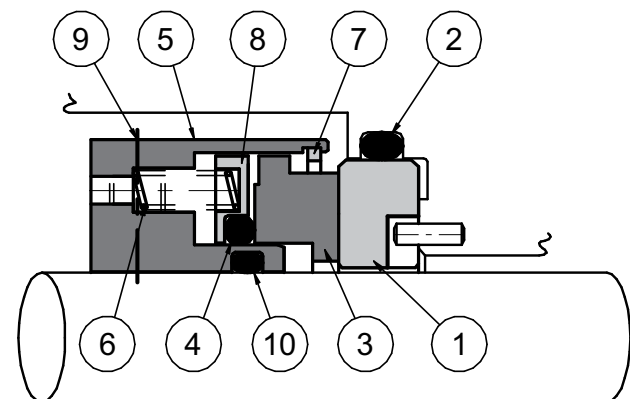
Note: The following installation instructions refer to single seal installed as a non-cartridge. If seal is used as an outboard seal in a dual cartridge arrangement please refer to the corresponding Installation Instructions.

O-RING PUSHER SEAL

Installation, Operation & Maintenance Instructions

Typical Type 28SCB seal cross section

FIGURE 2

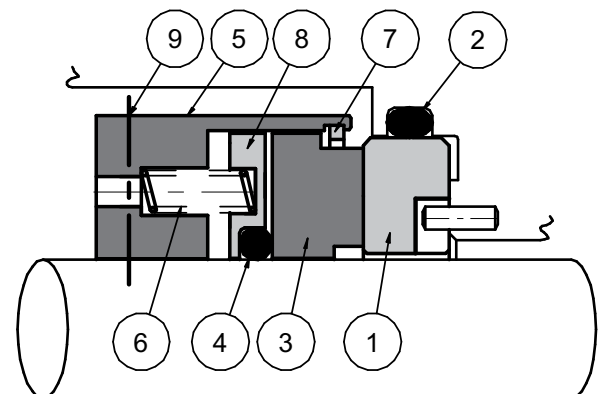


Typical Type 28SCB Seal Cross Section

Ref	Description	Ref	Description
1	Mating Ring	6	Spring
2	Mating ring O-ring	7	Snap ring
3	Primary ring	8	Thrust ring
4	Primary ring O-ring	9	Set screw
5	Retainer	10	Retainer O-ring

Typical Type 28SCB seal cross section

FIGURE 3

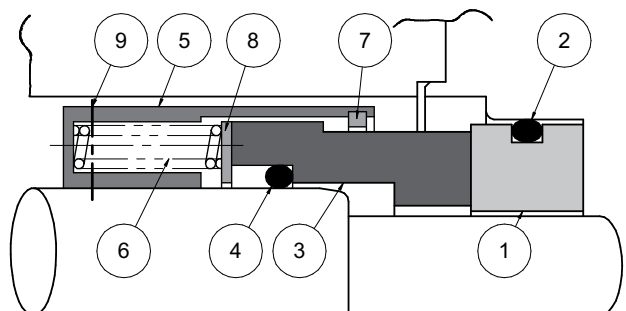


Typical Type 28SC Seal Cross Section

Ref	Description	Ref	Description
1	Mating Ring	6	Spring
2	Mating ring O-ring	7	Snap ring
3	Primary ring	8	Thrust ring
4	Primary ring O-ring	9	Set screw
5	Retainer		

Typical Type 28LD seal cross section

FIGURE 4



Typical Type 28LD Seal Cross Section

Ref	Description	Ref	Description
1	Mating Ring	6	Spring
2	Mating ring O-ring	7	Snap ring
3	Primary ring	8	Thrust ring
4	Primary ring O-ring	9	Set screw
5	Retainer		

O-RING PUSHER SEAL

Installation, Operation & Maintenance Instructions

Containment Seals Plan 72

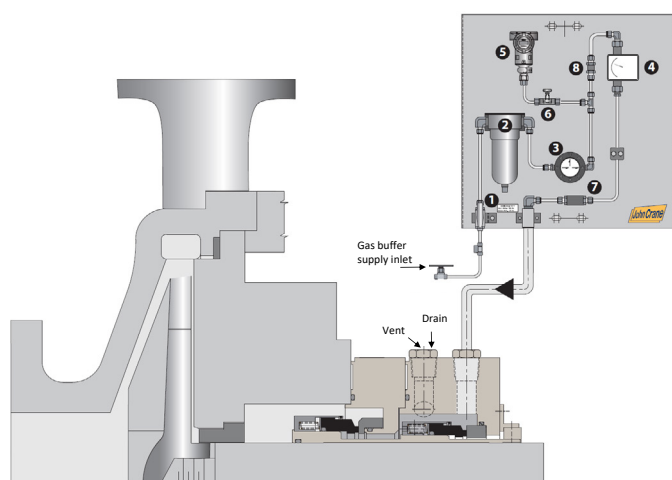
Description Plan 72 for secondary containment uses an external low pressure buffer gas, usually nitrogen, regulated by a control panel that injects it into the outer seal cavity.

Advantages Introduction of a buffer gas like nitrogen reduces fugitive emissions, prevents icing on cold applications, and provides for some cooling to the outboard seal.

General

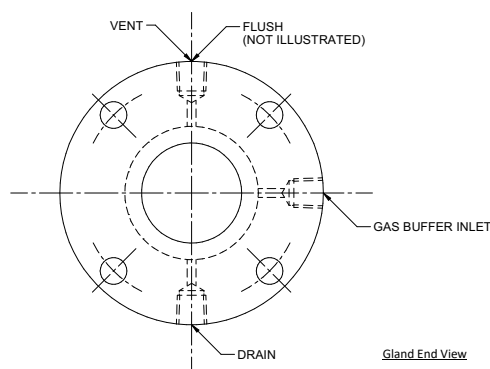
Plan 72 is normally used with Plan 75 for primary seal emissions that is condensing, or with Plan 76 for noncondensing emissions.

FIGURE 6



System Components

- | | |
|---|----------------------|
| 1 – Shut off valve, norm. open | 6 – 2 valve manifold |
| 2 – Coalescing filter | 7 – Check valve |
| 3 – Pressure control valve | 8 – Orifice |
| 4 – Flow transmitter with local indicator | |
| 5 – Pressure transmitter with local indicator | |



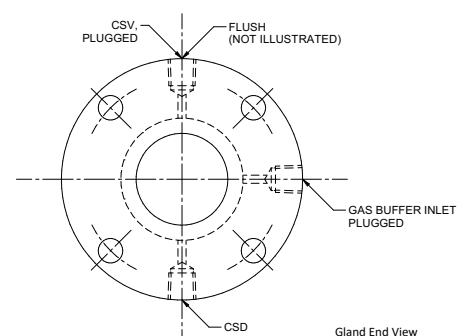
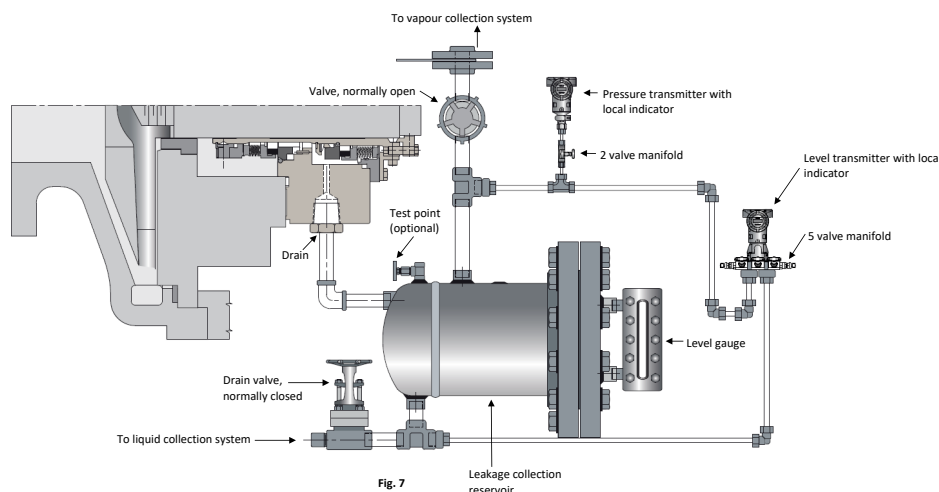
Containment Seals Plan 75

Description Plan 75 is a collection system used with secondary containment seals for process fluid that will condense at lower temperatures or is always in a liquid state.

Advantages The collection reservoir contains a pressure transmitter to indicate a build-up in pressure from excessive primary seal leakage or failure.

General

Plan 75 can be used in conjunction with a gas purge from Plan 72.



O-RING PUSHER SEAL

Installation, Operation & Maintenance Instructions

Containment Seals Plan 76

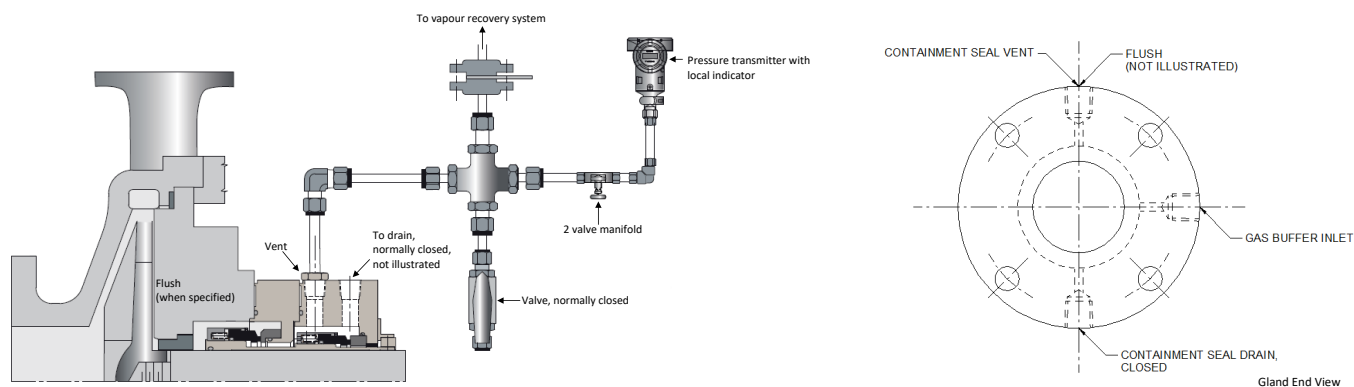
Description Plan 76 is a system to divert non-condensing primary seal emissions to a flare or vapour recovery system.

Advantages Lower initial and maintenance costs than dual unpressurized seals using a Plan 52.

General

Plan 76 can be used in conjunction with a gas purge from Plan 72.

FIGURE 5



O-RING PUSHER SEAL

Installation, Operation & Maintenance Instructions

1. Direction of shaft rotation must be correct, depending on mating ring spiral groove pattern. See Mating Ring groove pattern in Figures 9 and 10.
2. The gland plate is normally provided with three pipework connections, CSV, GBI and CSD.
3. The CSV (Containment Seal Vent) connection is recommended and should be used with API Plan 76 to divert non-condensing primary seal emissions to a flare or vapour recovery system. It requires a 3 mm or 0.125" orifice connected and high-pressure alarm switch at 0.5 bar (or 7 psi) above the mean operating condition in the flare or vapour recovery system.
4. The GBI (Gas Barrier Inlet) connection is optional and should be used with API Plan 72 if there is primary seal emission debris, coking, crystallization or icing. Provide an external purge of clean dry gas (typically nitrogen or air) with a recommended flow rate of 14 – 17 l/min (0.5 – 0.6 scfm) or 0.3 – 0.7 bar g (5 – 10 psig) differential pressure through a 1.6 mm (0.062 inches) orifice.
5. The CSD (Containment Seal Drain) connection is optional and should be used with API Plan 72 if there is condensing primary seal emissions. The condensed (or liquid) emissions are guided toward a drain collection system. CSD should be metal-plugged or closed during operation, or gas barrier pressure will be lost.
6. All connections should be protected with metal or plastic plug during shipping and storage for protection against contamination.
7. Gas lines must be in suitable material to avoid corrosion and contamination of the barrier gas.
8. Unused tapped connections must be safely plugged before seal operation.

FIGURE 8. Seal 28LD, 28SC and 28SCB

Piping Connections

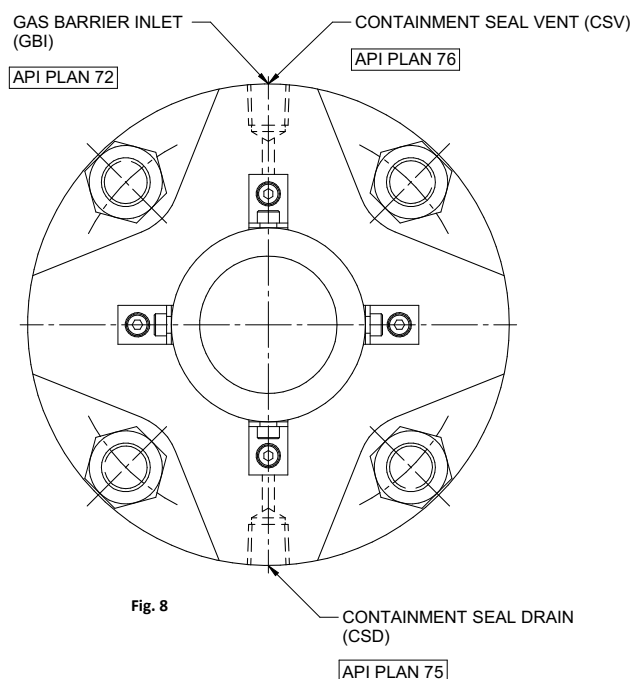


FIGURE 9.

Direction of rotation

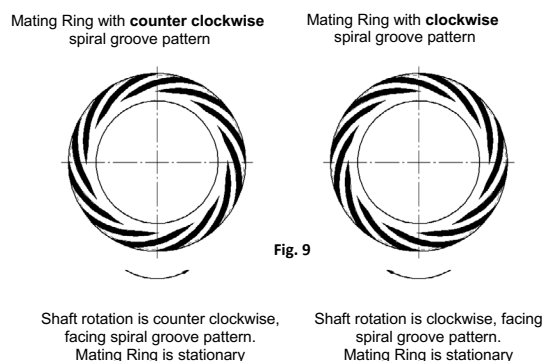
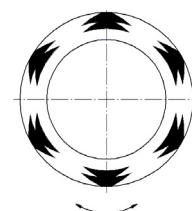


FIGURE 10.

Bi-Directional Profile

Mating Ring with bi-directional groove pattern





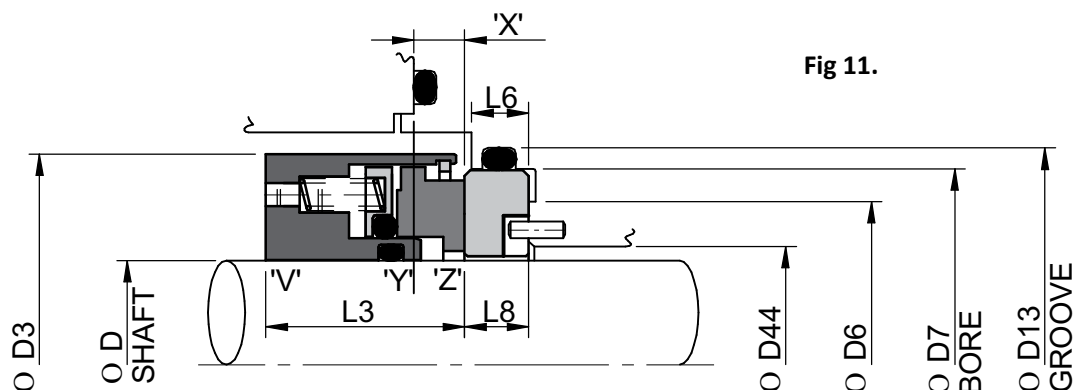
TYPE 28SCB, 28SC, 28LD

O-RING PUSHER SEAL

Installation, Operation & Maintenance Instructions

TYPE 28SCB Seal Typical Arrangement/Dimensional Data

FIGURE 11



TYPE 28SCB dimensions. All dimensions in mm

Seal Size	ØD	ØD3	ØD4	ØD6	ØD7	ØD13	ØD44	L3	L6	L8
0254	25.40	55.50	61.49	42.06	51.33	57.18	29.36	28	8	9
0285	28.58	58.67	64.67	45.16	54.43	60.27	32.46	28	8	9
0317	31.75	61.85	67.84	48.36	57.63	63.47	35.66	28	8	9
0349	34.93	65.02	71.02	51.56	60.83	66.68	38.86	28	8	9
0381	38.10	68.20	74.19	54.76	64.03	69.88	42.06	28	8	9
0412	41.28	71.37	77.37	57.86	67.13	72.97	45.16	28	8	9
0444	44.45	74.55	80.54	61.06	70.33	76.17	48.36	28	8	9
0476	47.63	77.72	83.72	64.26	73.53	79.38	51.56	28	8	9
0508	50.80	80.90	86.89	67.46	76.73	82.58	54.76	28	8	9
0539	53.98	84.07	90.07	70.56	79.83	85.67	57.86	28	8	9
0571	57.15	87.25	93.24	73.76	83.03	88.87	61.06	28	8	9
0603	60.33	90.42	96.42	76.96	86.23	92.08	64.26	28	8	9
0635	63.50	93.60	99.59	80.16	89.43	95.28	67.46	28	8	9
0666	66.68	96.77	102.77	83.26	92.53	98.37	70.56	28	8	9
0698	69.85	99.95	105.94	86.46	95.73	101.57	73.76	28	8	9
0730	73.03	107.14	113.13	92.84	102.92	108.76	76.96	30	9	10
0762	76.20	110.31	116.31	96.04	106.12	111.96	80.16	30	9	10
0793	79.38	113.49	119.48	99.14	109.22	115.06	83.26	30	9	10
0825	82.55	116.66	122.66	102.34	112.42	118.26	86.46	30	9	10
0857	85.73	119.84	125.83	105.54	115.62	121.46	89.66	30	9	10
0889	88.90	123.01	129.01	108.74	118.82	124.66	92.86	30	9	10
0920	92.08	126.19	132.18	111.84	121.92	127.76	95.96	30	9	10
0952	95.25	129.36	135.36	115.04	125.12	130.96	99.16	30	9	10
0984	98.43	132.54	138.53	118.24	128.32	134.16	102.36	30	9	10
1016	101.60	135.71	141.71	121.44	131.52	137.36	105.56	30	9	10
1047	104.78	138.89	144.88	124.54	134.62	140.46	108.66	30	9	10
1079	107.95	142.06	148.06	127.74	137.82	143.66	111.86	30	9	10
1111	111.13	145.24	151.23	130.94	141.02	146.86	115.06	30	9	10
1143	114.30	148.41	154.41	134.14	144.22	150.06	118.26	30	9	10

TYPE 28SCB dimensions. All dimensions in inches

Seal Size	ØD	ØD3	ØD4	ØD6	ØD7	ØD13	ØD44	L3	L6	L8
0254	1.000	2.185	2.421	1.656	2.021	2.251	1.156	1.103	0.315	0.354
0285	1.125	2.310	2.546	1.778	2.143	2.373	1.278	1.103	0.315	0.354
0317	1.250	2.435	2.671	1.904	2.269	2.499	1.404	1.103	0.315	0.354
0349	1.375	2.560	2.796	2.030	2.395	2.625	1.530	1.103	0.315	0.354
0381	1.500	2.685	2.921	2.156	2.521	2.751	1.656	1.103	0.315	0.354
0412	1.625	2.810	3.046	2.278	2.643	2.873	1.778	1.103	0.315	0.354
0444	1.750	2.935	3.171	2.404	2.769	2.999	1.904	1.103	0.315	0.354
0476	1.875	3.060	3.296	2.530	2.895	3.125	2.030	1.103	0.315	0.354
0508	2.000	3.185	3.421	2.656	3.021	3.251	2.156	1.103	0.315	0.354
0539	2.125	3.310	3.546	2.778	3.143	3.373	2.278	1.103	0.315	0.354
0571	2.250	3.435	3.671	2.904	3.269	3.499	2.404	1.103	0.315	0.354
0603	2.375	3.560	3.796	3.030	3.395	3.625	2.530	1.103	0.315	0.354
0635	2.500	3.685	3.921	3.156	3.521	3.751	2.656	1.103	0.315	0.354
0666	2.625	3.810	4.046	3.278	3.643	3.873	2.778	1.103	0.315	0.354
0698	2.750	3.935	4.171	3.404	3.769	3.999	2.904	1.103	0.315	0.354
0730	2.875	4.218	4.454	3.655	4.052	4.282	3.030	1.181	0.356	0.394
0762	3.000	4.343	4.579	3.781	4.178	4.408	3.156	1.181	0.356	0.394
0793	3.125	4.468	4.704	3.903	4.300	4.530	3.278	1.181	0.356	0.394
0825	3.250	4.593	4.829	4.029	4.426	4.656	3.404	1.181	0.356	0.394
0857	3.375	4.718	4.954	4.155	4.552	4.782	3.530	1.181	0.356	0.394
0889	3.500	4.843	5.079	4.281	4.678	4.908	3.656	1.181	0.356	0.394
0920	3.625	4.968	5.204	4.403	4.800	5.030	3.778	1.181	0.356	0.394
0952	3.750	5.093	5.329	4.529	4.926	5.156	3.904	1.181	0.356	0.394
0984	3.875	5.218	5.454	4.655	5.052	5.282	4.030	1.181	0.356	0.394
1016	4.000	5.343	5.579	4.781	5.178	5.408	4.156	1.181	0.356	0.394
1047	4.125	5.468	5.704	4.903	5.300	5.530	4.278	1.181	0.356	0.394
1079	4.250	5.593	5.829	5.029	5.426	5.656	4.404	1.181	0.356	0.394
1111	4.375	5.718	5.954	5.155	5.552	5.782	4.530	1.181	0.356	0.394
1143	4.500	5.843	6.079	5.281	5.678	5.908	4.656	1.181	0.356	0.394

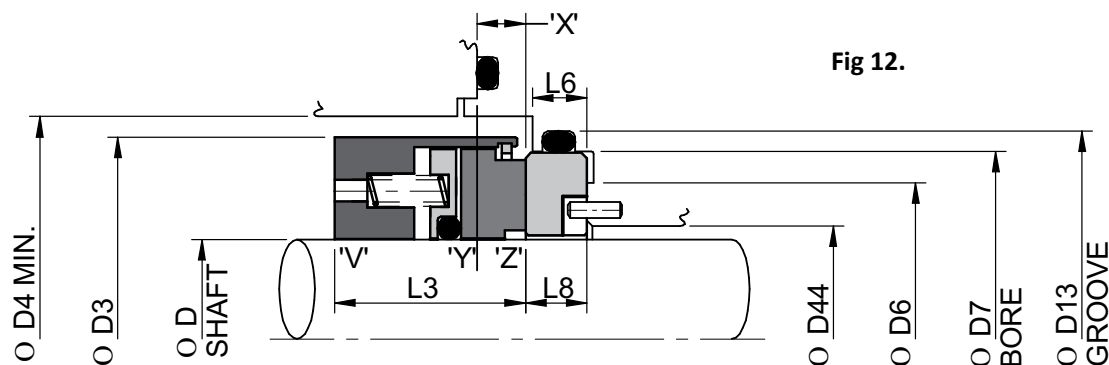
TYPE 28SCB, 28SC, 28LD

O-RING PUSHER SEAL

Installation, Operation & Maintenance Instructions

TYPE 28SCB seal typical arrangement/dimensional data

FIGURE 12



TYPE 28SCB Dimensions. All dimensions in mm

Seal Size	ØD	ØD3	ØD4	ØD6	ØD7	ØD13	ØD44	L3	L6	L8
0254	25.40	55.5	61.5	45.33	51.33	57.17	31.65	28	8	9
0285	28.58	58.6	64.6	48.43	54.43	60.27	34.75	28	8	9
0317	31.75	61.8	67.8	51.63	57.63	63.47	37.95	28	8	9
0349	34.93	65.0	71.0	54.83	60.83	66.67	41.15	28	8	9
0381	38.10	68.2	74.2	58.03	64.03	69.87	44.35	28	8	9
0412	41.28	71.3	77.3	61.13	67.13	72.97	47.45	28	8	9
0444	44.45	74.5	80.5	64.33	70.33	76.17	50.65	28	8	9
0476	47.63	77.7	83.7	67.53	73.53	79.37	53.85	28	8	9
0508	50.80	80.9	86.9	70.73	76.73	82.57	57.05	28	8	9
0539	53.98	84.0	90.0	73.83	79.83	85.67	60.15	28	8	9
0571	57.15	87.2	93.2	77.03	83.03	88.87	63.35	28	8	9
0603	60.33	90.4	96.4	80.23	86.23	92.07	66.55	28	8	9
0635	63.50	93.6	99.6	83.43	89.43	95.27	69.75	28	8	9
0666	66.68	96.7	102.7	86.53	92.53	98.37	72.85	28	8	9
0698	69.85	99.9	105.9	89.73	95.73	101.57	76.05	28	8	9
0730	73.03	107.1	113.1	96.93	102.93	108.77	79.25	30	9	10
0762	76.20	110.3	116.3	100.13	106.13	111.97	82.45	30	9	10
0793	79.38	113.4	119.4	103.23	109.23	115.07	85.55	30	9	10
0825	82.55	116.6	122.6	106.43	112.43	118.27	88.75	30	9	10
0857	85.73	119.8	125.8	109.63	115.63	121.47	91.95	30	9	10
0889	88.90	123.0	129.0	112.83	118.83	124.67	95.15	30	9	10
0920	92.08	126.1	132.1	115.93	121.93	127.77	98.25	30	9	10
0952	95.25	129.3	135.3	119.13	125.13	130.97	101.45	30	9	10
0984	98.43	132.5	138.5	122.33	128.33	134.17	104.65	30	9	10
1016	101.60	135.7	141.7	125.53	131.53	137.37	107.85	30	9	10
1047	104.78	138.8	144.8	128.63	134.63	140.47	110.95	30	9	10
1079	107.95	142.0	148.0	131.83	137.83	143.67	114.15	30	9	10
1111	111.13	145.2	151.2	135.03	141.03	146.87	117.35	30	9	10
1143	114.30	148.4	154.4	138.23	144.23	150.07	120.55	30	9	10
1174	117.48	151.6	157.6	141.43	147.43	153.27	123.75	30	9	10
1460	146.05	180.1	186.1	169.93	175.93	181.77	152.25	30	9	10

TYPE 28SCB Dimensions. All dimensions in mm

Seal Size	ØD	ØD3	ØD4	ØD6	ØD7	ØD13	ØD44	L3	L6	L8
0254	1.000	2.185	2.421	1.785	2.021	2.251	1.246	1.102	0.315	0.354
0285	1.125	2.307	2.543	1.907	2.143	2.373	1.368	1.102	0.315	0.354
0317	1.250	2.433	2.669	2.033	2.269	2.499	1.494	1.102	0.315	0.354
0349	1.375	2.559	2.795	2.159	2.395	2.625	1.62	1.102	0.315	0.354
0381	1.500	2.685	2.921	2.285	2.521	2.751	1.746	1.102	0.315	0.354
0412	1.625	2.807	3.043	2.407	2.643	2.873	1.868	1.102	0.315	0.354
0444	1.750	2.933	3.169	2.533	2.769	2.999	1.994	1.102	0.315	0.354
0476	1.875	3.059	3.295	2.659	2.895	3.125	2.12	1.102	0.315	0.354
0508	2.000	3.185	3.421	2.785	3.021	3.251	2.246	1.102	0.315	0.354
0539	2.125	3.307	3.543	2.907	3.143	3.373	2.368	1.102	0.315	0.354
0571	2.250	3.433	3.669	3.033	3.269	3.499	2.494	1.102	0.315	0.354
0603	2.375	3.559	3.795	3.159	3.395	3.625	2.62	1.102	0.315	0.354
0635	2.500	3.685	3.921	3.285	3.521	3.751	2.746	1.102	0.315	0.354
0666	2.625	3.807	4.043	3.407	3.643	3.873	2.868	1.102	0.315	0.354
0698	2.750	3.933	4.169	3.533	3.769	3.999	2.994	1.102	0.315	0.354
0730	2.875	4.217	4.453	3.816	4.052	4.282	3.120	1.181	0.354	0.394
0762	3.000	4.343	4.579	3.942	4.178	4.408	3.246	1.181	0.354	0.394
0793	3.125	4.465	4.701	4.064	4.300	4.530	3.368	1.181	0.354	0.394
0825	3.250	4.591	4.827	4.190	4.426	4.656	3.494	1.181	0.354	0.394
0857	3.375	4.717	4.953	4.316	4.552	4.782	3.620	1.181	0.354	0.394
0889	3.500	4.843	5.079	4.442	4.678	4.908	3.746	1.181	0.354	0.394
0920	3.625	4.965	5.201	4.564	4.800	5.030	3.868	1.181	0.354	0.394
0952	3.750	5.091	5.327	4.690	4.926	5.156	3.994	1.181	0.354	0.394
0984	3.875	5.217	5.453	4.816	5.052	5.282	4.120	1.181	0.354	0.394
1016	4.000	5.343	5.579	4.942	5.178	5.408	4.246	1.181	0.354	0.394
1047	4.125	5.465	5.701	5.064	5.300	5.530	4.368	1.181	0.354	0.394
1079	4.250	5.591	5.827	5.190	5.426	5.656	4.494	1.181	0.354	0.394
1111	4.375	5.717	5.953	5.316	5.552	5.782	4.620	1.181	0.354	0.394
1143	4.500	5.843	6.079	5.442	5.678	5.908	4.746	1.181	0.354	0.394
1174	4.625	5.969	6.205	5.568	5.804	6.034	4.872	1.181	0.354	0.394
1460	5.750	7.091	7.327	6.690	6.926	7.156	5.994	1.181	0.354	0.394

TYPE 28SCB, 28SC, 28LD

O-RING PUSHER SEAL

Installation, Operation & Maintenance Instructions

TYPE 28SCB seal typical arrangement/dimensional data

FIGURE 12

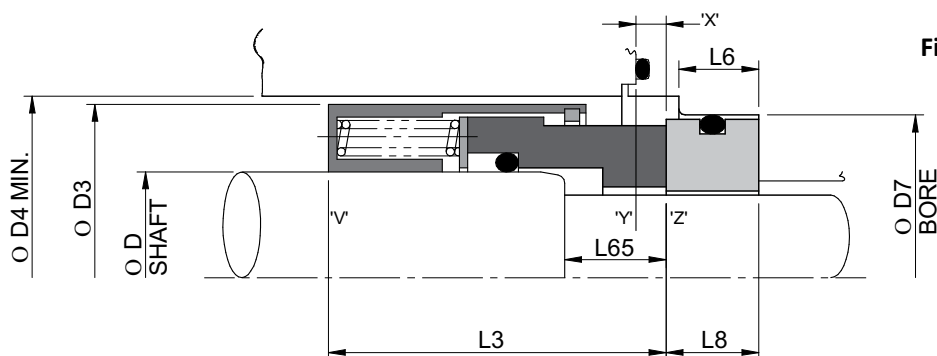


Fig 13.

Type 28LD dimensions. All dimensions in mm

Seal Size	ØD	ØD3	ØD4	ØD6	ØD7	L3	L6	L8	L65
0254	12.70	39.67	43.00	22.00	38.10	33.30	9.50	10.31	8.71
0285	15.88	42.85	46.00	25.50	41.27	34.90	9.50	11.10	8.71
0317	19.05	47.63	51.00	28.50	47.62	34.90	9.50	11.10	8.71
0349	22.23	50.80	54.00	32.00	50.80	35.71	9.50	11.10	8.71
0381	25.40	53.98	57.00	35.00	53.97	36.50	9.50	11.10	8.71
0412	28.58	60.33	63.50	38.00	57.15	44.50	9.50	11.10	11.10
0444	31.75	63.50	67.00	41.50	60.32	44.50	9.50	11.10	11.10
0476	34.93	66.68	70.00	44.50	63.50	44.50	11.10	12.70	11.10
0508	38.10	69.85	73.00	47.50	66.67	44.50	11.10	12.70	11.10
0539	41.28	76.20	79.50	51.00	73.02	52.40	11.10	12.70	12.70
0571	44.45	79.38	82.50	54.00	76.20	52.40	11.10	12.70	12.70
0603	47.63	82.55	86.00	57.00	79.37	52.40	12.70	14.30	12.70
0635	50.80	85.73	89.00	60.50	82.55	52.40	12.70	14.30	12.70
0666	53.98	88.90	92.00	63.50	85.72	52.40	12.70	14.30	12.70
0698	57.15	92.08	95.50	67.50	88.90	52.40	12.70	14.30	12.70
0730	60.33	95.25	98.50	70.50	92.07	52.40	14.30	15.90	12.70
0762	63.50	96.82	100.00	74.00	95.25	52.40	14.30	15.90	12.70
0793	66.68	100.00	103.51	77.00	98.42	52.40	14.30	15.90	14.27
0825	69.85	104.78	108.00	81.00	101.60	52.40	14.30	15.90	14.27
0857	73.03	107.95	111.00	84.00	104.78	52.40	16.70	19.80	14.27
0889	76.20	111.13	114.50	87.50	107.95	52.40	16.70	19.80	14.27
0920	79.38	114.30	117.50	90.50	111.13	52.40	16.70	19.80	14.27
0952	82.55	117.48	120.50	93.50	114.30	52.40	16.70	19.80	14.27
0984	85.73	120.65	124.00	96.00	117.48	52.40	16.70	19.80	14.27
1016	88.90	123.83	127.00	100.00	120.65	52.40	16.70	19.80	14.27
1047	92.08	130.18	130.51	103.00	123.83	52.40	16.70	19.80	14.27
1079	95.25	133.35	136.50	106.50	127.00	52.40	16.70	19.80	14.27
1111	98.43	136.53	140.00	109.50	130.18	52.40	16.70	19.80	14.27
1143	101.60	139.70	143.00	112.50	133.35	52.40	16.70	19.80	14.27

Type 28LD dimensions. All dimensions in mm

Seal Size	ØD	ØD3	ØD4	ØD6	ØD7	L3	L6	L8	L65
0254	0.500	1.562	1.693	0.866	1.500	1.311	0.374	0.406	0.343
0285	0.625	1.687	1.811	1.004	1.625	1.374	0.374	0.437	0.343
0317	0.750	1.875	2.008	1.122	1.875	1.374	0.374	0.437	0.343
0349	0.875	2.000	2.126	1.260	2.000	1.406	0.374	0.437	0.343
0381	1.000	2.125	2.244	1.378	2.125	1.437	0.374	0.437	0.343
0412	1.125	2.375	2.500	1.496	2.250	1.752	0.374	0.437	0.437
0444	1.250	2.500	2.638	1.634	2.375	1.752	0.374	0.437	0.437
0476	1.375	2.625	2.756	1.752	2.500	1.752	0.437	0.500	0.437
0508	1.500	2.750	2.874	1.870	2.625	1.752	0.437	0.500	0.437
0539	1.625	3.000	3.130	2.008	2.875	2.063	0.437	0.500	0.500
0571	1.750	3.125	3.248	2.126	3.000	2.063	0.437	0.500	0.500
0603	1.875	3.250	3.386	2.244	3.125	2.063	0.500	0.563	0.500
0635	2.000	3.375	3.504	2.382	3.250	2.063	0.500	0.563	0.500
0666	2.125	3.500	3.622	2.500	3.375	2.063	0.500	0.563	0.500
0698	2.250	3.625	3.760	2.657	3.500	2.063	0.500	0.563	0.500
0730	2.375	3.750	3.878	2.776	3.625	2.063	0.563	0.626	0.500
0762	2.500	3.812	3.937	2.913	3.750	2.063	0.563	0.626	0.500
0793	2.625	3.937	4.075	3.031	3.875	2.063	0.563	0.626	0.562
0825	2.750	4.125	4.252	3.189	4.000	2.063	0.563	0.626	0.562
0857	2.875	4.250	4.370	3.307	4.125	2.063	0.657	0.780	0.562
0889	3.000	4.375	4.508	3.445	4.250	2.063	0.657	0.780	0.562
0920	3.125	4.500	4.626	3.563	4.375	2.063	0.657	0.780	0.562
0952	3.250	4.625	4.744	3.681	4.500	2.063	0.657	0.780	0.562
0984	3.375	4.750	4.882	3.780	4.625	2.063	0.657	0.780	0.562
1016	3.500	4.875	5.000	3.937	4.750	2.063	0.657	0.780	0.562
1047	3.625	5.125	5.138	4.055	4.875	2.063	0.657	0.780	0.562
1079	3.750	5.250	5.374	4.193	5.000	2.063	0.657	0.780	0.562
1111	3.875	5.375	5.512	4.311	5.125	2.063	0.657	0.780	0.562
1143	4.000	5.500	5.630	4.429	5.250	2.063	0.657	0.780	0.562



TYPE 28SCB, 28SC, 28LD

O-RING PUSHER SEAL

Installation, Operation & Maintenance Instructions



North America United States of America Tel: 1-847-967-2400	Europe United Kingdom Tel: 44-1753-224002	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
---	--	--	---	---

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. It is dangerous to smoke while handling products made from PTFE. Old and new PTFE products must not be incinerated. ISO 9001 and ISO14001 Certified, details available on request.