

INFLATABLE SAFETY SEAL (ISS)

SEAL INSTALLATION

Description

The Chesterton Inflatable Safety Seal is an on-demand static shaft sealing device. This contained pneumatic inflatable bladder assembly is used in conjunction with a mechanical seal. The ISS plate firmly affixes to the process equipment, and the mechanical seal is then bolted to it. The ISS is designed to act as a static seal in the event of unacceptable mechanical seal leakage. It can also function as an interim static seal during mechanical seal rebuild. The robust system adds an element of security and flexibility to any sealing application.

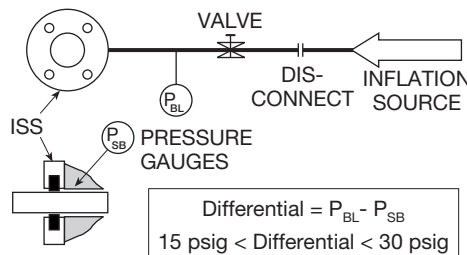
Typical uses: Side and bottom entry mixers and agitators, stern tubes, and larger pumps.

CAUTION: The ISS is NOT to be inflated on a rotating shaft!

Preparation

1. Read these instructions completely prior to installing equipment.
2. Installing personnel should be familiar with equipment operation and pressure swings of the particular stuffing box involved.
3. Air connections to the ISS plate are 1/4" NPT. An optional Schrader (tire-style) valve is included in the packaging. This valve can also be used for inflation via a manual pump if a compressed air source is not available.
4. Two pressure gauges and a stop valve are required to properly monitor the ISS during operation/inflation.

Follow this schematic:



5. To inflate the bladder to the proper differential pressure, the following must be known:
 P_{BL} = bladder inflation pressure
 P_{SB} = live stuffing box pressure exposed to the ISS.
 Do **not** rely on the bladder inflation port gauge to read stuffing box pressure!
6. **CAUTION:** When the plastic shipping plug is removed, ensure that dirt, liquid, or other contamination does not enter the inflation port.
7. Inspect the visible area of the bladder for any nicks or other obvious damage that may inhibit proper sealing. While handling, it is important that the user not expose the bladder to sharp debris that may get caught in between the bladder and plate housing.

Check the stuffing box.

1. The stuffing box face surface finish must be a maximum of 125 micro-inches RMS (3,2 microns) for the ISS plate gasket to seal.
2. Split case pumps will sometimes cause a step (misalignment) to occur on the stuffing box face. This step must be machined flat within 0.001 in (0,03 mm).

3. Make sure the stuffing box is clean and clear along its entire length.
4. If possible, attach a base dial indicator to the shaft and rotate both the indicator and shaft slowly while reading the runout of the stuffing box face. Misalignment of the stuffing box face relative to the shaft should not exceed (.002) (0,06 mm) TIR per inch of shaft diameter.

Installation

1. The ISS is to be placed in between the stuffing box and the mechanical seal.
2. Bolt the ISS to the equipment stuffing box using the provided counter bore through-holes or slots. Insert plastic shim centering gauges between the shaft and plate ID. Tighten the bolts evenly. Remove the gauges.

(Note that the through-holes or slots and their bolt circle is customized to each application.)
3. The ISS will now act as the new surface for mounting the mechanical seal. The ISS has tapped holes on a specific bolt circle that will fit a Chesterton mechanical seal. *Unless ordered otherwise, the standard ISS plate has tapped holes to fit a Chesterton 442 or 442M Split Seal.*
4. Install the mechanical seal by following the seal installation instructions.

CAUTION!

Non-conformance with the stated chemical compatibility or operating parameters for the Inflatable Safety Seal may result in damage to equipment and/or personal injury.

SEAL INSTALLATION

Inflation / Operation

1. **CAUTION: The ISS is to be inflated while the shaft is at rest! The ISS is not designed to operate on a rotating shaft. Failure will occur if the shaft is rotating while the bladder is inflated.**
2. It is critical that the user know the process pressure inside the equipment stuffing box.
3. A properly installed ISS requires inflation prior to seal disassembly. Normal inflation pressure is recommended to be approximately 15 psi above the pressure in the stuffing box. As the bladder inflates, it will seal between the plate, shaft, and stuffing box. This action isolates the mechanical seal from the process fluid pressure.

When sealing very low pressure fluids, note that the first 25-30 psig of inflation is necessary to overcome the initial bladder stretch and establish sealing contact to the shaft.

To determine whether the ISS bladder is holding pressure, close the valve as seen in the above schematic. Disconnect the source of inflation at the disconnect shown. To ensure bladder sealing stability, the pressure should hold steady without change for approximately 10 minutes.

4. **As a safety precaution to verify that the ISS is sealing, the following procedure is required:**

Before removal of the attached mechanical seal, remove the mechanical seal's flush port plug (or piping connection) to drain any remaining process fluid left in the cavity between the ISS and mechanical seal. This procedure also verifies that the inflated ISS bladder is properly sealing and not bypassing fluid. If in doubt, wait for a period of several minutes to verify that the inflated ISS is sealing.

Non-conformance with the stated chemical compatibility or operating parameters for the Inflatable Safety Seal may result in damage to equipment and/or personal injury.

5. **The maximum stuffing box pressure is 100 psig. The maximum bladder inflation pressure is 115 psig.**
- Contact Chesterton Applications Engineering if using higher process pressures or vacuum.**
6. Once assured that the bladder is sealing, the attached mechanical seal can be removed. Take care not to puncture the seal bladder while using tools to disassemble the mechanical seal. **Do not attempt to rotate the shaft while the bladder is inflated.**

Maintenance & Troubleshooting

1. When in use, the ISS bladder is exposed to the pressure swings from both the process fluid and inflation. Should the bladder become damaged in any way, replace it with a new Chesterton ISS bladder.
2. If the bladder does not hold inflation pressure, look for the following:
 - A. a leaking air supply connection, fitting, or valve,
 - B. physical damage to the bladder,
 - C. damage to the small o-ring (-O11) around the brass stem attached to the bladder.
3. If the inflated bladder is holding pressure but bypassing process fluid, it is possible that debris could be pinched between the shaft and bladder. If no debris is found consider increasing the bladder inflation pressure. Do not exceed an inflation-stuffing box differential of 30 psi/2 bar, and do not exceed the rated 115 psig inflation pressure.

If sealing is not effected at this point, contact Chesterton Applications Engineering.

4. When the ISS is removed from the process equipment, the bladder should be inspected for any damage. The bladder can be removed from the plate for inspection. Also inspect the stem o-ring for any damage.
5. Upon bladder re-installation, make sure that no debris or sharp burrs have entered inside the plate housing. Also make sure that the bladder stem is seated all the way into the socket.
6. When installing a new bladder use a silicone based grease (non-petroleum based) to assist proper seating into the ISS plate.

Specifications Components

See attached pages.

Spare Parts Purchase

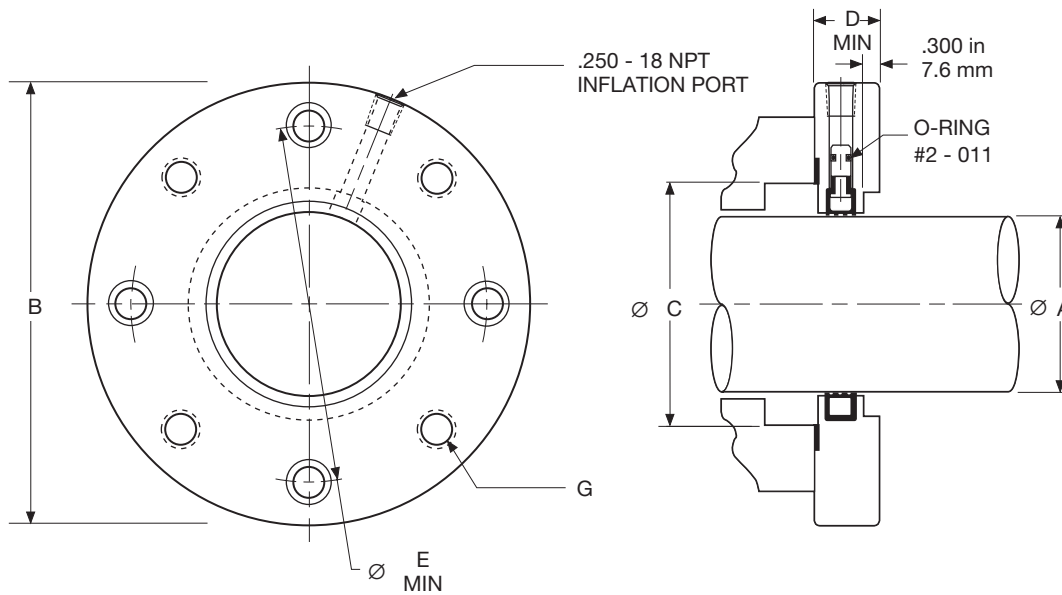
Individual components may be purchased by contacting A.W. CHESTERTON with the part number and description of the desired components. You can also find Chesterton on the internet:

www.Chesterton.com

CAUTIONS

These instructions are general in nature. It is assumed that the installer is familiar with seals and certainly with the requirements of their plant for the successful use of mechanical seals. If in doubt, get assistance from someone in the plant who is familiar with seals or delay the installation until a seal representative is available. All necessary auxiliary arrangements for successful operation (heating, cooling, flushing) as well as safety devices must be employed. These decisions are to be made by the user. The chemical listing is intended as a general reference for this seal only. The decision to use this seal or any other CHESTERTON seal or system in a particular service is the customer's responsibility.

DIMENSIONAL DATA (DRAWINGS)



DIMENSIONAL DATA (INCH)

SHAFT SIZE A	PLATE OD B	STUFFING BOX BORE C MAX	PLATE THICKNESS D MIN	EQUIPMENT MOUNT BOLT CIRCLE BY BOLT SIZE E MIN*				TAP SIZE (UNC) G
				1/2"	5/8"	3/4"	7/8"	
				E MIN*				
2.750	8.00	4.50	1.27	5.85	6.04			5/8 - 11
2.875 / 3.000	8.50	4.75	1.27	6.10	6.29			5/8 - 11
3.125 / 3.250	8.50	5.00	1.27	6.35	6.54	6.73		3/4 - 10
3.375 / 3.500	9.00	5.25	1.27	6.60	6.79	6.98		3/4 - 10
3.625 / 3.750	9.00	5.50	1.27	6.85	7.04	7.23		3/4 - 10
3.875 / 4.000	9.50	5.75	1.27	7.10	7.29	7.48		3/4 - 10
4.125 / 4.250	9.50	6.00	1.27	7.35	7.54	7.73		3/4 - 10
4.375 / 4.500	10.00	6.25	1.27	7.60	7.79	7.98		3/4 - 10
4.625 / 4.750	10.00	6.50	1.27	7.60	7.79	7.98		3/4 - 10
4.875 / 5.000	11.50	7.25	1.53		8.76	8.95	9.14	3/4 - 10
5.125 / 5.250	11.50	7.50	1.53		9.01	9.20	9.39	3/4 - 10
5.375 / 5.500	12.00	7.75	1.53		9.26	9.45	9.64	3/4 - 10
5.625 / 5.750	12.00	8.00	1.53		9.51	9.70	9.89	3/4 - 10
5.875 / 6.000	12.50	8.25	1.53		9.76	9.95	10.14	3/4 - 10
6.125 / 6.250	12.50	8.50	1.53		10.01	10.20	10.39	3/4 - 10
6.375 / 6.500	13.00	8.75	1.53		10.26	10.45	10.64	3/4 - 10
6.625 / 6.750	13.00	9.00	1.53		10.51	10.70	10.89	3/4 - 10
6.875 / 7.000	13.50	9.25	1.53		10.76	10.95	11.14	3/4 - 10
7.125 / 7.250	13.50	9.50	1.53		11.01	11.20	11.39	3/4 - 10
7.375 / 7.500	14.00	9.75	1.53		11.26	11.45	11.64	3/4 - 10
7.625 / 7.750	14.00	10.00	1.53		11.26	11.45	11.64	3/4 - 10

DIMENSIONAL DATA (METRIC)

SHAFT SIZE A	PLATE OD B	STUFFING BOX BORE C MAX	PLATE THICKNESS D MIN	EQUIPMENT MOUNT BOLT CIRCLE BY BOLT SIZE E MIN*				TAP SIZE G
				12 mm	14 mm	16 mm	18 mm	
				E MIN*				
70	203	114	32	148	151	154	157	5/8 - 11
80	216	127	32	160	163	166	169	3/4 - 10
90	229	133	32	167	170	173	176	3/4 - 10
100	241	146	32	180	183	186	189	3/4 - 10
110	254	159	32	192	195	198	201	3/4 - 10
120	254	165	32	192	195	198	201	3/4 - 10
130	292	191	39		226	229	232	3/4 - 10
140	305	197	39		233	236	239	3/4 - 10
150	318	210	39		245	248	251	3/4 - 10
160	318	216	39		252	255	258	3/4 - 10
170	330	229	39		264	267	270	3/4 - 10
180	343	235	39		277	280	283	3/4 - 10
190	356	248	39		283	286	289	3/4 - 10

*Based on sufficient clearance with 442M gland gasket.

PARTS IDENTIFICATION

STANDARD MATERIALS

Plate:

316 SS

Bladder:

EP

O-rings:

EP

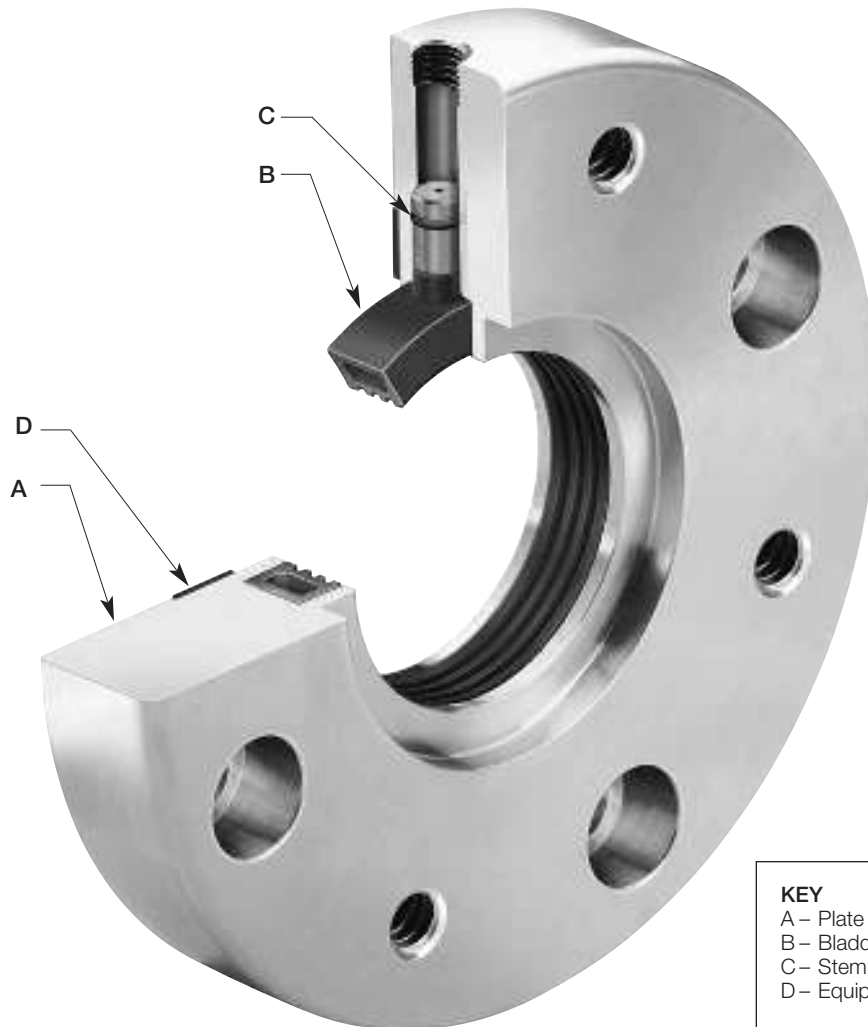
Pressure:

100 psig

stuffing box/seal
chamber pressure

115 psig

bladder inflation



KEY

A – Plate
B – Bladder
C – Stem O-Ring
D – Equipment Mount Gasket



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