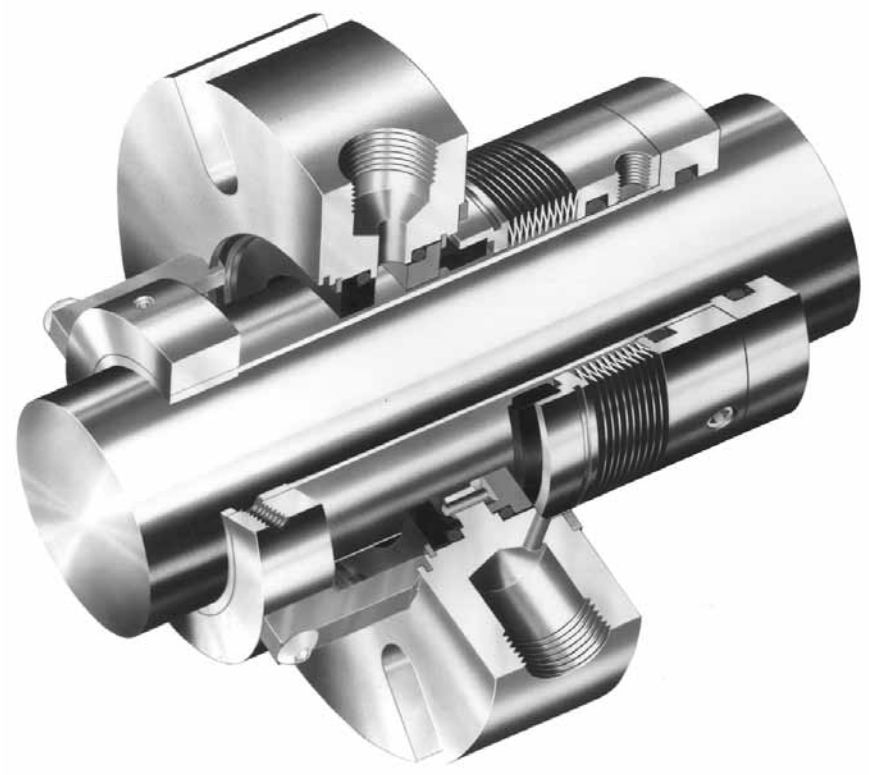
FLOWSERVE

Installation Instructions

Durametallic® X-100

Single cartridge mounted welded metal bellows seal



Experience In Motion

Description

This X-100 seal is a cartridge mounted mechanical seal, designed for ease of installation and reliable operation. **No seal setting dimensions are required.** Removable setting devices provide proper alignment. The flexible stationary face design compensates for inadvertent misalignment of the seal chamber face. Multiple springs provide uniform face loading and are external of the pumpage, resisting clogging or hang-up. Installation according to the following steps will assure long trouble free life of the X-100 seal.

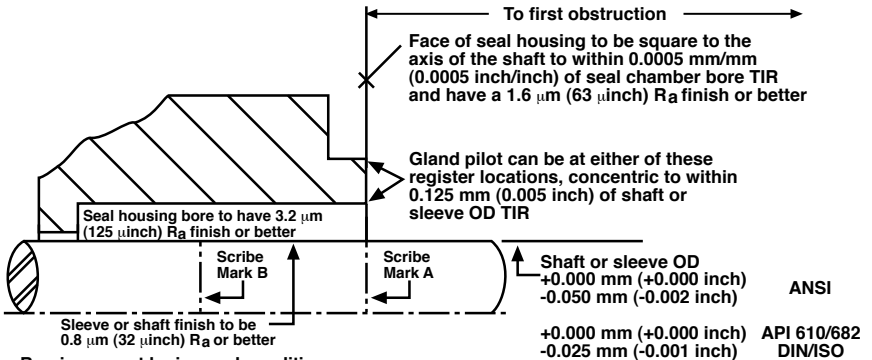
1 Equipment Check

1.1 **Follow plant safety regulations** prior to equipment disassembly:

- Lock out motor and valves.
- Wear designated personal safety equipment.
- Relieve any pressure in the system.
- Consult plant MSDS files for hazardous material regulations.

Seal Chamber Requirements

Figure 1

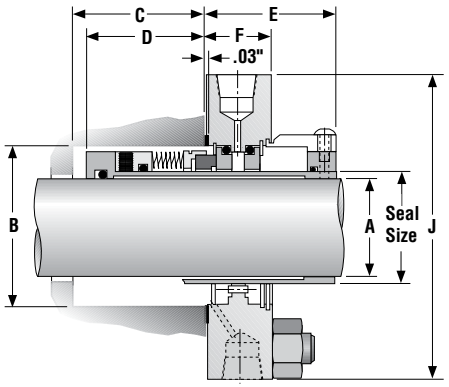


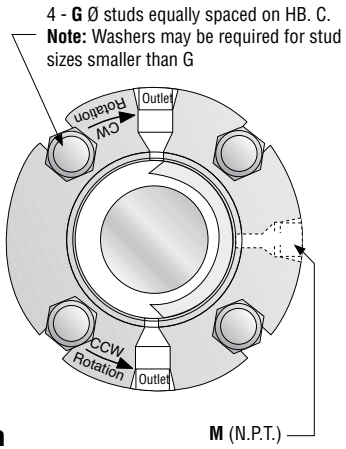
- **Bearings must be in good condition**
- **Maximum lateral or axial movement of shaft (end play) = 0.25 mm (0.010 inch) TIR**
- **Maximum shaft runout at face of seal housing = 0.05 mm (0.002 inch) TIR**
- **Maximum dynamic shaft deflection at seal housing = 0.05 mm (0.002 inch) TIR**

The images of parts shown in these instructions may differ visually from the actual parts due to manufacturing processes that do not affect the part function or quality.

X-100 Dimensional Data

Figure 2





Dimensional Data for X-100 seal, inch

Seal Size +0.000 -0.002	A ±0.001	B min.	B max.	C min.	D	E	F	G max.	H min.	J	M (N.P.T.)
1.125	1.000	1.750	1.875	1.78	1.69	2.00	1.02	0.375	2.75	3.75	0.375
*1.250	1.125	1.750	2.000	1.78	1.69	2.00	1.02	0.500	3.00	3.88	0.375
1.375	1.250	2.000	2.125	1.97	1.88	2.00	1.02	0.500	3.12	4.25	0.375
*1.500	1.375	2.000	2.250	1.97	1.88	2.00	1.02	0.375	3.25	4.25	0.375
1.625	1.500	2.250	2.500	1.97	1.88	2.00	1.02	0.375	3.75	4.75	0.375
1.750	1.625	2.375	2.625	1.97	1.88	2.00	1.02	0.500	3.75	4.75	0.375
1.875	1.750	2.500	2.750	1.97	1.88	2.00	1.02	0.500	3.75	5.00	0.375
2.000	1.875	2.625	2.875	1.97	1.88	2.00	1.02	0.500	3.88	5.00	0.375
2.125	2.000	2.750	3.000	1.97	1.88	2.00	1.02	0.625	4 .12	5.12	0.375
2.250	2.125	2.875	3.250	1.97	1.88	2.00	1.02	0.625	4.38	6.00	0.375
2.375	2.250	3.000	3.375	1.97	1.88	2.00	1.02	0.625	4.62	6.50	0.375
2.500	2.375	3.250	3.625	2.16	2.06	2.09	1.11	0.625	5.00	6.38	0.375
2.625	2.500	3.375	3.750	2.16	2.06	2.09	1.11	0.625	5.00	6.62	0.375
2.750	2.625	3.500	3.875	2.16	2.06	2.09	1.11	0.750	5 .75	7.25	0.375
2.875	2.750	3.750	—	2.16	2.06	2.62	1.58				0.750‡
†3.000	2.750	3.875	—	2.16	2.06	2.62	1.58				0.750‡
3.000	2.875	3.875	—	2.16	2.06	2.62	1.58				0.750‡
†3.125	2.875	4.000	—	2.16	2.06	2.62	1.58				0.750‡
3.125	3.000	4.000	—	2.16	2.06	2.62	1.58		**As**		0.750‡
†3.250	3.000	4.125	—	2.16	2.06	2.62	1.58				0.750‡
3.375	3.125	4.250	—	2.16	2.06	2.62	1.58		**Required**		0.750‡
3.500	3.250	4.375	—	2.28	2.19	2.75	1.71				0.750‡
3.625	3.375	4.500	—	2.28	2.19	2.75	1.71				0.750‡
3.750	3.500	4.625	—	2.28	2.19	2.75	1.71				0.750‡
3.875	3.625	4.750	—	2.28	2.19	2.75	1.71				0.750‡
4.000	3.750	4.875	—	2.28	2.19	2.75	1.71				0.750‡
4.125	3.875	5.000	—	2.28	2.19	2.75	1.71				0.750‡

* this seal size uses the N-CBR inner seal rotary unit.
† preferred design for these shaft sizes. Use whenever possible.
‡ maximum

1.2 **Disassemble equipment** in accordance with equipment manufacturer's instructions to allow access to seal installation area.

1.3 **Remove existing mechanical seal and gland** or compression packing and packing gland (follower flange).

1.4 Make sure the **shaft or sleeve** is free of burrs, cuts, dents, or corrosion that might cause leakage past the sleeve gasket. Replace worn shaft or sleeve. **Remove sharp edges** from keyways and threads.

1.5 Make sure the **seal housing face is clean** and free of burrs, cuts, dents, or corrosion that might cause leakage the gland gasket or misalign the seal gland.

1.6 **Check equipment dimensions** to ensure that they are within the dimensions shown in **Figures 1 and 2**. Critical dimensions include shaft or sleeve OD (A), a chamber depth (C), minimum and maximum seal housing bore (B), and the minimum distance to the first obstruction, (E) plus 0.125 inch.

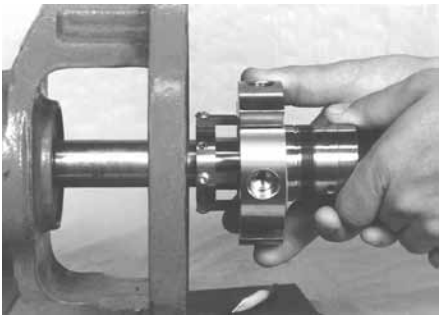
1.7 **Check gland bolting** to ensure that bolt diameter (G) and bolt circle (H) conform to the dimensions shown in Figure 2.

1.8 **Handle the X-100 seal with care**, it is manufactured to precise tolerances. The sealing faces of rotating and stationary faces are of special importance. They are lapped flat to within three light bands (34.8 millionths of an inch). **Keep the seal faces perfectly clean at all times**.

2 X-100 Seal Installation

Tools needed:

- **Open end wrench** for gland nuts
- **Allen wrenches** provided
- **Silicone lubricant** provided

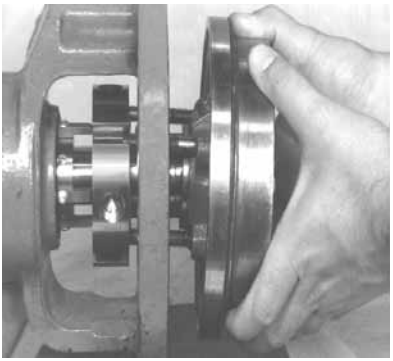


Install X-100 seal cartridge
Figure 3

2.1 **Lubricate the shaft** or sleeve OD lightly with silicone lubricant provided and **slide the complete X-100 Cartridge seal onto the shaft**, Figure 3, with the end with the setting devices toward the bearing housing.

2.2 **Install the pump backplate** (seal chamber), Figure 4. **Position the X-100 seal gland flush connection**, port ⓐ in Figure 7, **in the 3:00 o'clock position** for normal installations. Alternate positioning

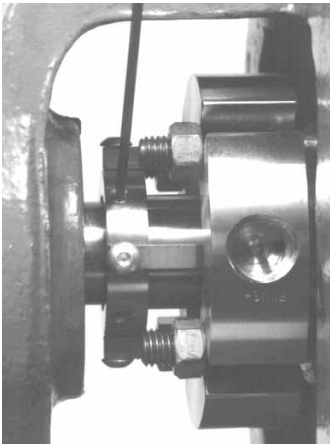
of the gland may be necessary with some pump designs to permit seal piping to clear the bearing housing. Refer to the assembly drawing that is supplied with the seal for proper positioning. **Bolt the back plate in place** on the bearing housing.



Install pump backplate
Figure 4

2.3 **Assemble the pump, adjust the bearings, set the impeller and connect the coupling** so that the shaft is in its operating axial position. Any subsequent adjustment of the shaft requires resetting of the seal. Connect pump piping, allow no pipe strain on the pump casing.

2.4 **Position the X-100 cartridge gland** with the gland gasket in place against the seal chamber (stuffing box) face and **tighten the nuts** evenly, cross staggering the adjustment of the nuts. The gland nuts should be torqued to a maximum of 13 N-m (10 ft-lbs). Excessive gland nut pressure can result in distortion of the stationary face.



Tighten drive collar set screws
Figure 5

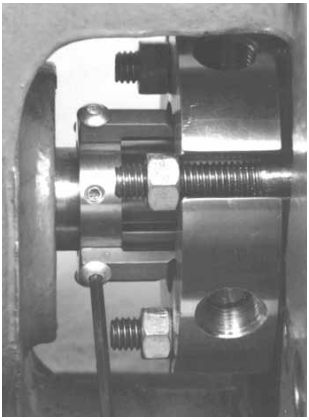
2.5 **Tighten the set screws** on the X-100 cartridge drive collar with the Allen wrench provided. See Figure 5.

2.6 **Remove setting devices** by removing the cap screws with the Allen wrench provided. See Figure 6. Save the setting devices for use if pump impeller must be reset or if the X-100 is removed for maintenance.

2.7 **Turn the shaft** by hand to ensure free operation.

2.8 **Pipe up the gland connections** to the X-100 seal, see section 3.

2.9 **See Operational Recommendations,** section 4, before starting pump.



Remove setting devices
Figure 6

3 Piping

Consult your Flowserve Sales and Service Representative or Flowserve Authorized Distributor for assistance in selection of seal environmental control plans. Usually one of three flush plans is used:

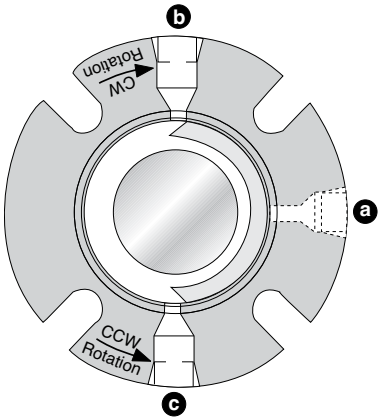
3.1 **ASME Flush Plan 7302, dead-ended,** may provide adequate removal of seal generated heat if the pump is equipped with an enlarged seal chamber or if the shaft speed and chamber pressure is low. If no flush is used, plug flush port ⓐ , Figure 7.

To maximize seal life, Flowserve recommends that a product bypass or clean external flush be used whenever possible with a X-100 seal installed in a conventional seal chamber such as a converted stuffing box.

3.2 **ASME Flush Plan 7311, product bypass flush,** is piped from the pump discharge to the X-100 seal flush port ⓐ , Figure 7. It may be necessary to install an orifice in the bypass line to reduce the flush velocity. The bypass may be cleaned or cooled as necessary. A Flowserve Floating Throat Bushing installed in the bottom of the seal chamber can be used to pressurize the chamber for products near their boiling points.

3.3 **ASME Flush Plan 7332, clean external flush,** is a supply of clean compatible flush fluid at a pressure at least 170 kPa (25 psi) above that in the seal chamber piped to the X-100 seal flush port ⓐ , Figure 7, at a flow adequate to remove seal generated heat. A Flowserve Floating Throat Bushing or other device installed in the bottom of the seal chamber can reduce product dilution to a minimum.

3.4 **Taps ⓑ and ⓒ in the gland are vent and drain** ports used for fluid quenching, ASME Flush Plan 7362. If they are not used, they should be plugged with pipe plugs.



	Inlet	Outlet
Clockwise (CW)	Port ⓒ	Port ⓑ
Counterclockwise (CCW)	Port ⓑ	Port ⓒ

Figure 7

4 Operation

Following these recommendations will ensure maximum MTBPM of the X-100 seal.

4.1 The X-100 is designed to resist corrosion by most chemicals. However, do not expose the X-100 materials of construction to products outside of their corrosion limits. The X-100 assembly drawing lists the materials of construction. Contact Flowserve for chemical resistance ratings.

4.2 To request Pressure-Velocity (P-V) limits contact Flowserve.

4.3 The materials of construction are listed on the assembly drawing supplied with the X-100 seal. Contact Flowserve for the temperature limits of materials.

4.4 **Do not start up or run the X-100 dry**. Product or flush fluid must be in the seal cavity at all times during pump operation.

For any special problems encountered during installation, contact your nearest Flowserve Sales and Service Representative or Authorized Distributor.

5 Repair

5.1 To reset the pump impeller, follow plant safety procedures, see 1.1.

- reinstall the X-100 setting devices using the cap screws.
- loosen the X-100 cartridge drive collar set screws.
- adjust the impeller clearance following pump manufacturers instructions.
- tighten the set screws on the X-100 cartridge drive collar**.**
- remove the setting devices by removing the cap screws.

This product is a precision sealing device. The design and dimension tolerances are critical to seal performance. Only parts supplied by Flowserve should be used to repair a seal. These are available from numerous Flowserve stocking locations. To order replacement parts, refer to the part code number and B/M number. A spare backup seal should be stocked to reduce repair time.

When repairs are not conducted at the customer's location, **decontaminate the seal assembly** and return it to Flowserve, with an order marked **"Repair or Replace"**. **A signed certificate of decontamination** must be attached. **A Material Safety Data Sheet (MSDS) must be enclosed** for any product that came in contact with the seal. The seal assembly will be inspected and, if repairable, it will be rebuilt, tested, and returned.

FLOWSERVE®

TO REORDER REFER TO
B/M #_____
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