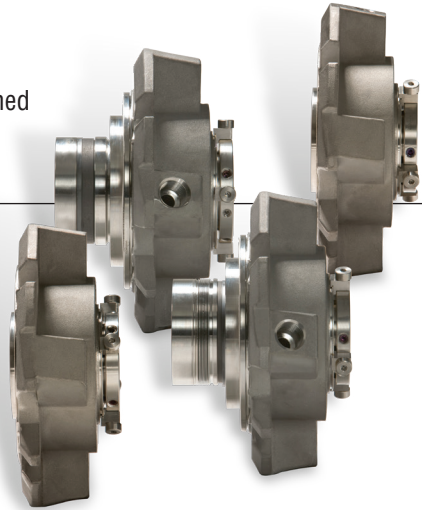


ISC2 Series

Innovative Standard Cartridge seal designed for general purpose applications.



1 Equipment Check

- 1.1 Follow plant safety regulations prior to equipment disassembly:
 - 1.1.1 Wear designated personal safety equipment
 - 1.1.2 Isolate equipment and relieve any pressure in the system
 - 1.1.3 Lock out equipment driver and valves
 - 1.1.4 Consult plant Safety Data Sheet (SDS) files for hazardous material regulations
- 1.2 Disassemble equipment in accordance with the equipment manufacturer's instructions to allow access to seal installation area.
- 1.3 Remove existing sealing arrangement (mechanical seal or otherwise). Clean seal chamber and shaft thoroughly.
- 1.4 Inspect surfaces under gaskets to ensure they are free from pits or scratches. Break all sharp corners on shaft steps, threads, reliefs, shoulders, key ways, etc. over which gasket(s) must pass and/or seal against.
- 1.5 Check shaft or sleeve OD, seal chamber bore, seal chamber depth, gland pilot, stud diameter, stud bolt pattern and distance to first obstruction to ensure they are dimensionally the same as shown in the seal assembly drawing.
- 1.6 Check seal assembly drawings for any modifications (reworks) to be made to the equipment for mechanical seal installation and act accordingly.
- 1.7 The equipment must be earthed to prevent sparks due to static electricity discharge

Shaft runout should be checked against the equipment manufacturer's specifications. Generally, should not exceed 0.05 mm (0.002 inch) TIR (Total Indicator Reading) at any point along the shaft for ball or roller type bearings. For sleeve type bearings, refer to manufacturer instructions. If the equipment is not completely dismantled, verify runout near seal location.

The above values apply to shaft speeds in the range from 1000 to 3600 RPM. For values above and below, consult your Flowserve representative. See Figure 1.

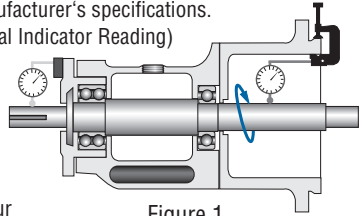


Figure 1

Shaft endplay should not exceed 0.25 mm (0.010 inch) TIR, regardless of thrust bearing type. See Figure 2.

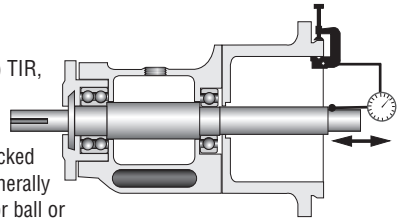


Figure 2

Radial bearing play at seal chamber face should be checked against the equipment manufacturer's specifications. Generally 0.05 - 0.10 mm (0.002 - 0.004 inch) will be applicable for ball or roller type bearings. For sleeve or journal type bearings, values will generally be in the order of 0.10 - 0.15 mm (0.004 - 0.006 inch). If equipment is found outside the general range, contact the equipment manufacturer and your Flowserve representative to verify the equipment's suitability for the seal.

Seal chamber squareness to the shaft centerline should be within 0.0005 mm/mm (0.0005 inch/inch) of seal chamber bore TIR.

Note: make sure that shaft endplay does not affect the reading. Verify the smoothness of the seal chamber face for a good gasket joint. See Figure 3.

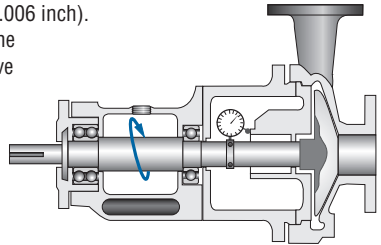


Figure 3

Concentricity of the shaft to the seal chamber bore or gland pilot register should be within 0.025 mm per 25 mm shaft diameter (0.001 inch per 1 inch shaft diameter) to a maximum of 0.125 mm (0.005 inch) TIR. See Figure 4.

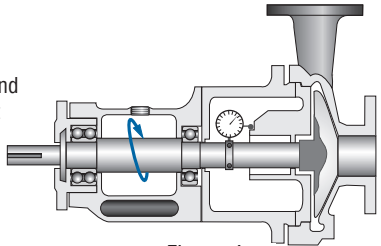
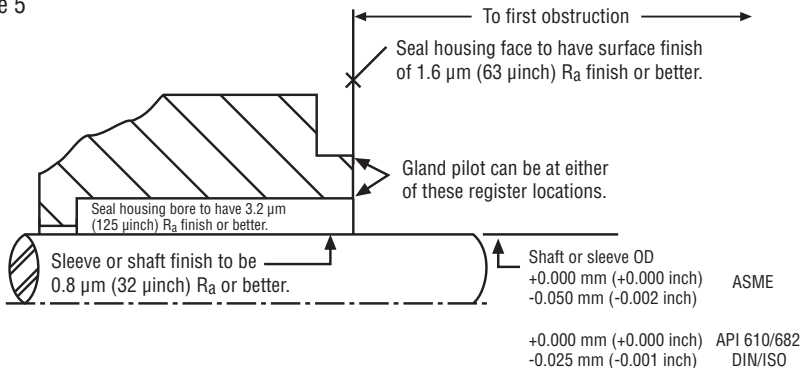


Figure 4

Surface finish requirements

Figure 5



Description

This ISC2 seal is a versatile 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 ISC2 seal family consists of:

ISC2-PX - Single pusher seal with stationary springs

ISC2-PP - Dual pusher seal with stationary springs

ISC2-BX - Single metal bellows seal with rotating bellows

ISC2-BB - Dual metal bellows seal with rotating bellows

ISC2-XP - Single pusher seal with a pumping device for a Plan 23

ISC2-XB - Single metal bellows seal with a pumping device for a Plan 23

2 ISC2 Seal Installation

Note: No seal setting measurements are needed to install the seal. Instructions are for end-suction back pull-out pumps. Modification of these procedures may be required for other style pumps. Consult Flowserve for installation support.

- 2.1 **Lubricate the shaft** or pump sleeve lightly with silicone lubricant unless otherwise specified.
- 2.2 **Tighten the setting device cap screws** to ensure they are tight before installation.
- 2.3 **Slide the ISC2 seal cartridge** onto the shaft or pump sleeve with the setting devices toward the bearing housing. See Figure 2.
- 2.4 **Install the seal chamber** and bolt it in place on the bearing frame. See Figure 3.

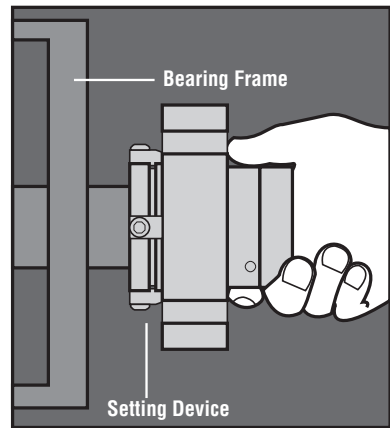


Figure 2

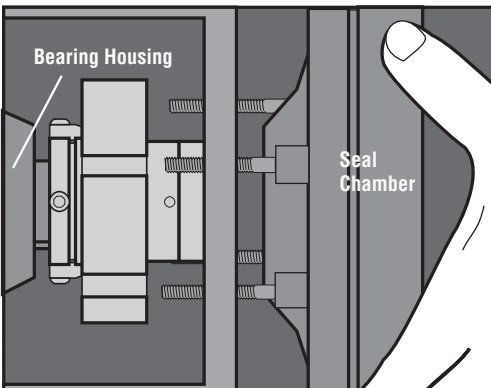


Figure 3

- 2.5 **Position the ISC2 seal** with the gland tight against the seal chamber.
- 2.6 **Orient the ISC2 seal** with the ports aiming as shown on the seal assembly drawing. See Section 3 for Piping Recommendations.
- 2.7 **Tighten the gland nuts evenly in a diagonal sequence.** Do not over-tighten the gland nuts, as this can warp seal parts and cause leakage. Confirm adequate thread engagement before final torque setting.

Recommended ISC2 seal minimum **gland nut torque** by size range:

Seal mm	25 - 50	54 - 70	75 - 102	108 - 152	159 - 203
Size (inch)	(1.000 - 2.000)	(2.125 - 2.750)	(2.875 - 4.000)	(4.250 - 6.000)	(6.250 - 8.000)
Torque	20 N-m (15 ft-lbs)	27 N-m (20 ft-lbs)	40 N-m (30 ft-lbs)	47 N-m (35 ft-lbs)	54 N-m (40 ft-lbs)

Note: Some equipment with small bore seal chambers provide limited access to the gland bolting and setting device cap screws. In some situations, the gland fasteners interfere with the setting devices and window access may require deviation from the standard fastening sequence.

For example, the collar/sleeve assembly may need to be rotated slightly from its factory-set position by loosening the setting device cap screws, rotating the collar/sleeve assembly, then tightening the screws. When nonstandard processes are followed, be careful to maintain the integrity of the seal cartridge at all times.

- 2.8 Assemble the equipment per manufacturer specifications. Avoid pipe strain.
Align the coupling per manufacturer specifications.
- 2.9 With the impeller, shaft, coupling and bearings in their final operating position, tighten the drive collar set screws. See Figure 4.

Note: in designs that have two smaller screws, these are quarter dog screws that hold the collar to the sleeve and should not be tightened. A hex key was provided for the set screws, not for the quarter dog screws.

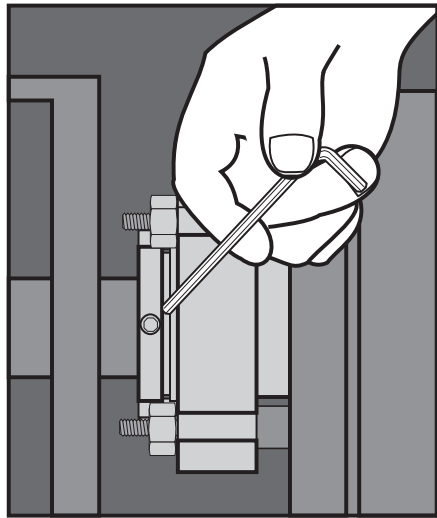


Figure 4

Recommended ISC2 seal minimum **set screw torque** by size range:

Seal mm	25 - 60	67 - 70	75 - 203	75 - 203
Size (inch)	(1.000 - 2.500)	(2.625 - 2.750)	(2.875 - 8.000)	(2.875 - 8.000)
Gland Size	All	All	Standard Bore	Enlarged Bore
Torque	4.5 N-m (40 in-lbs)	13.5 N-m (120 in-lbs)	16.9 N-m (150 in-lbs)	27.1 N-m (240 in-lbs)

- 2.10 **Remove the setting devices** from the drive collar by loosening the cap screws. See Figure 5. Save the setting devices and fasteners for future use when the pump impeller is reset or when the seal is removed for repairs.
- 2.11 **Turn the shaft** by hand to ensure unobstructed rotation.
- 2.12 See **Operational Recommendations** before start-up.

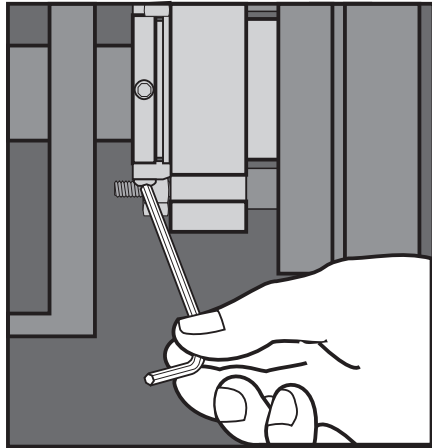


Figure 5

3 Piping Recommendations

- 3.1 Install and maintain an adequate piping plan. The ISC2 seal requires a clean, cool environment for maximum seal life. Typical piping plans are listed below. Contact Flowserve for additional piping plan information or technical support.

Important: All red plastic caps/thread guards are for shipping protection only and should be replaced with either a piping connection or a metal plug in the same metallurgy as the gland.

Plan 02: dead-ended seal chamber with no flush (single seals, always plug Flush port)

Plan 03: circulation created by the design of the seal chamber
(single seals, always plug Flush port)

Plan 11: default inner seal flush from pump discharge on horizontal pumps (single seals)

Plan 13: default inner seal flush and vent from pump suction on vertical pumps (single seals)

Plan 21: inner seal flush from pump discharge through a cooler for use with hot products
(single seals)

Plan 23: inner seal flush from internal pumping device through cooler
(ISC2-XP and ISC2-XB designs)

Plan 32: inner seal clean external flush for use with abrasive products or products that are incompatible with the seal (single seals)

Plan 52: dual seal circulation through a low pressure reservoir (dual seals)

Plan 53: dual seal circulation through a pressurized reservoir (53A),
finned tube array (53B) or piston accumulator (53C) (dual seals)

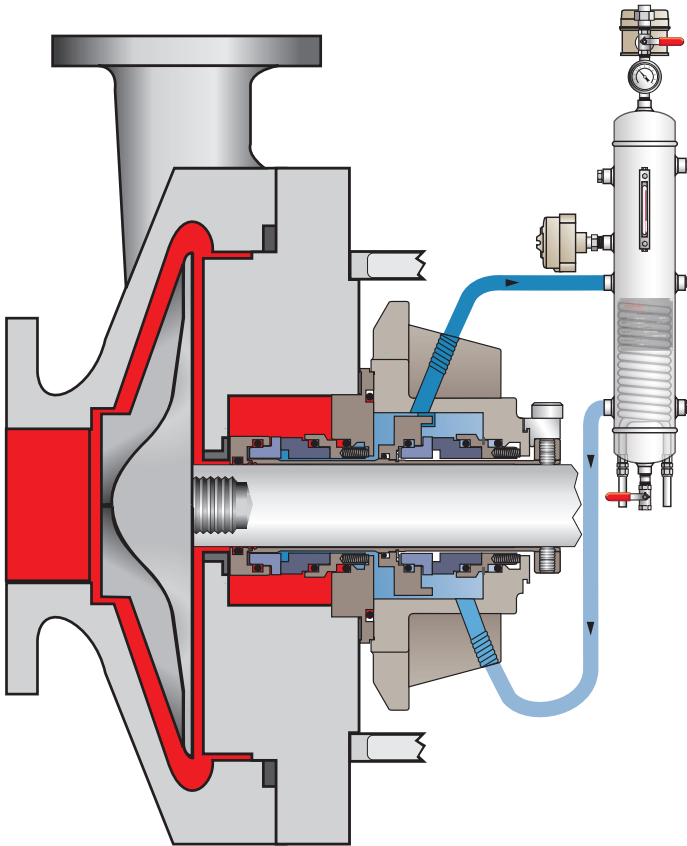
Plan 62: external quench on atmospheric side of seal (single seals)

- 3.2 For **dual seals**, LBI (Liquid Barrier Inlet) and LBO (Liquid Barrier Outlet) are marked on the gland. ISC2 seals are unidirectional and piping the correct inlet and outlet is important to proper circulation. The liquid barrier inlet should draw from the bottom of the support system while the liquid barrier outlet feeds the top of the system.

- 3.3 For **dual pressurized seal (Plan 53, double seal) operation**, supply a clean, compatible barrier fluid at a pressure at least 1.7 bar (25 psi) above the seal chamber pressure. See Figure 6. The pressure of the barrier fluid must not exceed the recommended maximum pressure.

Dual pressurized (Plan 53A) ISC2 with Supply Tank

Figure 6



- 3.4 For **dual unpressurized (Plan 52, tandem seal) operation**, supply a clean, compatible buffer fluid at a pressure below the seal chamber pressure. The pressure in the seal chamber must not exceed the recommended maximum pressure.
- 3.5 For **single seal operation excluding Plan 23**, ensure all ports are fitted with piping or plugs. Plans 02 and 03 must close the Flush port with a metal plug in the same metallurgy as the gland. If Plan 62 is not used, the Quench port should be plugged. The Drain port should be connected to a drain line to prevent leakage along the shaft. Note: the Quench and Drain ports are smaller than the Flush port as a distinguishing feature.
- 3.6 For **single seal operation with Plan 23**, FI (Flush Inlet) and FO (Flush Outlet) are marked on the gland. ISC2 seals are unidirectional and piping the correct inlet and outlet is important to proper circulation. The flush inlet should draw from the bottom of the cooler while the flush outlet feeds the top of the cooler. Ensure piping is optimized for thermosyphon flow.

4 Operational Recommendations

- 4.1 **Remove lock outs** on equipment and valves.
- 4.2 **Do not start up the pump dry** to check motor rotation or for any other reason. Open valves to flood pump with product fluid. Ensure that the seal flush or support system is operating. Vent air from the casing of the pump and the seal chamber before start-up.
- 4.3 **Observe the start-up.** If the seal runs hot or squeals, check the seal flush system. Do not allow the pump to run for any extended time if the seal gets hot or squeals.
- 4.4 **Do not exceed corrosion limits.** The ISC2 seal is designed to resist corrosion through proper material selection. Do not expose the ISC2 seal materials of construction to products outside of their corrosion limits. Consult Flowserve for chemical resistance recommendations.
- 4.5 **Do not exceed pressure and speed limits** established for the ISC2 seal.
- 4.6 **Do not exceed the temperature limits** of the ISC2 seal based on the materials of construction. For dual seals using supply tanks with cooling coils, turn on cooling water to the supply tank before start-up.
- 4.7 **Do not start up or run the ISC2 seal dry.** The seal chamber, pump and support systems should be thoroughly vented before start-up. Buffer or barrier fluid must flood the seal cavity of dual seals at all times during operation. Process fluid must be in the seal chamber at all times during single seal operation.

5 Repairs

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.

To order replacement parts, refer to the part code and B/M number. A spare backup seal should be stocked to reduce repair time.

When seals are returned to Flowserve for repair, **decontaminate the seal assembly** and include an order marked "**Repair or Replace.**" **A signed certificate of decontamination** must be attached. **A Safety Data Sheet (SDS) 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.

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.



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USA and Canada

Kalamazoo, Michigan USA

Telephone: 1 269 381 2650

Telefax: 1 269 382 8726

Europe, Middle East, Africa

Etten-Leur, the Netherlands

Telephone: 31 765 028 200

Telefax: 31 765 028 487

Asia Pacific

Singapore

Telephone: 65 6544 6800

Telefax: 65 6214 0541

Latin America

Mexico City

Telephone: 52 55 5567 7170

Telefax: 52 55 5567 4224