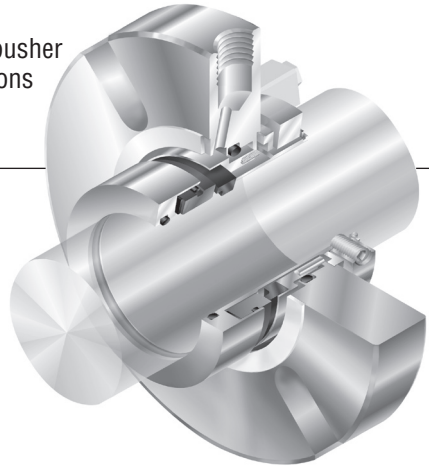


Five Star Seal™ 80 Series

Single, cartridge mounted, flexible stator pusher seal designed for general service applications

84 and 85



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.

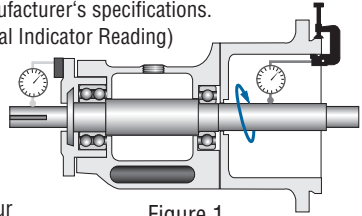


Figure 1

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

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.

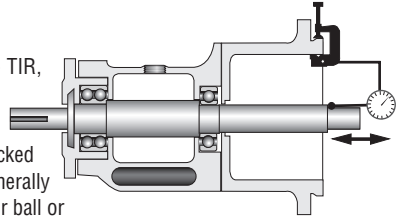


Figure 2

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.

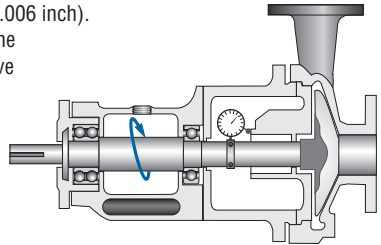


Figure 3

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.

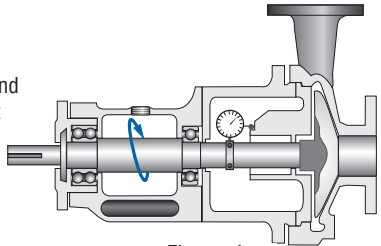
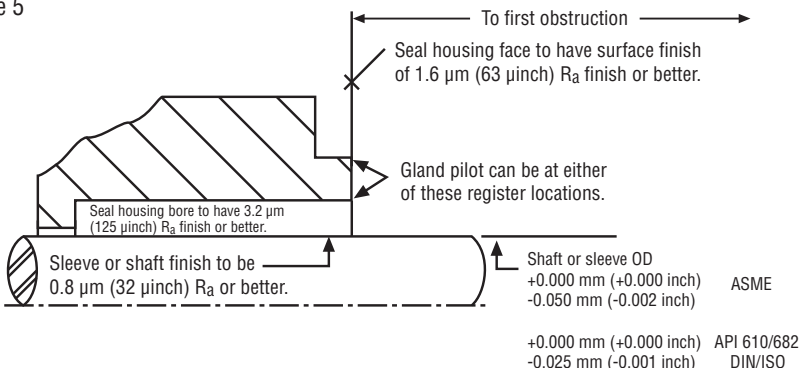


Figure 4

Surface finish requirements

Figure 5



Description

The 84/85 seals are cartridge mounted mechanical seals, designed for ease of installation and reliable operation. **No seal setting dimensions are required.** Rotatable 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 84/85 seals.

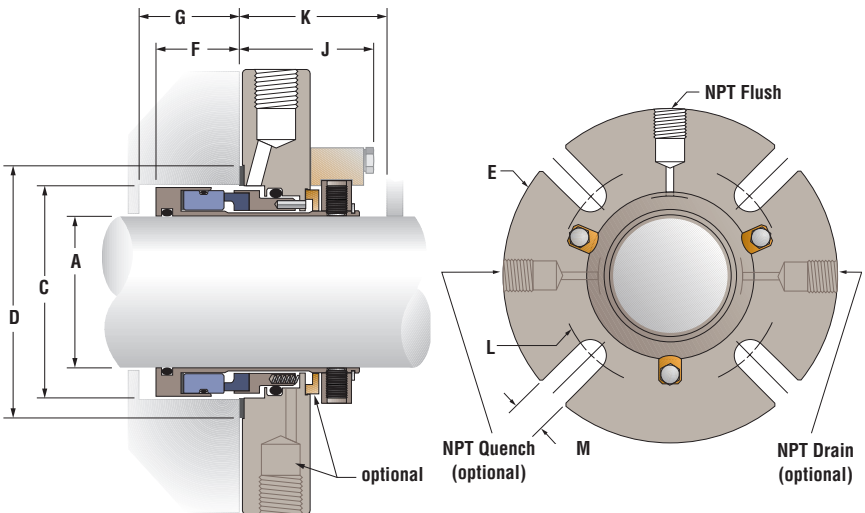
Check gland bolting to ensure that bolt diameter (**M**) and bolt circle diameter (**L**) conform to the dimensions shown in Figure 6.

Handle the 84/85 with care, it is manufactured to precise tolerances. The stationary and rotating sealing 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**.

Critical dimensions include shaft or sleeve OD (**A**), a chamber depth of at least dimension (**G**), minimum and maximum seal housing bore (**C**), and the minimum distance to the first obstruction (**K**). See Figure 6.

84/85 Dimensional Data (inches) for standard bore seal chambers

Figure 6



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.

84/85 Dimensional Data (inches) for standard bore seal chambers

continued

Figure 6

A	C		D	E	F	G		J	K		L	M
Shaft & Seal Size	Box Bore (Min) (Max)		Gasket OD	Gland OD		Box Depth (Min)			Dist to Obst (Min)		Slot Bolt Circle	Bolt Slot Dia.
1.000	1.750	2.010	2.250	4.000	1.025	1.087	1.663	1.725	2.743	0.438		
1.125	1.750	2.135	2.375	4.000	1.025	1.087	1.663	1.725	2.868	0.438		
1.250	2.000	2.260	2.500	4.000	1.025	1.087	1.663	1.725	3.087	0.531		
1.375	2.000	2.385	2.625	4.000	1.025	1.087	1.663	1.725	3.212	0.531		
1.500	2.250	2.510	2.750	4.500	1.025	1.087	1.663	1.725	3.337	0.531		
1.625	2.375	2.635	2.875	5.000	1.025	1.087	1.663	1.725	3.462	0.531		
1.750	2.500	2.760	3.000	5.500	1.025	1.087	1.663	1.725	3.587	0.531		
1.875	2.625	2.885	3.125	5.500	1.025	1.087	1.663	1.725	3.712	0.531		
2.000	2.750	3.010	3.250	5.400	1.025	1.087	1.663	1.725	3.837	0.531		
2.125	2.875	3.135	3.375	6.000	1.025	1.087	1.663	1.725	4.118	0.688		
2.250	3.250	3.760	4.000	6.000	1.025	1.087	1.663	1.725	4.739	0.688		
2.375	3.375	3.885	4.125	6.000	1.025	1.087	1.663	1.725	4.864	0.688		
2.500	3.250	3.760	4.000	6.000	1.025	1.087	1.663	1.725	4.989	0.688		
2.625	3.625	4.135	4.375	6.000	1.025	1.087	1.663	1.725	5.114	0.688		
2.750	3.750	4.260	4.500	7.000	0.860	0.922	1.828	1.890	5.239	0.688		
2.875	3.875	4.385	4.625	7.000	0.860	0.922	1.828	1.890	5.364	0.688		
3.000	4.000	4.510	4.750	8.000	0.860	0.922	1.828	1.890	5.489	0.688		
3.125	4.125	4.635	4.875	8.000	0.860	0.922	1.828	1.890	5.614	0.688		
3.250	4.375	5.135	5.375	8.000	1.548	1.610	2.298	2.360	6.345	0.813		
3.375	4.500	5.260	5.500	8.000	1.548	1.610	2.298	2.360	6.470	0.813		
3.500	4.625	5.385	5.625	8.500	1.548	1.610	2.298	2.360	6.595	0.813		
3.625	4.750	5.510	5.750	8.500	1.548	1.610	2.298	2.360	6.720	0.813		
3.750	4.750	5.510	5.750	8.750	0.893	0.955	1.828	1.890	6.708	0.813		
4.000	5.250	6.010	6.250	9.000	1.420	1.482	2.553	2.615	7.220	0.813		
4.250	5.500	6.260	6.500	9.500	1.420	1.482	2.553	2.615	7.470	0.813		
4.375	5.625	6.385	6.625	9.500	1.420	1.482	2.553	2.615	7.595	0.813		
4.500	5.750	6.510	6.750	10.000	1.420	1.482	2.553	2.615	7.720	0.813		
4.625	5.875	6.635	6.875	10.500	1.420	1.482	2.553	2.615	8.032	1.000		
4.750	5.750	6.573	6.813	9.500	1.298	1.360	2.298	2.360	7.719	0.813		
4.875	6.125	6.885	7.125	11.000	1.420	1.482	2.553	2.615	8.282	1.000		
5.000	6.500	7.510	7.750	11.000	1.709	1.771	2.673	2.735	8.907	1.000		
5.125	6.625	7.635	7.875	11.500	1.709	1.771	2.673	2.735	9.032	1.000		
5.250	6.750	7.760	8.000	11.500	1.709	1.771	2.673	2.735	9.157	1.000		
5.375	6.875	7.885	8.125	11.500	1.709	1.771	2.673	2.735	9.282	1.000		
5.500	7.000	8.010	8.250	11.500	1.709	1.771	2.673	2.735	9.407	1.000		
5.625	7.125	8.135	8.375	11.500	1.709	1.771	2.673	2.735	9.532	1.000		
5.750	7.250	8.260	8.500	12.000	1.709	1.771	2.673	2.735	9.657	1.000		
5.875	7.375	8.385	8.625	12.000	1.709	1.771	2.673	2.735	9.782	1.000		
6.000	7.500	8.510	8.750	12.000	1.709	1.771	2.673	2.735	9.907	1.000		
6.500	8.500	9.510	9.750	12.000	1.987	2.049	2.923	2.985	10.907	1.000		
7.000	9.000	10.010	10.250	14.000	1.987	2.049	2.923	2.985	11.407	1.000		

2 84/85 Installation

2.1 Tools needed for installation:

- An open end wrench for the gland bolt nuts
- 1/8" and 3/16" hex wrench (provided)
- 5/16" and 3/8" open end wrench (provided)
- Silicone Lubricant

2.2 Lubricate the shaft or sleeve lightly with silicone lubricant.

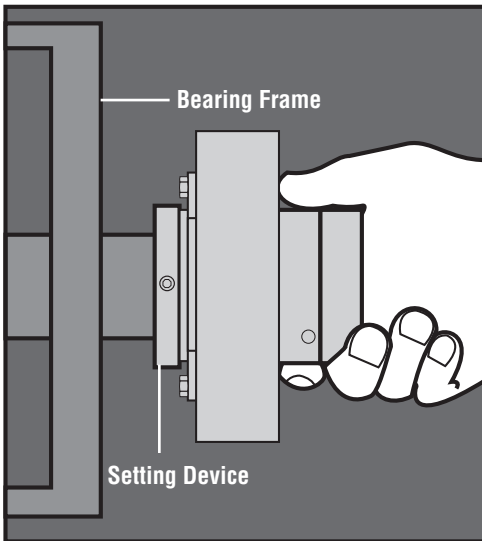


Figure 7

2.3 **Install the complete 84/85 cartridge assembly onto the shaft or sleeve with the setting devices near the bearing housing.** See Figure 7.

2.4 **Install the pump back plate (seal chamber) and bolt it in place on the bearing frame.** See Figure 8.

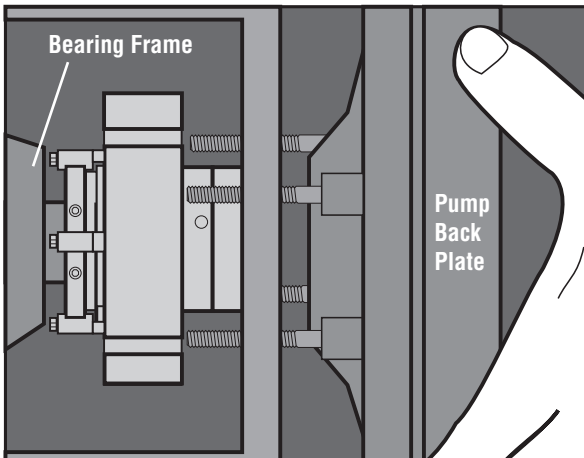


Figure 8

2.5 **Position the 84/85** with the gland tight against the seal chamber face. Turn the gland so that the flush tap is as close to the 12:00 o'clock position as possible and so that the flush piping will clear the bearing frame. **Tighten the gland nuts** evenly in a diagonal sequence. Do not overtighten the gland nuts, as this can warp seal parts and cause leakage.

2.6 **Assemble the pump.** Avoid pipe strain. Align coupling properly.

2.7 With the impeller, shaft, coupling, and bearings in their final operating positions, **tighten the 84/85 set screws**. See Figure 9.

2.8 **Rotate the setting devices** 180° from the drive collar and retighten. See Figure 10. Loosen the hex head bolts in the bronze centering tabs, rotate 180° to clear the drive collar. Retighten the hex head bolts to store the setting device on the gland.

2.9 **Turn the shaft** by hand to ensure unobstructed operation.

2.10 See **Operational Recommendations** before start-up.

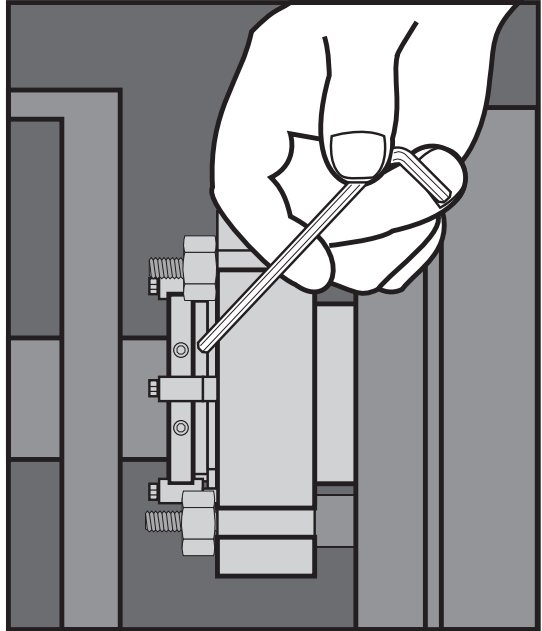


Figure 9

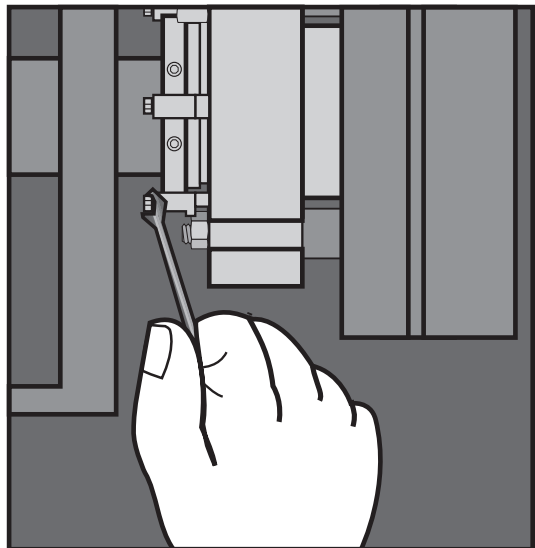


Figure 10

3 Operational Recommendations

- 3.1 Install an **adequate seal flush** system. The 84/85 requires a clean cool environment for maximum seal life. With a clean cool product, use a bypass flush from the pump discharge (plan 11) or a bypass flush to the pump suction (plan 13). With clean hot product, use a bypass flush through a cooler (plan 21). With abrasive products or products that are incompatible with the seal, use a flush from a clean external source (plan 32).

Note: All piping plan designations used in these instructions are from API 682. For the corresponding ASME B73 piping plan designation, please add a 73 in front of the referenced piping plan.

- 3.2 **Remove lock outs** on pump and valves.
- 3.3 **Do not start up the equipment dry** to check motor rotation, etc. Open valves to flood pump with product fluid. Ensure that the seal flush system is operating. Vent air from the casing of the pump and the seal chamber before start-up.
- 3.4 **Observe the start-up.** If the seal runs hot or squeals, check the seal flush system. Do not allow the equipment to run for any extended time if the seal gets hot or squeals.

4 Operational Recommendations

- 4.1 **Do not exceed corrosion limits.** The 84/85 seal is designed to resist corrosion by most chemicals. However, do not expose the 84/85 materials of construction to products outside of their corrosion limits.
- 4.2 **Do not exceed the Pressure limits** of the 84/85 seal, contact your nearest Flowserve Sales and Service Representative or Authorized Distributor.
- 4.3 **Do not exceed the temperature limits** of the 84/85 seal. The materials of construction are listed on the box label. Turn on cooling water to the supply tank before start up if the tank has coils.

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



TO REORDER REFER TO

B/M # _____

F.O. _____

5 Repair

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.

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