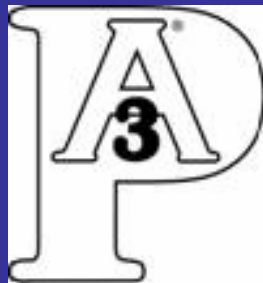


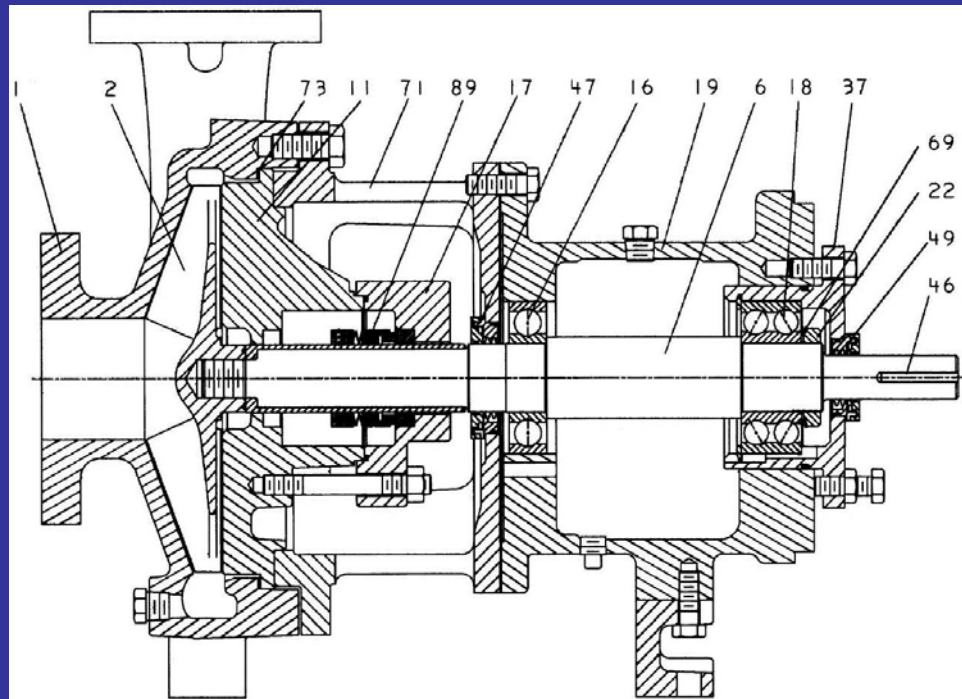
P3-A Standards
VS
ASME B73.1

Seals & Seal Chambers



P3-A Standards – Seals and Seal Chambers

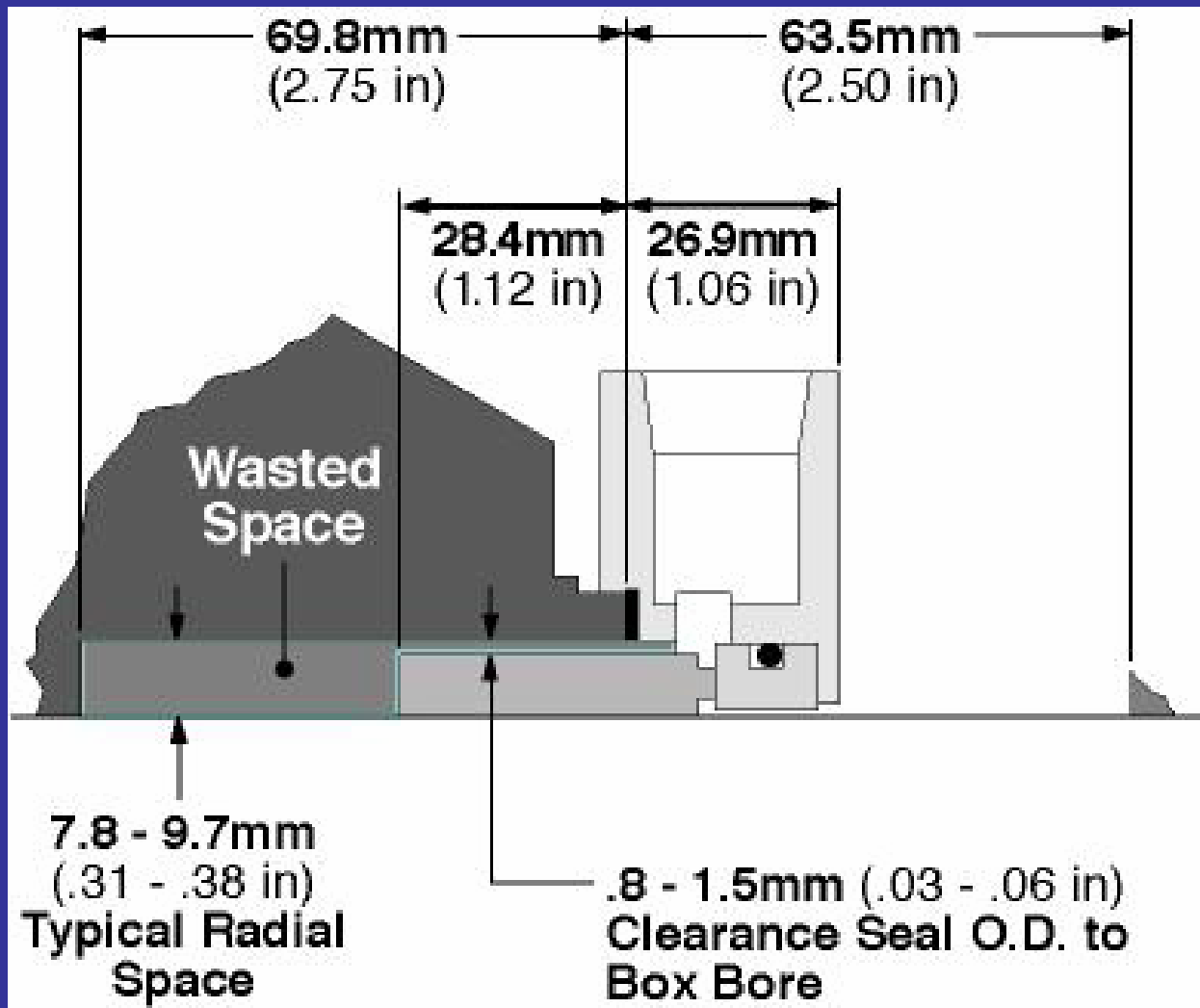
Typical ASME B73.1 Pump



- | | |
|------------------------|----------------------------------|
| 1 Casing | 37 Cover, bearing, outboard |
| 2 Impeller | 46 Key, coupling |
| 6 Shaft, pump | 47 Seal, bearing cover, inboard |
| 11 Cover, seal chamber | 49 Seal, bearing cover, outboard |
| 16 Bearing, inboard | 69 Lockwasher |
| 17 Gland | 71 Adapter |
| 18 Bearing, outboard | 73 Gasket |
| 19 Frame | 89 Seal |
| 22 Locknut, bearing | |

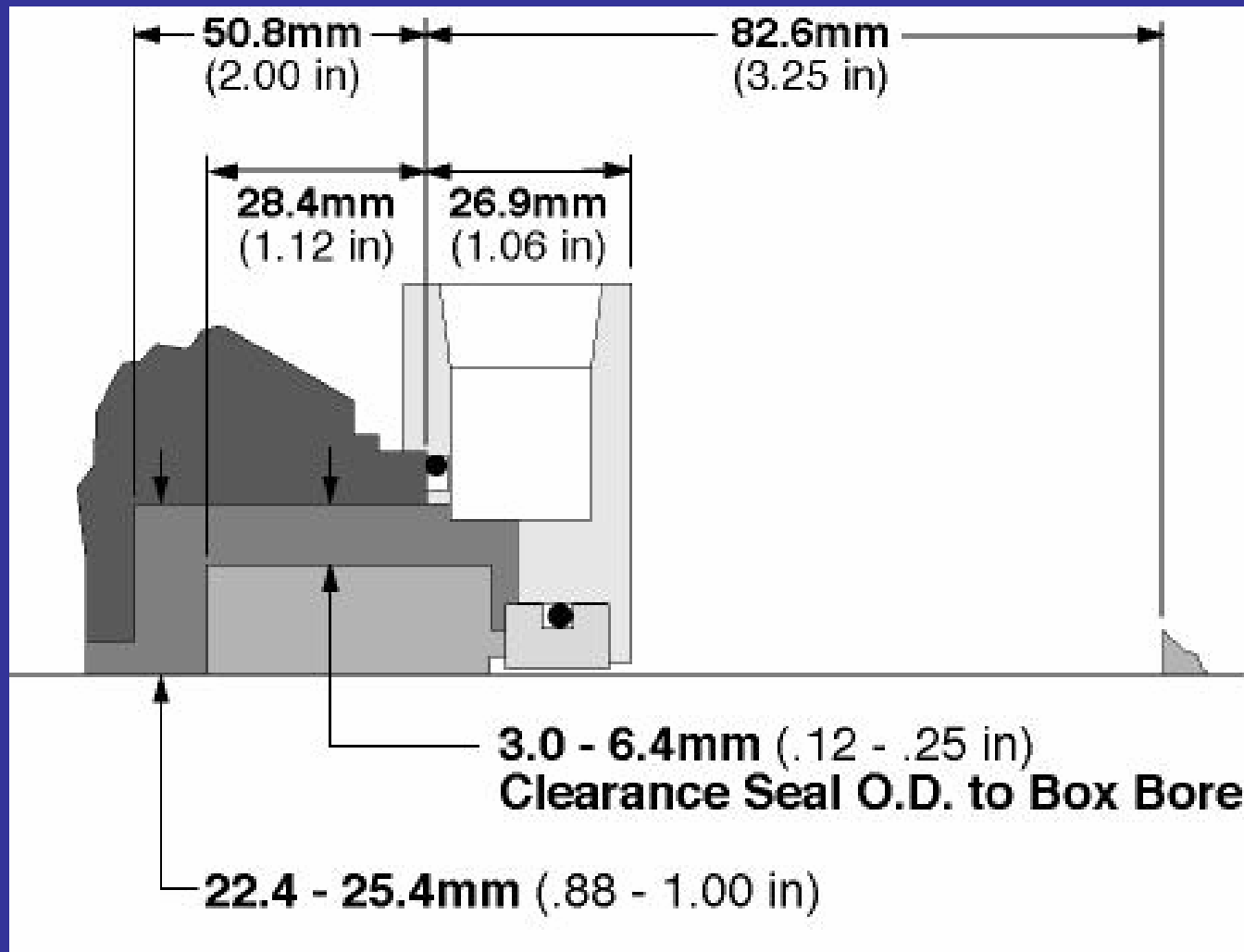
P3-A Standards – Seals and Seal Chambers

Stuffing Box – Small Bore Seal Chamber



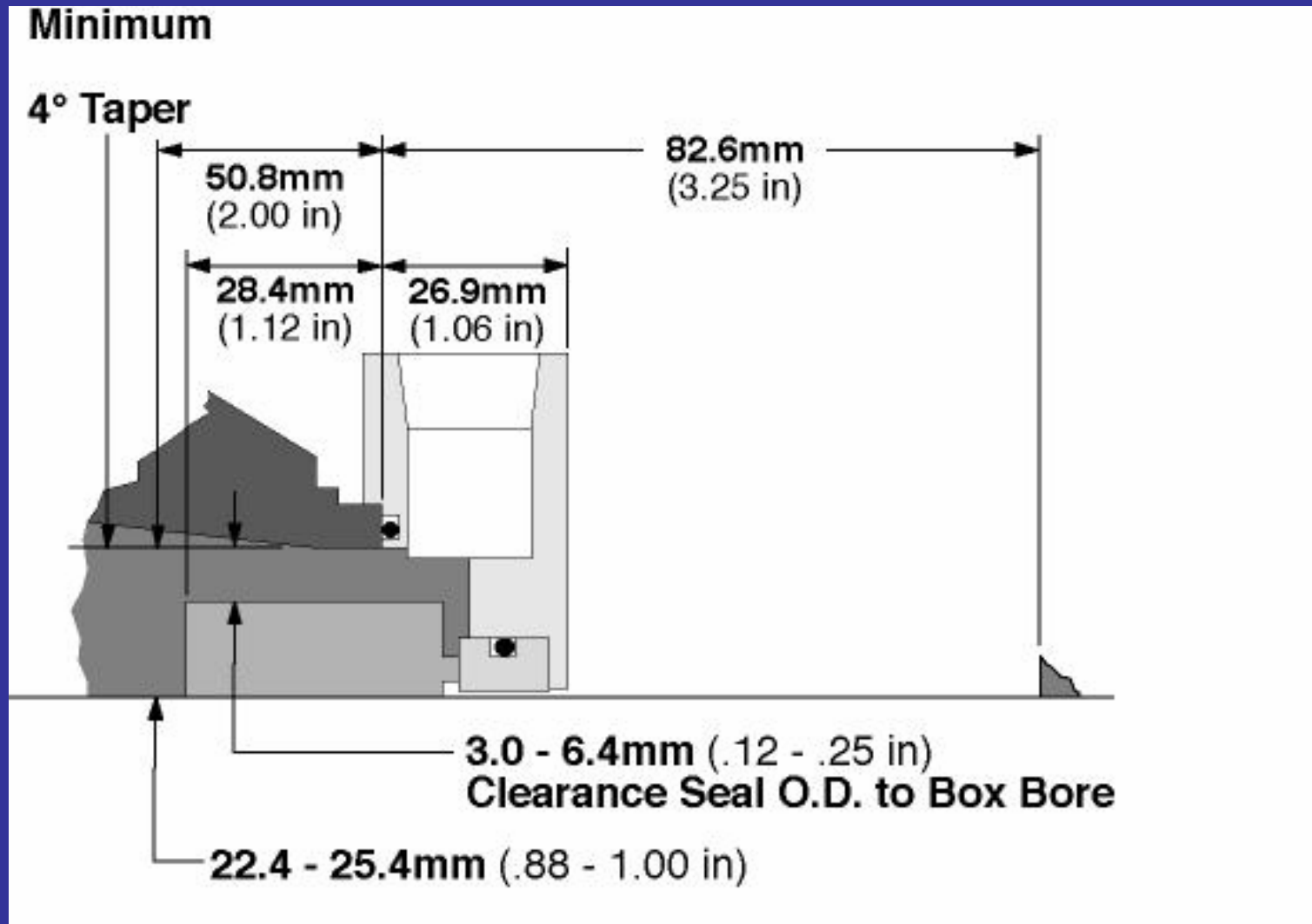
P3-A Standards – Seals and Seal Chambers

Large Cylindrical Bore Seal Chamber



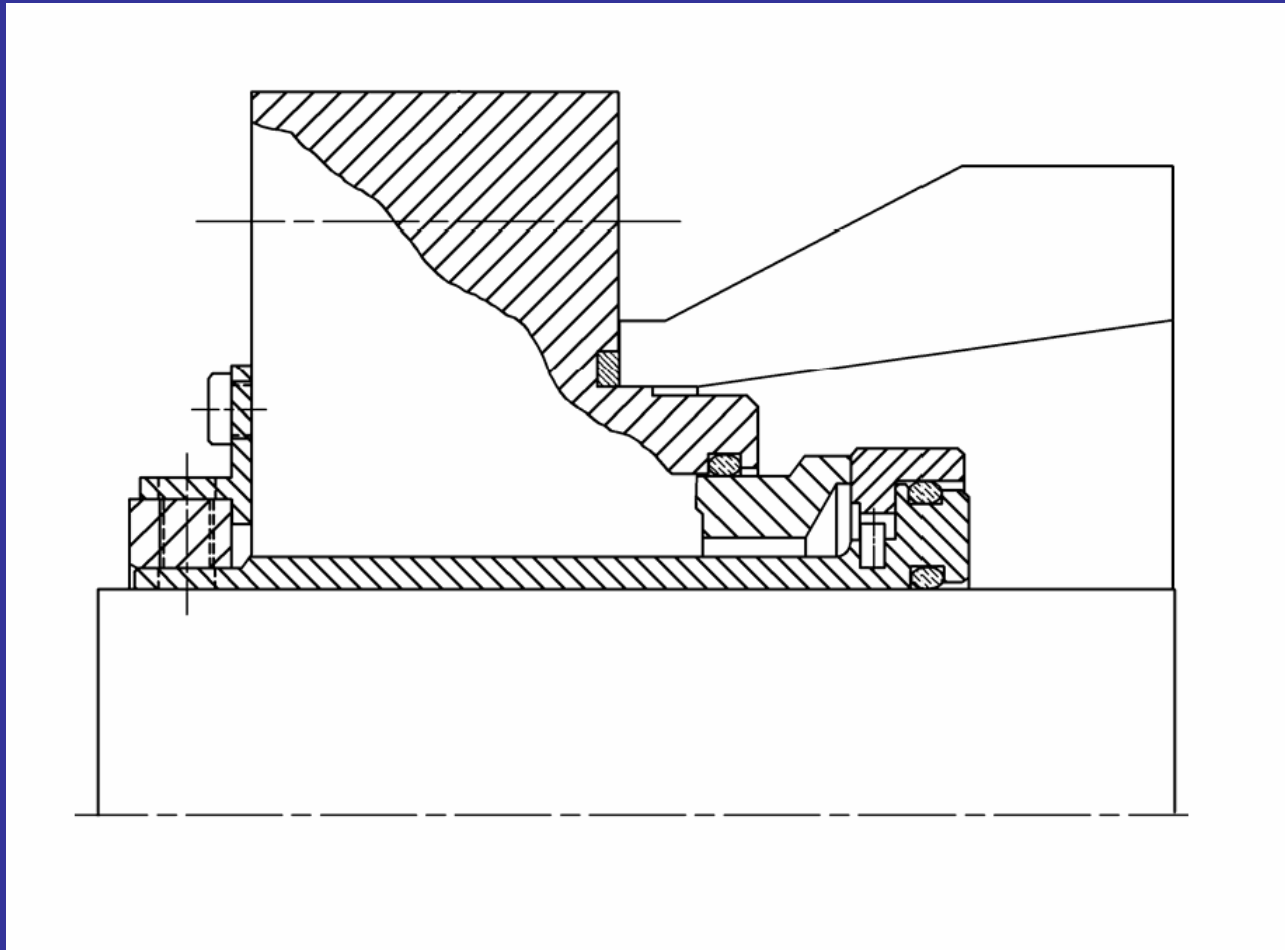
P3-A Standards – Seals and Seal Chambers

Tapered Large Bore Seal Chamber



P3-A Standards – Seals and Seal Chambers

P3-A Compliant Seal in Large Tapered Bore Seal Chamber



P3-A Standards – Seals and Seal Chambers

- **Materials – Selection of materials, finishes, and fabrication methods shall be based upon understanding of the environment of intended use. The owner/user shall accordingly be responsible for the final selection of materials of construction...**
- **Metals – Metal product contact surfaces shall be specified by the user from among the metals listed in P3-A 002. Metals shall be suitable for all phases of the process, including cleaning and steaming.**
- **Metals – Metallic materials used as product contact surfaces shall be resistant to corrosive attack... general corrosion rate shall not exceed 0.010 in/yr**

P3-A Standards – Seals and Seal Chambers

- **Elastomers – Elastomers shall be non-toxic and non-absorbent. Elastomers shall meet the requirements of P3-A 002:**
 - **Comply with 21 CFR177 - or-**
 - **Comply with USP Class IV, V, VI as applicable**
- **Lubricants – Lubricants intended for use during assembly shall meet requirements of P3-A 002:**
 - **Lubricants shall not be chemically reactive with equipment surfaces or product and shall not be used as a direct product contact surface**
- **Draining – All product contact surfaces shall be drainable without pump disassembly or removal**

P3-A Standards – Seals and Seal Chambers

P3-A

- **D6.1 The primary product mechanical end face seal shall be sanitary in design with all product contact parts demountable and accessible for inspection and cleaning.**
- **D6.2 Metal Bellows seals, split seals, and packing shall not be used. Seals that use set screws on product contact surfaces shall not be allowed.**

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- **4.6 Various seal types and packing allowed**
- **4.6 Various seal types and packing allowed. Set screws drive is common.**

P3-A Standards – Seals and Seal Chambers

P3-A

- **D6.3 Seals utilizing single spring designs that reside on the product side of the seal may only be used if manual cleaning methods, requiring pump disassembly, are utilized.**
- **D6.4 Seals shall be capable of momentary dry running. Details of such occurrences shall be specified by the end user.**

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- **4.6 Single Spring seals allowed**
- **4.6 Not Covered**

P3-A Standards – Seals and Seal Chambers

P3-A

- **D6.5 In liquid lubricated seal arrangements the buffer/barrier fluid used in dual seal arrangements shall be provided by the owner/user. The design of the outboard sealing chamber as applicable, piping circuit, and reservoir shall allow for the ability to drain and change the buffer/barrier fluid in order to reduce particulates, prevent degradation of the fluid lubricating properties, and manage biological degradation of some buffer/barrier fluids as necessary.**

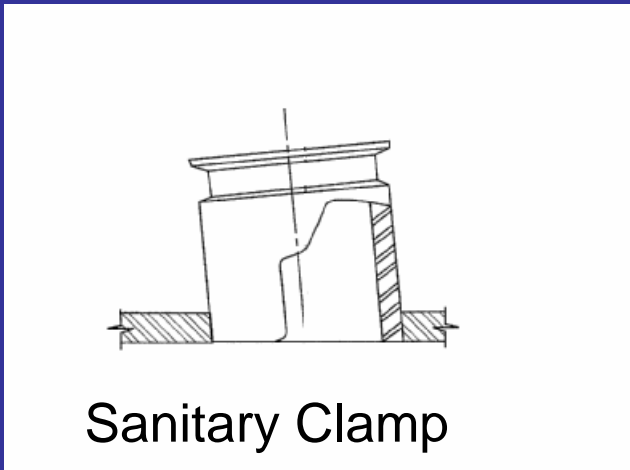
ASME B73.1

- **Figure 2 – Generic piping plans & general notes**

P3-A Standards – Seals and Seal Chambers

P3-A

- **D6.6 Seal Chambers shall be tapered bore design that will allow for complete draining of the pumped product in an assembled state. Seal chambers shall not contain threaded connections on product contact surfaces.**



Sanitary Clamp

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- **4.6.1, 4.6.2, & 4.12.4 Allows for stuffing boxes, cylindrical or tapered bore designs. Also specifies seal gland connections shall be 1/4" NPT minimum with 1/2" NPT preferred.**

P3-A Standards – Seals and Seal Chambers

P3-A

- **D6.7 Seal chambers and/or gland plates shall be designed such that the seal chamber and piping system, if supplied, is self-venting during start-up and operation.**
- **D6.8 Seal chambers shall not contain throat bushings.**
- **D6.9 Seal Chambers shall be provided by the pump or seal manufacturer.**

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- **4.6.2 Allows for vent connections (manual venting)**
- **4.6.5.1 Allows for throat bushings**
- **4.6 Not specific**

P3-A Standards – Seals and Seal Chambers

P3-A

- **D6.10 All product contact surfaces in the seal chamber and gland plate shall be as cast or machined. Machined surfaces shall have a maximum surface roughness of 63µin Ra. Specific surface finishes other than stated above shall be specified on the data sheet (Appendix A).**

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- **4.6.2 Secondary sealing surfaces shall not exceed a roughness of 63µin. Figure 6 allows 250 Ra minimum or as cast on the tapered bore surface**

P3-A Standards – Seals and Seal Chambers

P3-A

- D7.1 Gaskets and O-ring retaining grooves in product contact surfaces for removable gaskets shall not exceed 1/4" in depth or be less than 1/4" wide except those for standard O-rings smaller than 1/4" , and those provided in Table 1.

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- Gland-to-seal chamber gasket or O-ring shall be confined to prevent blowout

TABLE 1 - Groove Radii Dimensions for Standard O-Rings

O-Ring Cross Section, Nominal (AS 568 ²)	O-Ring Cross Section, Actual (AS 568)	O-Ring Cross Section, Actual (ISO 3601-1 ³)	Minimum Groove Radius
1/16 in.	0.070 in.	1.80 mm	0.016 in. (0.406 mm)
3/32 in.	0.103 in.	2.65 mm	0.031 in. (0.787 mm)
1/8 in.	0.139 in.	3.55 mm	0.031 in. (0.787 mm)
3/16 in.	0.210 in.	5.30 mm	0.062 in. (1.575 mm)
1/4 in.	0.275 in.	7.00 mm	0.094 in. (2.388 mm)