

GP 10-01-03	Shaft Sealing Systems for Centrifugal and Rotary Pumps	March 2005
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Shaft Sealing Systems for Centrifugal and Rotary Pumps

GP 10-01-03

Scope

- 1) [I] This Global Practice (GP) covers pump mechanical seals and sealing systems regardless of size, pressure, temperature or fluid of application.
 - 2) [I] All requirements specified in this GP are additions to those of API STD 682-1 (first edition, October 1994), unless specifically noted as exceptions. Section numbers in this GP which do not appear in API STD 682-1 are new paragraphs.
 - 3) [I] An asterisk (*) indicates that a decision by Purchaser is required or that additional information is furnished by Purchaser.
 - 4) [I] A bullet (•) is shown in API STD 682-1, indicating that a Purchaser decision is required.
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1. Required References

[I] This Section lists Practices and Standards that are generically referenced and assumed to be a part of this document. Unless otherwise specified herein, use the latest edition.

1.1. Global Practices–ExxonMobil Engineering Practices

GP 03-12-01	Valve Selection
GP 18-12-01	Positive Material Identification

1.2. ExxonMobil Data Sheets

ExxonMobil Data Sheets	ExxonMobil Data Sheet Home Page
T100103C01	Category 1 & 2 Seals - Mechanical Seal Data Sheet for Centrifugal & Rotary Pumps - Customary Units
T100103C02	Category 3 Seals - Mechanical Seal Data Sheet for Centrifugal & Rotary Pumps - Customary Units
T100103M01	Category 1 & 2 Seals - Mechanical Seal Data Sheet for Centrifugal & Rotary Pumps - Metric (S.I.) Units
T100103M02	Category 3 Seals - Mechanical Seal Data Sheet for Centrifugal & Rotary Pumps - Metric (S.I.) Units

1.3. API–American Petroleum Institute

API STD 682-1	Shaft Sealing Systems for Centrifugal and Rotary Pumps First Edition, October 1994
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1.4. ASME–American Society of Mechanical Engineers

ASME B16.11	Forged Fittings, Socket-Welding and Threaded
ASME B31.3	Process Piping
ASME SEC VIII D1	BPVC Section VIII - Rules for Construction of Pressure Vessels - Division 1

2. Additional Requirements

* [I] The following GP shall be used with this Practice as specified by Purchaser.

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2.1. Global Practices–ExxonMobil Engineering Practices

GP 18-10-01	Additional Requirements for Materials
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3. Revisions to API Standard 682

All headings contained herein correspond to paragraph numbering within API STD 682-1, first edition, December 1994, and reflect additions, substitutions, modifications, and deletions. All provisions not modified or deleted remain in force.

Modifications to Section 1: General

1.1.1.e. Addition: Vendor Qualification

[R] Seals and sealing systems rated over 500 psig (34.5 barg), sealing liquids above 500°F (260°C) or below 32°F (0°C) or with a balance diameter equal to or greater than 4 in. (100 mm) and all dual seals regardless of service shall be supplied by vendors qualified by experience to manufacture the units proposed. To qualify, Vendor must have at least two seals of comparable tangential speed, pressure, temperature, and fluid properties. These seals must have been in service for at least one year and be performing satisfactorily.

1.2.a. Addition: Alternative Designs

* [R] Where Vendor qualification requirement of Paragraph 1.1.1e prevents the application of the latest technology, Vendor shall submit to the purchaser an alternative proposal incorporating such features for review and approval by the Owner's Engineer. The proposal shall specifically identify the undemonstrated features and state their advantages.

Modifications to Section 2: Seal Design

2.1.5. Exception: Standard Seal Types and Arrangements

□ [R] Balanced outer seals are preferred.

2.1.6. Addition: Standard Seal Types and Arrangements

- a) * [R] Pressurized dual seals which cannot be operated at rated barrier pressure with atmospheric pressure in the pump require approval by the Owner's Engineer.
- b) [I] Pressurized dual seals using a gas or vapor as the barrier fluid are acceptable alternatives to liquid barrier designs and shall also meet the requirements of Paragraph 2.1.6a.

2.3.6. Addition: Seal Chambers and Glands

[I] Operation of a pressurized dual seal (Arrangement 3) with rated barrier fluid pressure and ambient pressure in the pump shall be considered when determining stress levels.

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2.3.9. Addition: Seal Chambers and Glands

- a) [R] Mechanical seal gland plates shall be furnished with a connection to permit measurement of seal chamber pressure during normal operation when a connection is not provided on the seal chamber directly. The seal chamber external vent if provided may be used for this purpose.
- b) □ When a pressure measurement port is provided in the gland it shall be directed to an area of the seal chamber and not the area used for distribution of flush fluid. When inclusion of this second port restricts the flow area for flush distribution or may otherwise negatively impact seal face cooling/flushing the design shall be submitted to Purchaser for review and approval of the Owner's Engineer.

2.3.10. Exception: Seal Chambers and Glands

□ [O], [R] Seal chamber conditions of pressure and temperature shall meet the seal vendor's requirements for satisfactory margin to vaporization with a minimum margin of 25 psi (1.72 bar). Where special provisions must be added to the pump or seal (such as floating throat bushings, coolers or hydropadded faces) to meet the required conditions the special provisions shall be submitted to Purchaser for review and approval of the Owner's Engineer.

2.3.11. Addition: Seal Chambers and Glands

[R] For single seals with stationary flexible elements, the flush inlet arrangement shall be designed to avoid erosion of the stationary seal elements.

2.3.16. Addition: Seal Chambers and Glands

[O], [M] Gland plates for Arrangement 1 seals shall be furnished with flush inlet, quench inlet and drain connections as a minimum.

2.3.18.1. Addition: Seal Chambers and Glands

[O], [R] Unless specified otherwise, for vertical pumps utilizing any flush plan other than 02, 23, 53 or 54, the specified port for the inner seal shall be used to connect a plan 13 flush in addition to the specified flush. The orifice shall be sized to allow free removal of vapor without significantly affecting seal chamber pressure. When the port is used as the barrier/buffet fluid exit of a dual seal, the orifice and valve shall be eliminated.

2.3.20.a. Addition: Seal Chambers and Glands

* [I] Floating bushings shall be carbon.

2.3.20.b. Exception: Seal Chambers and Glands

□ Alternative secondary devices will be specified by Purchaser.

2.3.20.c. Addition: Seal Chambers and Glands

Contacting (dry running) backup seals and non contacting abeyant backup seals shall not be used for pumping temperatures above 350°F (176°C) unless a Plan 21, 23 or 32 cool flush is used to avoid coking and the need for steam quench.

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