

Sealless Centrifugal Pumps for Petroleum, Petrochemical, and Gas Industry Process Service

API STANDARD 685
SECOND EDITION, FEBRUARY 2011



AMERICAN PETROLEUM INSTITUTE

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Downstream Segment

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Introduction

Users of this National Standard should be aware that further or differing requirements may be needed for individual applications. This National Standard is not intended to inhibit a Vendor from offering, or the Purchaser from accepting, alternative equipment or engineering solutions for the individual application. This may be particularly appropriate where there is innovative or developing technology. Where an alternative is offered, the Vendor should identify any variations from this National Standard and provide details.

Annex A contains application specific information and cautions.

Annex B contains hazard-based criteria for secondary containment/control specification.

Annex C contains nomenclature for sealless pumps.

Annex D contains schematic drawings of cooling water and circulation systems.

Annex E defines options for instrumentation and protective systems.

Annex F specifies criteria for piping design.

Annex G gives guidance on material class selection.

Annex H specifies requirements and gives guidance on materials selection.

Annex I provides information on magnetic materials for magnetic couplings.

Annex J specifies requirements for determining residual unbalance.

Annex K provides information and examples for pressure temperature profiles in the recirculation flowpath.

Annex L specifies requirements for lateral analysis.

Annex M specifies requirements for standard baseplates.

Annex N contains an inspector's checklist.

Annex O contains forms which may be used to indicate Vendor drawing and data requirements.

Annex P contains forms which may be used to record test data.

Annex Q specifies calculations for specific speed and suction specific speed.

Annex R contains a data sheet format which Purchasers are encouraged to use.

This National Standard requires the Purchaser to specify certain details and features.

A bullet (•) at the beginning of a subclause or paragraph indicates that either a decision by, or further information from, the Purchaser is required. Further information should be shown on the data sheets or stated in the quotation request and purchase order.

In this National Standard, US Customary units are included in brackets for information.

Sealless Centrifugal Pumps for Petroleum, Petrochemical, and Gas Industry Process Service

1 Scope

1.1 This standard specifies the minimum requirements for sealless centrifugal pumps for use in petroleum, heavy duty petrochemical and gas industry services. Refer to Annex A for application information. Notes following a clause are informative.

1.2 This standard is applicable to single stage overhung pumps of two classifications, Magnetic Drive Pumps (MDP) and Canned Motor Pumps (CMP). Sections 2 through 8 and Section 10 cover requirements applicable to both classifications. Section 9 is divided into two subsections and covers requirements unique to each classification.

NOTE Extension of applicability to other designs such as multistage will need additional input and agreement between Purchaser and Supplier.

1.3 When application of sealless pumps is indicated, relevant industry operating experience suggests sealless pumps produced to this Standard may be used for many applications and should be applied when conditions exceed any of the following:

— Discharge pressure	1900 kPa	(275 psig)
— Suction pressure	500 kPa	(75 psig)
— Pumping temperature	150 °C	(300 °F)
— Rotative speed	3600 r/min	
— Rated total head	120 m	(400 ft)
— Impeller diameter	330 mm	(13 in.)

NOTE For sealed pumps, refer to ISO Standard 13709 (API 610).

2 Normative References

2.1 The following referenced documents are indispensable for the application of this document. The way in which these referenced documents are cited determines the extent (in whole or in part) to which they apply. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

API 547, *General-purpose Form-wound Squirrel-cage Induction Motors—250 Horsepower and Larger*

API 611, *General-purpose Steam Turbines for Petroleum, Petrochemical, and Gas Industry Service*

API 670, *Machinery Protection Systems*

API 677, *General-purpose Gear Units for Petroleum, Chemical, and Gas Industry Services*

ABMA 7 ¹, *Shaft and Housing Fits for Metric Radial Ball and Roller Bearings (Except Tapered Roller Bearings) Conforming to Basic Boundary Plan*

¹) American Bearing Manufacturers Association, 2025 M Street, NW, Suite 800, Washington, DC 20036, USA.