



American National Standard for

Rotodynamic Pumps

for Pump Piping



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American National Standard

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Foreword [Not part of American National Standard (ANSI)]

Purpose and aims of the Hydraulic Institute

The purpose and aims of the Hydraulic Institute are to drive all Pump System stakeholders towards a sustainable future by:

- a) Advancing Solutions for Pump System Performance and Efficiency
- b) Developing Standards and Technical Resources
- c) Educating the Global Marketplace
- d) Advocating for the Industry

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Comments from users of this standard will be appreciated, to help the Hydraulic Institute prepare even more useful future editions. Questions arising from the content of this standard may be directed to the Technical Director of the Hydraulic Institute. If appropriate, the inquiry will then be directed to the appropriate technical committee for provision of a suitable answer.

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Units of measurement

Metric units of measurement are used, and corresponding US customary units appear in parentheses. Charts, graphs, and sample calculations are also shown in both metric and US customary units. Because values given in metric units are not exact equivalents to values given in US customary units, it is important that the selected units of measure to be applied be stated in reference to this standard. If no such statement is provided, metric units shall govern.

Consensus

Consensus for this American National Standard was achieved by use of the canvass method. The following organizations, recognized as having an interest in the standardization of pumps, were contacted prior to the approval of this revision of the standard. Inclusion in this list does not necessarily imply that the organization concurred with the submittal of the proposed standard to ANSI.

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Hydraulic, Measurement, and Inspection Consulting, LLC	Peerless Pump Company
Budris Consulting	Formally Sulzer
4B Engineering & Consulting, LLC	Summit Pump Inc
CDM Smith	Pentair
DynaTech Engineering, Inc.	Weir Minerals NA
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Kennedy Jenks	Westinghouse Electric Co.
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Carollo Engineers	Irving Oil
Trillium Pumps USA, Inc.	Syncrude Canada

Committee list

Although this standard was processed and approved for submittal to ANSI by the canvass method, a working committee met many times to facilitate its development. At the time it was developed, the committee had the following members:

Chair – Dave Werth, Clemson Engineering Hydraulics, Inc.

Vice-chair – Steven Fehniger, CDM Smith, Water Services Group

Chair (Retired) – Mick Cropper, Sulzer (Retired)

Committee Member

Lloyd Aanonsen
Charlie Allaben
Paul Boyadjis
Jack Claxton
Bob Hawboldt
Kara Hurtig
Andrew Johansson

Company

General Rubber Corporation
HDR, Inc.
Mechanical Solutions, Inc.
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AE - Associated Engineering
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Alden Research Laboratory, Inc.

Committee Member

Daniel Boldt
Mark Lawson
Fangbiao Lin
Paul Moulton
Michael Mueller
Jeff Olsen
Maria Elena Rodriguez Hernandez
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David Skinner
Mark Supplee
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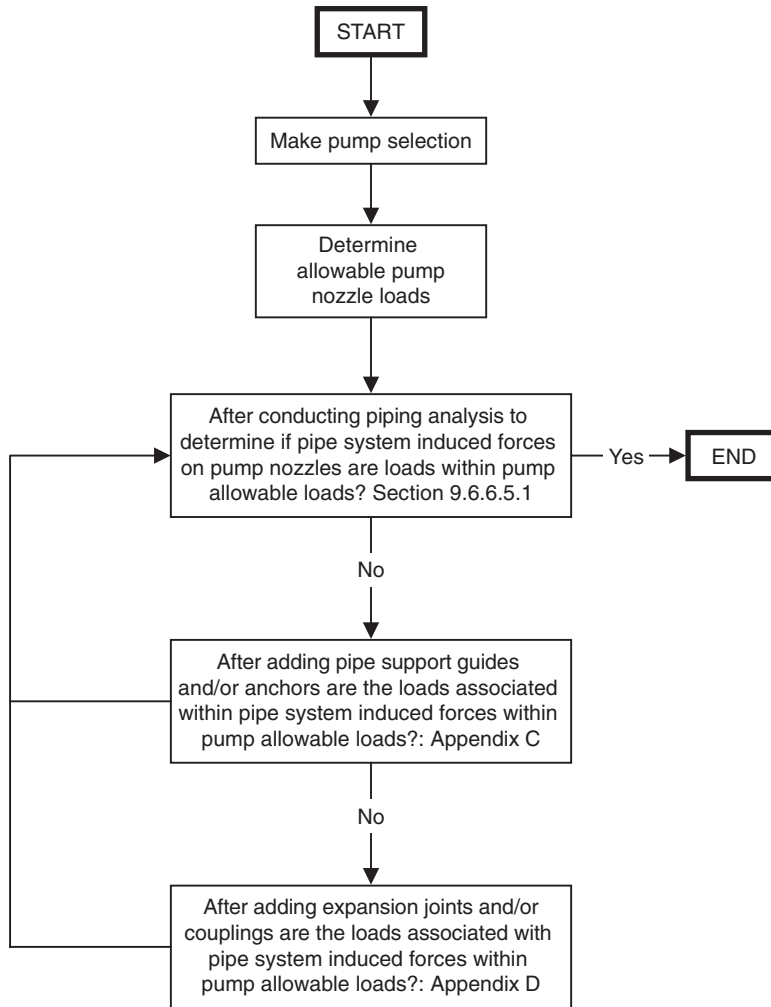
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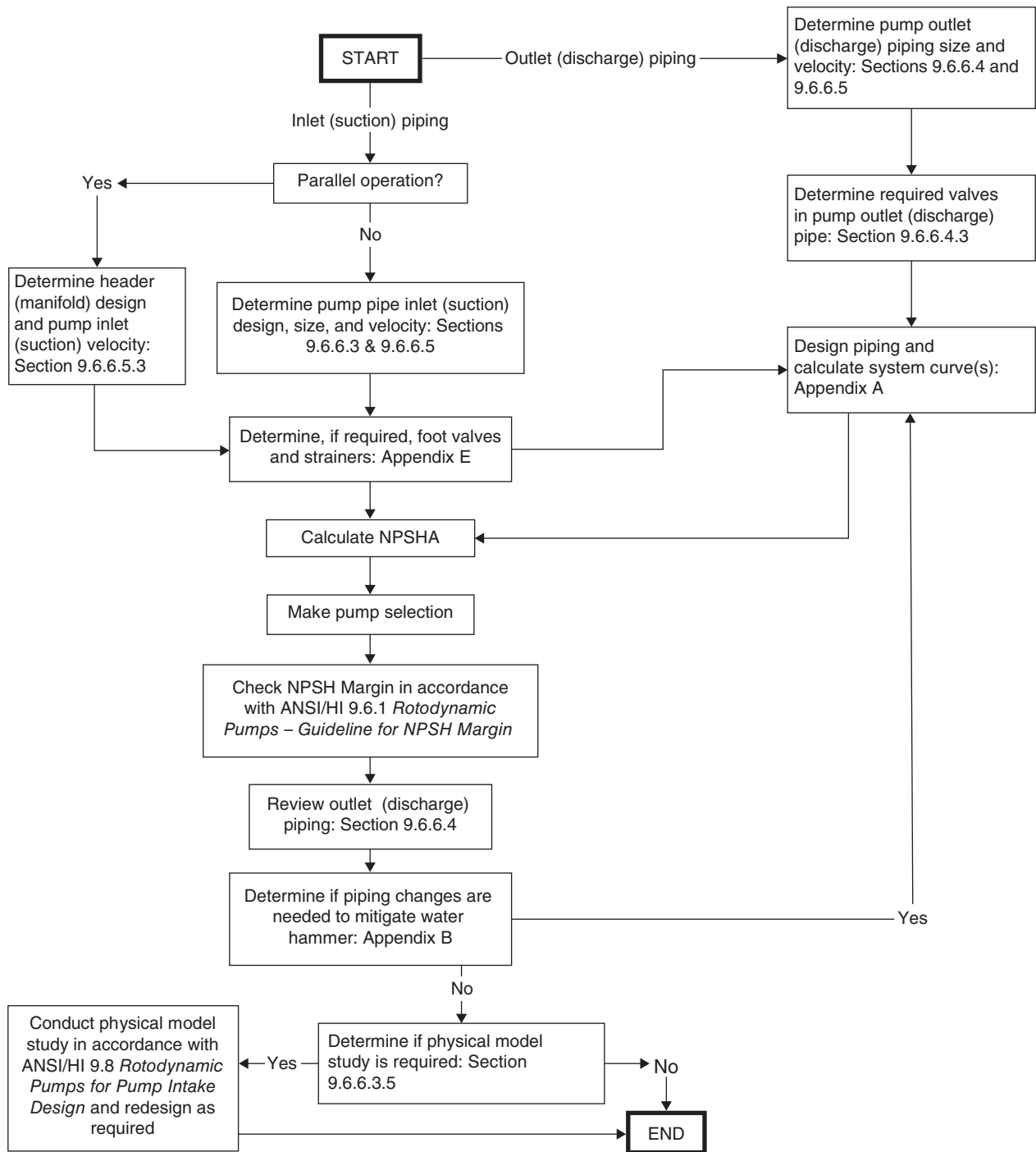
Flowchart for use of standard (mechanical considerations)

NOTE: This flowchart is intended as a guide to the use of this standard and can be used to locate the appropriate sections in this standard. The chart is not a substitute for comprehension of the complete standard.



Flowchart for use of standard (hydraulic considerations)

NOTE: This flowchart is intended as a guide to the use of this standard and can be used to locate the appropriate sections in this standard. The chart is not a substitute for comprehension of the complete standard.



9.6.6 Rotodynamic pumps for pump piping

9.6.6.1 Introduction

This most recent revision of the standard has been divided into numbered requirements followed by guidance (indicated by the word “Notes”) for the user. Any lettered list within a numbered requirement are also requirements. For guidance on the use of this standard for mechanical and hydraulic piping design, refer to the flow charts preceding this introduction.

9.6.6.1.1 Purpose

The objectives of this standard are to provide the requirements for rotodynamic pump piping and to educate users about the effects and interactions of inlet (suction) and outlet (discharge) piping on rotodynamic pump performance and service life.

9.6.6.1.2 Scope

This standard applies to inlet (suction) and outlet (discharge) piping for rotodynamic pumps of radial, mixed and axial flow types, in all worldwide markets. It identifies and details the required and recommended practices for pump piping that will serve to reduce the risk of the pump failure to perform due to system interaction.

9.6.6.1.2.1 Piping

This document is intended to complement ANSI/HI 9.8 *Rotodynamic Pumps for Pump Intake Design*. To eliminate the possibility of overlap and conflict with other standards, this document is applicable as follows:

- All piping upstream from the pump, regardless of pump suction orientation (e.g. side-suction, bottom-suction, etc.) and installation configuration (e.g. horizontal and vertical).
- All piping downstream from the pump, regardless of pump suction orientation (e.g. side-suction, bottom-suction, etc.) and installation configuration (e.g. horizontal or vertical).

The standard excludes the following:

- 1) Any piping integral to the pump unit, such as auxiliary or lubricant piping.
- 2) Requirements for suction piping when the pipe enters a tank, vessel, or other pump intake structure as described in ANSI/HI 9.8 where specific suction piping requirements are provided.

The standard covers the following topics as they relate to rotodynamic pump suction and discharge piping:

- Effects of piping on liquid suction conditions (such as the effect on net positive suction head available [NPSHA], which influences cavitation).
- Effects on pressure development of the pump, hydraulic and piping loads on the pump, piping system considerations (water hammer, parallel pump operation, valving, and pipe supports), pump noise, and pump vibration.

9.6.6.1.2.2 Viscosity considerations

The fundamental recommendations and requirements of this standard do not change with increases in liquid viscosities for Reynolds numbers above 1×10^5 .

Effects of changes in liquid viscosity on pump performance are described in ANSI/HI 9.6.7 *Rotodynamic Pumps – Guideline for Effects of Liquid Viscosity on Performance*.