



American National Standard for

Rotodynamic Pumps

for Hydraulic Performance Acceptance Tests



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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

Purpose of Document:

Hydraulic Institute Standards and Guidelines may be published as American National Standards, and are adopted in the public interest to help eliminate misunderstandings between the manufacturer, the purchaser, and/or the user and to assist the purchaser in selecting and obtaining the proper product for a particular need. Use is completely voluntary and does not in any respect preclude a member from manufacturing or selling products which are not conforming.

Definition of Hydraulic Institute Standard

Quoting from Article XV, Standards, of the By-Laws of the Institute, Section B:

“An Institute Standard defines the product, material, process or procedure with reference to one or more of the following: nomenclature, composition, construction, dimensions, tolerances, safety, operating characteristics, performance, quality, rating, testing and service for which designed.”

Definition of Hydraulic Institute Guideline

A Hydraulic Institute Guideline is not normative. The guideline is tutorial in nature, to help the reader better understand the subject matter.

Comments from Users

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.

Revisions

American National Standards of the Hydraulic Institute are subject to constant review, and revisions are undertaken whenever it is found necessary because of new developments and progress in the art. Errata or addenda may be issued to address limited changes. If no revisions are made for five years, the standards are reaffirmed using the ANSI canvass procedure.

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This document does not contain a complete statement of all requirements, analyses, and procedures necessary to ensure safe or appropriate selection, installation, testing, inspection, and operation of any pump or associated products. Each application, service, and selection is unique with process requirements that shall be determined by the owner, operator, or its designated representative.

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.

4B Engineering & Consulting, LLC	Patterson Pump Company
AECOM	Peerless Pump Company
ASME	Pentair
Brown and Caldwell	Petrofac
Carollo Engineers	Servicios Procure
Crane Pump & Systems	Sulzer
DuPont	Summit Pump, Inc.
Ekwestrel LLC	Suncor
Flowserve	Swiss Flow Solutions GmbH
Lincus, Incorporated	Taco Comfort, Inc.
Hydraulic, Measurement, and Inspection Consulting, LLC	Tarrant Regional Water District
Irving Oil	Trillium Flow Technologies
Leistriz	Vibration Institute
Meier Consulting	WC Livoti Consulting
MWI Pumps	Westinghouse
	Xylem, Inc.

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 - Michael Coussens, Peerless Pump Company
Vice-chair - Mark Heiser, Xylem Inc. - Applied Water Systems

Committee members

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Rex Beach
Karen Bettencourt
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Jorge Cortes
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Company

HDR, Inc.
PSG, a Dover Company
AECOM
National Pump Company
Patterson Pump Company
SPP Pumps, Inc.
Hayward Tyler, Inc.
Sulzer Pumps Ltd.
Flowserve Corporation
CDM Smith - Water Services Group

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Joseph Orlins
James Roberts
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Jim Wall
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Patrick Wilson

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Murraysmith & Associates
Trillium Pumps USA
Grundfos USA
Smith & Loveless, Inc.
Mechanical Solutions, Inc.
Gorman-Rupp, Mansfield Division
INDAR Electric
Weir Minerals North America
Xylem Inc. - Water Solutions
ITT - Industrial Process
Grundfos Water Utility
ShinMaywa Industries, Ltd.
Stantec
Franklin Electric Company, Inc.
Carollo Engineers, Inc.

Company

Trillium Pumps USA
Xylem Inc. - Water Solutions
Smith & Loveless, Inc.
Stantec
Pentair - Berkeley
AECOM
AECOM
Xylem Inc. - Applied Water Systems
Xylem Inc. - Applied Water Systems
Sulzer Pumps Ltd.
Flowserve Corporation
Flowserve Corporation

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14.6 Hydraulic performance acceptance tests

14.6.1 Introduction

This new ANSI/HI 14.6 *Hydraulic Performance Acceptance Tests* standard is revised and updated, superseding the first publication of ANSI/HI 14.6, which replaced ANSI/HI 1.6 *Centrifugal Pump Tests* and ANSI/HI 2.6 *Vertical Pump Tests*. The performance acceptance criteria are in harmony with the revised ISO 9906 *Rotodynamic pumps - Hydraulic performance acceptance test* standard and ANSI/HI 11.6 *Rotodynamic Submersible Pumps for Hydraulic Performance, Hydrostatic Pressure, Mechanical, and Electrical Acceptance Tests*. This standard is normative, meaning the standard must be adhered to in order to comply with the standard. The appendices of this standard are either normative or informative; they are individually marked to clearly show their status. The normative appendices must be adhered to in order to comply with the standard, whereas informative appendices are written to inform and educate the user and do not require compliance.

This standard defines industry-specific default test acceptance grades for cases where the user has not specified an acceptance grade. These default test acceptance grades may not be fully harmonized with ISO 9906.

The standard includes three grades of accuracy of measurement: grade 1 for higher accuracy, and grades 2 and 3 for lower accuracy. These grades include different values for tolerance bands for allowable fluctuations and uncertainties of measurement. It also defines separate tolerances for pumps below 10 kW (13 hp).

References to ANSI/HI 1.6 or ANSI/HI 2.6 in procurement documents and test specifications shall refer to ANSI/HI 14.6 for all applicable parts of the standard.

14.6.1.1 Purpose

This standard provides acceptance criteria and uniform procedures for performance, net positive suction head, hydrostatic pressure testing, data recording, and reporting of test results for rotodynamic pumps. It provides acceptance grades that can be specified for various types of applications. It also defines test procedures that will result in consistent and repeatable results. Final acceptance grade selections will be defined in a contractual agreement between the purchaser and manufacturer.

14.6.1.2 Scope

This standard covers hydraulic performance tests for acceptance of rotodynamic pumps (centrifugal, mixed flow, and axial flow pumps), in this document referred to as *pumps*.

ANSI/HI Standard 14.6 is intended for pump acceptance testing at pump test facilities, such as manufacturers' pump test facilities or laboratories only. Industry experience shows that it is very difficult to perform measurements accurate enough to satisfy the acceptance requirements in this standard when testing is performed in the field.

Information in the standard may be applied to rotodynamic pumps of any size and to any pumped liquids behaving as clear water (see Appendix M.1).

This standard applies to a pump by itself without any fittings. The pump may also be tested with a combination of upstream and/or downstream fittings by prior agreement and agreed on contractually.

There are other pump acceptance test standards for submersible (OH8A and OH8B) and sealless pumps, as defined in their respective documents, that take into account the unique features that those products exhibit. The Hydraulic Institute recommends that the user of this standard consult those respective standards (ANSI/HI 11.6 and ANSI/HI 5.1-5.6 *Sealless Rotodynamic Pumps for Nomenclature, Definitions, Design, Application, Operation, and Test*) to determine if one of these standards are more appropriate for the products being considered for testing.