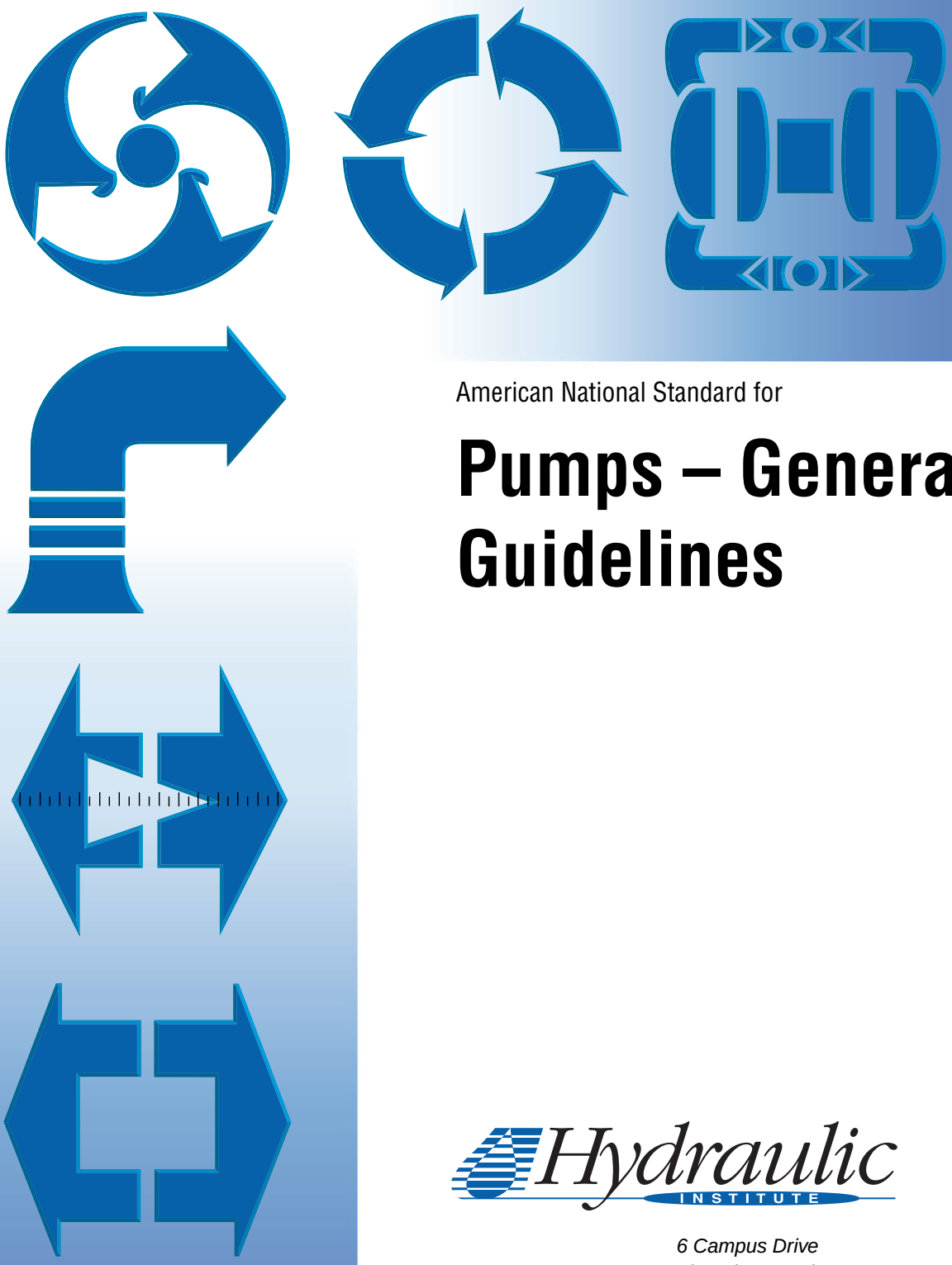

American National Standard for

Pumps – General Guidelines

ANSI/HI 9.1–9.5-2015

Hydraulic INSTITUTE

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First Floor North
Parsippany, New Jersey
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Pumps – General Guidelines

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Approved May 11, 2015
American National Standards Institute, Inc.

American National Standard

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Foreword (Not part of Standard)

Purpose and aims of the Hydraulic Institute

The purpose and aims of the Institute are to promote the continued growth and well-being of pump users and pump manufacturers and further the interests of the public in such matters as are involved in manufacturing, engineering, distribution, safety, transportation, and other problems of the industry, and to this end, among other things:

a) To develop and publish standards for pumps;

b) To collect and disseminate information of value to its members and to the public;

c) To appear for its members before governmental departments and agencies and other bodies in regard to matters affecting the industry;

d) To increase the amount and to improve the quality of pump service to the public;

e) To support educational and research activities;

f) To promote the business interests of its members but not to engage in business of the kind ordinarily carried on for profit or to perform particular services for its members or individual persons as distinguished from activities to improve the business conditions and lawful interests of all of its members.

Purpose of Standards

1) Hydraulic Institute Standards are adopted in the public interest and are designed 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.

2) Use of Hydraulic Institute Standards is completely voluntary. Existence of Hydraulic Institute Standards does not in any respect preclude a member from manufacturing or selling products not conforming to the Standards.

Definition of a Standard of the Hydraulic Institute

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.”

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 sent to the Technical Director of the Hydraulic Institute. The inquiry will then be directed to the appropriate technical committee for provision of a suitable answer.

If a dispute arises regarding the content of an Institute publication or an answer provided by the Institute to a question such as indicated above, the point in question shall be sent in writing to the Technical Director of the Hydraulic Institute, who shall initiate the Appeals Process.

Revisions

The 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. If no revisions are made for five years, the standards are reaffirmed using the ANSI canvass procedure.

Units of measurement

Metric units of measurement are used and corresponding US customary units appear in parentheses. Charts, graphs, and example 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 be stated in reference to this standard. If no such statement is provided, metric units shall govern.

Consensus for this standard was achieved by use of the canvass method

The following organizations, recognized as having an interest in the standardization of the general guidelines for 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
Allaben Consulting
Bechtel Power Corporation
Brown and Caldwell
DuPont Company
ekwestrel corp
Fluid Sealing Association
Healy Engineering, Inc.
Hydraulic, Measurement, & Inspection Counseling
J.A.S Solutions Ltd.
Kemet, Inc
Leistritz Advanced Technologies Corp.
LVVWD - Las Vegas Valley Water District
Mechanical Solutions, Inc.
Peerless Pump Company
Pentair Flow Technologies - Berkeley
Pentair Flow Technologies - Nijhuis
Powell Kugler, Inc.
Pump Design, Development & Diagnostics, LLC
Sulzer Pumps (US) Inc.
TACO, Inc.
WEG Electric Corp.
Weir Floway, Inc.
Weir Minerals North America

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 - Arnold Sdano, Pentair Flow Technologies - Nijhuis
Vice-chair - Aleksander Roudnev, Weir Minerals North America

Committee Members	Company
Randy Bennett	Leistritz Advanced Technologies Corp.
Michael Coussens	Peerless Pump Company
Allen Hobratschk	National Pump Company
Al Iseppon	Pentair Flow Technologies - Berkeley
Rodney Mrkvicka	Smith & Loveless, Inc.
James Roberts	Xylem Inc - Applied Water Systems
Ernie Sturtz	CDM Smith
James Volk	Franklin Electric Company, Inc.

Alternates	Company
Mark Heiser	Xylem, Inc. - Applied Water Systems
Dimitar Kalchev	Peerless Pump Company
John Kelly	Smith & Loveless, Inc.
Randy Kosmicki	Weir Minerals North America
James McKee	Pentair Flow Technologies - Berkeley

9 Pumps – general guidelines

9.0 Scope

This standard applies to all industrial/commercial pumps of positive displacement and rotodynamic types. This document covers pump type classifications, materials of construction, airborne sound measurement, and decontamination. Refer to ANSI/HI 1.1 – 1.2 *Rotodynamic Centrifugal Pumps for Nomenclature and Definitions*, ANSI/HI 2.1 – 2.2 *Rotodynamic Vertical Pumps for Nomenclature and Definitions*, ANSI/HI 3.1 – 3.5 *Rotary Pumps for Nomenclature, Definitions, Application, and Operation*, and ANSI/HI 6.1 – 6.5 *Reciprocating Power Pumps for Nomenclature, Definitions, Application, and Operation* for the pumps covered in the scope of this document. Figure 9.0 shows a pump type tree diagram.

9.0.1 Preferred measurement units and conversion factors

Table 9.0.1 has been prepared by the Hydraulic Institute to aid those wishing to convert US customary units to metric units and vice versa.

Table 9.0.1 — Preferred measurement units and conversion factors

Quantity[a]	Typical applications	Metric unit	Abbr.	US customary unit	Abbr.	Conversion factors - multiply by	
						Metric to US unit	US unit to metric
1. Space and time							
plane angle	fluid flow angle	degree	°	degree	°	1	1
length	dimensions of sumps and pits	meter	m	foot	ft or ′	3.281	0.3048[b]
		meter	m	inch	in or ″	39.37[b]	0.0254[b]
	mechanical engineering drawings	millimeter	mm	inch	in or ″	0.03937	25.4[b]
	coating thickness, surface finish, filter particle size	micrometer	µm	thousandths of inch	mil	0.03937	25.4[b]
		micrometer	µm	microinch	µin	39.37	0.0254[b]
		micrometer	µm	micron	µm	1[b]	1[b]
area	surface area, flow area	square meter	m^2	square foot	ft^2	10.76	0.09290
		square centimeter	cm^2	square inch	in^2	0.155	6.452
volume	fluid volume rate of flow	milliliter (cm^3)[c]	mL[d]	cubic inch	in^3	0.06102	16.39
		cubic meter	m^3	cubic foot	ft^3	35.31	0.02832
		cubic meter	m^3	gallon	gal	264.2	0.003785
		liter	L	quart	qt	1.057	0.9464
time	time interval	hour	h	hour	h	1[c]	1[c]
		minute	min	minute	min	1[c]	1[c]
		second	s	second	s	1[c]	1[c]
volume per unit time	flow rate of fluids	cubic meter per hour	m^3/h	gallon per minute	gpm	4.403	0.2271
		liter per minute	L/min	gallon per minute	gpm	0.2642	3.785
velocity, linear	fluid velocity	meter per second	m/s	foot per second	ft/s	3.281	0.3048[b]