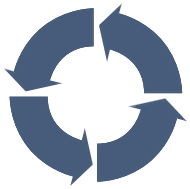
ANSI/HI 4.1 - 4.6 -2017

American National Standard for

Sealless, Magnetically Driven Rotary Pumps

for Nomenclature, Definitions, Application, Operation, and Test



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Hydraulic Institute
www.Pumps.org

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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 Hydraulic Institute are to promote the advancement of the pump manufacturing industry and further the interests of the public and to this end, among other things:

a) Develop and publish standards.

b) Address pump systems.

c) Expand knowledge and resources.

d) Educate the marketplace.

e) Advocate for the industry.

Purpose of Standards and Guidelines

a) Hydraulic Institute Standards and Guidelines 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.

b) Use of Hydraulic Institute Standards and Guidelines 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."

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

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This document was prepared by a committee of the Hydraulic Institute and approved by following ANSI essential requirements. Neither the Hydraulic Institute, Hydraulic Institute committees, nor any person acting on behalf of the Hydraulic Institute: 1) makes any warranty, expressed or implied, with respect to the use of any information, apparatus, method, or process disclosed in this document or guarantees that such may not infringe privately owned rights; 2) assumes any liabilities with respect to the use of, or for damages resulting from the use of, any information, apparatus, method, or process disclosed in this guideline. The Hydraulic Institute is in no way responsible for

any consequences to an owner, operator, user, or anyone else resulting from reference to the content of this document, its application, or use.

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.

Colfax Fluid Handling/Imo Pump
DuPont Company
ekwestrel corp
Fluid Sealing Association
Kemet Inc.
Leistritz Advanced Technologies Corp.
LVVWD- Las Vegas Valley Water District
Patterson Pump Company
Pentair
Rotating Equipment Repair, Inc
Sulzer

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 - Randy Bennett, Leistritz Advanced Technologies Corp.
Vice-Chair - Richard Foster, Blackmer, Inc.

Committee members	**Company**
Kelly Barnes	Boerger LLC
David G. McKinstry	PumpsPositive
Kees van der Sluijs	Flowserve Corporation

Alternate	**Company**
Scott Wild	Leistritz Advanced Technologies Corp.

4 Sealless, magnetically driven rotary pumps

4.0 Scope

This standard covers the unique features of sealless, magnetically driven rotary pumps and includes sections on types and nomenclature; definitions; design and applications; installation, operation, and maintenance; and test. Because of the variety of rotary pump configurations available and the broad range of applications, familiarization with Hydraulic Institute Standards ANSI/HI 3.1–3.5 *Rotary Pumps for Nomenclature, Definitions, Application and Operation* and ANSI/HI 3.6 *Rotary Pump Tests* is recommended. This standard does not apply to the flexible member or peristaltic rotary pump type.

4.1 Types and nomenclature

4.1.1 Objective

To clearly outline information necessary to define, apply, operate, and maintain sealless rotary pumps.

4.1.2 Introduction

This standard covers magnetically coupled rotary pumps (sometimes called *magnetic drives* or *magnetic couplings*), which eliminate the shaft seal. These pumps use permanent magnets to drive an internal rotating assembly through a magnetically permeable containment shell (canister). There are no openings or leak paths through the shell, and the rotor and bearings are completely submerged in the fluid. There are static seals in the pump.

The coupling referred to is the radial synchronous magnetic type. Other means of eliminating the shaft seal are axial magnetic couplings, eddy current (slip) drives, and canned motors. Although concepts within this standard apply, these devices have not been included because they are considered to be currently in limited distribution and focused information on the synchronous magnetic coupling is of greater importance. In addition, within their flow and pressure ranges, peristaltic pumps can also be considered as a sealless solution.

4.1.3 Types of magnetic drive configurations

ANSI/HI 3.1–3.5 *Rotary Pumps for Nomenclature, Definitions, Application and Operation*, Figure 3.1, provides a diagrammatic breakdown of types of rotary pumps. Because this family of products is so broad, this standard does not attempt to provide guidance or figures with each type in a sealless configuration.

The figures included in this standard are to illustrate the fundamental magnetic drive configurations and those components that are typically applicable to various types of rotary pumps:

- Figure 4.1.3a Close-coupled, vane-type, magnetic drive pump
- Figure 4.1.3b Separately coupled, internal gear, magnetic drive pump with secondary control
- Figure 4.1.3c Separately coupled, screw-type, magnetic drive pump
- Figure 4.1.3d Close-coupled, gear-type, magnetic drive pump

The definitions of component parts are included in Table 4.1.3 — Nomenclature.