



ANSI/HI 12.1-12.6-2011

American National Standard for

# Rotodynamic (Centrifugal) Slurry Pumps

for Nomenclature, Definitions,  
Applications, and Operation



6 Campus Drive  
First Floor North  
Parsippany, New Jersey  
07054-4406  
[www.Pumps.org](http://www.Pumps.org)

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Approved May 19, 2011  
**American National Standards Institute, Inc.**

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Published By

**Hydraulic Institute**  
**6 Campus Drive, First Floor North**  
**Parsippany, NJ 07054-4406**

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Printed in the United States of America

ISBN 978-0-9824330-6-5



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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 rotodynamic (centrifugal) 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 and Consulting, LC  
AR Wilfley & Sons, Inc.  
Brown and Caldwell  
DuPont  
ekwestrel corp  
Fluid Sealing Association  
GIW Industries  
Healy Engineering, Inc.  
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Peerless Pump  
Powell Kugler, Inc.  
Sulzer Pumps US Inc.  
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:

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Vice-Chair - Aleksander S. Roudnev, Weir Minerals North America

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## 12 Rotodynamic (centrifugal) slurry pumps

### 12.0 Scope

This standard is for rotodynamic (centrifugal), single-stage, overhung impeller slurry pumps, horizontal and vertical of industrial types used for abrasive slurries, herein referred to as *slurry pumps*. It includes types and nomenclature; definitions; design and application; and installation, operation, and maintenance.

### 12.1 Objective

This standard is normative and sets out requirements, recommendations, and statements to define, select, apply, operate, and maintain slurry pumps. Requirements convey criteria to be fulfilled if compliance with the document is to be claimed and from which no deviation is permitted. Recommendations convey that, among several possibilities, one is particularly suitable, without excluding or prohibiting others.

#### 12.1.1 Introduction

This standard covers slurry pumps used for pumping and/or transporting mixtures of solids and liquids or so-called “slurries.” Slurries are often abrasive and, if not considered, may cause high wear and shortened life of pumps. Unlike clear water, slurries alter the performance of the pumps and cause wear to the wet-end parts. Below a certain velocity, some slurries also settle out in the piping, causing blockages. These differences are such that if they are not taken into account, the pumps will not work satisfactorily or not at all. For this reason, this standard includes information about slurries and their effects, which is necessary to select, apply, operate, and maintain slurry pumps of different designs and materials of construction.

#### 12.1.2 Pump types and nomenclature

Figure 12.1.2a shows classifications of slurry pumps based on mechanical configuration. Figures 12.1.2b through 12.1.2q show typical constructions commonly used for each pump type. Lowercase letter part designations are for different manufacturer variants of the same type. Other variations are also acceptable.

While there are no rigid rules about where different mechanical configurations are to be applied, initial cost, wear parts (maintenance) cost, and arrangement convenience are such that mechanical configurations tend to be aligned to certain services.

The separately coupled, frame-mounted mechanical configurations are preferred for the heavier solids transport wear services (described as class 3 and class 4 in Section 12.3.4.2). The hard metal pumps are preferred for services involving the largest sizes of solids. Elastomer pumps, by virtue of the needed support, must be of the lined type.

Cantilevered wet pit pumps are used in plant mining process service (described as class 3 in Section 12.3.4.2) but are more widely used in the lighter-class wear services (described as class 1 and class 2 in Section 12.3.4.2) for cleanup and lower concentration slurries. These pumps usually are limited to no more than 300-mm (12-in) discharge size.

The close-coupled submersible pump types are similar to the cantilevered wet pit pumps, mostly used in cleanup services, but there may be areas where they are used as process pumps. These are also limited to smaller sizes.