American National Standard for

Rotodynamic Submersible Pumps

for Hydraulic Performance, Hydrostatic Pressure, Mechanical, and Electrical Acceptance Tests

ANSI/HI 11.6-2012

Hydraulic INSTITUTE

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Sponsor
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Foreword (Not part of Standard)

The Hydraulic Institute's Submersible Pump Committee was charged with updating and reaffirming the 2001 standard. The committee, which consists of major manufacturers and users, has decided to view the submersible pump as an integrated unit from the acceptance test point of view. This change and the adaptation of the same test acceptance grades as HI's new rotodynamic pump test standard and the new ISO 9906 pump test standard constitute the major changes. Minor updates, corrections, and refinements have also been made.

This submersible pump test standard represents a major departure from the previous submersible pump test standard (ANSI/HI 11.6 – 2001) *in that the submersible pump is guaranteed and tested as a complete close-coupled unit*. If pump efficiency or pump power has been guaranteed, then the pump wire-to-water efficiency or electric input power is guaranteed and tested, in addition to the mandatory flow and head test.

This standard does not identify the various sources of losses within the boundary of the submersible pump unit. When a manufacturer offers an efficiency guarantee for a submersible pump, or an input power guarantee, that guarantee encompasses the entire pump unit. This standard specifies how acceptance testing shall be performed and it defines pump acceptance. The overall pump efficiency can be precisely determined by dividing the output hydraulic (useful or water horsepower) power delivered by the pump with the electrical input power delivered to the electric motor. The user of this standard must understand that any attempt to calculate an individual component's efficiency (such as pump, motor, cooling system, seal, or bearing efficiency, to name a few) will only yield data of approximate magnitude and must not be used to judge a submersible pump unit's acceptance.

It is not meaningful to compare pump test results from a submersible pump test based on this standard with test results from tests performed to the old ANSI/HI 11.6 or any other pump test standards. See Appendix A for an explanation of the difference between wire-to-water efficiency and pump hydraulic efficiency. Formulas used to estimate a submersible pump's hydraulic efficiency can also be found in this appendix.

The pump acceptance test grades incorporated into this document are the result of a collaborative effort made by Europump and the Hydraulic Institute.

The work to harmonize ISO and ANSI/HI standards aims at creating a single world pump test standard that is supported by Europump and the Hydraulic Institute.

The points below summarize the major differences between this standard and the current ANSI/HI standard and ISO 9906, respectively:

- Old: Has two test acceptance levels, A and B. New: Has three levels of acceptance: grade 1 with tighter tolerance band that can be applied in three acceptance grades (1U, 1E, 1B); grade 2 with a broader tolerance band can be applied in two acceptance grades (2B, 2U); and grade 3 with even broader tolerance band. Acceptance grades 1U and 2U have no negative tolerance.

- Grade 1U corresponds closely with the old ANSI/HI grade A.

- Grade 1B corresponds closely with the old ANSI/HI grade B.

- The new standard defines industry-specific default test acceptance grades for cases where the user has not defined an acceptance grade.

- Users in all parts of the world will be working with identical technical requirements and test acceptance grades.

Scope

The purpose and aims of the Institute are to promote the continued growth of pump knowledge for the interest of pump users and pump manufacturers and to 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;

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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 buyer and/or the user and to assist the buyer 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 Standard 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 brackets. Charts, graphs, and sample calculations are also shown in both metric and US customary units. Since 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 standard was achieved by use of the canvass method. The following organizations, recognized as having an interest in the Submersible Pump Test Standard, 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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