ASME B73.1-2020

(Revision of ASME B73.1-2012)

Specification for Horizontal End Suction Centrifugal Pumps for Chemical Process

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers

ASME B73.1-2020
(Revision of ASME B73.1-2012)

Specification for Horizontal End Suction Centrifugal Pumps for Chemical Process

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers

Two Park Avenue • New York, NY • 10016 USA

Date of Issuance: September 11, 2020

This Standard will be revised when the Society approves the issuance of a new edition.

Periodically certain actions of the ASME B73 Committee may be published as Cases. Cases are published on the ASME website under the B73 Committee Page at http://go.asme.org/B73committee as they are issued.

Errata to codes and standards may be posted on the ASME website under the Committee Pages to provide corrections to incorrectly published items, or to correct typographical or grammatical errors in codes and standards. Such errata shall be used on the date posted.

The B73 Committee Page can be found at http://go.asme.org/B73committee. There is an option available to automatically receive an e-mail notification when errata are posted to a particular code or standard. This option can be found on the appropriate Committee Page after selecting “Errata” in the “Publication Information” section.

The American Society of Mechanical Engineers
Two Park Avenue, New York, NY 10016-5990

CONTENTS

Forms

FOREWORD

In 1955, the Standards Committee on Centrifugal Pumps for Chemical Industry Use, B73, undertook the development of centrifugal pump standards to meet the needs of the chemical industry. Although the Standards Committee had not completed its assignment, the work of one of its task forces resulted in the development of a de facto standard that was published by the Manufacturing Chemists Association in 1962 as an American Voluntary Standard (AVS). More than a dozen manufacturers of chemical process pumps marketed pumps conforming with the AVS.

In 1965, the Hydraulic Institute published a tentative standard similar in content to the AVS, but updated certain portions. Although the Hydraulic Institute Tentative Standard reflected more nearly the current practice of manufacturers and users, it was believed necessary to publish a new document that would supersede both the original AVS and the tentative standard, and that could incorporate the technical content of both documents and dimensional criteria and features generally accepted by manufacturers and users. The January 1968 revision of the AVS was therefore approved as an American National Standard under the existing standards method and published as ANSI B123.1-1971.

ANSI B73.1 superseded ANSI B123.1-1971 and was first published in 1974. The 1974 edition brought to 15 the number of pump sizes covered by the standard. The committee continued to be active, adding 5 more sizes for a total of 20, and making a number of revisions in the text of the standard.

Shortly thereafter, the American National Standards Committee B73 undertook to revise the standard, and, as a result, new information on baseplate rigidity, bearing frame adapter, and bearing housing drain was introduced. The 1984 edition included, for the first time, information that covered documentation of the pump and driver outline drawing of the centrifugal pump, data sheet, mechanical seal drawing, packing box piping plans, and cooling/heating piping plans.

The 1991 revision included larger and self-venting tapered seal chambers, as well as conventional packing boxes; revised baseplate dimensions, with a new identification numbering system; and a ductile material requirement for the bearing frame adapter if it clamps the rear cover plate to the casing.

With the expanding utilization of the ASME B73.1 pumps in the chemical process industry and its growing acceptance in the hydrocarbons processing industry, the B73 committee continued to improve the B73.1 standard. The 2001 revision of the standard incorporated 7 new sizes of pumps, bringing the total number to 27. Many of the new additions were at the request of the user population. Inclusion of ISO standard size pumps was considered by the committee. It was consensus that the ISO inclusion would have made the B73.1 standard overly complex and weakened its mechanical fortitude. Thus, this action was rejected by the committee. The “Materials of Construction” section of the standard was expanded to include readily available corrosion-resistant alloys. Recent publications by the Hydraulic Institute in areas such as baseplate tolerance, acceptable nozzle loads, preferred operating region, and NPSH margin were incorporated into this revision. A standardized electronic data exchange file specification was established as an integral portion of the standard. This was, in part, in response to the needs of the user community for compliance to U.S. government regulations covering chemical process equipment and pumps, specifically OSHA Process Safety Management, 29 CFR 1910.119. In total, these revisions to the standard were intended to better serve process industries and expand the use of ASME B73 pumps worldwide.

The 2012 revision of the standard includes several changes to reduce redundancy in the B73 set of standards and to better align with the Hydraulic Institute (HI) and American Petroleum Institute (API) pump standards. Revisions have also been made to further improve the reliability of the B73.1 pumps. ASME standard B73.5 on solid polymer pumps has been merged into B73.1 due to the many similarities of the two standards. B73.5 will be withdrawn. Reference is now made to API practices for mechanical seal configurations and cooling and heating plans. A mechanical seal configuration code and a material classification code have been added to B73.1. A universal cover has been added to the standard as an alternate sealing cover. Requirements for the bearing frame have been revised to assure more robust pumps. C-face motor adapters are now an option. The default performance test acceptance grade has been revised to reflect the new HI/ISO performance test standard. More detail has been added to the required drawings, curve, and documentation that should be included with the pump. A new data sheet has been developed and added to the standard. The standard endorses the electronic data exchange standard that was developed by the Hydraulic Institute and Fiatech Automating Equipment Information Exchange (AEX) project.

This revision was approved as an American National Standard on March 19, 2020.

ASME B73 COMMITTEE
Chemical Standard Pumps

(The following is the roster of the Committee at the time of approval of this Standard.)

STANDARDS COMMITTEE OFFICERS

R. W. Estep, *Chair*
D. W. Wood, *Vice Chair*
D. Papert, *Secretary*

STANDARDS COMMITTEE PERSONNEL

M. H. Basue, John Crane
K. R. Burkhardt, DuPont
S. Camara, Cargill, Inc.
D. Clark, HMD Kontro Sealless Pumps
R. W. Estep, The Dow Chemical Co.
F. Hernandez, Lewa-Nikkiso America, Inc.
J. Hubbard, ITT Goulds Pumps
M. B. Huebner, Flowserve Corp.
I. S. James, DXP Pumps, PumpWorks
B. S. Myers, Bayer Crop Science
D. Papert, The American Society of Mechanical Engineers
G. W. Sabol, Flint Hills Resources
C. Sakhalkar, Teikoku USA, Inc.
K. Van Der Sluijs, Flowserve Corp.
D. W. Wood, The Chemours Co.
E. Eylat, *Alternate*, Flowservice Corp.
E. J. Kupp, *Alternate*, ITT Goulds Pumps
R. P. McKillips, *Alternate*, DuPont Industrial Biosciences
A. Wilson, *Alternate*, The Dow Chemical Company
P. F. Gaydon, *Contributing Member*, Hydraulic Institute
J. S. Simmons III, *Contributing Member*, Occidental Petroleum Corp.

CORRESPONDENCE WITH THE B73 COMMITTEE

General. ASME Standards are developed and maintained with the intent to represent the consensus of concerned interests. As such, users of this Standard may interact with the Committee by requesting interpretations, proposing revisions or a case, and attending Committee meetings. Correspondence should be addressed to:

Secretary, B73 Standards Committee
The American Society of Mechanical Engineers
Two Park Avenue
New York, NY 10016-5990
http://go.asme.org/Inquiry

Proposing Revisions. Revisions are made periodically to the Standard to incorporate changes that appear necessary or desirable, as demonstrated by the experience gained from the application of the Standard. Approved revisions will be published periodically.

The Committee welcomes proposals for revisions to this Standard. Such proposals should be as specific as possible, citing the paragraph number(s), the proposed wording, and a detailed description of the reasons for the proposal, including any pertinent documentation.

Proposing a Case. Cases may be issued to provide alternative rules when justified, to permit early implementation of an approved revision when the need is urgent, or to provide rules not covered by existing provisions. Cases are effective immediately upon ASME approval and shall be posted on the ASME Committee web page.

Requests for Cases shall provide a Statement of Need and Background Information. The request should identify the Standard and the paragraph, figure, or table number(s), and be written as a Question and Reply in the same format as existing Cases. Requests for Cases should also indicate the applicable edition(s) of the Standard to which the proposed Case applies.

Attending Committee Meetings. The B73 Standards Committee regularly holds meetings and/or telephone conferences that are open to the public. Persons wishing to attend any meeting and/or telephone conference should contact the Secretary of the B73 Standards Committee. Future Committee meeting dates and locations can be found on the Committee Page at http://go.asme.org/B73committee.

SPECIFICATION FOR HORIZONTAL END SUCTION CENTRIFUGAL PUMPS FOR CHEMICAL PROCESS

1 SCOPE

(a) This Standard is a design and specification standard that covers metallic and solid polymer centrifugal pumps of horizontal, end suction single stage, centerline discharge design. This Standard includes dimensional interchangeability requirements and certain design features to facilitate installation and maintenance and to enhance reliability and safety of B73.1 pumps. It is the intent of this Standard that pumps of the same standard dimension designation from all sources of supply shall be interchangeable with respect to mounting dimensions, size, and location of suction and discharge nozzles, input shafts, baseplates, and foundation bolt holes (see Tables 1-1 and 1-2). Maintenance and operation requirements are not included in this Standard.

(b) This Standard has been revised to include solid polymer pumps formerly covered under ASME B73.5. The design and construction features for metallic pumps are covered in section 5. The design and construction features for solid polymer pumps are covered in section 6. This Standard must be read in its entirety for proper application.

(c) This Standard has been revised to broaden the scope to include specialty designs developed on ASME B73.1 product line platforms. These specialty designs have many common components with the B73.1 models and meet the intent of the standard except for most notably the standard's dimensional and hydraulic coverage requirements. These specialty designs include pump models referred to as self-primer, recessed impeller, low flow, and repeller pumps.

(d) Sealless Pumps (Magnetic Drive and Canned Motor) are covered in ASME B73.3.

2 REFERENCES

The following documents form a part of this Standard to the extent specified herein. The latest edition shall apply.

ANSI B11.19, Performance Criteria for Safeguarding
Publisher: Association for Manufacturing Technology (AMT), 7901 Jones Branch Drive, Suite 900, McLean, VA 22102-3316 (www.amtonline.org)

ANSI/ABMA-9, Load Ratings and Fatigue Life for Ball Bearings

ANSI/ABMA-11, Load Ratings and Fatigue Life for Roller Bearings
Publisher: American Bearing Manufacturers Association (ABMA), 1001 N. Fairfax Street, Suite 500, Alexandria, VA 22314 (www.americanbearings.org)

ANSI/AGMA 9000, Flexible Couplings — Potential Unbalance Classification
ANSI/AGMA 9002, Bores and Keyways for Flexible Couplings (Inch Series)
Publisher: American Gear Manufacturers Association (AGMA) 1001 North Fairfax Street, Suite 500, Alexandria, VA 22314 (www.agma.org)

ANSI/HI 1.4, Rotodynamic (Centrifugal) Pumps for Manuals Describing Installation, Operation and Maintenance
ANSI/HI 9.1-9.5, Pumps — General Guidelines for Types, Definitions, Application, Sound Measurement and Decontamination
ANSI/HI 9.6.1, Rotodynamic Pumps — Guideline for NPSH Margin
ANSI/HI 9.6.2, Rotodynamic Pumps for Assessment of Applied Nozzle Loads
ANSI/HI 9.6.3, Rotodynamic (Centrifugal and Vertical) Pumps — Guideline for Allowable Operating Region
ANSI/HI 9.6.4, Rotodynamic Pumps Vibration Measurements and Allowable Values
ANSI/HI 9.6.8, Dynamics of Pumping Machinery
ANSI/HI 14.1-14.2, Rotodynamic Pumps for Nomenclature and Definitions
ANSI/HI 14.3, Rotodynamic Pumps for Design and Application
ANSI/HI 14.6, Rotodynamic Pumps for Hydraulic Performance Acceptance Tests
Publisher: Hydraulic Institute (HI), 6 Campus Drive, Parsippany, NJ 07054-4406 (www.pumps.org)

API Std 610, Centrifugal Pumps for Petroleum, Petrochemical and Natural Gas Industries
API Std 682, Pumps — Shaft Sealing Systems for Centrifugal and Rotary Pumps
Publisher: American Petroleum Institute (API), 200 Massachusetts Avenue NW, Suite 1100, Washington, DC 20001–5571 (www.api.org)