ASME B73.2-2023
(Revision of ASME B73.2-2016)

Specification for Vertical In-Line Centrifugal Pumps for Chemical Process

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers

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FOREWORD

The vertical in-line style of centrifugal pump was introduced for chemical process use. These pumps have certain advantages that have led to growing acceptance of this configuration for chemical process applications. In January 1969, in response to this interest, the Manufacturing Chemists Association (MCA) requested that the American National Standards Institute (ANSI) develop a standard. In 1971, the scope of B73 was expanded to include vertical in-line pumps, using the MCA draft of February 1971 as a basis.

American National Standard B73.2 was developed and approved by the B73 Standards Committee; final approval by ANSI was granted on April 21, 1975.

Shortly thereafter, the American National Standards Committee B73 revised the Standard, introducing new information on critical speed, bearing housing design, vibration, bearing frame adapter, and bearings. The 1984 edition included, for the first time, an appendix that covered documentation of pump and driver outline drawing, a vertical in-line pump data sheet, mechanical seal drawing, stuffing box piping plans, and cooling/heating piping plans.

That edition was approved by letter ballot of the B73 Main Committee on April 25, 1983. Following acceptance by the Sponsor, the revision was referred to ANSI for designation as an American National Standard. Designation was granted on March 23, 1984.

In 1986, the Committee began discussing revisions that resulted in changes to the section on jackets. Additionally, the information on the stuffing box and seal chamber was expanded. Modifications were also made to the appendix drawings and plans.

These revisions were approved by the B73 Committee. Following B73 approval, the proposal was submitted to ANSI for recognition as an American National Standard. Approval was granted on January 22, 1991.

With the expanding use of ASME B73 pumps in the chemical process industry and their growing acceptance in the hydrocarbons processing industry, the B73 Committee has continued to improve the B73.2 Standard. The 2003 revision of the Standard incorporated the addition of the technical documentation of the pump as a mandatory portion of the Standard, which previously appeared as a nonmandatory appendix. The incorporation was partly 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. Recent publications by the Hydraulic Institute (HI) in areas such as preferred operating region and net positive suction head margin were incorporated into the revision. Additionally, the materials of construction section was expanded to include readily available corrosion-resistant alloy. In total, these revisions to the Standard were intended to better serve process industries and expand the use of ASME B73 pumps worldwide.

The 2016 edition of ASME B73.2 was approved as an American National Standard on November 16, 2016. It included revisions to the American Petroleum Institute (API) practices for mechanical seal configurations and cooling and heating plans. A mechanical seal configuration code aligned with the API sealing standard and a material classification code were also added. A universal cover was offered as an option to the Standard as an alternate sealing cover. Requirements for the bearing frame were revised to ensure more robust pumps. Nomenclature for the pump sizes was added to align with the more commonly used sizes identified in ASME B73.1. Approximate hydraulic performance for the ASME B73.2 pumps were established. The default performance test acceptance grade was revised to reflect the new HI/ISO performance test standard. More detail was added to the required drawings, curve, and documentation that should be included with the pump. A new data sheet common to the ASME B73.1 and ASME B73.2 Standards was developed and added. This Standard endorsed the Electronic Data Exchange standard, which was developed by HI and the Fiatech AEX project. These revisions were made to further improve the reliability of the ASME B73.2 pumps. These changes also better aligned with the HI and API pump standards.

This 2023 revision of ASME B73.2 includes updates to align with the 2020 revision of ASME B73.1. Tables for Approximate Performance of Standard Pumps and Minimum Continuous Flow were removed from ASME B73.2. Tables for Published Performance Curve Rated Speeds and Nondestructive Testing Levels were added. In addition, coupling requirements were added for Type VB pumps, external bearing design requirements were modified, welding requirements were modified, jacket requirements for heating and cooling were updated, safety guard and coupling guard requirements were added, multiple HI references were updated, an option for a welded casing drain connection was added, and details

regarding document requirements including details for Certified Mill Test Report and Statement of Compliance were added. An illustration was added with impeller dimensions used to select between a single-plane or two plane-balance.

ASME B73.2-2023 was approved by ANSI as an American National Standard on November 14, 2023.

ASME B73 COMMITTEE
Chemical Standard Pumps

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

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CORRESPONDENCE WITH THE B73 COMMITTEE

General. ASME codes and standards are developed and maintained by committees with the intent to represent the consensus of concerned interests. Users of ASME codes and standards may correspond with the committees to propose revisions or cases, report errata, or request interpretations. Correspondence for this Standard should be sent to the staff secretary noted on the committee's web page, accessible at https://go.asme.org/B73committee.

Revisions and Errata. The committee processes revisions to this Standard on a periodic basis 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 in the next edition of the Standard.

In addition, the committee may post errata on the committee web page. Errata become effective on the date posted. Users can register on the committee web page to receive e-mail notifications of posted errata.

This Standard is always open for comment, and the committee welcomes proposals for revisions. Such proposals should be as specific as possible, citing the paragraph number, the proposed wording, and a detailed description of the reasons for the proposal, including any pertinent background information and supporting documentation.

Cases

(a) The most common applications for cases are

(1) to permit early implementation of a revision based on an urgent need

(2) to provide alternative requirements

(3) to allow users to gain experience with alternative or potential additional requirements prior to incorporation directly into the Standard

(4) to permit the use of a new material or process

(b) Users are cautioned that not all jurisdictions or owners automatically accept cases. Cases are not to be considered as approving, recommending, certifying, or endorsing any proprietary or specific design, or as limiting in any way the freedom of manufacturers, constructors, or owners to choose any method of design or any form of construction that conforms to the Standard.

(c) A proposed case shall be written as a question and reply in the same format as existing cases. The proposal shall also include the following information:

(1) a statement of need and background information

(2) the urgency of the case (e.g., the case concerns a project that is underway or imminent)

(3) the Standard and the paragraph, figure, or table number

(4) the editions of the Standard to which the proposed case applies

(d) A case is effective for use when the public review process has been completed and it is approved by the cognizant supervisory board. Approved cases are posted on the committee web page.

Interpretations. The committee does not issue interpretations for this Standard.

Committee Meetings. The B73 Standards Committee regularly holds meetings that are open to the public. Persons wishing to attend any meeting should contact the secretary of the committee. Information on future committee meetings can be found on the committee web page at https://go.asme.org/B73committee.

SPECIFICATION FOR VERTICAL IN-LINE CENTRIFUGAL PUMPS FOR CHEMICAL PROCESS

1 SCOPE

(a) This Standard is a design and specification standard that covers metallic centrifugal pumps of vertical shaft single-stage design with suction and discharge nozzles in-line. This Standard includes dimensional interchangeability requirements and certain design features to facilitate installation and maintenance and enhance reliability and safety of ASME B73.2 pumps. The intent of this Standard is to ensure 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 (see Table 1-1). Maintenance and operation requirements are not included in this Standard.

(b) Sealless pumps (magnetic drive and canned motor) are covered in ASME B73.3.

2 REFERENCES

The following is a list of publications referenced in this Standard. Unless otherwise specified, the latest edition shall apply.

ANSI/ABMA 9. Load Ratings and Fatigue Life for Ball Bearings. American Bearing Manufacturers Association.
ANSI/ABMA 11. Load Ratings and Fatigue Life for Roller Bearings. American Bearing Manufacturers Association.
ANSI/AGMA 9000-D11. Flexible Couplings - Potential Unbalance Classification. American Gear Manufacturers Association.
ANSI/AGMA 9002-C14. Bores and Keyways for Flexible Couplings, Inch Series. American Gear Manufacturers Association.
ANSI B11.19. Performance Requirements for Risk Reduction Measures: Safeguarding and Other Means of Reducing Risk. American National Standards Institute.
ANSI/HI 9.1-9.5. Pumps–General Guidelines for Materials, Sound Testing, and Decontamination. Hydraulic Institute.
ANSI/HI 9.6.1. Rotodynamic Pumps Guideline for NPSH Margin. Hydraulic Institute.
ANSI/HI 9.6.2. Rotodynamic Pumps for Assessment of Applied Nozzle Loads. Hydraulic Institute.
ANSI/HI 9.6.3. Rotodynamic Pumps–Guideline for Operating Regions. Hydraulic Institute.
ANSI/HI 9.6.4. Rotodynamic Pumps for Vibration Measurements and Allowable Values. Hydraulic Institute.
ANSI/HI 9.6.8. Rotodynamic Pumps–Guideline for Dynamics of Pumping Machinery. Hydraulic Institute.
ANSI/HI 14.1-14.2. Rotodynamic Pumps for Nomenclature and Definitions. Hydraulic Institute.
ANSI/HI 14.3. Rotodynamic Pumps for Design and Application. Hydraulic Institute.
ANSI/HI 14.4. Rotodynamic Pumps for Installation, Operation and Maintenance. Hydraulic Institute.
ANSI/HI 14.6. Rotodynamic Pumps for Hydraulic Performance Acceptance Tests. Hydraulic Institute.
ANSI/NEMA MG 1. Motors and Generators. National Electrical Manufacturers Association.
ANSI Z535.1. Standard for Safety Colors. American National Standards Institute.
API 610. Centrifugal Pumps for Petroleum, Petrochemical, and Natural Gas Industries. American Petroleum Institute.
API 682. Pumps — Shaft Sealing Systems for Centrifugal and Rotary Pumps. American Petroleum Institute.
ASME Boiler Pressure and Vessel Code. The American Society of Mechanical Engineers.
ASME B16.5. Pipe Flanges and Flanged Fittings: NPS ½ Through 24 Metric/Inch Standard. The American Society of Mechanical Engineers.
ASME B16.11. Forged Fittings, Socket-Welding and Threaded. The American Society of Mechanical Engineers.
ASME B16.42. Ductile Iron Pipe Flanges and Flanged Fittings, Classes 150 and 300. The American Society of Mechanical Engineers.
ASME B31.3. Process Piping. The American Society of Mechanical Engineers.
ASTM A48/A48M. Standard Specification for Gray Iron Castings. ASTM International.
ASTM A105/A105M. Standard Specification for Carbon Steel Forgings for Piping Applications. ASTM International.
ASTM A106/A106M. Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service. ASTM International.