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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 13469-2021

Replacing GB/T 13469-2008

**Economical operation for centrifugal, mixed flow and axial flow
pump systems**

离心泵、混流泵与轴流泵系统经济运行

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1 Scope

GB/T 13469-2021 is the Chinese national standard on economical operation for centrifugal, mixed flow and axial flow pump systems, in the field of energy and heat transfer engineering. The /T suffix marks it as a recommended standard: it is not compulsory by itself, but it becomes binding as soon as a contract, a tender or a customer specification calls it up - which in practice is how most foreign buyers meet it. It was issued on 21 May 2021 by the State Administration for Market Regulation; Standardization Administration of

China, and has been in force since 1 December 2021. Classification: ICS 27.010, CCS F01. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This Standard specifies the basic requirements, judgment and evaluation methods, test methods and energy-saving management measures of the economical operation for centrifugal pumps, mixed flow pumps and axial flow pump systems driven by AC motors. This Standard is applicable to centrifugal pumps, mixed flow pumps and axial flow pump systems driven by AC motors in use. The design of reconstruction, expansion and new centrifugal pump, mixed flow pump and axial flow pump system can be implemented by reference.

2 Normative References

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) is applicable to this document.

GB/T 9481 Axial-Flow Pump of Medium-Small Size - Types and Basic Parameters

GB/T 13007 Centrifugal pump - Efficiency

GB/T 13008 Technical Specification for Mixed and Axial Flow Pumps

GB/T 13466 The General Principles of Economic Operation for AC Driven Fan (Pump Air Compressor) System

GB/T 13468 Measurement and Calculation Methods of Electric Energy Balance for Pumped Liquid Transportation Systems

GB/T 16666 Monitoring and Testing for Energy Saving of Motor-Pump Liquid Transport System

GB 17167 General Principle for Equipping and Managing of the Measuring Instrument of Energy in Organization of Energy Using

4.2.4 The selection of the pump shall meet the following requirements:

- a) Satisfy the use head and flow of the system;
- b) The selection of the pump shall comply with the provisions of GB/T 9481, GB/T 13007, GB/T 13008 and other relevant standards;
- c) The design operating point shall be in the economic working area specified by the pump manufacturer.

4.2.5 Under a variety of working conditions and production process conditions, the matching pump shall be selected according to the system load characteristics. The selection of multiple pumps for combined operation shall meet the requirements of series and parallel technical conditions.

4.3 Requirements for installation, commissioning and acceptance of the pump systems

4.3.1 The installation shall be carried out by a dedicated installation technician in accordance with the installation provisions of the manufacturer.

4.3.2 The determination of the installation site and location shall fully consider the convenience of operation and management; and reserve necessary maintenance space.

4.3.3 After installation of the pump system, online debugging shall be carried out to check whether the pump is out of the high-efficiency zone where the pump is allowed to operate; and perform the test in accordance with Clause 6. the inclination shall be no less than 0.5%;

c) The suction pipeline layout and flow rate of large centrifugal pumps, axial flow pumps and mixed flow pumps shall be selected so that the suction medium does not produce vortex, cavitation, etc.;

d) The bottom valve should not be used in the suction pipeline;

e) In order to ensure the suction performance of the pump, the medium flow rate of the suction pipe for conveying clean water at room temperature shall be less than 2m/s.

4.4.2.10 The discharge pipeline shall meet the following requirements:

a) For the connection between the branch pipe and the main pipe, an oblique connection should be used instead of a straight connection;

b) No additional resistance valve or micro resistance valve should be used;

c) The discharge pipeline shall adopt economical flow rate, and the flow rate of clean water at room temperature shall be 2m/s~3m/s.

4.4.3 Economical operation of the system

4.4.3.1 Applicable control and regulation systems shall be adopted according to the user's flow and head requirements.

4.4.3.2 For long running time, large load changes and discontinuous operation conditions, a regulating device system including a variable frequency speed regulating device should be used. The application technical conditions of the variable frequency speed regulating device shall comply with the provisions of GB/T 21056.

4.4.3.3 When the flow rate variation is less than 20%, or the annual operating time is less than 4000h, the following flow adjustment methods should be adopted, including:

- a) The throttling method can be used for small centrifugal pumps;
- b) For mixed flow pumps and axial flow pumps, the flow rate and head can be adjusted through changing the installation angle of the blades or adjusting the inlet guide blades;
- c) When the change range of flow rate is less than 10%, the variable flow constant pressure method shall be adopted;
- d) Voltage reduction and power saving technology can be used when the motor is lightly loaded.

4.4.3.4 The equipment and pipe network that transport high (low) temperature medium

4.5.2.3 For pumps with a capacity of 100kW and above, economic indicators of the systems should be tested regularly.

4.5.3 Requirements for finding and troubleshooting faults

4.5.3.1 Once a failure occurs, the cause of the failure shall be analysed and eliminated in time; and the results of the failure shall be recorded in detail.

4.5.3.2 The following should be recorded when the system fails:

- a) Failure overview (time of failure, description of failure and failure phenomenon, working conditions and environmental conditions at the time of failure, name of the person who discovered the failure);
- b) The nature of the failure;
- c) The fault characteristics of the product performance (the measured value of the fault parameter and the minimum required value of the parameter);
- d) Analytical opinions and suggested corrective measures related to failures.

4.5.3.3 The following failure maintenance information shall be recorded:

- a) Failure verification (the used instruments and methods, description of observation results);
- b) Repair instructions (the taken measures, repair date, name of maintenance personnel);
- c) Description of the replaced parts (part name, model, supplier, failure cause and classification opinions).

5 Judgment and Evaluation Method of Economical