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

**GB/T 35717-2024**

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**Discharge measurement for hydraulic turbines, storage pumps  
and pump-turbines - Ultrasonic transit-time method**

水轮机、蓄能泵和水泵水轮机流量的测量 超声传播时间法

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### Foreword

This document is in accordance with the provisions of GB/T 1:1-2020 "Guidelines for standardization work Part 1: Structure and drafting rules for standardization documents"

Drafting: This document replaces GB /Z 35717-2017 "Measurement of flow rates of turbines, storage pumps and pump-turbines - Ultrasonic propagation time method" and is compatible with Compared with GB /Z 35717-2017, in addition to structural adjustments and editorial changes, the main technical changes are as follows:

--- Added device parameter configuration and debugging (see 7:3);

--- Added regular tracking and evaluation of flow measurement data (see 8:2): Please note that some of the contents of this document may involve patents: The issuing organization of this document does not assume the responsibility for identifying patents: This document was proposed by the China Electrical Equipment Industry Association: This document is under the jurisdiction of the National Technical Committee for Standardization of Hydraulic Turbines (SAC/TC175): This document was drafted by: China Institute of Metrology, State Grid Gansu Electric Power Company Electric Power Research Institute, China Water Resources and Hydropower Science Research Institute, Beijing Water Resources Dispatching and Management Affairs Center, Harbin Electric Power Research Institute Co., Ltd., Hohai University, China Yangtze Power Co., Ltd: Co., Ltd., Rural Electrification Research Institute of the Ministry of Water Resources, NARI Technology Co., Ltd., Electromechanical Research Institute of the Ministry of Water Resources, Qingdao Qingwan Water Technology Co., Ltd., Yalong River Basin Hydropower Development Co., Ltd., Tsinghua University, Beijing Huasheng Measurement Technology Co., Ltd., Xi'an University of Technology, Nanjing Shenrui Electric System Control Co., Ltd., Dongfang Electric Corporation Dongfang Electric Corporation, China Power Construction Corporation East China Survey and Design Institute Co., Ltd: Company, Datang Hydropower Science

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---First published in: 2017 as GB /Z 35717-2017;

---This is the first revision: Measurement of flow rates of hydraulic turbines, storage pumps and pump-turbines Ultrasonic propagation time method

## 1 Scope

GB/T 35717-2024 covers the measurement of discharge through hydraulic turbines, storage pumps and pump-turbines by the ultrasonic transit-time method. The efficiency of a hydro unit is the ratio of power to the product of head and flow, and of the three the flow is by far the hardest to measure: the penstock is large, cannot be obstructed and cannot be taken out of service, so the acceptance and guarantee of machines worth hundreds of millions turns on a method that works by timing sound pulses across the pipe in both directions. The standard sets the measurement principle - the transit time measurement, the calculation of the mean velocity in each acoustic path layer and the integration to flow - then the technical requirements on the device including the choice of measuring pipe section, the path configuration and the flow measuring device, the installation and commissioning covering transducer positioning, geometric parameter measurement and parameter configuration, and the uncertainty analysis and reporting. It replaces GB/Z 35717-2017 and took effect on 1 December 2024.

This document describes the ultrasonic propagation time method for flow measurement in turbines, storage pumps and pump-turbines, including the measurement principle, test methods, Equipment site selection and model selection, equipment installation and commissioning requirements, test data quality evaluation, etc: This document is applicable to the on-site flow measurement of turbines, storage pumps and pump turbines, with circular or rectangular cross-sections and a diameter of Or equivalent diameter not less than 0.8m: This document is applicable to the flow measurement of ultrasonic propagation time flow measuring devices using internal or external transducers: Flow measurement of flow measuring device with external transducer:

## 2 Normative references

The contents of the following documents constitute the essential clauses of this document through normative references in this document: For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies to This document:

GB/T 35138 Measurement of fluid flow in closed pipes - Transit time method - Liquid ultrasonic flowmeter

JJF1358 Calibration specification for DN1000~DN15000 liquid ultrasonic flowmeter using non-real flow method

## 3 Terms and definitions

The following terms and definitions apply to this document: 3:

1 Ultrasonic transit-time method The difference between the propagation time of ultrasound in the fluid upstream and downstream is used to calculate the axial velocity of the sound channel, and the surface plane is calculated by the integral algorithm: The method of averaging the flow velocity and multiplying it by the area to get the flow rate: 3:

2 Ultrasonic transducer A component in an ultrasonic flow measurement device that uses piezoelectric ceramics to achieve mutual conversion between electrical output and mechanical vibration output:

Note: Also called ultrasonic probe: 3:

3 Built-in transducer The ultrasonic transducer is fixed on the inner wall of the flow channel: 3:

4 Plug-in transducer An ultrasonic transducer is inserted and fixedly mounted from the outer wall of the flow channel: 3:

5 The ultrasonic transducer is directly installed on the existing flow channel and the device uses the ultrasonic propagation time method to measure the flow rate:

Note: Hereinafter referred to as flow measuring device: