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

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Foreword

This instructional document has been drafted in accordance with the rules given in GB/T 1.1-2009.

This guidance document is proposed by China Electrical Equipment Industry Association.

This Guidance Document is organized by the National Committee for Standardization of Hydraulic Turbines (SAC/TC175).

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Large flow measurement Technology Co., Ltd., Beijing City Lake Management Office, China Construction Group Northwest Survey and Design Institute Co., Ltd., State Power

Dadu River Maintenance Installation Co., Ltd., Xi'an University of Technology.

1 Scope

This guidance is given in the technical documents of turbines, storage pumps and pump turbines ultrasonic flow measurement time method, including measurement of the original Management, test methods and calibration, measurement uncertainty.

This guideline is applicable to the on-site flow measurement of water turbines, storage pumps and pump turbines. The runners are pressurized runners and the cross section is Circular or rectangular, diameter or equivalent diameter of not less than 0.8m; does not apply to turbine, energy storage pump and pump turbine model test flow measuring.

This guideline is applicable to the Ultrasonic Propagation Time Measurement Unit (hereinafter referred to as the "Flow Measurement Unit"

Device) flow measurement, does not apply to the use of clamp-type ultrasonic flowmeter flow measurement.

2 Normative references

The following documents for the application of this document is essential. For dated references, only the dated version applies to this article

Pieces. For undated references, the latest edition (including all amendments) applies to this document.

JZF1358-2012 non-real-current method calibration DN1000 ~ DN15000 liquid ultrasonic flowmeter calibration specification

IEC 60041-1991 Turbine, storage pump and pump turbine hydraulic field acceptance test (Fieldacceptanceteststo

determinethehydraulicperformanceofhydraulicturbines, storagepumpsandpump-turbines)

ISO 12242.2012 Determination of fluid flow in closed conduits Liquid Ultrasonic Propagation Time Method (Measurement Measurement Fluid

inclosedconduits-Ultrasonictransit-timemetersforliquid)

ASMEPTC18-2011 Hydraulic Turbines and Pump-Turbines Performance Test Specification PerformanceTestCodes)

3 Terms and definitions

The following terms and definitions apply to this document.

3.1

Ultrasonic transmission time method ultrasonictransit-timemethod

Using the difference between ultrasonic propagation time in the fluid and the countercurrent propagation time, the flow velocity is obtained, which is obtained by multiplying the flow velocity by the area

Method of traffic.

3.2

Ultrasonic transducer ultrasonictransducer

In the role of electrical signals can produce ultrasonic output, and ultrasonic signals can be converted into electrical signals of the device.

3.3

Internal Transducer build-intransducer

The use of welding, bolts and other ways fixed on the inner wall of the ultrasonic transducer transducer.

Note. The internal transducer is also referred to as an enclosed transducer.