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

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**Specification of flow measuring devices for hydropower plant
(English Translation)**

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Foreword

This standard is drafted in accordance with the rules given in GB/T 1.1-2009 "Guidelines for Standardization Work Part 1: Standard Structure and Compilation" of.

Please note that certain contents of this document may involve patents. The issuing agency of this document is not responsible for identifying these patents.

This standard was proposed by the China Electricity Council.

This standard is under the jurisdiction of the Electric Power Industry Hydropower Station Automation Standardization Technical Committee.

Drafting organizations of this standard. China Institute of Water Resources and Hydropower Research, Tianjin Institute of Water Resources and Electric Power, China Three Gorges Corporation, China Qing Datang International Pengshui Hydropower Development Co., Ltd.

1 Scope

This standard specifies the technical requirements for the structure, function, performance and test of flow measurement devices for hydropower plants.

This standard applies to mechanical flow switches, thermal conductivity flow switches, volute differential pressure flowmeters, electromagnetic flowmeters, time difference Configuration, selection, design and manufacture of sonic flow meters.

2 Normative references

The following documents are indispensable for the application of this document. For dated reference documents, only the dated version applies to this document.

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

GB/T 2423.10 Environmental testing of electric and electronic products Part 2: Test method Test Fc. Vibration (sinusoidal) GB 4208 Shell protection grade (IP code) GB 4793.1 Safety requirements for electrical equipment for measurement, control and laboratory use Part 1: General requirements GB/T 11901 Water Quality Determination of Suspended Matter Gravimetric Method GB/T 17214.1 Working conditions of industrial process measurement and control equipment Part 1: Climatic conditions GB/T 18271.3 General performance evaluation methods and procedures for process measurement and control devices. Part 3: Tests for influences DL/T 1107 Basic technical conditions for automation components of hydropower plants JJG 1030 Ultrasonic Flowmeter Verification Regulation JJG 1033 Verification Regulation of Magnetic Flowmeter JB/T 9248 electromagnetic flowmeter

3.1 Mechanical flow switch

3.1.1

Suitable for generator cooling water, water turbine generator set guide bearing lubrication water, main shaft sealing water, air compressor cooling water, maintenance/leakage drain Flow monitoring of pump lubricating water, main transformer cooling water, unit oil circulation system, and main transformer oil circulation system.

3.1.2 Operating environment

- a) Temperature. 5°C~40°C;
- b) Relative humidity. ≤95%, no condensation.

3.1.3 Structural requirements

3.1.3.1

The nozzle diaphragm type and target type (baffle type) structure shall be adopted.

3.1.3.2

The baffle of the target flow switch shall be made of stainless steel or treated with anti-scaling coating.

3.1.3.3

For mechanical flow switches with unidirectional and bidirectional operation, the flow

direction identification shall be marked on the shell.

3.1.3.4

The mechanical flow switch used on pipelines of DN40 and below should use threaded connection structure, and the mechanical flow switch used on pipelines of DN50 and above the flow switch should use flange connection structure.

3.1.4 Functional requirements

3.1.4.1

There should be a pair of normally open and normally closed contact outputs.

3.1.4.2

When the pipeline is flowing through or the flow is reduced to the set flow, a signal shall be sent out separately.

3.1.4.3

It should be able to return to zero when there is pressure and no flow.

3.1.4.4

The action value of the flow switch should be adjustable.

3.1.5 Performance requirements

3.1.5.1

Maximum working flow rate. 8m/s.

3.1.5.2

Maximum pressure. 1.5 times the rated working pressure.

3.1.5.3

The measurement error does not exceed 5%FS.

3.1.5.4

Repeated action error. no more than 10% of the maximum set flow value.

3.1.5.5

The minimum operating flow is not more than 25% of the rated flow.

3.1.5.6

Contact capacity. AC220V, $\geq 3A$; DC220V, $\geq 0.2A$.

3.1.5.7

The contact life is not less than 100,000 times.

3.1.5.8

The protection level is not less than IP65.

3.2 Thermal conductivity type flow switch

3.2.1

Suitable for generator cooling water, hydraulic turbine guide bearing lubricating water and sealing water, main shaft sealing water, air compressor cooling water, maintenance/leakage Flow monitoring of drainage pump lubricating water, fire-fighting water, turbine oil system, etc.

3.2.2 Operating environment

- a) Temperature. 5°C~40°C;
- b) Relative humidity. $\leq 95\%$, no condensation;
- c) Working power supply. 24VDC or 220VAC.

3.2.3 Structural requirements

3.2.3.1

The probe should be made of stainless steel or treated with anti-scaling coating.

3.2.3.2

The length of the probe should ensure that the probe is always immersed in the medium.

3.2.4 Functional requirements

3.2.4.1

There should be LEDs to display the flow status and alarm indications.

3.2.4.2

There should be relay or NPN/PNP transistor output.

3.2.4 3 The action value of the flow switch is adjustable.

3.2.5 Performance requirements

3.2.5.1

Flow velocity measurement range. water 0.01m/s~1.5m/s, oil 0.03m/s~3m/s.

3.2.5.2

The action error is not more than 5%FS.