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Hydrometry — Rotating-element current-meters

Hydrométrie — Moulinets à élément rotatif

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 2537 was prepared by Technical Committee ISO/TC 113, *Hydrometry*, Subcommittee SC 5, *Instruments, equipment and data management*.

This fourth edition cancels and replaces the third edition (ISO 2537:1988), which has been technically revised.

Hydrometry — Rotating-element current-meters

1 Scope

This International Standard specifies the operational requirements, construction, calibration, and maintenance of rotating-element devices for the measurement of flow velocities in open channels.

ISO 748 gives information on the use of these devices.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 772, *Hydrometric determinations — Vocabulary and symbols*

ISO 3454, *Hydrometry — Direct depth sounding and suspension equipment*

ISO 3455, *Hydrometry — Calibration of current-meters in straight open tanks*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 772 and the following apply.

3.1
propeller pitch
distance the propeller current-meter relatively moves through the water during one revolution

4 Principle of operation

4.1 Proportionality

The rotating element of a current-meter is driven by the fluid at an angular velocity that is proportional to the local velocity of the fluid at the point of immersion when that velocity exceeds a critical value.

4.2 Flow velocity

In order to determine the velocity of the fluid, a current-meter is placed at a point in a stream and the number of revolutions of the rotor during a specified time interval is counted or the time required by the rotor to turn a given number of revolutions is observed. The velocity is obtained from the current-meter calibration table or calibration equation(s), established experimentally during its calibration (Clause 9). The number of current-meter revolutions (rotations) may be determined by sensing the signals emitted (such as electrical pulses) through the rotation of the rotor by using a suitable counting device. The velocity can be determined from a direct reading of the speed of rotation of the rotating element by means of equipment designed for this purpose.

5 Types of current-meters

5.1 General

The current-meters are generally classified depending upon the type of rotating element used, i.e. vertical axis cup-type and horizontal axis propeller-type.

5.2 Cup-type current-meter

The rotor of the cup-type current-meter is constructed out of conical cups, or curved vanes attached at equal intervals around the perimeter of a hub, which rotates when placed in a fluid flow. Usually, the rotor is mounted with the axis vertical.

5.3 Propeller-type current-meter

The propeller-type current-meter is an assembly consisting of a number of straight or angled vanes attached at equal intervals around the perimeter of a hub, or two or more helical screw blades formed around a hub that rotates about a horizontal axis when placed in a fluid flow.

6 Operational requirements

6.1 Positioning

The current-meter shall maintain alignment with the flow in such a way that the rotating element responds to flow movement as intended. It shall balance in the stream with its longitudinal axis parallel to the water surface. If a pivoted suspension is incorporated within the current-meter, it shall permit freedom in the vertical plane to ensure correct alignment with the stream flow. Alignment in the horizontal plane may be affected by the correct choice of suspension equipment (see ISO 3454).

Current-meters of conventional construction are intended to operate in a horizontal or near-horizontal position. Current-meters designed to operate in other positions are not covered by this International Standard.

6.2 Resistance to flow

The current-meter shall offer minimum resistance to the force of the flow.

6.3 Limits of use

The rotating element of the current-meter shall be such that, when driven by the fluid, it rotates at an angular velocity, which has a known relation to the velocity of the flow within the calibrated velocity range stated by the manufacturer or rating laboratory. The suspension system shall be used as specified by the manufacturer.

The current-meter shall respond rapidly and consistently to the changes in velocity. The manufacturer shall state the expected response rates.

The current-meter shall be used only in liquids with properties similar to those in which it was calibrated. If the liquid properties are significantly different, the current-meter shall be recalibrated in a liquid with properties similar to that in which the current-meter is to be used.

Unless otherwise indicated, the current-meter shall be capable of being used in waters containing suspended sediment and in saline waters.

The manufacturer shall state the maximum hydrostatic pressure to which the instrument may be subjected.