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МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Measurement of clean water flow in closed conduits — Velocity-area method using current-meters in full conduits and under regular flow conditions

Mesure de débit d'eau propre dans les conduites fermées — Méthode d'exploration du champ des vitesses dans les conduites en charge et dans le cas d'un écoulement régulier, au moyen de moulinets

Reference number
ISO 3354 : 1988 (E)

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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 3354 was prepared by Technical Committee ISO/TC 30, *Measurement of fluid flow in closed conduits.*

This second edition cancels and replaces the first edition (ISO 3354 : 1975), of which it constitutes a technical revision.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

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Measurement of clean water flow in closed conduits — Velocity-area method using current-meters in full conduits and under regular flow conditions

1 Scope and field of application

1.1 Scope

This International Standard describes a method for the determination of the volume flow-rate in a closed conduit by means of the velocity-area method using propeller-type current-meters under the following conditions:

a) the velocity distribution is regular (see 6.1.2);

b) the fluid is water which is clean or considered to be clean [1];

c) the conduit is full;

d) the flow is steady [2].

It deals in particular with the technology and calibration of propeller-type current-meters, the measurement of local velocities and the calculation of the flow-rate by velocity integration.

1.2 Field of application

The method of measurement and the requirements defined in this International Standard aim at achieving (at the 95 % confidence level) an uncertainty in flow-rate not greater than ± 2 % provided that the correction for blockage effect (see 6.4.3 and annex B) has been applied.

However, this method is valid only if the flow is not affected by excessive swirl or asymmetry; criteria are given in 6.1.2 so that an estimate can be made of whether or not the flow is regular enough for this International Standard to be applicable and whether the uncertainty lies within the required range. If not, reference should be made to ISO 7194.

In general, if any of the requirements of this International Standard are not fulfilled, this method may still be applied but the uncertainty in the flow-rate measurement will be larger.

Moreover, only circular and rectangular cross-sections are specifically dealt with in this International Standard, to cover the large majority of practical cases. Nevertheless directions on how to proceed for certain other cross-sections of particular shape are given in annex A.

2 References

ISO 3455, *Liquid flow measurement in open channels — Calibration of rotating-element current-meters in straight open tanks.*

ISO 4006, *Measurement of fluid flow in closed conduits — Vocabulary and symbols.*

ISO 5168, *Measurement of fluid flow — Estimation of uncertainty of a flow-rate measurement.*

ISO 7194, *Measurement of fluid flow in closed conduits — Velocity-area methods of flow measurement in swirling or asymmetric flow conditions in circular ducts by means of current-meters or Pitot static tubes.*

3 Definitions and symbols

3.1 Definitions

For the purposes of this International Standard, the definitions given in ISO 4006 apply.

The definitions given here are for terms used with a special meaning or for terms the meaning of which might be usefully recalled.

3.1.1 current-meter: Device provided with a rotor the rotational speed of which is a function of the local velocity of the fluid in which the device is immersed.

This International Standard is concerned only with propeller-type current-meters, i.e. current-meters the rotor of which is a propeller rotating around an axis approximately parallel to the direction of flow.

NOTE — Obviously this definition does not prohibit the use of self-compensating propellers (see 6.1.5), the merit of which is, in particular, that they can be used at a rather high angle relative to the local direction of the flow. However, the use of cup-type current-meters is not allowed for the purposes of this International Standard.

1) This method may be applied to other single-phase fluids but special precautions should be taken in this case.

2) The steady flows observed in conduits are in practice flows in which quantities such as velocity, pressure, density and temperature vary in time about mean values independent of time; these are actually "mean steady flows".