International Standard 1088

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Liquid flow measurement in open channels — Velocity-area methods — Collection and processing of data for determination of errors in measurement

Mesure de débit des liquides dans les canaux découverts — Méthodes d'exploration du champ des vitesses — Recueil et traitement des données pour la détermination des erreurs de mesurage

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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.

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 1088 was prepared by Technical Committee ISO/TC 113, *Measurement of liquid flow in open channels.*

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1 Scope and field of application

This International Standard specifies a standard basis for the collection and processing of data for the determination of individual components of the total error in the measurement of liquid flow in open channels by velocity-area methods.

For determining the discharge in open channels by the velocity-area method, components of the flow need to be measured. The total uncertainty in discharge is a combination of the uncertainties in these components. This International Standard specifies a standard basis for collecting and processing the data required to compute the component uncertainties for determining the total uncertainty in discharge. This International Standard may be used when carrying out an investigation of component uncertainties from data taken from a large sample of rivers in a basin or in a country or for international investigations.

2 References

ISO 748, *Liquid flow measurement in open channels — Velocity-area methods.*

ISO 772, *Liquid flow measurement in open channels — Vocabulary and symbols.*

ISO 4363, *Liquid flow measurement in open channels — Methods for measurement of suspended sediment.*

ISO 4364, *Liquid flow measurement in open channels — Bed material sampling.*

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

ISO/TR 7178, *Liquid flow measurement in open channels — Velocity-area methods — Investigation of total error.*

3 General

3.1 Principle

The principle of the velocity-area method consists in determining from measurements the distribution of the flow velocity in the cross-section and the cross-sectional area, and using these observations for the computation of the discharge.

The measurements of the flow velocity are made in a number of verticals. In each vertical the mean velocity is determined from measurements at a selected number of points. The discharge per unit width may be found by multiplying the mean velocity by the depth in the vertical considered.

Each vertical is assumed to be representative of a segment of the cross-sectional area. The selection of the number and location of the verticals determines the width of these segments. Assuming that the discharge has remained constant during the measurements, summation of the discharge in the various segments gives the total discharge through the section.

3.2 Occurrence of error

When measuring width, depth and flow velocity, errors occur. The application of certain computational methods also introduces errors depending on the assumptions made.

A distinction shall be made between random and systematic errors, resulting from the instruments used, the measuring procedures and the processing of data. Random errors are also influenced by the nature of turbulent flow. The magnitude of random errors can be influenced favourably by the proper selection of instruments and methods. Systematic errors may be constant or variable and they cannot be eliminated by repeating the measurements or by increasing the duration of a measurement. There are, in addition, mistakes due to misreading an instrument or to instrument malfunction.