

INTERNATIONAL STANDARD

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Liquid flow measurement in open channels — Slope-area method

*Mesure de débit des liquides dans les canaux découverts — Méthode de
la pente de la ligne d'eau*



Reference number
ISO 1070:1992(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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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.

International Standard ISO 1070 was prepared by Technical Committee ISO/TC 113, *Measurement of liquid flow in open channels*, Subcommittee SC 1, *Velocity area methods*.

This second edition cancels and replaces the first edition (ISO 1070:1973), of which it constitutes a technical revision.

Annexes A and B of this International Standard are for information only.

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International Organization for Standardization
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Liquid flow measurement in open channels — Slope-area method

1 Scope

This International Standard specifies a method of determining liquid flow in open channels from observations of the surface slope and cross-sectional area of the channel. It is suitable for use under somewhat special conditions when direct measurement of discharge by more accurate methods, such as the velocity-area method, is not possible.

The slope-area method can be used with reasonable accuracy in open channels having stable boundaries, bed and sides (e.g. rock or very cohesive clay), in lined channels and in channels with relatively coarse material. It may also be used in alluvial channels, including channels with overbank flow or non-uniform channel cross-sections, but in these cases the method is subject to large uncertainties owing to the selection of the rugosity coefficient (such as Manning's coefficient n or Chezy's coefficient C).

Generally the method may be used to determine discharge

- a) at the time of determining gauge heights from a series of gauges;
- b) for a peak flow that left marks on a series of gauges or where peak stages were recorded by a series of gauges;
- c) for a peak flow that left high-water marks along the stream banks.

This method is not suitable for use in very large channels, channels with very flat surface slopes and high sediment load or channels having significant curvature.

Although the accuracy of the results given by the slope-area method is less than that of the results given by the velocity-area method, the slope-area method is sometimes the only method that can be used for determining the extreme high-stage end of rating curves in cases where the magnitude of

floods is such that other methods of measuring discharge cannot be used.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 772:1988, *Liquid flow measurement in open channels — Vocabulary and symbols.*

ISO 1100-2:1982, *Liquid flow measurement in open channels — Part 2: Determination of the stage-discharge relation.*

ISO 4373:1978, *Measurement of liquid flow in open channels — Water level measuring devices.*

ISO 5168:1978, *Measurement of fluid flow — Estimation of uncertainty of a flow-rate measurement.*

3 Definitions

For the purposes of this International Standard, the definitions given in ISO 772 apply.

4 Principle of the method of measurement

A measuring reach is chosen for which the mean area of the stream or river cross-section is determined and the surface slope of the flowing water in that reach is measured. The mean velocity is then established by using known empirical formulae which relate the velocity to the hydraulic mean depth, and the surface slope is corrected for the kinetic energy of the flowing water and the charac-