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Measurement of liquid flow in open channels — Field measurement of discharge in large rivers and floods

Mesure de débit des liquides dans les canaux découverts — Mesurage in situ du débit des grandes rivières et des débits de crue

Reference number
ISO 9825:1994(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 9825 was prepared by Technical Committee ISO/TC 113, *Hydrometric determinations*, Subcommittee SC 1, *Velocity area methods*.

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Measurement of liquid flow in open channels — Field measurement of discharge in large rivers and floods

1 Scope

This International Standard deals specifically with the measurement of discharge in large rivers and the measurement of flood flows. It also describes the relevant field measurements when it becomes necessary to use indirect methods of estimating discharge.

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 748:—[1], *Measurement of liquid flow in open channels — Velocity-area methods.*

ISO 772:—[2], *Measurement of liquid flow in open channels — Vocabulary and symbols.*

ISO 1070:1992, *Liquid flow measurement in open channels — Slope-area method.*

ISO 1100-1:1981, *Liquid flow measurement in open channels — Part 1: Establishment and operation of a gauging station.*

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

ISO 1438-1:1980, *Water flow measurement in open channels using weirs and Venturi flumes — Part 1: Thin-plate weirs.*

ISO 3846:1989, *Liquid flow measurement in open channels by weirs and flumes — Rectangular broad-crested weirs.*

ISO 3847:1977, *Liquid flow measurement in open channels by weirs and flumes — End-depth method for estimation of flow in rectangular channels with a free overfall.*

ISO 4359:1983, *Liquid flow measurement in open channels — Rectangular, trapezoidal and U-shaped flumes.*

ISO 4360:1984, *Liquid flow measurement in open channels by weirs and flumes — Triangular profile weirs.*

ISO 4369:1979, *Measurement of liquid flow in open channels — Moving-boat method.*

ISO 4371:1984, *Measurement of liquid flow in open channels by weirs and flumes — End depth method for estimation of flow in non-rectangular channels with a free overfall (approximate method).*

ISO 4374:1990, *Liquid flow measurement in open channels — Round-nose horizontal broad-crested weirs.*

ISO 4377:1990, *Liquid flow measurement in open channels — Flat-V weirs.*

1) To be published. (Revision of ISO 748:1979)

2) To be published. (Revision of ISO 772:1988)

ISO 6416:1992, *Measurement of liquid flow in open channels — Measurement of discharge by the ultrasonic (acoustic) method.*

ISO 6420:1984, *Liquid flow measurement in open channels — Position fixing equipment for hydrometric boats.*

ISO 8333:1985, *Liquid flow measurement in open channels by weirs and flumes — V-shaped broad-crested weirs.*

ISO 8368:1985, *Liquid flow measurement in open channels — Guidelines for the selection of flow gauging structures.*

ISO 9555-1:—[3], *Measurement of liquid flow in open channels — Tracer dilution methods for the measurement of steady flow — Part 1: General.*

ISO 9555-2:1992, *Measurement of liquid flow in open channels — Tracer dilution methods for the measurement of steady flow — Part 2: Radioactive tracers.*

ISO 9555-3:1992, *Measurement of liquid flow in open channels — Tracer dilution methods for the measurement of steady flow — Part 3: Chemical tracers.*

ISO 9555-4:1992, *Measurement of liquid flow in open channels — Tracer dilution methods for the measurement of steady flow — Part 4: Fluorescent tracers.*

World Meteorological Organization, *Manual on Stream Gauging,* Vol. 1: *Field work,* Vol. 2: *Computation of discharge;* WMO 519 OHR 13, Geneva, 1980.

3 Definitions

For the purpose of this International Standard, the definitions given in ISO 772 and the following definitions apply.

3.1 large river: River which presents particular measurement problems because of its large discharge or large physical parameters.

3.2 flood flow: High discharge corresponding to or exceeding natural bankful stage; an unusually high discharge associated with high stage.

It may or may not be confined within banks.

3) To be published.

4 Units of measurement

The units of measurement used in this International Standard are SI units.

5 Appropriate techniques

Due to the dimensions of large rivers and the hazards associated with flood flows, some of the techniques available for discharge measurement on smaller rivers and under normal flow conditions may not be appropriate, or may need modification if used.

The choice of methodology will, in a general sense, be dictated by river dimensions, stream conditions, feasibility of measurements, measuring instruments and equipment, purpose and available funds. In specific instances the choice of technique will be decided by the physical conditions at the site. Hazards discussed in this International Standard are confined to those peculiar to the measurement of large river and flood discharges.

Those techniques which may be partially or entirely appropriate within certain limitations imposed by degree of difficulty of operation are:

a) Velocity-area methods (see ISO 748)

   — current meters,

   — floats.

b) Tracer dilution methods (see ISO 9555, Parts 1 to 4).

c) Weirs and flumes (see ISO 1438, ISO 3846, ISO 3847, ISO 4359, ISO 4360, ISO 4371, ISO 4374, ISO 4377 and ISO 8333).

d) Indirect methods (see ISO 748, ISO 1070, ISO 1100-1, ISO 1100-2)

   — *in situ* measurement,

   — remote sensing methods.

6 Nature of difficulties likely to be encountered

6.1 Measured parameters

When any of the three parameters used to determine discharge (width, depth and velocity) is abnormally large, it may cause problems not usually encountered.