INTERNATIONAL STANDARD

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Hydrometric determinations — Flow measurements in open channels using structures — Compound gauging structures

Déterminations hydrométriques — Mesure de débit des liquides dans les canaux découverts au moyen de structures — Structures de jaugeage hybrides

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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 3.

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 International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 14139 was prepared by Technical Committee ISO/TC 113, *Hydrometric determinations*, Subcommittee SC 2, *Notches, weirs and flumes*.

Annexes A to C form a normative part of this International Standard.

Hydrometric determinations — Flow measurements in open channels using structures — Compound gauging structures

1 Scope

This International Standard specifies the methods of measurement of flow in rivers and artificial channels, using any combination of standard weirs and/or flumes in a compound structure. For guidance on the selection of weirs and/or flumes, refer to ISO 8368. All structures can be operated in the modular flow range, but only a limited number of structures can be used in the drowned (non-modular) flow range (see clause 4). Compound weirs improve the quality of discharge measurements at low stages.

The characteristics of velocity distribution are described annex A.

Structures standardized for operation in the drowned (non-modular) flow range and the method of computation of flow are described in annex B.

Methods and examples of flow measurement calculations are given in annex C.

Compound flow-measuring structures without divide piers need in situ or model calibrations and are not covered by this International Standard.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 772:1996, *Hydrometric determinations — Vocabulary and symbols.*

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 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 4362:1999, *Hydrometric determinations — Flow measurement in open channels using structures — Trapezoidal broad-crested weirs.*

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.*

ISO/TR 5168:1998, *Measurement of fluid flow — Evaluation of uncertainties.*

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

ISO 8368:1999, *Hydrometric determinations — Flow measurements in open channels using structures — Guidelines for selection of structure.*

ISO 9826:1992, *Measurement of liquid flow in open channels — Parshall and SANIIRI flumes.*

ISO 9827:1994, *Measurement of liquid flow in open channels by weirs and flumes — Streamlined triangular profile weirs.*

3 Terms, definitions and symbols

For the purposes of this International Standard, the terms and definitions given in ISO 772 apply. A full list of symbols with the corresponding units of measurement is given below.

Symbol		Units of measurement
A	area of cross-section of flow	m^2
b	crest width	m
B	width of approach channel	m
C_D	coefficient of discharge	non-dimensional
C_{dr}	drowned-flow reduction factor	non-dimensional
C_v	coefficient of approach velocity	non-dimensional
e	uncertainty in absolute magnitude	non-dimensional
g	acceleration due to gravity	m/s^2
h	gauged head	m
H	total head	m
h_p	crest-tapping pressure head	m
h_v	velocity approach head	m
L	length of flume throat or weir crest in direction of flow	m
n	number of measurements in a set	non-dimensional
p	height of flume invert or weir crest above mean bed level	m
Q	total discharge	m^3/s
Q_1, Q_2, Q_3	individual section discharges (in general Q_n)	m^3/s
Q_{mod}	total modular discharge	m^3/s
q	discharge per unit width	m^3/s
s_y	standard deviation of a set of measurements of quantity y	m
$s_{\bar{y}}$	estimated standard deviation of the mean of several readings of quantity y	m
$\bar{v}$	mean velocity at cross-section	m/s
$\bar{v}_a$	mean velocity in approach channel	m/s
X_Q	percentage uncertainty in total discharge	non-dimensional