AS 3778.2.3—1990
ISO 1100/2: 1982

Australian Standard®

Measurement of water flow in open channels

Part 2.3: General—Determination of the stage-discharge relation

This Australian Standard was prepared by Committee CE/24, Measurement of Water Flow in Open Channels and Closed Conduits. It was approved on behalf of the Council of Standards Australia on 9 April 1990 and published on 10 December 1990.

The following interests are represented on Committee CE/24:

Association of Consulting Engineers of Australia

Australian Water and Wastewater Association

Board of Works, Melbourne

Department of Water Resources, NSW

Engineering and Water Supply Department of South Australia

Forestry Commission, NSW

Institute of Instrumentation and Control

Monash University

Public Works Department, NSW

Snowy Mountains Engineering Corporation

University of New South Wales

University of Queensland

Water Authority of Western Australia

Water Board, Sydney

Water Resources Commission, Queensland

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PREFACE

This Standard was prepared by the Standards Australia Committee on Measurement of Water Flow in Open Channels and Closed Conduits. It is identical with and has been reproduced from ISO 1100/2-1982, *Liquid flow measurement in open channels—Part 2: Determination of the stage-discharge relation.*

This Standard is one of a series which deals with methods of measurement of water flow in open channels. The series when complete will consist of the following parts:

Part 1: Vocabulary and symbols
Part 2.1: General—Guidelines for the selection of methods of measurement
Part 2.2: General—Establishment and operation of a gauging station
Part 2.3: General—Determination of the stage-discharge relation (this Standard)
Part 2.4: General—Estimation of uncertainty of a flow-rate measurement
Part 2.5: General—Guidelines for the selection of flow gauging structures
Part 3: Velocity-area methods—
Method 3.1: Measurement by current-meters and floats
Method 3.2: Measurement by moving-boat method
Method 3.3: Measurement by slope-area method
Method 3.4: Collection and processing of data for determination of errors in measurement
Method 3.5: Investigation of total error
Method 3.6: Measurement of flow in tidal channels
Method 3.7: Measurement by ultrasonic (acoustic) method
Method 3.8: Electromagnetic method using a full-channel-width coil
Part 4: Measurement using flow gauging structures—
Method 4.1: Thin-plate weirs
Method 4.2: Rectangular broad-crested weirs
Method 4.3: Round-nose horizontal broad-crested weirs
Method 4.4: V-shaped broad-crested weirs
Method 4.5: Triangular profile weirs
Method 4.6: Flat-V weirs
Method 4.7: Rectangular trapezoidal and U-flumes
Method 4.8: Trapezoidal profile weirs
Method 4.9: Parshall and Saniiri flumes
Method 4.10: End-depth method for estimation of flow in rectangular channels with a free overfall
Method 4.11: End-depth method for estimation of flow in non-rectangular channels with a free overfall (approximate method)
Part 5: Dilution methods—
Method 5.1: Constant-rate injection method for the measurement of steady flow
Method 5.2: Integration method for the measurement of steady flow
Part 6.1: Measuring devices, instruments and equipment—Rotating element current-meters
Part 6.2: Measuring devices, instruments and equipment—Direct depth sounding and suspension equipment
Part 6.3: Measuring devices, instruments and equipment—Calibration of rotating element current-meters in straight open tanks
Part 6.4: Measuring devices, instruments and equipment—Echo sounders for water depth measurements
Part 6.5: Measuring devices, instruments and equipment—Water level measuring devices
Part 6.6: Measuring devices, instruments and equipment—Cableway system for stream gauging
Part 6.7: Measuring devices, instruments and equipment—Ultrasonic (acoustic) velocity meters
Part 6.8: Measuring devices, instruments and equipment—Position fixing equipment for hydrometric boats

For the purposes of this Australian Standard, the ISO text should be modified as follows:

(a) Wherever the words ‘International Standard’ appear referring to this Standard, they should be read as ‘Australian Standard’

(b) Wherever the word ‘fluid’ appears, it should be read as ‘water’.

(c) Substitute a point (.) for a comma (,) as a decimal marker.

(d) The references to other publications should be replaced by references to Australian Standards.

Reference to International Standard		*Australian Standard*	
ISO		AS	
1000	SI units and recommendations for the use of their multiples and of certain other units.	1000	The international system of units (SI) and its application
31	Quantities, units and symbols	2900	Quantities units and symbols
		3778	Measurement of water flow in open channels

772	Liquid flow measurement in open channels—Vocabulary and symbols	3778.1	Part 1: Vocabulary and symbols
1100/1	Liquid flow measurement in open channels—Part 1: Establishment and operation of a gauging station	3778.2.2	Part 2.2: General—Establishment and operation of a gauging station
5168	Measurement of fluid flow—Estimation of uncertainty of a flow-rate measurement	3778.2.4	Part 2.4: General estimation of uncertainty of a flow-rate measurement
778	Liquid flow measurement in open channels—Velocity-area methods	3778.3.1	Part 3: Velocity-area methods—Method 3.1: Measurement by current-meters and floats
4369	Measurement of liquid flow in open channels—Moving-boat method	3778.3.2	Part 3: Velocity-area methods—Method 3.2: Measurement by moving-boat method
1070	Liquid flow measurement in open channels—Slope-area method	3778.3.3	Part 3: Velocity-area methods—Methods 3.3: Measurement by slope-area method
1088	Liquid flow measurement in open channels—Velocity-area methods—collection of data for determination of errors in measurement	3778.3.4	Part 3: Velocity-area methods—Method 3.4: Collection and processing of data for determination of errors in measurement
TR 7178	Measurement of liquid in open channels—Investigation of the total error in measurement of flow by velocity—area methods	3778.3.5	Part 3: Velocity-area methods—Method 3.5: Investigation of total error

Measurement of water flow in open channels

Part 2.3: General—Determination of the stage-discharge relation

1 Scope and field of application

This International Standard specifies methods of determining the stage-discharge relation for a gauging station. A sufficient number of discharge measurements complete with corresponding stage measurements is required to permit the stage-discharge relation to be determined to the accuracy required by this International Standard.

Stable and unstable channels are considered, including those subject to ice conditions, but considerable care must be taken if this International Standard is applied to flow conditions which suddenly or rapidly vary.

An analysis is included of the uncertainties involved in the preparation and the use of the stage-discharge relation.

2 References

ISO 31, *Quantities, units and symbols.*

ISO 555/1, *Liquid flow measurement in open channels — Dilution methods for measurement of steady flow — Part 1: Constant rate injection method.*

ISO 555/2, *Liquid flow measurement in open channels — Dilution methods for measurement of steady flow — Part 2: Integration (sudden injection) method.*

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

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

ISO 1000, *SI units and recommendations for the use of their multiples and of certain other units.*

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

ISO 1088, *Liquid flow measurement in open channels — Velocity-area methods — Collection of data for determination of errors in measurement.*

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

ISO 1438/1, *Liquid flow measurement in open channels using weirs and venturi flumes — Part 1: Thin-plate weirs.*

ISO 2537, *Liquid flow measurement in open channels — Cup-type and propeller-type current meters.*

ISO 3454, *Liquid flow measurement in open channels — Sounding and suspension equipment*

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

ISO 3846, *Liquid flow measurement in open channels by weirs and flumes — Free overall weirs of finite crest width (rectangular broad-crested weirs).*

ISO 3847, *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, *Liquid flow measurement in open channels using flumes.*[1)]

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

ISO 4383, *Liquid flow measurement in open channels — Methods for measurement of suspended sediment.*

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

ISO 4366, *Echo sounders for water depth measurement.*

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

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

ISO 4375, *Measurement of liquid flow in open channels — Cableway system for stream gauging.*