

Australian Standard[®]

**Measurement of water flow in open
channels**

**Method 3.2: Velocity-area methods—
Measurement by moving-boat method**

STANDARDS
Australia



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This Standard was published on 10 December 1990.

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 - 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
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Standards Australia wishes to acknowledge the participation of the expert individuals that contributed to the development of this Standard through their representation on the Committee.

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RECONFIRMATION

OF

AS 3778.3.2—1990

Measurement of water flow in open channels

Method 3.2: Velocity-area methods—Measurement by moving-boat method

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Approved for reconfirmation in accordance with Standards Australia procedures for reconfirmation on 07 February 2022.

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First published as AS 3778.3.2—1990.
Reconfirmed 2009.

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Published by Standards Australia GPO Box 476, Sydney, NSW 2001, Australia

ISBN 0 7262 6295 1

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

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
- 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 (this Standard)
 - 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 structures methods —
 - 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-shaped 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.

<i>Reference to International Standard</i>	<i>Australian Standard</i>
ISO	AS
	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

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
748	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

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Measurement of water flow in open channels

Part 3: Velocity-area methods

Method 3.2: Measurement by moving-boat method

1 Scope and field of application

This International Standard specifies methods for measuring discharge in large rivers and estuaries by the moving-boat technique. In the following sections procedures applicable to this method and the general requirements of equipment are covered. A complete facsimile example of computation of a moving boat measurement is given in the annexes.

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

ISO 4366, *Liquid flow measurement in open channels — Echo sounders.*

ISO 5168, *Calculation of the uncertainty of a measurement of flowrate.*¹⁾

3 Definitions

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

4 Units of measurement

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

5 General

Frequently, on large rivers and estuaries, conventional methods of measuring discharge by current meters are difficult and involve costly and tedious procedures.

This is particularly true at remote sites where no facilities exist, or during floods when facilities may be inundated or inaccessible.

In those cases where the steady flow conditions require that measurement be made as rapidly as possible, the moving-boat technique is applicable. It requires no fixed facilities and lends itself to the use of alternate sites.

The moving-boat technique uses a velocity-area method of determining discharge. The technique requires that the following information be obtained

- a) location of observation points across the stream with reference to the distance from an initial point;
- b) stream depth, d , at each observation point;
- c) stream velocity, v , perpendicular to the cross section at each observation point.

The principal difference between a conventional measurement and the moving-boat measurement is in the method of data collection. The mean velocity in the segments of a cross-section of the stream in the case of a conventional technique is determined by point velocities or an integrated mean velocity in the vertical. The moving-boat technique measures the velocity over the width of a segment by suspending the current meter at a constant depth during the traverse of the boat across the stream. The measured velocity and the additional information of the depth sounding gives the required data for determining the discharge.

1) At present at the stage of draft.