AS 3778.4.2—1991
ISO 3846: 1989

Australian Standard®

Measurement of water flow in open channels

Part 4: Measurement using flow gauging structures

Method 4.2: Rectangular broad-crested weirs

[ISO title: Liquid flow measurement in open channels by weirs and flumes—Rectangular broad-crested weirs]

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 12 July 1991 and published on 23 September 1991.

The following interests are represented on Committee CE/24:

Association of Consulting Engineers, Australia

Australian Water and Wastewater Association

Board of Works, Melbourne

Department of Water Resources, N.S.W.

Engineering and Water Supply Department of South Australia

Forestry Commission, N.S.W.

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Water Board, Sydney—Illawarra—Blue Mountains

Water Resources Commission, Queensland

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First published as AS 3778.4.2—1991.

PUBLISHED BY STANDARDS AUSTRALIA
(STANDARDS ASSOCIATION OF AUSTRALIA)
1 THE CRESCENT, HOMEBUSH, NSW 2140

ISBN 0 7262 7060 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 3846:1989, *Liquid flow measurement in open channels by weirs and flumes—Rectangular broad-crested weirs.*

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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 to 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* (this Standard)
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 overall (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:

(i) Wherever the words 'International Standard' appear, referring to this Standard, they should be read as 'Australian Standard'.

(ii) Wherever the word 'fluid' appears, it should be read as 'water'.

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

(iv) The references to other publications should be replaced by references to Australian Standards as follows:

Reference to International Standard		*Australian Standard*	
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
1100 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
8368	Liquid flow measurement in open channels—Guidelines for the selection of flow gauging structures	3778.2.5	Part 2.5: General—Guidelines for the selection of flow gauging structures
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

Measurement of water flow in open channels

Part 4:
Measurement using flow gauging structures

Method 4.2:
Rectangular broad-crested weirs

1 Scope and field of application

This International Standard lays down requirements for the use of rectangular broad-crested weirs for the measurement of flow of clear water in open channels under free flow conditions.

Annexes A, B and C form an integral part of this International Standard.

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

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

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

3 Definitions

For the purposes of this International Standard, the definitions given in ISO 772 apply. The symbols used in this International Standard are given in annex A.

4 Installation

The conditions regarding the preliminary survey, selection of site, installation, approach channel, maintenance, measurement of the head, and stilling or float wells which are generally necessary for flow measurement are given in 4.1, 4.2, clause 5 and clause 6. The particular requirements for the rectangular broad-crested weir are given separately in clause 7.

4.1 Selection of site

A preliminary survey shall be made of the physical and hydraulic features of the proposed site to check that it conforms (or may be made to conform) to the requirements necessary for flow measurement by the weir.

Particular attention shall be paid to the following features in selecting the site for the weir:

a) the availability of an adequate length of channel of regular cross-section;

b) the existing velocity distribution;

c) the avoidance of a steep channel, if possible (see 4.2.2);

d) the effects of any increased upstream water level due to the measuring structure;

e) the conditions downstream, including influences such as tides, confluences with other streams, sluice gates, mill dams and other controlling features, which might cause drowning;

f) the impermeability of the ground on which the structure is to be founded, and the necessity for piling, grouting or other means of controlling seepage;

g) the necessity for flood banks to confine the maximum discharge to the channel;