AS 3778.4.3—1991
ISO 4374:1990
Reconfirmed 2019

AS 3778.4.3—1991

Australian Standard®

Measurement of water flow in open channels

Method 4.3: Measurement using flow gauging structures—Round-nose horizontal broad-crested weirs

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- 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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STANDARDS AUSTRALIA

RECONFIRMATION

OF
AS 3778.4.3—1991
Measurement of water flow in open channels
Method 4.3: Measurement using flow gauging structures
—Round-nose horizontal broad-crested weirs

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NOTES

Australian Standard®

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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 4374:1990, *Liquid flow measurement in open channels—Round-nose horizontal 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 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 (this Standard)*
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:

(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
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

Measurement of water flow in open channels

Part 4: Measurement using flow gauging structures

Method 4.3: Round-nose horizontal broad-crested weirs

1 Scope

1.1 This International Standard deals with the measurement of flow in rivers and artificial channels under steady flow conditions using round-nose horizontal broad-crested weirs (see figures 1 and 2).

1.2 The flow conditions considered are limited to steady flows which are uniquely dependent on the upstream head. Drowned flows, which depend on downstream as well as upstream levels, are not covered by this International Standard.

1.3 The round-nose horizontal broad-crested weir has a good discharge range and modular limit and is appropriate for use in small- and medium-sized installations. It is particularly robust and insensitive to minor damage.

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 772: 1988, *Liquid flow measurement in open channels — Vocabulary and symbols.*

ISO 5168: 1978, *Measurement of fluid flow — Estimation of uncertainty of a flow-rate measurement.*

3 Definitions and symbols

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

4 Installation

4.1 Selection of site

4.1.1 The weir shall be located in a straight section of channel, avoiding local obstructions, roughness or unevenness of the bed.

4.1.2 A preliminary study shall be made of the physical and hydraulic features of the proposed site, to check that it conforms (or can be made to conform) to the requirements necessary for measurement of discharge by the weir. Particular attention should be paid to the following features in selecting the site:

a) the adequacy of the length of channel of regular cross-section available (see 4.2.2.2);

b) the uniformity of the existing velocity distribution (see annex B);

c) the avoidance of a steep channel (but see 4.2.2.6);

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;

h) the stability of the banks, and the necessity for trimming and/or revetment in natural channels;

i) the uniformity of the cross-section of the approach channel;

j) the prevailing wind, which can have a considerable effect on the flow in a river, or over a weir or flume, especially when the river, weir or flume is wide and the head is small and when the prevailing wind is in a transverse direction;

k) aquatic weed growth;

l) sediment transportation.

4.1.3 If the site does not possess the characteristics necessary for satisfactory measurements, or if an inspection of the stream shows that the velocity distribution in the approach channel deviates appreciably from the examples described in annex B, the site shall not be used unless suitable improvements are practicable. Alternatively, the performance of the installation may be checked by independent flow measurements.