Australian Standard™

Measurement of water flow in open channels

Part 3.8: Velocity-area method—Electromagnetic method using a full-channel-width coil

[ISO title: Measurement of total discharge in open channels—Electromagnetic method using a full-channel-width coil]

Standards Australia

This Australian Standard was prepared by Committee CE-024, Measurement of Water Flow in Open Channels and Closed Conduits. It was approved on behalf of the Council of Standards Australia on 25 September 2000 and published on 12 March 2001.

The following interests are represented on Committee CE-024:

Australian Water and Wastewater Association

Department of Natural Resources, Qld

Institute of Instrumentation and Control Australia

Department of Land and Water Conservation, New South Wales

Department of Public Works and Services, New South Wales

South Australian Water Corporation

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This Standard was issued in draft form for comment as DR 99554.

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Part 3.8: Velocity-area method—Electromagnetic method using a full-channel-width coil

Originated as AS 3778.3.8—1990.
Second edition 2001.

Published by Standards Australia International Ltd
GPO Box 5420, Sydney, NSW 2001, Australia

ISBN 0 7337 3652 1

PREFACE

This Standard was prepared by the Standards Australia Committee CE-024, Measurement of Water Flow in Open Channels and Closed Conduits.

This Standard is identical to and is reproduced from ISO 9213:1992, *Measurement of total discharge in open channels—Electromagnetic method using full-channel with coil*.

This Standard is Part 3.8 of AS 3778, *Measurement of water flow in open channels*, which is published in parts as follows:

AS		
3778		Measurement of water flow in open channels
3778.1	Part 1:	Vocabulary and symbols
3778.2	Part 2:	General
3778.2.1	Part 2.1:	Guidelines for the selection of methods of measurement
3778.2.2	Part 2.2:	Establishment and operation of a gauging station
3778.2.3	Part 2.3:	Determination of the stage-discharge relation
3778.2.4	Part 2.4:	Estimation of uncertainty of a flow-rate measurement
3778.2.5	Part 2.5:	Guidelines for the selection of flow gauging structures
3778.3	Part 3:	Velocity-area method
3778.3.1	Part 3.1:	Measurement by current meters and floats
3778.3.2	Part 3.2:	Measurement by moving boat method
3778.3.3	Part 3.3:	Measurement by slope-area method
3778.3.4	Part 3.4:	Collection and processing of data for determination of errors in measurement
3778.3.5	Part 3.5:	Investigation of total error
3778.3.6	Part 3.6:	Measurement of flow in tidal channels
3778.3.7	Part 3.7:	Measurement by ultrasonic (acoustic) method
3778.3.8	Part 3.8:	Electromagnetic method using a full-channel-width coil (this Standard)
3778.4	Part 4:	Measurement using flow gauging structures
3778.4.1	Part 4.1:	Thin-plate weirs
3778.4.2	Part 4.2:	Rectangular broad-crested weirs
3778.4.3	Part 4.3:	Round-nose horizontal broad-crested weirs`
3778.4.4	Part 4.4:	V-shaped broad-crested weirs
3778.4.5	Part 4.5:	Triangular profile weirs
3778.4.6	Part 4.6:	Flat-V weirs
3778.4.7	Part 4.7:	Rectangular, trapezoidal and U-shaped flumes
3778.4.8	Part 4.8:	Trapezoidal profile weirs
3778.4.9	Part 4.9:	Parshall and Saniiri flumes
3778.4.10	Part 4.10:	End-depth method for estimation of flow in rectangular channels with a free overfall
3778.4.11	Part 4.11:	End-depth method for estimation of flow in rectangular channels with a free overfall (approximate method)
3778.5	Part 5:	Dilution method
3778.5.1	Part 5.1:	Constant-rate injection method for the measurement of steady flow
3778.5.2	Part 5.2:	Integration method for the measurement of steady flow
3778.6	Part 6:	Measuring devices, instruments and equipment
3778.6.1	Part 6.1:	Rotating element current-meters
3778.6.2	Part 6.2:	Direct depth sounding and suspension equipment
3778.6.3	Part 6.3:	Calibration of rotating element current meters in straight open tanks
3778.6.4	Part 6.4:	Echo sounders for water depth measurements
3778.6.5	Part 6.5:	Water level measuring devices
3778.6.6	Part 6.6:	Cableway system for stream gauging
3778.6.7	Part 6.7:	Ultrasonic (acoustic) velocity meters
3778.6.8	Part 6.8:	Position fixing equipment for hydrometric boats

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(e) A full point should be substituted for a comma when referring to a decimal marker.

References to International Standards should be replaced by references to equivalent Australian Standards as follows:

Reference to International Standard		*Australian Standard*	
ISO		AS	
772	Liquid flow measurement in open channels—Vocabulary and symbols	3778 3778.1	Measurement of water flow in open channels Part 1: Vocabulary and symbols
1100	Liquid flow measurement in open channels	3778.2.3	Part 2.3:General—Determination of the stage-discharge relation
1100-2	Part 2: Determination of the stage-discharge relation		
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

NOTES

AUSTRALIAN STANDARD

Measurement of water flow in open channels

Part 3.8:
Velocity-area methods—Electromagnetic method using a full-channel-width coil

1 Scope

This International Standard specifies procedures for the establishment and operation of a gauging station, equipped with an electromagnetic flow-meter, in an open channel or a closed conduit with a free water surface.

The field of application is limited to sites where the magnetic field is generated by an electromagnetic coil which traverses the full channel width.

This International Standard does not apply to flow-meters which operate by using the Earth's magnetic field.

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 748:1979, *Liquid flow measurement in open channels — Velocity-area methods.*

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

ISO 5168:—[1], *Measurement of fluid flow — Evaluation of uncertainties.*

ISO 1100-2:1982, *Liquid flow measurement in open channels — Part 2: Determination of the stage-discharge relation.*

ISO 7066-1:1989, *Assessment of uncertainty in the calibration and use of flow measurement devices — Part 1: Linear calibration relationships.*

IEC 68-1:1988, *Environmental testing, Part 1: General and guidance.*

IEC 68-2-28:1990, *Environmental testing, Part 2: Tests — Guidance for clamp heat tests.*

IEC 801-3:1984, *Electromagnetic compatibility for industrial-process measurement and control equipment, Part 3: Radiated electromagnetic field requirements.*

IEC 801-4:1988, *Electromagnetic compatibility for industrial process measurement and control equipment, Part 4: Electric fast transient/burst requirements.*

3 Definitions

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

4 Principles of operation

4.1 The electromagnetic gauge operates on a principle similar to that of an electric dynamo. If a length of conductor moves through a magnetic field, a voltage is generated between the ends of the conductor. In the electromagnetic gauge, a vertical magnetic field is generated by means of an insulated coil which is located either above or beneath the channel. The conductor is formed by the water which moves through the magnetic field; the ends of the conductor are represented by the channel walls or river banks. The very small voltage generated is sensed by electrodes on the channel banks, and these are connected to the input of a sensitive voltage measuring device. The faster the velocities, the greater is the voltage which is generated.

1) To be published. (Revision of ISO 5168:1978)