

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]



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Australian Water and Wastewater Association
Department of Natural Resources, Qld
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Department of Land and Water Conservation, New South Wales
Department of Public Works and Services, New South Wales
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**Part 3.8: Velocity-area method—
Electromagnetic method using a
full-channel-width coil**

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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
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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
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3778.4.10	Part 4.10:	End-depth method for estimation of flow in rectangular channels with a free overfall
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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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References to International Standards should be replaced by references to equivalent Australian Standards as follows:

<i>Reference to International Standard</i>		<i>Australian Standard</i>	
ISO		AS	
772	Liquid flow measurement in open channels—Vocabulary and symbols	3778	Measurement of water flow in open channels
		3778.1	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

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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 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 700-2:1982, *Liquid flow measurement in open channels — Part 2: Determination of the stage-discharge relation.*

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

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

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

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