Australian Standard®

Measurement of water flow in open channels

Part 7: Determination of volume of water and water level in lakes and reservoirs

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The following are represented on Committee CE-024:

- Australian Industry Group
- Department of Natural Resources and Water, Qld
- Institute of Instrumentation, Control and Automation Australia
- Irrigation Australia
- National Measurement Institute
- NSW Department of Commerce
- University of New South Wales
- Water and Wastewater Association of Australia

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Measurement of water flow in open channels

Part 7: Determination of volume of water and water level in lakes and reservoirs

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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.

The objective of this Standard is to establish a relation between water level and volume by the survey of the topography of lakes and reservoirs for the determination of volume of line storage and the determination of water level.

This Standard is identical with, and has been reproduced from ISO TR 11330:1997, *Determination of volume of water and water level in lakes and reservoirs*.

This Standard is Part 7 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
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
3778.7	Part 7:	Determination of volume of water and water level in lakes and reservoirs (this Standard)

As this Standard is reproduced from an international standard, the following applies:

(a) its number appears on the cover and title page while the international standard number appears only on the cover

(b) In the source text 'ISO/TR 11330' should read 'AS 3778.7'.

(c) A full point substitutes for a comma when referring to a decimal marker.

References to International Standards should be replaced by references to Australian or Australian/New Zealand Standards, as follows:

Reference to International Standard		*Australian Standard*	
ISO		AS	
		3778	Measurement of water flow in open channels
772	Hydrometric determinations—Vocabulary and symbols	3778.1	Part 1: Vocabulary and symbols
4366	Echo sounders for water depth measurements	3778.6.4	Part 6.4: Measurement of water flow in open channels—Measuring devices, instruments and equipment—Echo sounders for water depth measurements
4373	Measurement of liquid flow in open channels—Water level measuring devices	3778.4.3	Part 4.3: Measurement using flow gauging structures—Round-nose horizontal broad-crested weirs
6420	Liquid flow measurement in open channels—Position fixing equipment for hydrometric boats	3778.6.8	Part 6.8: Measurement of water flow in open channels—Measuring devices, instruments and equipment—Position fixing equipment for hydrometric boats

The terms 'normative' and 'informative' are used to define the application of the annex to which they apply. A normative annex is an integral part of a standard, whereas an informative annex is only for information and guidance.

AUSTRALIAN STANDARD

Measurement of water flow in open channels

Part 7: Determination of volume of water and water level in lakes and reservoirs

1 Scope

This Technical Report deals with the survey of the topography of lakes and reservoirs for the determination of volume of line storage and the determination of water level, the objective being to establish a relation between water level and volume. Both conventional surveying methods and electronic distance measurement (EDM) and Global Positioning System (GPS) total station methods are included.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Technical Report. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Technical Report 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 772:1996, *Hydrometric determinations — Vocabulary and symbols.*

ISO 4366:1979, *Echo sounders for water depth measurements.*

ISO 4373:1995, *Measurement of liquid flow in open channels — Water-level measuring devices.*

ISO 6420:1984, *Liquid flow measurement in open channels — Position fixing equipment for hydrometric boats.*

3 Definitions and symbols

For the purpose of this Technical Report, the definitions and symbols given in ISO 772 and the following definitions apply.

3.1 live storage: Storage which can be drawn off from the reservoir to downstream users.

3.2 total storage: Storage between the lowest bed level and top water level.

3.3 flood storage: Volume held above top water level during a flood event.

NOTE — Flood storage is not retained in the reservoir but is discharged until the normal top water level is reached.