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Measurement of water flow in open channels

Part 2.5: General — Guidelines for the selection of flow-gauging structures (ISO 8368:2019, IDT)

AS 3778.2.5:2022

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Australian Bureau of Meteorology
Australian Hydrographers Association
Australian Industry Group
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Engineers Australia
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National Measurement Institute
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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, to supersede AS 3778.2.5:2001.

The objective of this document is to give guidelines for selecting a particular type of flow measuring structure for measuring liquid flow in an open channel. It describes how the individual structures function in simple non-technical terms, and sets out the factors and parameters to take into account in order to make an informed decision on which type of structure to use.

Values of the relevant parameters describing the limitations and uncertainty involved in the use of these structures are given in this document. More definitive details of a particular type of structure are given in the individual standards listed in Table 1, which cover each type of structure.

This document is identical with, and has been reproduced from, ISO 8368:2019, *Hydrometric determinations — Flow measurements in open channels using structures — Guidelines for selection of structure*.

As this document has been reproduced from an International document, a full point substitutes for a comma when referring to a decimal marker.

Australian or Australian/New Zealand Standards that are identical adoptions of international normative references may be used interchangeably. Refer to the online catalogue for information on specific Standards.

The terms "normative" and "informative" are used in Standards to define the application of the appendices or annexes to which they apply. A "normative" appendix or annex is an integral part of a Standard, whereas an "informative" appendix or annex is only for information and guidance.

National Foreword

Instream barrier installations, such as weirs, may be subject to regulations to enable upstream passage of fish and other instream fauna, as many instream species have limited ability to jump or pass over instream barriers. When considering the passage of fish as part of the selection of a flow gauging structure, reference should be made to any regulatory requirements and information should be sought from a specialist in the behaviour of Australian native fish during design of the weir structure if fish passage is required by regulation.

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 113, *Hydrometry*, Subcommittee SC 2, *Flow measurement structures*.

This third edition cancels and replaces the second edition (ISO 8368:1999), which has been technically revised.

The main changes from the previous edition are:

— the list of types of structure included in the text has been reviewed and the details of any structure that is no longer recommended for use have been removed;

— the technical details of all structures included in the text have been reviewed and updated where necessary;

— greater detail has been given to the considerations needed when evaluating the whole life cost of a structure;

— greater detail has also been given to the considerations needed when evaluating the impact of a structure on the environment, and the natural processes occurring in the channel.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Flow measuring structures are used worldwide to measure liquid flow in artificial channels in water treatment facilities, research laboratories and natural watercourses. The number of weirs and structures found in the artificial environment far exceeds the number of those found in the field. Whatever the application, however, the information they provide is put to a variety of uses, including:

— hydraulic research and liquid flow control;

— local specific water availability surveys;

— day-to-day management of water resources;

— waste water disposal;

— long-term strategic water resources planning.

The flow information is also used by government-sponsored environmental protection agencies that manage the natural water resources in a country or region and enforce environmental legislation. This is intended to maintain and preserve water quantity and quality in the natural environment.

Flow measuring structures can be installed by any interested party or user. This could be an environmental protection agency or private operator, such as a commercial organization or an individual. The user is therefore faced with the choice of which form of measuring structure to install. This document gives advice on which type of structure is the most appropriate to satisfy the needs of the application, within all other relevant constraints and limitations.

The technical detail given on each type of structure is, by intention, couched in simple terms. This is so that the non-specialist user can gain an understanding of what is involved in the selection and installation of flow measuring structures, without the need for an in-depth knowledge of fluid hydraulics. Hence, the document does not cover:

— the detailed hydraulics of operation of each type of structure;

— the detailed civil engineering requirements to be met during its construction.

The user is therefore directed to the specific standards that relate to each type of structure for this level of detail. These are listed in the Bibliography and given in Tables 1 and 3 and Figure 1. In this way, the user can be ensured of the most up-to-date details on the hydraulics of operation of each type of structure.

NOTES

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1 Scope

This document gives guidelines for selecting a particular type of flow measuring structure for measuring liquid flow in an open channel. It describes how the individual structures function in simple non-technical terms, and sets out the factors and parameters to take into account in order to make an informed decision on which type of structure to use.

Values of the relevant parameters describing the limitations and uncertainty involved in the use of these structures are given in this document. More definitive details of a particular type of structure are given in the individual standards listed in Table 1, which cover each type of structure.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 772, *Hydrometry — Vocabulary and symbols*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 772 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 Symbols

Symbol	Unit	Description
a	m	height of sluice gate or radial gate opening
A	m^2	area of approach channel
B	m	width of approach channel
b	m	breadth of weir crest perpendicular to flow direction
C_{dr}		drowned flow reduction factor
D	m	diameter of u-shaped flume
g	ms^{-2}	acceleration due to gravity
H	m	total head relative to crest level
H_e	m	total effective head relative to crest level
H	m	gauged head relative to crest level (upstream head is inferred if no subscript is used)
H'	m	difference between lowest and highest crest elevations.
h	m	stage – often design capacity of structure
L	m	length of weir crest in direction of flow