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# Australian Standard 2360—1980



# MEASUREMENT OF FLUID FLOW IN CLOSED CONDUITS—VOCABULARY AND SYMBOLS

STANDARDS ASSOCIATION OF AUSTRALIA
*Incorporated by Royal Charter*



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THE FOLLOWING SCIENTIFIC, INDUSTRIAL AND GOVERNMENTAL ORGANIZATIONS and departments were officially represented on the committee entrusted with the preparation of this standard:

Brisbane City Council

British Society of Rheology

Department of Housing and Construction

Division of Forest Research, CSIRO

Hydro-Electric Commission, Tasmania

Institute of Instrumentation and Control

Melbourne and Metropolitan Board of Works

Metropolitan Water Sewerage and Drainage Board, Sydney

Metropolitan Water Supply Sewerage and Drainage Board, Perth

National Measurement Laboratory, CSIRO

Queensland Water Resources Commission

Snowy Mountains Hydro-Electric Authority

University of Melbourne

University of New South Wales

Water Resources Commission, New South Wales

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AUSTRALIAN STANDARD

# MEASUREMENT OF FLUID FLOW IN CLOSED CONDUITS— VOCABULARY AND SYMBOLS

## AS 2360—1980



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# PREFACE

This standard was prepared by the Association's Committee on Measurement of Water Flow in Closed Conduits and Open Channels. The standard defines terms and symbols used in connection with the measurement of fluid flow in closed conduits and, for this purpose, circular pipe and conduit have been regarded as being synonymous terms.

The standard is based essentially on ISO 4006, Measurement of Fluid Flow in Closed Conduits—Vocabulary and Symbols, which was first issued in September 1977, Australia being one of the member bodies endorsing its publication.

Since the committee was constituted, a review of international standards in this field has begun with a view to the preparation of parallel Australian standards. As a starting point priority has been given to vocabulary and symbols.

The purpose of the standard is to establish the use of a common terminology in the field of fluid flow measurement and, at the same time, to eliminate inconsistencies. In its preparation the committee endeavoured, as far as possible, to follow two principles, viz:

(a) To standardize suitable terms and symbols and not to perpetuate unsuitable ones merely because they have been used in the past.

(b) To discard any term or symbol which is used with different meanings and replace it by a term or symbol which has an unequivocal meaning.

This standard excludes terms which come under the following categories:

(a) Those which are self-evident.

(b) Those which are irrelevant, in particular, those referring more specifically to flow in open channels.

(c) Those referring to methods of measurement which are not commonly used or accepted by ISO.

(d) Those which refer to the analysis of the final measurement rather than to the method of measurement.

The editorial format of this standard is such that the terms are listed in their order of association in Sections, each term or group of terms having a discrete number which indicates the Section, principal term and subsidiary term, as appropriate. Where more than one term is (or can be) associated with a particular definition, the preferred term is the first one listed and is printed in bold type. The non-preferred term is printed in light type.

The standard contains two appendices. Appendix A details definitions of general terms used in fluid mechanics commonly associated with specifications for flow measurement. Definitions contained within ISO technical committees are also included. Appendix B is an alphabetical list of symbols.

Both preferred and non-preferred terms are listed in the Index. Each non-preferred term is printed in italics and is followed by the letters 'NP' (indicating non-preferred), then the appropriate cross-reference to the preferred term and associated term number.

The standard makes reference to the following international standards:

ISO 31 Quantities, Units, Symbols, Conversion Factors and Conversion Tables

ISO 5167 Measurement of Fluid Flow by Means of Orifice Plates, Nozzles and Venturi Tubes Inserted in Circular Cross-section Conduits Running Full

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# for
# MEASUREMENT OF FLUID FLOW IN CLOSED CONDUITS—VOCABULARY AND SYMBOLS

## SECTION 1. GENERAL TERMS

| No | Term | Definition |
|---|---|---|
| 111 | **flow rate of a fluid** | The amount of fluid flowing through the cross-section of a conduit in unit time. |
| | .1 **mass flow rate ($q_m$)** | The mass of fluid flowing through the cross-section of a conduit in unit time. |
| | .2 **volume flow-rate ($q_v$)** | The volume of fluid flowing through the cross-section of a conduit in unit time at the conditions of pressure and temperature pertaining to that section. |
| 112 | **flowmeter** | A device for measuring the flow rate. |
| 113 | **primary device (general)** | A device which generates a signal enabling the flow rate to be determined. According to the principle used, the primary device can be internal or external to the conduit. *See also* 212 and 611. |
| 114 | **secondary device** | A device which receives from the primary device a signal and displays, records, transforms and/or transmits it as a measure of the flow rate. *See also* 611.2. |
| 115 | **straight length** | A portion of a conduit whose axis is straight, and in which the cross-sectional area and cross-sectional shape are constant. |
| 116 | **irregularity (of a conduit)** | Any element or configuration which makes the conduit different from a straight length. |
| 117 | **fully-developed velocity distribution** | A velocity distribution that does not change between two cross-sections of a flow. It is generally obtained at the end of a sufficient straight length of a conduit. |
| 118 | **regular velocity distribution** | Flow in which the velocity distribution sufficiently approaches that of a fully developed velocity distribution to permit measurements to be made with sufficient accuracy. |
| 119 | **flow straightener** | General term used to describe various devices which have the functions of swirl removing or profile regulating. |
| | .1 **swirl remover** | A device inserted in a conduit to eliminate or reduce circumferential velocity components which comprise swirl. *See* note. |
| | .2 **profile regulator** | A device inserted in a conduit to reduce the straight length required to achieve a regular velocity distribution.<br>NOTE: The difference between the functions of a swirl remover and a profile regulator is not always clearly made in respect of particular flow straighteners, and indeed some devices may perform both functions to a greater or lesser extent. |
| 120 | **steady flow** | Flow in which the flow rate in a measuring section does not vary significantly with time.<br>NOTE: The steady flows observed in conduits are in practice flows in which quantities such as velocity, pressure, mass density and temperature vary in time about mean values independent of time; these are actually 'statistically steady flows'. |
| 121 | **pulsating flow of mean constant flow rate** | Flow in which the flow rate in a measuring section is a function of time but has a constant mean value when averaged over a sufficiently long period of time.<br>NOTE: There are two types of pulsating flow:<br>(a) Periodic pulsating flow,<br>(b) Fluctuating (random) pulsating flow. |
| 122 | **unsteady flow** | Flow which may be laminar or turbulent, in which the flow rate in a measuring section fluctuates randomly with time.<br>NOTE: The time interval to be considered is to be long enough to exclude from this definition the random components of the turbulent flow itself. |
| 123 | **hydraulic radius ($R_h$)** | The ratio of the wetted cross-sectional area and the wetted perimeter.<br>NOTE: For the circular conduit running full, the hydraulic radius is half the radius of the conduit. |
| 124 | **pressure loss (caused by a primary device)** | The irrecoverable pressure loss caused by the presence of a primary device in the conduit. |
| 125 | **working temperature** | The static temperature of the fluid immediately upstream of the primary device. |
| 126 | **working pressure** | The static pressure of the fluid immediately upstream of the primary device. |