INTERNATIONAL STANDARD

ISO 4064-1

Second edition
1993-05-15

Measurement of water flow in closed conduits — Meters for cold potable water —

Part 1:
Specifications

Mesurage de débit d'eau dans les conduites fermées — Compteurs d'eau potable froide —

Partie 1: Spécifications

Reference number
ISO 4064-1:1993(E)

Contents

International Organization for Standardization
Case Postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 4064-1 was prepared by Technical Committee ISO/TC 30, *Measurement of fluid flow in closed conduits*, Sub-Committee SC 7, *Water meters*.

This second edition cancels and replaces the first edition (ISO 4064-1:1977), of which has been technically revised.

ISO 4064 consists of the following parts, under the general title *Measurement of water flow in closed conduits — Meters for cold potable water*:

— *Part 1: Specifications*

— *Part 2: Installation requirements*

— *Part 3: Test methods and equipment*

Annex A of this part of ISO 4064 is for information only.

This page intentionally left blank

Measurement of water flow in closed conduits — Meters for cold potable water —

Part 1:
Specifications

1 Scope

This part of ISO 4064 deals with terminology, technical characteristics, metrological characteristics and pressure loss.

It applies to water meters of various metrological classes (see clause 5) which can withstand permanent flow-rates from 0,6 m^3/h to 4 000 m^3/h, maximum admissible working pressures (MAP) equal to or greater than 10 bar[1)] and a maximum admissible temperature (MAT) of 30 °C.

The recommendations of this part of ISO 4064 apply to water meters defined as follows: self-contained integrating measuring instruments continuously determining the volume of water flowing through them, employing a direct mechanical process involving the use of volumetric chambers with mobile walls ("volumetric" water meters) or the action of the velocity of the water on the rotation rate of a moving part ("velocity" meters).

Legal requirements take precedence over the recommendations of this part of ISO 4064.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 4064. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 4064 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 228-1:1982, *Pipe threads where pressure-tight joints are not made on the threads — Part 1: Designation, dimensions and tolerances.*

ISO 7005-2:1988, *Metallic flanges — Part 2: Cast iron flanges.*

ISO 7005-3:1988, *Metallic flanges — Part 3: Copper alloy and composite flanges.*

IEC 529:1989, *Degrees of protection provided by enclosures (IP Code).*

3 Definitions

For the purposes of this part of ISO 4064, the following definitions apply.

3.1 "volumetric" meter: Device, fitted into a closed conduit, which consists of chambers of known volume and a mechanism driven by the flow, whereby these chambers are successively filled with water and then emptied. By counting the number of these volumes passing through the device, the indicating device totals the volume flow.

3.2 "velocity" meter: Device, fitted into a closed conduit, which consists of a moving element set in

1) 1 bar = 10^5 Pa

motion directly by the velocity of the water flow. The movement of the moving element is transmitted by mechanical or other means to the indicating device, which totals the volume flow.

3.2.1 Woltmann meter: Device consisting of a helical blade which rotates about the axis of flow in the meter.

3.2.2 single-jet and multi-jet meters: Devices consisting of a turbine rotor rotating about the axis perpendicular to the flow of water in the meter. The meter is called a single-jet meter if the jet impinges at a single place on the rotor's periphery, and a multi-jet if the jet impinges simultaneously at several points around the periphery of the rotor.

3.3 flow-rate: Quotient of the volume of water passing through the water meter and the time taken for this volume to pass through the water meter.

3.4 permanent flow-rate, q_p[2]: Flow-rate at which the meter is required to operate in a satisfactory manner (see 3.6) under normal conditions of use, e.g. under steady and/or intermittent flow conditions.

3.5 overload flow-rate, q_s[2]: Flow-rate at which the water meter is required to operate in a satisfactory manner (see 3.6) for a short period of time without deteriorating; its value is twice the value of q_p.

3.6 minimum flow-rate, q_{min}[2]: Lowest flow-rate at which the meter is required to give indications within the maximum permissible error tolerance. It is determined in relation with the numerical value of the meter designation.

3.7 flow-rate range: Range limited by the overload flow-rate, q_s, and the minimum flow-rate, q_{min}, in which the meter indications must not be subject to an error in excess of the maximum permissible errors.

This range is divided into two zones called "upper" and "lower" zones, separated by the transitional flow-rate.

3.8 transitional flow-rate, q_t[2]: Flow-rate value, occurring between overload and minimum flow-rates, at which the flow-rate range is divided into two zones, the "upper zone" and "lower zone", each characterized by a maximum permissible error in this zone.

3.9 volume flow: Volume of water passing through the water meter, disregarding the time taken.

3.10 indicating device: Device displaying the volume flow.

3.11 nominal pressure (PN): Numerical designation which is a rounded number for reference purposes.

All equipment of the same nominal size (DN) and designated by the same PN number shall have compatible mating dimensions.

3.12 maximum admissible working pressure (MAP): For a water meter, maximum internal pressure that it can withstand permanently at a given temperature.

NOTE 1 For low temperatures between 0 °C and 30 °C, the MAP for materials currently used for the bodies of water meters remains constant. For cold water meters PN = MAP.

3.13 nominal size (DN): Numerical designation common to all the components of a pipe system, excluding those designated by their external diameter or by the thread dimension. It is a whole number used for reference only, approximating the constructional dimensions.

3.14 pressure loss: Pressure loss caused by the presence of a water meter in the pipeline at a given flow-rate.

3.15 maximum admissible temperature (MAT): For a water meter, maximum temperature that it can withstand at a given internal pressure.

3.16 meter designation N: Numerical value, preceded by the capital letter N, to designate the meter in relation to tabulated values of dimensions.

4 Technical characteristics

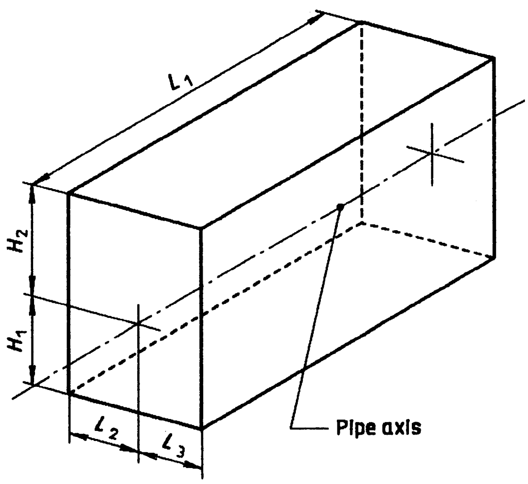
4.1 Meter size and overall dimensions — Meter designation and permanent flow-rate

4.1.1 Meter size and overall dimensions

Meter size is characterized either by the thread size of the end connections or by the nominal size of the flange. For each meter size there is a corresponding fixed set of overall dimensions (see figure 1). The dimensions are given in tables 1 and 2.

For threaded end connections, two minimum dimensions, *a* and *b*, are specified (see 4.1.4).

2) Flow-rates to be expressed in cubic metres per hour (m^3/h).



$H_1 + H_2$, L_1, $L_2 + L_3$ define the height, length and width respectively of a cuboid within which the water meter can be contained (the cover being at right angles to its closed position).

H_1, H_2, L_2, L_3 are maximum dimensions.

L_1 is a fixed value with specified tolerances.

Figure 1 — Meter size and overall dimensions

4.1.2 Relationship between meter designation and permanent flow-rate

The numerical value of the permanent flow-rate, q_p, expressed in cubic metres per hour (m^3/h), shall be at least equal to the meter designation. Where the value is greater than the meter designation, it shall be equal to one of the values given in tables 1 and 2 for meter designation provided that the relationship between meter size and meter designation according to 4.1.3 is maintained.

4.1.3 Relationship between meter size and meter designation

Meter size and hence overall dimensions are in principle linked to the designation of the water meter as specified in tables 1 and 2. For a given meter size, it nevertheless is permitted to adopt the immediately adjacent larger or smaller meter size, provided that the metrological requirements are met. In such a case the meter shall be designated not only by its numerical N value but also by its DN. End connections shall be the same at the water meter inlet and outlet.

Table 1 — Water meters with threaded end connections — Meter designation, meter sizes and dimensions

Dimensions in millimetres

Meter sizes		Meter dimensions						
Meter designation N	Meter size (nominal size of threaded end connection)	Thread	a_{min}	b_{min}	L_1 (tolerance $^{0}_{-2}$)	$L_{2\,max}$ and $L_{3\,max}$	$H_{1\,max}$	$H_{2\,max}$
—	—	G 3/4 B	10	12	80	50	50	180
N 0,6	G 3/4 B[1)]	G 3/4 B	10	12	110	50	50	180
N 1	G 3/4 B[1)]	G 3/4 B	10	12	130	50	50	180
N 1,5	G 3/4 B[1)]	G 3/4 B	10	12	165	50	50	180
N 2,5	G 1 B[1)]	G 1 B	12	14	190	65	60	240
N 3,5	G 1 1/4 B	G 1 1/4 B	12	16	260	85	65	260
N 6	G 1 1/2 B	G 1 1/2 B	13	18	260	85	70	280
N 10	G 2 B	G 2 B	13	20	300	105	75	300

1) The thread size of the next larger value is acceptable as an alternative.

Table 2 — Water meters with flanged end connections — Meter designation, meter sizes and dimensions

Dimensions in millimetres

Meter size			Meter dimensions									
Meter designation N		Size	DN 1)	L_1 [tolerances $^{0}_{-3}$ ($200 \leqslant L_1 \leqslant 400$), $^{0}_{-5}$ ($400 < L_1 \leqslant 1\,200$)]			$L_{2\,max}$ and $L_{3\,max}$		$H_{1\,max}$		$H_{2\,max}$	
Volumetric, single-jet and multi-jet	Woltmann	DN 1)		Volumetric, single-jet and multi-jet	Other meters either	Other meters or	Volumetric, single-jet and multi-jet	Woltmann	Volumetric, single jet and multi-jet	Woltmann	Volumetric, single-jet and multi-jet	Woltmann
N 15	N 15	50	50	350	300	200	135	135	115	100	300	390
N 20	N 25	65	65	450	300	200	150	135	130	110	320	390
N 30	N 40	80	80	500	350	200	180	135	150	120	320	410
N 50	N 60	100	100	650	350	250	225	135	215	140	320	440
	N 100	125	125		350	250		135		140		440
	N 150	150	150		500	300		175		180		500
	N 250	200	200		500	350		190		200		500
	N 400	250	250		600	450		210		220		500
	N 600	300	300		800	500		240		250		500
	N 1 000	400	400		800	600		290		320		500
	N 1 500	500	500		1 000	800		365		380		520
	N 2 500	600	600		1 200	1 000		390		450		600
	N 4 000	800	800		1 200	1 200		510		550		700

1) DN: nominal size of flange end connections.

4.1.4 Threaded connection

Values are given in table 1. Threads shall comply with ISO 228-1. Figure 2 defines dimensions *a* and *b*.

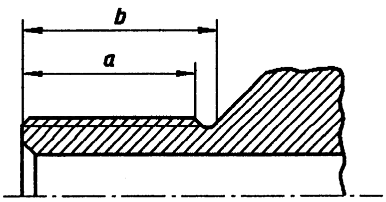


Figure 2 — Thread

4.1.5 Flanged connection

Flanged end connections shall comply with ISO 7005-2 and ISO 7005-3 for a nominal pressure corresponding to that of the water meter. Dimensions are given in table 2.

The manufacturer shall provide a reasonable clearance behind the rear face of the flange to allow access for installation and removal.

4.2 Indicating device

4.2.1 General requirements

4.2.1.1 Function

The indicating device shall provide an easily read, reliable and unambiguous visual indication of the volume flow.

The device shall include visual means for verification and calibration.

The device may include additional elements for verification and calibration by other methods, e.g. automatic.

4.2.1.2 Unit of measurement, symbol and its location

The volume of water measured shall be expressed in cubic metres.

The unit symbol (m^3) shall appear on the dial or immediately adjacent to the numbered display.

4.2.1.3 Indicator range

The indicating device shall be able to record, without passing zero, the volume expressed in cubic metres, corresponding to at least 1 999 h of operation at the permanent flow-rate.

This provision is formulated in table 3.

Table 3 — Indicator range

q_p m^3/h	Indicator range m^3 (min.)
$q_p \leqslant 5$	9 999
$5 < q_p \leqslant 50$	99 999
$50 < q_p \leqslant 500$	999 999
$500 < q_p \leqslant 4\,000$	9 999 999

4.2.1.4 Colour coding

The colour black shall be used to indicate cubic metres and its multiples. The colour red shall be used to indicate sub-multiples of cubic metres.

These colours shall be applied to either the pointers, needles, numbers, wheels, disks, dials or aperture frames.

4.2.1.5 Direction of indicator movement

Rotational movement of pointers or circular scales shall be clockwise. Linear movement of pointers or scales shall be left to right. Movement of numbered roller indicators shall be upwards.

4.2.1.6 Incremental change in electronic digital indicator

The incremental change in electronic digital indication shall be instantaneous.

4.2.2 Types of indicating device

The following types of indicators are permissible.

4.2.2.1 Type 1 — Analog device

The volume of water is given by continuous movement of

a) one or more pointers moving relative to graduated scales;

b) one or more circular scales or drums each passing a pointer.

The value expressed in cubic metres for each scale division shall be of the form 10^n, where n is a positive or negative whole number or zero, thereby establishing a system of consecutive decades. Each scale shall be

— either graduated in values expressed in cubic metres,