INTERNATIONAL STANDARD

ISO 10385-1

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Measurement of water flow in closed conduits — Meters for hot water —

Part 1: Specifications

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

Partie 1: Spécifications

Reference number
ISO 10385-1:2000(E)

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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.

Attention is drawn to the possibility that some of the elements of this part of ISO 10385 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 10385-1 was prepared by Technical Committee ISO/TC 30, *Measurement of fluid flow in closed conduits*, Subcommittee SC 7, *Volume methods including water meters*.

ISO 10385 consists of the following parts, under the general title *Measurement of water flow in closed conduits — Meters for hot water*:

— *Part 1: Specifications*

Installation conditions as well as test methods and equipment will be the subjects of future parts to ISO 10385.

Measurement of water flow in closed conduits — Meters for hot water —

Part 1: Specifications

1 Scope

This part of ISO 10385 specifies the technical characteristics, metrological characteristics, pressure loss and marking of meters for hot water.

This part of ISO 10385 applies to water meters which are self-contained integrating measuring instruments which continuously determine the volume of water flowing through them, employing a direct mechanical process involving the use of volumetric chambers with mobile walls ("volumetric" meters) or the action of the velocity of the water on a moving part ("velocity" meters). A magnetic coupling is considered as a direct mechanical process.

It applies to hot-water meters having permanent flowrates which lie within the range 0,6 m^3/h to 400 m^3/h at maximum admissible working pressures (MAP) of 10 bar[1] to 40 bar and at maximum admissible temperatures (MAT) corresponding to one of the following values: 70 °C, 90 °C, 130 °C and 180 °C.

Legal requirements take precedence over the specifications of this part of ISO 10385.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 10385. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 10385 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 228-1, *Pipe threads where pressure-tight joints are not made on the threads — Part 1: Dimensions, tolerances and designation.*

ISO 7005-1:1992, *Metallic flanges — Part 1: Steel flanges.*

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 60529, *Degrees of protection provided by enclosures (IP Code).*

1) 1 bar = 10^5 Pa = 0,1 MPa

3 Terms and definitions

For the purposes of this part of ISO 10385, the following terms and 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

NOTE By counting the number of these volumes passing through the device, the indicating device totalizes the volume of water passed.

3.2
velocity meter
device, fitted into a closed conduit, which consists of a moving element deriving its motion directly from the velocity of the water flow

NOTE The movement of the moving element is transmitted by mechanical or other means to the indicating device which totalizes the volume of water passed.

3.2.1
Woltman meter
velocity meter comprising a rotor with helical blades which rotates about the axis of the flow within the meter

3.2.2
single-jet meter

velocity meter comprising a turbine rotor which rotates about an axis perpendicular to the axis of the flow within the meter

NOTE The jet impinges at a single place on the periphery of the rotor.

3.2.3
multi-jet meter
velocity meter comprising a turbine rotor which rotates about an axis perpendicular to the axis of the flow within the meter

NOTE The jets impinge at several points around the periphery of the rotor.

3.3
flowrate
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
overload flowrate
q_s
flowrate 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 being twice the value of q_p

NOTE It is expressed in cubic metres per hour.

3.5
minimum flowrate
q_{min}
lowest flowrate at which the meter is required to give indications within the maximum permissible error tolerance and determined as a function of the numerical value of the meter designation

NOTE It is expressed in cubic metres per hour.

3.6
flowrate range
range, limited by the overload flowrate q_s, and the minimum flowrate q_{min}, in which the meter indications are not to be subject to an error in excess of the maximum permissible error

NOTE This range is divided into two zones called the “upper” and “lower zone”, separated by the transitional flowrate.

3.7
permanent flowrate
q_p
flowrate at which the meter is required to operate in a satisfactory manner (see 3.6) under normal conditions of use, for example under steady and/or intermittent flow conditions

NOTE It is expressed in cubic metres per hour.

3.8
transitional flowrate
q_t
flowrate value, occurring between the overload and minimum flowrates, at which the flowrate range is divided into two zones, the “upper zone” and the “lower zone”, each characterized by a maximum permissible error in this zone

NOTE It is expressed in cubic metres per hour.

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

NOTE All equipment of the same nominal size (DN) designated by the same PN number has compatible mating dimensions.

3.12
maximum admissible working pressure
MAP
for a water meter, the maximum internal pressure that it can withstand permanently at a given temperature

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

NOTE It is a whole number used for reference only, approximating the constructional dimensions.

3.14
pressure loss
that loss in pressure caused by the presence of the water meter in the pipeline at a given flowrate

3.15
maximum admissible temperature
MAT
for a water meter, the maximum temperature that it can withstand permanently 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 flowrate

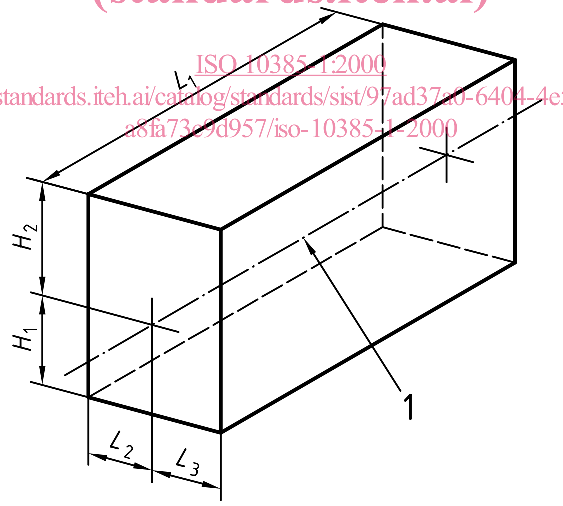
4.1.1 Meter size and overall dimensions

Meter size is designated 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) as specified in Tables 1 and 2.

— $H_1 + H_2$, L_1 and $L_2 + L_3$ 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 and L_3 are maximum dimensions.

— L_1 is a fixed value with specified tolerances. For threaded end connections, two minimum dimensions, a and b, are specified (see 4.1.4).



Key

1 Axis of pipework

Height: $H_1 + H_2$

Length: L_1

Width: $L_2 + L_3$

Figure 1 — Overall dimensions of a meter

4.1.2 Relationship between meter designation and permanent flowrate

The numerical value of the permanent flowrate q_p, expressed in cubic metres per hour, shall be at least equal to the numerical value to the meter designation. In cases where it is greater than the numerical value of 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 the meter size and the meter designation specified in 4.1.3 is maintained.

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

Dimensions in millimetres

Meter sizes		Meter dimensions						
Meter designation N	**Meter size** [a]	**Thread**	a_{min}	b_{min}	$L_1\ {}^{0}_{-2}$	$L_{2\,max}$ 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 [b]	G 3/4 B	10	12	110	50	50	180
N 1	G 3/4 B [b]	G 3/4 B	10	12	130	50	50	180
N 1,5	G 3/4 B [b]	G 3/4 B	10	12	165	50	50	180
N 2,5	G 1 B [b]	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

[a] Nominal size of threaded end connection.

[b] The thread size of the next larger value is acceptable as an alternative.

Table 2 — Hot water meters with flanged end connections — Meter designations, meter sizes and dimensions

Dimensions in millimetres

Meter size DN	Meter sizes		Meter dimensions								
	Meter designation N		L_1: $L_1\ {}^{0}_{-2} \leqslant 200$ $200 < L_1\ {}^{0}_{-3} \leqslant 400$ $400 < L_1\ {}^{0}_{-5} \leqslant 600$			$L_{2\,max}$ and $L_{3\,max}$		$H_{1\,max}$		$H_{2\,max}$	
	Volume-tric, single-jet and multi-jet meters	Woltman type meters	Volume-tric, single-jet and multi-jet meters	Woltman type meters		Volume-tric, single-jet and multi-jet meters	Woltman type meter	Volume-tric, single-jet and multi-jet meters	Woltman type meter	Volume-tric, single-jet and multi-jet meters	Woltman type meter
				either	or						
—	—	—	80	—	—	50	—	50	—	180	—
15	N 0,6	—	110	—	—	50	—	50	—	180	—
15	N 1	—	130	—	—	50	—	50	—	180	—
15	N 1,5	—	165	—	—	50	—	50	—	180	—
20	N 2,5	—	190	—	—	65	—	60	—	240	—
25	N 3,5	—	260	—	—	85	—	65	—	260	—
32	N 6	—	260	—	—	85	—	70	—	280	—
40	N 10	—	300	—	—	105	—	75	—	300	—
50	N 15	N 15	350	300	200	135	135	115	100	300	390
65	N 20	N 25	450	300	200	150	135	130	110	320	390
80	N 30	N 40	500	350	200	180	135	150	120	320	410
100	N 50	N 60	650	350	250	225	135	215	140	320	440
125	—	N 100	—	350	250	—	135	—	140	—	440
150	—	N 150	—	500	300	—	175	—	180	—	500
200	—	N 250	—	500	350	—	190	—	200	—	500
250	—	N 400	—	600	450	—	210	—	220	—	500

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, nevertheless it 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.

4.1.4 Threaded connection

Dimensions for the threaded connection are specified in Table 1. Threads shall comply with ISO 228-1. Figure 2 defines dimensions a and b.

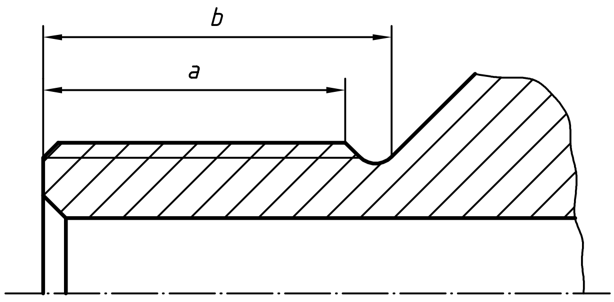


Figure 2 — Dimensions *a* and *b*

4.1.5 Flanged connection

Flanged end connections shall comply with ISO 7005-1, ISO 7005-2 and ISO 7005-3 (as appropriate) for a nominal pressure corresponding to that of the water meter. Dimensions are specified 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, for example automatic means.

4.2.1.2 Unit of measurement — Symbol and its position

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 Indicating 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 flowrate. This provision is formulated in Table 3.

Table 3 — Minimum indicating range

q_p m^3/h	**Indicating range** m^3
$0,6 \leqslant q_p \leqslant 5$	9 999
$5 < q_p \leqslant 50$	99 999
$50 < q_p \leqslant 400$	999 999

