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Water meters for cold potable water and hot water —

Part 1: Metrological and technical requirements

*Compteurs d'eau potable froide et d'eau chaude —**Partie 1: Exigences métrologiques et techniques*

ICS: 91.140.60

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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, www.iso.org/directives.

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The committees responsible for this document are Technical Committee ISO/TC 30, *Measurement of fluid flow in closed conduits*, Subcommittee SC 7, *Volume methods including water meters* and OIML Technical Subcommittee TC 8/SC 5 *Water meters*.

This fifth edition of ISO 4064-1 cancels and replaces the fourth edition (ISO 4064-1:2014), which has been technically revised.

ISO 4064 consists of the following parts, under the general title *Water meters for cold potable water and hot water*:

- *Part 1: Metrological and technical requirements*
- *Part 2: Test methods*
- *Part 3: Test report format*
- *Part 4: Non-metrological requirements not covered in ISO 4064-1*
- *Part 5: Installation requirements*

This edition of ISO 4064-1 is identical to the corresponding edition of OIML R 49-1, which has been issued concurrently. OIML R 49-1 was approved for final publication by the International Committee of Legal Metrology at XXX meeting in XXX. It will be submitted to the International Conference on Legal Metrology in XXX for formal sanction.

Water meters for cold potable water and hot water —

Part 1: Metrological and technical requirements

1 Scope

This part of ISO 4064|OIML R 49 specifies the metrological and technical requirements for water meters for cold potable water and hot water flowing through a fully charged, closed conduit. These water meters incorporate devices which indicate the accumulated volume.

In addition to water meters based on mechanical principles, this part of ISO 4064|OIML R 49 applies to devices based on electrical or electronic principles, and mechanical principles incorporating electronic devices, used to measure the volume of cold potable water and hot water.

This part of ISO 4064|OIML R 49 also applies to electronic ancillary devices. Ancillary devices are optional. However, it is possible for national or regional regulations to render some ancillary devices mandatory in relation to the utilization of water meters.

NOTE Any national regulations apply in the country of use.

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 4064-2, *Water meters for cold potable water and hot water - Part 2: Test methods*

3 Terms and definitions

For the purposes of this document, the following definitions apply.

This terminology conforms to that used in ISO/IEC Guide 99:2007|OIML V 2-200:2012,^[1] OIML V 1:2013^[2] and OIML D 11.^[3] Modified versions of some terms defined in References [1], [2] and [3] are listed here.

3.1 Water meter and its constituents

3.1.1

water meter

instrument intended to measure, memorize, and display the volume of water passing through the measurement transducer at metering conditions

Note 1 to entry: A water meter includes at least a measurement transducer, a calculator (including adjustment or correction devices, if present) and an indicating device. These three devices can be in different housings.

Note 2 to entry: A water meter may be a combination meter (see 3.1.16).

Note 3 to entry: In this International Standard, a water meter is also referred to as a “meter”.

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3.1.2

measurement transducer

part of the meter that transforms the flow rate or volume of water to be measured into signals which are passed to the calculator and includes the sensor

Note 1 to entry: The measurement transducer may function autonomously or use an external power source and may be based on a mechanical, electrical or electronic principle.

3.1.3

sensor

element of a meter that is directly affected by a phenomenon, body or substance carrying a quantity to be measured

[SOURCE: ISO/IEC Guide 99:2007|OIML V 2-200:2012 (VIM), 3.8, modified — "meter" replaces "measuring system".]

Note 1 to entry: For a water meter, the sensor may be a disc, piston, wheel or turbine element, the electrodes on an electromagnetic meter, or another element. The element senses the flow rate or volume of water passing through the meter and is referred to as a "flow sensor" or "volume sensor".

3.1.4

calculator

part of the meter that transforms the output signals from the measurement transducer(s) and, possibly, from associated measuring instruments and stores the results in memory until they are used

Note 1 to entry: The gearing is considered to be the calculator in a mechanical meter.

Note 2 to entry: The calculator may be capable of communicating both ways with ancillary devices.

3.1.5

indicating device

part of the meter that provides an indication corresponding to the volume of water passing through the meter

Note 1 to entry: For the definition of the term "indication", see ISO/IEC Guide 99:2007|OIML V 2-200:2012 (VIM), 4.1.

Note 2 to entry: In this International Standard, the volume of water passing through the meter refers to the accumulated volume.

3.1.6

adjustment device

part of the meter that allows an adjustment of the meter such that the error curve of the meter is generally shifted parallel to itself to fit in the envelope of the maximum permissible errors

Note 1 to entry: For the definition of the term "adjustment of a measuring system", see ISO/IEC Guide 99:2007|OIML V 2-200:2012 (VIM), 3.11.

3.1.7

correction device

device connected to or incorporated in the meter for automatic correction of the volume of water at metering conditions, by taking into account the flow rate and/or the characteristics of the water to be measured and the pre-established calibration curves

Note 1 to entry: For the definition of the term "correction", see ISO/IEC Guide 99:2007|OIML V 2-200:2012 (VIM), 2.53.

3.1.8 ancillary device

device intended to perform a specific function, directly involved in elaborating, transmitting or displaying measured values

Note 1 to entry: For the definition of “measured value”, see ISO/IEC Guide 99:2007|OIML V 2-200:2012 (VIM), 2.10.

Note 2 to entry: The main ancillary devices are:

- a) zero-setting device;
- b) price-indicating device;
- c) repeating indicating device;
- d) printing device;
- e) memory device;
- f) tariff control device;
- g) pre-setting device;
- h) self-service device;
- i) flow sensor movement detector (for detecting movement of the flow sensor before this is clearly visible on the indicating device);
- j) remote reading device (which may be incorporated permanently or added temporarily).

Note 3 to entry: Depending on national regulations, ancillary devices may be subject to legal metrological control.

3.1.9 tariff control device

device that allocates measured values into different registers depending on tariff or other criteria, each register having the possibility to be read individually

3.1.10 pre-setting device

device that permits the selection of the quantity of water to be measured and which automatically stops the flow of water after the selected quantity has been measured

3.1.11 associated measuring instrument

instrument connected to the calculator or the correction device for measuring a quantity, characteristic of water, with a view to making a correction and/or a conversion

3.1.12 meter for two constant partners

meter that is permanently installed and only used for deliveries from one supplier to one customer

3.1.13 in-line meter

type of meter that is fitted into a closed conduit by means of the meter end connections provided

Note 1 to entry: The end connections may be flanged or threaded.

3.1.14 complete meter

meter whose measurement transducer, calculator, and indicating device are not separable

ISO/DIS 4064-1:2023(E)**3.1.15****combined meter**

meter whose measurement transducer, calculator, and indicating device are separable

3.1.16**combination meter**

meter comprising one large meter, one small meter, and a changeover device that, depending on the magnitude of the flow rate passing through the meter, automatically directs the flow through either the small or the large meter, or both

Note 1 to entry: The meter reading is obtained from two independent totalizers, or from one totalizer which adds up the values from both meters.

3.1.17**equipment under test****EUT**

complete meter, sub-assembly or ancillary device that is subjected to a test

3.1.18**concentric meter**

type of meter that is fitted into a closed conduit by means of a manifold

Note 1 to entry: The inlet and outlet passages of the meter and the manifold are coaxial at the interface between them.

3.1.19**concentric meter manifold**

pipe fitting specific to the connection of a concentric meter

3.1.20**cartridge meter**

type of meter that is fitted into a closed conduit by means of an intermediate fitting called a connection interface

Note 1 to entry: The inlet and outlet passages of the meter and the connection interface are either concentric or axial as specified in ISO 4064-4.

3.1.21**cartridge meter connection interface**

pipe fitting specific to the connection of an axial or concentric cartridge meter

3.1.22**meter with exchangeable metrological module**

meter comprising a connection interface and an exchangeable metrological module from the same type approval

3.1.23**exchangeable metrological module**

self-contained module comprising a measurement transducer, a calculator and an indicating device

3.1.24**connection interface for meters with exchangeable metrological modules**

pipe fitting specific to the connection of exchangeable metrological modules

3.1.25**non-adjustable water meter**

meter whose indication cannot be altered in any way (e.g. without changing the internal dimensions and/or method of operation), and which has no adjustment device or correction device.

Note 1 to entry: This category should also include mechanical meters with an internal adjustment device where the adjustment cannot be altered at initial verification stage as the meter would need to be dismantled.

Note 2 to entry: The meter should not have a correction device, *i.e.* the indicating device of the meter should either be purely mechanical or be electronic but with a constant multiplying factor applied to the indication and set to the same value for all meters (such as a device which counts the number of rotations of the shaft and multiplies by a fixed value to give total volume passed).

3.1.26

adjustable water meter

meter that is connected to or incorporates an adjustment and/or correction device

3.1.27

software-controlled water meter

a water meter that incorporates and utilizes legally relevant software modules.

3.2 Metrological characteristics

3.2.1

actual volume

 V_a

total volume of water passing through the meter, disregarding the time taken

Note 1 to entry: This is the measurand.

Note 2 to entry: The actual volume is calculated from a reference volume as determined by a suitable measurement standard, taking into account differences in metering conditions, as appropriate.

3.2.2

indicated volume

 V_i

volume of water indicated by the meter, corresponding to the actual volume

3.2.3

primary indication

indication which is subject to legal metrological control

3.2.4

error

measured quantity value minus a reference quantity value

[SOURCE: ISO/IEC Guide 99:2007|OIML V 2-200:2012 (VIM), 2.16]

Note 1 to entry: For the application of this part of ISO 4064|OIML R 49, the indicated volume is considered as the measured quantity value and the actual volume as the reference quantity value. The difference between indicated volume and actual volume is referred to as: error (of indication).

Note 2 to entry: In this International Standard, the error (of indication) is expressed as a percentage of the actual

volume, and is equal to: $\frac{(V_i - V_a)}{V_a} \times 100\%$

3.2.5

maximum permissible error

MPE

extreme value of measurement error, with respect to a known reference quantity value, permitted by specifications or regulations for a given meter

[SOURCE: ISO/IEC Guide 99:2007|OIML V 2-200:2012 (VIM), 4.26, modified — "meter" replaces "measurement, measuring instrument, or measuring system"]

3.2.6

intrinsic error

error of a meter determined under reference conditions

[SOURCE: OIML D 11:2013, 3.8, modified — "meter" replaces "measuring instrument,"]

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3.2.7

initial intrinsic error

intrinsic error of a meter as determined prior to performance tests and durability evaluations

[SOURCE: OIML D 11:2013, 3.9, modified — "meter" replaces "measuring instrument"]

3.2.8

fault

difference between the error (of indication) and the intrinsic error of a meter

[SOURCE: OIML D 11:2013, 3.10, modified — "of indication" placed in parentheses; "meter" replaces "measuring instrument"]

3.2.9

significant fault

fault greater than the value specified in this part of ISO 4064|OIML R 49

[SOURCE: OIML D 11:2013, 3.12, modified — "this part of ISO 4064|OIML R 49" replaces "the relevant Recommendation"]

Note 1 to entry: See [5.1.2](#), which specifies the value of a significant fault.

3.2.10

durability

ability of a meter to maintain its performance characteristics over a period of use

[SOURCE: OIML D 11:2013, 3.18, modified — "meter" replaces "measuring instrument"]

3.2.11

metering conditions

conditions of the water, the volume of which is to be measured, at the point of measurement

EXAMPLE Water temperature, water pressure.

3.2.12

first element of an indicating device

element which, in an indicating device comprising several elements, carries the graduated scale with the verification scale interval

3.2.13

verification scale interval

lowest value scale division of the first element of an indicating device

3.2.14

resolution of a displaying device

smallest difference between displayed indications that can be meaningfully distinguished

[SOURCE: ISO/IEC Guide 99:2007|OIML V 2-200:2012 (VIM), 4.15]

Note 1 to entry: For a digital indicating device, this is the change in the indication when the least significant digit changes by one step.

3.3 Operating conditions

3.3.1

flow rate

Q

$Q = dV/dt$ where V is actual volume and t is the time taken for this volume to pass through the meter

Note 1 to entry: ISO 4006:1991,^[4] 4.1.2 prefers the use of the symbol q_V for this quantity, but Q is used in this International Standard as it is well established in the industry.