



**International
Standard**

ISO 4064-3

**Water meters for cold potable water
and hot water —**

**Part 3:
Test report format**

Compteurs d'eau potable froide et d'eau chaude —

Partie 3: Format du rapport d'essai

**Fifth edition
2024-12**

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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 document 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).

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For an explanation of 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 www.iso.org/iso/foreword.html.

This document was prepared by 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*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 92, *Water meters*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This fifth edition of ISO 4064-3 cancels and replaces the fourth edition (ISO 4064-3:2014), which has been technically revised.

This edition of ISO 4064-3 is identical to the corresponding edition of OIML R 49-3 and OIML R49-4, which will be submitted for approval for final publication by the International Committee of Legal Metrology at its 59th meeting in October 2024. It will be submitted to the International Conference on Legal Metrology in 2024 for formal sanction.

A list of all parts in the ISO 4064 series can be found on the ISO website.

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

Implementation of this test report format is informative with regard to the implementation of ISO 4064-1:2024|OIML R 49-1:2024 and ISO 4064-2:2024|OIML R 49-2:2024 in national regulations; however, its implementation is required within the framework of the OIML Certificate System for Measuring Instruments [ISO 4064-2:2024|OIML R 49-2:2024, 11.1].

[Clause 4](#) shows the required format of a type evaluation report for a complete or combined water meter.

A type evaluation report for a separable calculator (including indicating device) or a measurement transducer (including flow or volume sensor) requires a similar format. However, some modifications to the tables may be required because a large number of variations in the design of these separable units is possible.

Some examples of tables for presenting the test results for separable units are shown in [Clause 5](#) for initial verifications. These tables can also be adapted for type evaluation reports.

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Water meters for cold potable water and hot water —

Part 3:

Test report format

1 Scope

This document specifies a test report format to be used in conjunction with ISO 4064-1:2024|OIML R 49-1:2024 and ISO 4064-2:2024|OIML R 49-2:2024 for water meters for cold potable water and hot water.

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 4064-1:2024|OIML R 49-1:2024, *Water meters for cold potable water and hot water — Part 1: Metrological and technical requirements*

ISO 4064-2:2024|OIML R 49-2:2024, *Water meters for cold potable water and hot water — Part 2: Test methods*

3 Terms, definitions, symbols, and abbreviated terms

For the purposes of this document, the terms and definitions given in ISO 4064-1|OIML R 49-1 apply.

Some symbols and abbreviated terms used in the tables are as follows.

+	pass
–	fail
n/a	not applicable
EUT	equipment under test
H	horizontal
MAP	maximum admissible pressure
MAT	maximum admissible temperature
MPE	maximum permissible error
V	vertical

4 Type evaluation report

4.1 General

For each examination and test the checklist shall be completed according to this example:

+	–	
×		Pass
	×	Fail
n/a	n/a	Not applicable

4.2 Information concerning the type

4.2.1 General

Application number: _____

Applicant: _____

Authorized representative: _____

Address: _____

Testing laboratory: _____

Authorized representative: _____

Address: _____

4.2.2 Model submitted

New model: _____

Variant of approved model(s): _____

Approval number: _____

Variation of approved model: _____

See [Table 1](#).

Table 1 — Model submitted

Submitted for approval tests	Yes ^a	No ^a	Remarks
Mechanical water meter (complete)			
Mechanical water meter (combined)			
Electronic water meter (complete)			
Electronic water meter (combined)			
Family of water meters			
Separable calculator (including indicating device)			
Separable measurement transducer (including flow or volume sensor)			
Supplementary electronic device(s) for testing (permanently attached to meter)			
Supplementary electronic device(s) for data transmission (permanently attached to meter)			
Supplementary electronic device(s) for testing (temporarily attached to meter)			
Supplementary electronic device(s) for data transmission (temporarily attached to meter)			
Ancillary devices			
^{a)} Tick as appropriate.			

4.2.3 Mechanical water meter (complete or combined)

Manufacturer: _____

Model number: _____

Type details:

Q_1 _____ m³/h

Q_2 _____ m³/h

Q_3 _____ m³/h

Q_4 _____ m³/h

Q_3/Q_1 _____

for combination meters

Q_{x1}	_____ m ³ /h
Q_{x2}	_____ m ³ /h
Measuring principle:	_____
Accuracy class:	_____
Temperature class:	_____
Environmental class:	_____
Electromagnetic environment:	_____
Maximum admissible temperature:	_____ °C
Maximum admissible pressure:	_____ MPa (_____ bar)

	Orientation limitation:	_____
	Pressure loss class:	_____
	Reverse flow:	
	a) Meters designed to measure reverse flow	
	b) Meters not designed to measure reverse flow	
	c) Meters which prevent reverse flow	

EUT testing requirements (ISO 4064-2:2024|OIML R 49-2:2024, 8.1.8):

Category: _____

Case: _____

Installation details:

Connection type (flange, screw thread, concentric manifold): _____

Minimum straight length of inlet pipe: _____ mm

Minimum straight length of outlet pipe: _____ mm

Flow conditioner (details if required): _____

Mounting: _____

Orientation: _____

Other relevant information: _____

If a family of meters is submitted, the details in this subclause are to be given for each size of water meter.

4.2.4 Electronic water meter (complete or combined)

Manufacturer: _____

Model number: _____

Type details:

Q_1 _____ m³/h

Q_2 _____ m³/h

Q_3 _____ m³/h

Q_4 _____ m³/h

Q_3/Q_1 _____

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Maximum sampling interval in user mode: _____ s

for combination meters

	Q_{x1}	_____ m ³ /h
	Q_{x2}	_____ m ³ /h
	Measuring principle:	_____
	Accuracy class:	_____
	Temperature class:	_____
	Environmental class:	_____
	Electromagnetic environment:	_____
	Maximum admissible temperature:	_____ °C
	Maximum admissible pressure:	_____ MPa (_____ bar)
	Orientation limitation:	_____
	Pressure loss class:	_____
	Reverse flow:	
	a) Meters designed to measure reverse flow	
	b) Meters not designed to measure reverse flow	
	c) Meters which prevent reverse flow	
	Software version (if applicable):	

EUT testing requirements (ISO 4064-2:2024|OIML R 49-2:2024, 8.1.8):

Category: _____

Case: _____

Installation details (mechanical):

Connection type (flange, screw thread, concentric manifold): _____

Minimum straight length of inlet pipe: _____ mm

Minimum straight length of outlet pipe: _____ mm

Flow conditioner (details if required): _____

Mounting: _____

Orientation: _____

Other relevant information: _____

Installation details (electrical):

Wiring instructions: _____

Mounting arrangement: _____

Orientation limitations: _____

Power supply:

Type (battery, mains AC, mains DC): _____

$U_{\max}$: _____ V

$U_{\min}$: _____ V

Frequency: _____ Hz

If a family of meters is submitted, the details in this subclause are to be given for each size of water meter.

4.2.5 Separable calculator (including indicating device)

Manufacturer: _____

Model number: _____

Type details:

Q_1 _____ m³/h

Q_2 _____ m³/h

Q_3 _____ m³/h

Q_4 _____ m³/h

Q_3/Q_1 _____

for combination meters

	Q_{x1}	_____ m ³ /h
	Q_{x2}	_____ m ³ /h
Measuring principle:		_____
Accuracy class:		_____
Temperature class:		_____
Environmental class:		_____
Electromagnetic environment:		_____
Maximum admissible temperature:		_____ °C
Maximum admissible pressure:		_____ MPa (_____ bar)
Orientation limitation:		_____
Pressure loss class:		

Reverse flow:	
a) Meters designed to measure reverse flow	
b) Meters not designed to measure reverse flow	
c) Meters which prevent reverse flow	
Software version (if applicable):	

EUT testing requirements (ISO 4064-2:2024|OIML R 49-2:2024, 8.1.8):

Category: _____

Case: _____

Maximum relative error specified by the manufacturer:

Lower flow rate zone, $Q_1 \leq Q < Q_2$:	_____ %
Upper flow rate zone, $Q_2 \leq Q \leq Q_4$:	_____ %

Installation details (electrical):

Wiring instructions: _____

Mounting arrangement: _____

Orientation limitations: _____

Power supply:

Type (battery, mains AC, mains DC): _____

$U_{\max}$: _____ V

$U_{\min}$: _____ V

Frequency: _____ Hz

Approval number(s) of compatible measurement transducer(s) (including flow or volume sensor): _____

4.2.6 Separable measurement transducer (including flow or volume sensor)

Manufacturer: _____

Model number: _____

Type details:

Q_1 _____ m³/h

Q_2 _____ m³/h

Q_3 _____ m³/h

Q_4 _____ m³/h

Q_3/Q_1 _____

for combination meters

	Q_{x1}	_____ m ³ /h
	Q_{x2}	_____ m ³ /h
	Measuring principle:	_____
	Accuracy class:	_____
	Temperature class:	_____
	Environmental class:	_____
	Electromagnetic environment:	_____
	Maximum admissible temperature:	_____ °C
	Maximum admissible pressure:	_____ MPa (_____ bar)
	Orientation limitation:	_____

EUT testing requirements (ISO 4064-2:2024|OIML R 49-2:2024, 8.1.8):

Category: _____

Case: _____

Maximum relative error specified by the manufacturer:

Lower flow rate zone, $Q_1 \leq Q < Q_2$:	_____ %
Upper flow rate zone, $Q_2 \leq Q \leq Q_4$:	_____ %

Installation details (mechanical):

Connection type (flange, screw thread, concentric manifold): _____

Minimum straight length of inlet pipe: _____ mm

Minimum straight length of outlet pipe: _____ mm

Flow conditioner (details if required): _____

Mounting: _____

Orientation: _____

Other relevant information: _____

Installation details (electrical):

Wiring instructions: _____

Mounting arrangement: _____

Orientation limitations: _____

Power supply:

Type (battery, mains AC, mains DC): _____

$U_{\max}$: _____ V

$U_{\min}$: _____ V

Frequency: _____ Hz

Approval number(s) of compatible calculator(s)
(including indicating device): _____

4.2.7 Supplementary electronic device(s) used for testing (permanently attached to meter)

Manufacturer: _____

Model number: _____

Power supply:

Type (battery, mains AC, mains DC): _____

$U_{\max}$: _____ V

$U_{\min}$: _____ V

Frequency: _____ Hz

Installation details (electrical):

Wiring instructions: _____

Mounting arrangement: _____

Orientation limitations: _____

4.2.8 Supplementary electronic device(s) used for data transmission (permanently attached to meter)

Manufacturer: _____

Model number: _____

Power supply:

Type (battery, mains AC, mains DC): _____

$U_{\max}$: _____ V

$U_{\min}$: _____ V

Frequency: _____ Hz

Installation details (electrical):

Wiring instructions: _____

Mounting arrangement: _____

Orientation limitations: _____

4.2.9 Supplementary electronic device(s) used for testing (temporarily attached to meter)

Manufacturer: _____

Model number: _____

Power supply:

Type (battery, mains AC, mains DC): _____

$U_{\max}$: _____ V

$U_{\min}$: _____ V

Frequency: _____ Hz

Installation details (electrical):

Wiring instructions: _____

Mounting arrangement: _____

Orientation limitations: _____

4.2.10 Supplementary electronic device(s) used for data transmission (temporarily attached to meter)

Manufacturer: _____

Model number: _____

Power supply:

Type (battery, mains AC, mains DC): _____

$U_{\max}$: _____ V

$U_{\min}$: _____ V

Frequency: _____ Hz

EUT testing requirements (ISO 4064-2:2024|OIML R 49-2:2024, 8.1.8):

Category: _____

Case: _____

Installation details (electrical):

Wiring instructions: _____

Mounting arrangement: _____

Orientation limitations: _____

4.2.11 Ancillary devices

Manufacturer: _____

Model number: _____

Power supply:

Type (battery, mains AC, mains DC): _____

$U_{\max}$: _____ V

$U_{\min}$: _____ V

Frequency: _____ Hz

Approval number(s) of compatible calculator(s)
(including indicating device): _____

EUT testing requirements (ISO 4064-2:2024|OIML R 49-2:2024, 8.1.8):

Category: _____

Case: _____

Installation details (electrical):

Wiring instructions: _____

Mounting arrangement: _____

Orientation limitations: _____

Approval number(s) of compatible water me-
ters, calculator(s) (including indicating device)
and measurement transducer(s) (including flow
or volume sensor): _____

4.2.12 Documents concerning the type

A list of documents in accordance with ISO 4064-1:2024|OIML R 49-1:2024, 7.2.9, shall be submitted with the type approval application as in [Annex A](#).

4.3 General information concerning the test equipment

Details of the main items of measuring equipment and test instruments used for the type examinations, or initial verifications are listed in [Table 2](#).

Table 2 — Listing of test equipment used in examinations and tests

Manufacturer	Model	Serial number	Used in performance test No. (ISO 4064-2:2024 OIML R 49-2:2024, subclause)	Comments
All calibration periods of test equipment used in examinations and tests listed above are in the quality system documentation of the test laboratory. Measurement equipment are traceable to the International System of Units.				

4.4 Check list for water meter examinations and performance tests

4.4.1 Check list for water meter examinations

Table 3

External examination for all water meters				
ISO 4064-1:2024 OIML R 49-1:2024, subclause	Requirement	+	-	Remarks
Function of the indicating device				
6.7.1.1	The indicating device shall provide an easily read, reliable and unambiguous visual indication of the indicated volume			
6.7.1.1	The indicating device shall include visual means for testing and calibration.			
6.7.1.1	The indicating device may include additional elements for testing and calibration by other methods, e.g. for automatic testing and calibration			
Unit of measurement and its placement				
6.7.1.2	The indicated volume of water shall be expressed in cubic metres			
6.7.1.2	The symbol m ³ shall appear on the dial or immediately adjacent to the numbered display			
Indicating range				
6.7.1.3	For $Q_3 \leq 6,3$, the minimum indicating range is 0 m ³ to 9 999 m ³			
6.7.1.3	For $6,3 < Q_3 \leq 63$, the minimum indicating range is 0 m ³ to 99 999 m ³			
6.7.1.3	For $63 < Q_3 \leq 630$, the minimum indicating range is 0 m ³ to 999 999 m ³			
6.7.1.3	For $630 < Q_3 \leq 6\,300$, the minimum indicating range is 0 m ³ to 9 999 999 m ³			
Colour coding for indicating device				
6.7.1.4	The colour black should be used to indicate the cubic metre and its multiples			
6.7.1.4	The colour red should be used to indicate sub-multiples of a cubic metre			
6.7.1.4	The colours shall be applied to either the pointers, indexes, numbers, wheels, discs, dials or aperture frames			
6.7.1.4	Other means of indicating the cubic metre may be used provided there is no ambiguity in distinguishing between the primary indication and alternative displays, e.g. sub-multiples for verification and testing			
Types of indicating device: Type 1 — Analogue device				
6.7.2.1	The indicated volume shall be shown by continuous movement of either: a) one or more pointers moving relative to graduated scales; or b) one or more circular scales or drums each passing an index			
6.7.2.1	The value expressed in cubic metres for each scale division shall be of the form 10 ⁿ , where <i>n</i> is a positive or a negative whole number or zero, thereby establishing a system of consecutive decades.			

Table 3 (continued)

External examination for all water meters				
ISO 4064-1:2024 OIML R 49-1:2024, subclause	Requirement	+	–	Remarks
6.7.2.1	The scale shall be graduated in values expressed in cubic metres or accompanied by a multiplying factor ($\times 0,001$; $\times 0,01$; $\times 0,1$; $\times 1$; $\times 10$; $\times 100$; $\times 1\,000$ etc.)			
6.7.2.1	Rotational movement of the pointers or circular scales shall be clockwise			
6.7.2.1	Linear movement of pointers or scales shall be left to right			
6.7.2.1	Movement of numbered roller indicators shall be upwards			
Types of indicating device: Type 2 — Digital device				
6.7.2.2	The indicated volume is given by a line of digits appearing in one or more apertures			
6.7.2.2	The advance of one digit shall be completed while the digit of the next immediately lower decade changes from 9 to 0			
6.7.2.2	The apparent height of the digits shall be at least 4 mm			
6.7.2.2	For non-electronic devices, movement of numbered roller indicators (drums) shall be upwards			
6.7.2.2	For non-electronic devices, the lowest value decade may have a continuous movement, the aperture being large enough to permit a digit to be read without ambiguity			
6.7.2.2	For electronic devices with non-permanent displays the volume shall be able to be displayed at any time for at least 10 s			
6.7.2.2	For electronic devices, the meter shall provide visual checking of the entire display which shall have the following sequence: — for seven segment type displaying all the elements (e.g. an “eights” test); and — for seven segment type blanking all the elements (a “blanks” test). For graphical displays, an equivalent test is required to demonstrate that display faults cannot result in any digit being misinterpreted. Each step of the sequence shall last at least 1 s			
Types of indicating device: Type 3 — Combination of analogue and digital devices				
6.7.2.3	The indicated volume is given by a combination of type 1 and type 2 devices and the respective requirements of each shall apply			
Verification devices — General requirements				
6.7.3.1	Every indicating device shall provide means for visual, non-ambiguous verification testing and calibration			
6.7.3.1	The visual verification may have either a continuous or a discontinuous movement			
6.7.3.1	In addition to the visual verification display, an indicating device may include provisions for rapid testing by the inclusion of complementary elements (e.g. star wheels or discs), providing signals through externally attached sensors.			
Verification devices — Visual verification displays				
6.7.3.2.1	The value of the verification scale interval, expressed in cubic metres, shall be of the form: 1×10^n , 2×10^n or 5×10^n , where n is a positive or negative whole number, or zero			
6.7.3.2.	The indicated volume is given by a line of digits appearing in one or more apertures			

Table 3 (continued)

External examination for all water meters				
ISO 4064-1:2024 OIML R 49-1:2024, subclause	Requirement	+	-	Remarks
6.7.3.2.1	For analogue or digital indicating devices with continuous movement of the first element, the verification scale interval may be formed from the division into 2, 5 or 10 equal parts of the interval between two consecutive digits of the first element. Numbering shall not be applied to these divisions			
6.7.3.2.1	For digital indicating devices with discontinuous movement of the first element, the verification scale interval is the interval between two consecutive digits or incremental movements of the first element			
6.7.3.2.2	On indicating devices with continuous movement of the first element, the apparent scale spacing shall be not less than 1 mm and not more than 5 mm			
6.7.3.2.2	The scale shall consist of either: a) lines of equal thickness not exceeding one quarter of the scale spacing and differing only in length; or b) contrasting bands of a constant width equal to the scale spacing			
6.7.3.2.2	The apparent width of the pointer at its tip shall not exceed one-quarter of the scale spacing and in no case shall it be greater than 0,5 mm			
Resolution of the indicating device				
6.7.3.2.3	The sub-divisions of the verification scale shall be small enough to ensure that the resolution of the indicating device does not exceed 0,25 % of the actual volume for accuracy class 1 meters, and 0,5 % of the actual volume for accuracy class 2 meters, for a 90 min test at the minimum flow rate, Q_1 . NOTE 1 When the display of the first element is continuous, an allowance should be made for a maximum error in each reading of not more than half of the verification scale interval. NOTE 2 When the display of the first element is discontinuous, an allowance should be made for a maximum error in each reading of not more than one digit of the verification scale			
For combination meters with two indicating devices, the above requirements apply to both indicating devices.				
Marks and inscriptions				
6.6.1	A place shall be provided on the meter for affixing the verification mark, which shall be visible without dismantling the meter			
6.6.2	The water meter shall be clearly and indelibly marked with the information listed in the following, either grouped or distributed on the casing, the indicating device dial, an identification plate or on the meter cover if it is not detachable			
6.6.2 a)	Unit of measurement: cubic metre			
6.6.2 b)	The accuracy class, where it differs from accuracy class 2			
6.6.2 c)	The numerical value of Q_3 and the ratio Q_3/Q_1 (may be preceded by R). If the meter measures reverse flow and Q_3 and the ratio Q_3/Q_1 are different in the two directions, both values of Q_3 and Q_3/Q_1 shall be inscribed; the direction of flow to which each pair of values refers shall be clear. If the meter has different values of Q_3/Q_1 in horizontal and vertical positions, both values of Q_3/Q_1 shall be inscribed, and the orientation to which each value refers shall be clear			

Table 3 (continued)

External examination for all water meters				
ISO 4064-1:2024 OIML R 49-1:2024, subclause	Requirement	+	–	Remarks
6.6.2 d)	The type approval sign according to national regulations			
6.6.2 e)	The name or trademark of the manufacturer			
6.6.2 f)	The year of manufacture (or the last two digits of the year of manufacture or the month and year of manufacture)			
6.6.2 g)	The serial number (as near as possible to the indicating device)			
6.6.2 h)	The direction of flow (shown on both sides of the body; or on one side only, provided the direction of flow arrow is easily visible under all circumstances)			
6.6.2 i)	The maximum admissible pressure (MAP) if it exceeds 1 MPa (10 bar) or 0,6 MPa (6 bar) for nominal diameter ≥ 500 mm. (The unit bar may be used where national regulations permit)			
6.6.2 j)	The letter V or H, if the meter can only be operated in the vertical or horizontal position			
6.6.2 k)	The temperature class where it differs from T30			
6.6.2 l)	The pressure loss class where it differs from Δp 63			
6.6.2 m)	The installation sensitivity class where it differs from U0/D0			
Additional markings for water meters with electronic devices				
6.6.2 n)	For an external power supply: the voltage and frequency			
6.6.2 o)	For a replaceable battery: the latest date by which the battery shall be replaced			
6.6.2 p)	For a non-replaceable battery: the latest date by which the meter shall be replaced			
6.6.2 q)	Environmental classification			
6.6.2 r)	Electromagnetic environmental class			
Protection devices				
6.8.1	Water meters shall include protection devices which can be sealed so as to prevent, both before and after correct installation of the water meter, dismantling or modification of the meter, its adjustment device or its correction device, without damaging these devices. In the case of combination meters, this requirement applies to both meters			
Protection devices — Electronic sealing devices				
6.8.2.1	When access to parameters that influence the determination of the results of measurements is not protected by mechanical sealing devices, the protection shall fulfil the following provisions. a) Access shall only be allowed to authorized people, e.g. by means of a code (password) or of a special device (hard key, etc.). The code shall be capable of being changed. b) It shall be possible for at least the last intervention to be memorized. The record shall include the date and a characteristic element identifying the authorized person making the intervention [see a)]. If it is possible to memorize more than one intervention and if a previous intervention requires deletion to permit a new record, the oldest record shall be deleted			

Table 3 (continued)

External examination for all water meters				
ISO 4064-1:2024 OIML R 49-1:2024, subclause	Requirement	+	–	Remarks
6.8.2.2	For meters with parts which can be disconnected one from another by the user and which are interchangeable, the following provisions shall be fulfilled: a) it shall not be possible to access parameters that participate in the determination of results of measurements through disconnected points unless the provisions of ISO 4064-1:2024 OIML R 49-1:2024, 6.8.2.1 are fulfilled; b) interposing any device which may influence the accuracy shall be prevented by means of electronic and data processing securities or, if this is not possible, by mechanical means			
6.8.2.3	For meters with parts which may be disconnected one from the other by the user and which are not interchangeable, the provisions in ISO 4064-1:2024 OIML R 49-1:2024, 6.8.2.2 apply. Moreover, these meters shall be provided with devices which do not allow them to operate if the various parts are not connected according to the approved type. Disconnections which are not allowed to the user may be prevented, e.g. by means of a device that prevents any measurement after disconnecting and reconnecting			
Examination and testing of checking facilities				
General requirements for examining checking facilities				
5.1.3	Water meters with electronic devices shall be provided with the checking facilities specified in ISO 4064-1:2024 OIML R 49-1:2024, Annex B, except in the case of non-resettable measurements between two constant partners			
5.1.3	All meters equipped with checking facilities shall prevent or detect reverse flow, as laid down in ISO 4064-1:2024 OIML R 49-1:2024, 4.2.7.			

4.4.2 Checklist for water meter performance tests

4.4.2.1 Performance tests for all water meters

Table 4

ISO 4064-1:2024 OIML R 49-1:2024, subclause	Requirement	+	–	Remarks
Static pressure test				
4.2.10	The meter shall be capable of withstanding the following test pressures without leakage or damage: — 1,6 times the maximum admissible pressure for 15 min; — 2 times the maximum admissible pressure for 1 min			
Intrinsic errors (of indication)				

Table 4 (continued)

ISO 4064-1:2024 OIML R 49-1:2024, subclause	Requirement	+	-	Remarks
7.2.3	The errors (of indication) of the water meter (in the measurement of the actual volume), shall be determined at least at the following flow rate ranges: a) Q_1 to $1,1Q_1$; b) Q_2 to $1,1Q_2$; c) $0,33(Q_2 + Q_3)$ to $0,37(Q_2 + Q_3)$; d) $0,67(Q_2 + Q_3)$ to $0,74(Q_2 + Q_3)$; e) $0,9Q_3$ to Q_3; f) $0,95Q_4$ to Q_4; and for combination meters;; g) $0,85Q_{x1}$ to $0,95Q_{x1}$; h) $1,05Q_{x2}$ to $1,15Q_{x2}$. The water meter should be tested without its temporary supplementary devices attached (if any). During a test all other influence factors shall be held at reference conditions. Other flow rates may be tested depending on the shape of the error curve. 1) The relative errors (of indication) observed for each of the flow rates shall not exceed the maximum permissible errors (MPEs) given in ISO 4064-1:2024 OIML R 49-1:2024, 4.2.2 or 4.2.3. If the error observed on one or more meters is greater than the MPE at one flow rate only, then if only two results have been taken at that flow rate, the test at that flow rate shall be repeated. The test shall be declared satisfactory if two out of the three results at that flow rate lie within the MPE and the arithmetic mean of the results for the three tests at that flow rate lies within the MPE. 2) If all the errors (of indication) of the water meter have the same sign, within the complete measuring range (Q_1 to Q_4), the water meter shall only pass initial verification if all errors do not exceed one-half of the maximum permissible error. For non-adjustable water meters, statistical means may be used to demonstrate that a batch of water meters complies with this requirement when the error at the maximum of the error distribution does not exceed one-half of the maximum permissible error at flowrate Q_2 or Q_3 (see also ISO 4064-2:2024 OIML R 49-2:2024, 10.1.4)			
7.2.4	The meter shall be repeatable: the standard deviation of three measurements at the same flow rate shall not exceed one-third of the MPEs given in ISO 4064-1:2024 OIML R 49-1:2024, 4.2.2 or 4.2.3. Tests shall be carried out at nominal flow rates of Q_1, Q_2, and Q_3			
Water temperature test				
4.2.8	The requirements relating to the MPEs shall be met for all water temperature variations within the rated operating conditions of the meter			
Water pressure test				
4.2.8	The requirements relating to the MPEs shall be met for all water pressure variations within the rated operating conditions of the meter			
Reverse flow test				

Table 4 (continued)

ISO 4064-1:2024 OIML R 49-1:2024, subclause	Requirement	+	-	Remarks
4.2.7	A water meter designed to measure reverse flow shall either: a) subtract the reverse flow volume from the indicated volume; or b) record the reverse flow volume separately. The MPEs of ISO 4064-1:2024 OIML R 49-1:2024, 4.2.2 or 4.2.3 shall be met for both forward and reverse flow			
4.2.7	A water meter not designed to measure reverse flow shall either: a) prevent it; or b) be capable of withstanding an accidental reverse flow at a flow rate up to Q_3 without any deterioration or change in its metrological properties for forward flow			
Meter characteristics at zero flow rate				
4.2.9	The water meter totalization shall not change when the flow rate is zero			
Pressure loss test				
6.5	The pressure loss of the water meter, including its filter where the latter forms an integral part of the water meter, shall not be greater than 0,063 MPa (0,63 bar) between Q_1 and Q_3			
Flow disturbance test				
6.3.4	If the accuracy of water meters is affected by disturbances in the upstream or downstream pipeline, the meter shall be provided with sufficient straight pipe lengths with or without a flow straightener (as specified by the manufacturer) so that the indications of the installed water meter do not exceed MPEs according to the accuracy class of the meter. Forward flow tests Reverse flow tests (where applicable)			
Overload temperature test				
7.2.5	Water meters with MAT ≥ 50 °C shall be capable of withstanding a water temperature of MAT + 10 °C for 1 h			
Durability tests				
7.2.6	The water meter shall undergo a durability test according to the permanent flow rate Q_3 and the overload flow rate Q_4 of the meter, simulating service conditions			
7.2.6	Meters with $Q_3 \leq 16$ m ³ /h: a) 100 000 flow cycles between 0 and Q_3 ; b) 100 h at Q_4			
7.2.6	Meters with $Q_3 > 16$ m ³ /h: a) 800 h at Q_3 ; b) 200 h at Q_4 ; and for combination meters: c) 50 000 flow cycles between $Q \geq 2Q_{x2}$ and 0			

Table 4 (continued)

ISO 4064-1:2024 OIML R 49-1:2024, subclause	Requirement	+	-	Remarks
7.2.6.2	Accuracy class 1 meters The variation in the error curve shall not exceed 2 % for flow rates in the lower zone ($Q_1 \leq Q < Q_2$) and 1 % for flow rates in the upper zone ($Q_2 \leq Q \leq Q_4$). For the purpose of these requirements, the arithmetic mean value of the errors (of indication) $\bar{E}$ for each flow rate shall apply. For flow rates in the lower flow rate zone ($Q_1 \leq Q < Q_2$), the error (of indication) curve shall not exceed a maximum error limit of ± 4 % for all temperature classes. For flow rates in the upper flow rate zone ($Q_2 \leq Q \leq Q_4$), the error (of indication) curve shall not exceed a maximum error limit of $\pm 1,5$ % for meters of temperature class T30 and $\pm 2,5$ % for all other temperature classes			
7.2.6.3	Accuracy class 2 meters The variation in the error curve shall not exceed 3 % for flow rates in the lower zone ($Q_1 \leq Q < Q_2$) and 1,5 % for flow rates in the upper zone ($Q_2 \leq Q < Q_4$). For the purpose of these requirements, the arithmetic mean value of the errors (of indication) $\bar{E}$ for each flow rate shall apply. For flow rates in the lower flow rate zone ($Q_1 \leq Q < Q_2$), the error (of indication) curve shall not exceed a maximum error limit of ± 6 % for all temperature classes. For flow rates in the upper flow rate zone ($Q_2 \leq Q < Q_4$) the error (of indication) curve shall not exceed a maximum error limit of $\pm 2,5$ % for meters of temperature class T30 and $\pm 3,5$ % for all other temperature classes			
7.2.7	It shall be demonstrated that cartridge meters and exchangeable metrological modules for water meters with exchangeable metrological modules are independent of the connection interfaces they are made for, as far as their metrological performance is concerned. The cartridge meters and exchangeable metrological modules shall be tested in accordance with the test specified in ISO 4064-2:2024 OIML R 49-2:2024, 7.4.6			
7.2.8	All water meters where the mechanical components may be influenced by a static magnetic field and all meters with electronic components shall be tested by applying a specified field. The test shall be carried out at Q_3 and show that the indications of the installed water meter do not exceed MPEs of the upper zone according to the accuracy class of the meter: Forward flow tests Reverse flow tests (where applicable) Application of the field in different planes			

4.4.2.2 Performance tests for electronic water meters and electronic devices fitted to mechanical meters (first version)

Table 5

ISO 4064-1:2024 OIML R 49-1:2013, subclause	Requirement	+	-	Remarks
Dry heat				
A.5	To verify compliance with the provisions in 4.2 under conditions of high temperature (see ISO 4064-2:2024 OIML R 49-2:2024, 8.2)			
Cold				
A.5	To verify compliance with the provisions in 4.2 under conditions of low temperature (see ISO 4064-2:2024 OIML R 49-2:2024, 8.3)			
Damp heat, cyclic, condensation				
A.5	To verify compliance with the provisions in 5.1.1 under conditions of high humidity when combined with cyclic temperature changes. Cyclic tests shall be applied in all the cases where condensation is important or when the penetration of vapour is accelerated by the breathing effect. (see ISO 4064-2:2024 OIML R 49-2:2024, 8.4)			
Power voltage variation, for water meters powered by DC batteries and DC mains				
A.5	To verify compliance with the provisions in 4.2 under conditions of varying DC voltage (if relevant). (see ISO 4064-2:2024 OIML R 49-2:2024, 8.5)			
Replaceable battery				
5.2.4	To verify compliance with the provisions in 5.2.4.3. The properties and parameters of the meter shall not be affected by the interruption of the electrical supply when the battery is replaced			
Power voltage variation, for water meters powered by direct AC or by AC/DC converters				
A.5	To verify compliance with the provisions in 4.2 under conditions of varying AC mains power voltage (if relevant). (see ISO 4064-2:2024 OIML R 49-2:2024, 8.5)			
Vibration (random)				
A.5	To verify compliance with the provisions in 5.1.1 under conditions of random vibration. (see ISO 4064-2:2024 OIML R 49-2:2024, 8.6)			
Mechanical shock				
A.5	To verify compliance with the provisions in 5.1.1 under conditions of mechanical shocks. (see ISO 4064-2:2024 OIML R 49-2:2024, 8.7)			
Short time power reductions				
A.5	To verify compliance with the provisions in 5.1.1 under conditions of short time mains voltage reductions. (see ISO 4064-2:2024 OIML R 49-2:2024, 8.8)			
Bursts				
A.5	To verify compliance with the provisions in 5.1.1 under conditions where electrical bursts are superimposed on input/output and communication ports. (see ISO 4064-2:2024 OIML R 49-2:2024, 8.9)			

Table 5 (continued)

ISO 4064-1:2024 OIML R 49-1:2013, subclause	Requirement	+	-	Remarks
A.5	To verify compliance with the provisions in 5.1.1 under conditions where electrical bursts are superimposed on the mains voltage. (see ISO 4064-2:2024 OIML R 49-2:2024, 8.10)			
Electrostatic discharge				
A.5	To verify compliance with the provisions in 5.1.1 under conditions of direct and indirect electrostatic discharges. (see ISO 4064-2:2024 OIML R 49-2:2024, 8.11)			
Electromagnetic susceptibility — electromagnetic fields				
A.5	To verify compliance with the provisions in 5.1.1 under conditions of radiated electromagnetic fields. (see ISO 4064-2:2024 OIML R 49-2:2024, 8.12)			
A.5	To verify compliance with the provisions in 5.1.1 under conditions of conducted electromagnetic fields. (see ISO 4064-2:2024 OIML R 49-2:2024, 8.13)			
A.5	To verify compliance with the provisions in 5.1.1 under conditions of mains power frequency electromagnetic fields test (see ISO 4064-2:2024 OIML R 49-2:2024, 8.13)			
Surges on signal, data, and control lines				
A.5	To verify compliance with the provisions in 5.1.1 under conditions where electrical surges are superimposed on I/O and communication ports. (see ISO 4064-2:2024 OIML R 49-2:2024, 8.14)			
Surges on AC and DC mains power lines				
A.5	To verify compliance with the provisions in 5.1.1 under conditions where electrical surges are superimposed on the mains voltage. (see ISO 4064-2:2024 OIML R 49-2:2024, 8.15)			

4.5 Type evaluation tests (for all water meters)

4.5.1 Static pressure test (ISO 4064-2:2024|OIML R 49-2:2024, 7.3)

Application No: _____	Ambient temperature: _____	At start	At end	°C
Model: _____	Ambient relative humidity: _____			%
Date: _____	Ambient atmospheric pressure: _____			MPa
Observer: _____	Time: _____			

Table 6

Meter serial No.	MAP × 1,6	Start time	Initial pressure	End time	Final pressure	Remarks
	MPa (bar)		MPa (bar)		MPa (bar)	

Table 7

Meter serial No.	MAP × 2	Start time	Initial pressure	End time	Final pressure	Remarks
	MPa (bar)		MPa (bar)		MPa (bar)	

Comments:

4.5.2 Determination of changeover flow rates for combination meters (ISO 4064-2:2024|OIML R 49-2:2024, 7.4.3)

Application No: _____

Model: _____

Date: _____

Observer: _____

Ambient temperature: _____

Ambient relative humidity: _____

Ambient atmospheric pressure: _____

Time: _____

At start	At end	
		°C
		%
		MPa

Table 8

Test method:	Gravimetric/volumetric
Volume measures/weighbridge used — m ³ or kg:	
Water conductivity (electromagnetic induction meters only) — S/cm:	
Length of straight pipe before meter (or manifold) — mm:	
Length of straight pipe after meter (or manifold) — mm:	
Nominal diameter DN of pipe before and after meter (or manifold) — mm:	
Describe flow straightener installation if used:	

Increasing flow rate

Table 9

Flow rate immediately before changeover, Q_a	
Flow rate immediately after changeover, Q_b	
Changeover flow rate, $Q_{x2} = \frac{(Q_a + Q_b)}{2}$	

Decreasing flow rate

Table 10

Flow rate immediately before changeover, Q_c	
Flow rate immediately after changeover, Q_d	
Changeover flow rate, $Q_{x1} = \frac{(Q_c + Q_d)}{2}$	

Comments:

4.5.3 Determination of the intrinsic errors (of indication) and the effects of meter orientation (ISO 4064-2:2024|OIML R 49-2:2024, 7.4.4)

Application No: _____	Ambient temperature: _____	At start	At end	°C
Model: _____	Ambient relative humidity: _____			%
Date: _____	Ambient atmospheric pressure: _____			MPa
Observer: _____	Time: _____			

Table 11

Test method:	Gravimetric/volumetric
Volume measures/weighbridge used — m ³ or kg:	
Water conductivity (electromagnetic induction meters only) — S/cm:	
Length of straight pipe before meter (or manifold) — mm:	
Length of straight pipe after meter (or manifold) — mm:	
Nominal diameter DN of pipe before and after meter (or manifold) — mm:	
Describe flow straightener installation if used:	

Meter serial No.: _____ Orientation (V, H, other): _____

Flow direction (see Requirement 3): ____ Location of indicating device (see Requirement 4): ____

Table 12

Actual flow-rate	Initial supply pressure	Water temperature	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE ^a
$Q_{(i)}$ m ³ /h	MPa (bar)	T_w °C	$V_i(i)$ m ³	$V_i(f)$ m ³	V_i m ³	V_a m ³	E_m %	%
b								
						$\bar{E}_{m2}$		
						$\bar{E}_{m3}$		
							Standard deviation %	MPE ^a /3 %
						s^c		

^a For a complete water this is the maximum permissible error as defined in ISO 4064-1:2024|OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable sub-assembly, the MPE shall be defined by the manufacturer (ISO 4064-2:2024|OIML R 49-2:2024, 9.4). For acceptance criteria refer to ISO 4064-2:2024|OIML R 49-2:2024, 7.4.5

^b Perform a third test if $Q = Q_1, Q_2$ or Q_3 or if the first or second test is outside the MPE (ISO 4064-2:2024|OIML R 49-2:2024, 7.4.5)

^c Calculate standard deviation if $Q = Q_1, Q_2$ or Q_3 (ISO 4064-2:2024|OIML R 49-2:2024, 7.4.5)

Meter serial No.: _____ Orientation (V, H, other): _____

Flow direction (see Requirement 3): ____ Location of indicating device (see Requirement 4): ____

Table 13

Actual flowrate	Initial supply pressure	Water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE ^a
$Q_{(i)}$ m ³ /h	MPa (bar)	T_w °C	$V_i(i)$ m ³	$V_i(f)$ m ³	V_i m ³	V_a m ³	E_m %	%
b								
						$\bar{E}_{m2}$		
						$\bar{E}_{m3}$		
							Standard deviation %	MPE ^a /3 %
						s^c		
^a For a complete water this is the maximum permissible error as defined in ISO 4064-1:2024 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable sub-assembly, the MPE shall be defined by the manufacturer (ISO 4064-2:2024 OIML R 49-2:2024, 9.4). For acceptance criteria refer to ISO 4064-2:2024 OIML R 49-2:2024, 7.4.5 ^b Perform a third test if $Q = Q_1, Q_2$ or Q_3 or if the first or second test is outside the MPE (ISO 4064-2:2024 OIML R 49-2:2024, 7.4.5) ^c Calculate standard deviation if $Q = Q_1, Q_2$ or Q_3 (ISO 4064-2:2024 OIML R 49-2:2024, 7.4.5)								

Meter serial No.: _____ Orientation (V, H, other): _____

Flow direction (see Requirement 3): ___ Location of indicating device (see Requirement 4): ___

Table 14

Actual flowrate	Initial supply pressure	Water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE ^a
$Q_{(i)}$ m ³ /h	MPa (bar)	T_w °C	$V_i(i)$ m ³	$V_i(f)$ m ³	V_i m ³	V_a m ³	E_m %	%
b								
						$\bar{E}_{m2}$		
						$\bar{E}_{m3}$		
							Standard deviation %	MPE ^a /3 %
						s^c		
^a For a complete water this is the maximum permissible error as defined in ISO 4064-1:2024 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable sub-assembly, the MPE shall be defined by the manufacturer (ISO 4064-2:2024 OIML R 49-2:2024, 9.4). For acceptance criteria refer to ISO 4064-2:2024 OIML R 49-2:2024, 7.4.5 ^b Perform a third test if $Q = Q_1, Q_2$ or Q_3 or if the first or second test is outside the MPE (ISO 4064-2:2024 OIML R 49-2:2024, 7.4.5) ^c Calculate standard deviation if $Q = Q_1, Q_2$ or Q_3 (ISO 4064-2:2024 OIML R 49-2:2024, 7.4.5)								

Requirements

Requirement 1: Tables for each flow rate according to ISO 4064-2:2024|OIML R 49-2:2024, 7.4.4 shall be added.

ISO 4064-3:2024(en)

Requirement 2: Tables for each orientation, which shall be as specified in ISO 4064-2:2024|OIML R 49-2:2024, 7.4.2.2.7.5 shall be provided for meters not marked either "H" or "V".

Requirement 3 If the flow axis is vertical, the flow direction (from bottom to top or from top to bottom) shall be given.

Requirement 4 If the flow axis is horizontal and the meter has an indicating device which is integral with the body of the meter, the location of the indicating device (at the side or at the top of the meter) shall be given.

Comments:

4.5.4 Interchange test on all types of cartridge meters and meters with exchangeable metrological modules (ISO 4064-1:2024|OIML R 49-1:2024, 7.2.7, ISO 4064-2:2024|OIML R 49-2:2024, 7.4.4, 7.4.6)

Application No: _____	Ambient temperature: _____	At start	At end	°C
Model: _____	Ambient relative humidity: _____			%
Date: _____	Ambient atmospheric pressure: _____			MPa
Observer: _____	Time: _____			

Table 15

Test method:	Gravimetric/volumetric
Volume measures/weighbridge used — m ³ or kg:	
Water conductivity (electromagnetic induction meters only) — S/cm:	
Length of straight pipe before meter (or manifold) — mm:	
Length of straight pipe after meter (or manifold) — mm:	
Nominal diameter DN of pipe before and after meter (or manifold) — mm:	
Describe flow straightener installation if used:	

Meter serial No.: _____ **Orientation (V, H, other):** _____

Flow direction (see Requirement 3): ___ **Location of indicating device (see Requirement 4):** ___

Table 16

Actual flowrate	Initial supply pressure	Water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE ^a
$Q_{(i)}$ m ³ /h	MPa (bar)	T_w °C	$V_i(i)$ m ³	$V_i(f)$ m ³	V_i m ³	V_a m ³	E_m %	%
b								
						$\bar{E}_{m2}$		
						$\bar{E}_{m3}$		
^a For a complete water this is the maximum permissible error as defined in ISO 4064-1:2024 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable sub-assembly, the MPE shall be defined by the manufacturer (ISO 4064-2:2024 OIML R 49-2:2024, 9.4). For acceptance criteria refer to ISO 4064-2:2024 OIML R 49-2:2024, 7.4.5								
^b Perform a third test if $Q = Q_1, Q_2$ or Q_3 or if the first or second test is outside the MPE (ISO 4064-2:2024 OIML R 49-2:2024, 7.4.5)								
^c The error variation (see ISO 4064-2:2024 OIML R 49-2:2024, 7.4.6.4) shall be checked								

ISO 4064-3:2024(en)

Meter serial No.:_____ Orientation (V, H, other):_____

Flow direction (see Requirement 3): ___ Location of indicating device (see Requirement 4): ___

Table 17

Actual flowrate	Initial supply pressure	Water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE ^a
$Q_{()}$ m ³ /h	MPa(bar)	T_w °C	$V_i(i)$ m ³	$V_i(f)$ m ³	V_i m ³	V_a m ³	E_m %	%
b								
						$\bar{E}_{m2}$		
						$\bar{E}_{m3}$		
^a For a complete water this is the maximum permissible error as defined in ISO 4064-1:2024 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable sub-assembly, the MPE shall be defined by the manufacturer (ISO 4064-2:2024 OIML R 49-2:2024, 9.4). For acceptance criteria refer to ISO 4064-2:2024 OIML R 49-2:2024, 7.4.5 ^b Perform a third test if $Q = Q_1, Q_2$ or Q_3 or if the first or second test is outside the MPE (ISO 4064-2:2024 OIML R 49-2:2024, 7.4.5) ^c The error variation (see ISO 4064-2:2024 OIML R 49-2:2024, 7.4.6.4) shall be checked								

Meter serial No.:_____ Orientation (V, H, other):_____

Flow direction (see Requirement 3): ___ Location of indicating device (see Requirement 4): ___

Table 18

Actual flowrate	Initial supply pressure	Water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE ^a
$Q_{()}$ m ³ /h	MPa(bar)	T_w °C	$V_i(i)$ m ³	$V_i(f)$ m ³	V_i m ³	V_a m ³	E_m %	%
b								
						$\bar{E}_{m2}$		
						$\bar{E}_{m3}$		
^a For a complete water this is the maximum permissible error as defined in ISO 4064-1:2024 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable sub-assembly, the MPE shall be defined by the manufacturer (ISO 4064-2:2024 OIML R 49-2:2024, 9.4). For acceptance criteria refer to ISO 4064-2:2024 OIML R 49-2:2024, 7.4.5 ^b Perform a third test if $Q = Q_1, Q_2$ or Q_3 or if the first or second test is outside the MPE (ISO 4064-2:2024 OIML R 49-2:2024, 7.4.5) ^c The error variation (see ISO 4064-2:2024 OIML R 49-2:2024, 7.4.6.4) shall be checked								

Requirements

Requirement 1: Tables for each flow rate according to ISO 4064-2:2024|OIML R 49-2:2024, 7.4.4 shall be added.

Requirement 2: Tables for each orientation, which shall be as specified in ISO 4064-2:2024|OIML R 49-2:2024, 7.4.2.2.7.5 shall be provided for meters not marked either "H" or "V".

Requirement 3 If the flow axis is vertical, the flow direction (from bottom to top or from top to bottom) shall be given.

ISO 4064-3:2024(en)

Requirement 4 If the flow axis is horizontal and the meter has an indicating device which is integral with the body of the meter, the position of the indicating device (at the side or at the top of the meter) shall be given.

4.5.5 Water temperature test (ISO 4064-2:2024|OIML R 49-2:2024, 7.5) and overload water temperature test (ISO 4064-2:2024|OIML R 49-2:2024, 7.6)

Application No: _____	Ambient temperature: _____	At start	At end	°C
Model: _____	Ambient relative humidity: _____			%
Date: _____	Ambient atmospheric pressure: _____			MPa
Observer: _____	Time: _____			

Table 19

Test method:	Gravimetric/volumetric
Volume measures/weighbridge used — m ³ or kg:	
Water conductivity (electromagnetic induction meters only) — S/cm:	
Length of straight pipe before meter (or manifold) — mm:	
Length of straight pipe after meter (or manifold) — mm:	
Nominal diameter DN of pipe before and after meter (or manifold) — mm:	
Describe flow straightener installation if used:	

Meter serial No.: _____ Orientation (V, H, other): _____

Flow direction (see Requirement 1): ____ Location of indicating device (see Requirement 2): ____

Table 20

Application conditions	Nom- inal flow rate	Ac- tual flow rate	Initial supply pres- sure	Initial inlet water tempera- ture	Initial read- ing	Final read- ing	Indi- cated volume	Actual vol- ume	Meter error	MPE ^a
	Q_2 m ³ /h	Q_1 m ³ /h	MPa(bar)	°C	$V_i(i)$ m ³	$V_i(f)$ m ³	V_i m ³	V_a m ³	E_m %	%
10 °C ^b	Q_2									
30 °C ^c	Q_2									
MAT	Q_2									
Reference ^d	Q_2									
Comments:										

^a For a complete water meter, this is the maximum permissible error as defined in ISO 4064-1:2024|OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable sub-assembly, the MPE shall be defined by the manufacturer (ISO 4064-2:2024|OIML R 49-2:2024, 9.4).

^b Applicable to temperature classes T30 to T180.

^c Applicable to temperature classes T30/70 to T30/180.

^d Applicable to meters with an MAT ≥ 50 °C. After exposing the meter to a flow of water at a temperature of MAT + 10 °C ± 2,5 °C for a period of 1 h after the meter has reached temperature stability; and after recovery, the meter functionality with regard to volume totalization shall remain unaffected; additional functionality, as indicated by the manufacturer, shall remain unaffected; the error (of indication) of the meter shall not exceed the applicable MPE.

Requirements

ISO 4064-3:2024(en)

Requirement 1: If the flow axis is vertical, the flow direction (from bottom to top or from top to bottom) shall be given.

Requirement 2: If the flow axis is horizontal and the meter has an indicating device which is integral with the body of the meter, the location of the indicating device (at the side or at the top of the meter) shall be given.

4.5.6 Water pressure test (ISO 4064-2:2024|OIML R 49-2:2024, 7.7)

Application No: _____	Ambient temperature: _____	At start	At end	°C
Model: _____	Ambient relative humidity: _____			%
Date: _____	Ambient atmospheric pressure: _____			MPa
Observer: _____	Time: _____			

Table 21

Test method:	Gravimetric/volumetric
Volume measures/weighbridge used — m ³ or kg:	
Water conductivity (electromagnetic induction meters only) — S/cm:	
Length of straight pipe before meter (or manifold) — mm:	
Length of straight pipe after meter (or manifold) — mm:	
Nominal diameter DN of pipe before and after meter (or manifold) — mm:	
Describe flow straightener installation if used:	

Meter serial No.: _____ Orientation (V, H, other): _____

Flow direction (see Requirement 1): ____ Location of indicating device (see Requirement 2): ____

Table 22

Application conditions	Nominal flow rate	Actual flow rate	Initial supply pressure	Initial inlet water temperature	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE ^a
	m ³ /h	Q _I m ³ /h	MPa(bar)	°C	V _i (i) m ³	V _i (f) m ³	V _i m ³	V _a m ³	E _m %	%
0,03 MPa (0,3 bar)	Q ₂									
MAP	Q ₂									
Comments:										
^a For a complete water meter this is the maximum permissible error as defined in ISO 4064-1:2024 OIML R 49-1:2024, 4.2.1 or 4.2.2 according to the accuracy class of the meter. If the EUT is a separable sub-assembly, the MPE shall be defined by the manufacturer (ISO 4064-2:2024 OIML R 49-2:2024, 9.4).										

Requirements

Requirement 1: If the flow axis is vertical, the flow direction (from bottom to top or from top to bottom) shall be given.

Requirement 2: If the flow axis is horizontal and the meter has an indicating device which is integral with the body of the meter, the location of the indicating device (at the side or at the top of the meter) shall be given.

4.5.7 Reverse flow test (ISO 4064-2:2024|OIML R 49-2:2024, 7.8)

4.5.7.1 General

Application No: _____	Ambient temperature: _____	At start	At end	°C
Model: _____	Ambient relative humidity: _____			%
Date: _____	Ambient atmospheric pressure: _____			MPa
Observer: _____	Time: _____			

Table 23

Test method:	Gravimetric/volumetric
Volume measures/weighbridge used — m ³ or kg:	
Water conductivity (electromagnetic induction meters only) — S/cm:	
Length of straight pipe before meter (or manifold) — mm:	
Length of straight pipe after meter (or manifold) — mm:	
Nominal diameter DN of pipe before and after meter (or manifold) — mm:	
Describe flow straightener installation if used:	

4.5.7.2 Meters designed to measure accidental reverse flow (ISO 4064-2:2024|OIML R 49-2:2024, 7.8.3.1)

Meter serial No.:_____ Orientation (V, H, other):_____

Flow direction (see Requirement 1): _____ Location of indicating device (see Requirement 2):_____

Table 24

Application conditions	Nominal flow rate	Actual flow rate	Initial supply pressure	Initial inlet water temperature	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE ^a
	m ³ /h	m ³ /h	MPa(bar)	°C	V _i (i) m ³	V _i (f) m ³	V _i m ³	V _a m ³	E _m %	%
Reverse flow	Q ₁									
Reverse flow	Q ₂									
Reverse flow	Q ₃									
Comments:										
^a For a complete water meter this is the maximum permissible error as defined in ISO 4064-1:2024 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable sub-assembly the MPE shall be defined by the manufacturer (ISO 4064-2:2024 OIML R 49-2:2024, 9.4).										

4.5.7.3 Meters not designed to measure accidental reverse flow (ISO 4064-2:2024|OIML R 49-2:2024, 7.8.3.2)

Meter serial No.:_____ Orientation (V, H, other):_____

Flow direction (see Requirement 1): _____ Location of indicating device (see Requirement 2):_____

Table 25

Application conditions	Nomi- nal flow rate	Ac- tual flow rate	Initial supply pres- sure	Initial inlet water tem- perature	Initial read- ing	Final read- ing	Indi- cated volume	Actual vol- ume	Meter error	MPE ^a
	m ³ /h	$Q_{()}$ m ³ /h	MPa(bar)	°C	$V_i(i)$ m ³	$V_i(f)$ m ³	V_i m ³	V_a m ³	E_m %	%
reverse flow	0,9 Q_3									
forward flow	Q_1									
forward flow	Q_2									
forward flow	Q_3									
Comments:										
^a For a complete water meter, this is the maximum permissible error as defined in ISO 4064-1:2024 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable sub-assembly, the MPE shall be defined by the manufacturer (ISO 4064-2:2024 OIML R 49-2:2024, 9.4).										

4.5.7.4 Meters which prevent reverse flow (ISO 4064-2:2024|OIML R 49-2:2024, 7.8.3.3)

Meter serial No.:_____ Orientation (V, H, other):_____

Flow direction (see Requirement 1): ____ Location of indicating device (see Requirement 2): ____

Table 26

Application conditions	Nomi- nal flow rate	Ac- tual flow rate	Initial supply pres- sure	Initial inlet water tem- perature	Initial read- ing	Final read- ing	Indi- cated volume	Actual vol- ume	Meter error	MPE ^a
	m ³ /h	m ³ /h	Mpa(bar)	°C	$V_i(i)$ m ³	$V_i(f)$ m ³	V_i m ³	V_a m ³	E_m %	%
MAP at reverse flow	0	—			—	—	—	—	—	—
forward flow	Q_1									
forward flow	Q_2									
forward flow	Q_3									
Comments:										
^a For a complete water meter, this is the maximum permissible error as defined in ISO 4064-1:2024 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable sub-assembly, the MPE shall be defined by the manufacturer (ISO 4064-2:2024 OIML R 49-2:2024, 9.4).										

Requirements

Requirement 1: If the flow axis is vertical, the flow direction (from bottom to top or from top to bottom) shall be given.

Requirement 2: If the flow axis is horizontal and the meter has an indicating device which is integral with the body of the meter, the location of the indicating device (at the side or at the top of the meter) shall be given.

4.5.8 Pressure-loss test (ISO 4064-2:2024|OIML R 49-2:2024, 7.9)

Application No: _____

Model: _____

Date: _____

Observer: _____

Ambient temperature: _____

Ambient relative humidity: _____

Ambient atmospheric pressure: _____

Time: _____

At start	At end	
		°C
		%
		MPa

Meter serial No.:_____ Orientation (V, H, other):_____

Flow direction (see Requirement 1): ____ Location of indicating device (see Requirement 2):__

Measurement 1

Table 27

Flow rate $Q_{()}$	L_1	L_2	L_3	L_4	Initial supply pressure	Water tem- perature	Measuring section	Pressure loss Δp_1
m ³ /h	mm	mm	mm	mm	MPa (bar)	° C	mm	MPa (bar)

Measurement 2

Table 28

Flow rate $Q_{()}$	L_1	L_2	L_3	L_4	Initial supply pressure	Water tem- pera- ture	Measuring section	Pressure loss Δp_2	Meter pres- sure loss Δp
m ³ /h	mm	mm	mm	mm	MPa (bar)	° C	mm	MPa (bar)	MPa (bar)
Comments:									

Requirements

Requirement 1: If the flow axis is vertical, the flow direction (from bottom to top or from top to bottom) shall be given.

Requirement 2: If the flow axis is horizontal and the meter has an indicating device which is integral with the body of the meter, the location of the indicating device (at the side or at the top of the meter) shall be given.

4.5.9 Flow disturbance tests (ISO 4064-2:2024|OIML R 49-2:2024, 7.10, Annex C)

Application No: _____

Model: _____

Date: _____

Observer: _____

Ambient temperature: _____

Ambient relative humidity: _____

Ambient atmospheric pressure: _____

Time: _____

At start	At end	
		°C
		%
		MPa

Table 29

Test method:	Gravimetric/volumetric
Volume measures/weighbridge used — m ³ or kg:	
Water conductivity (electromagnetic induction meters only) — S/cm:	
Nominal diameter DN of pipe before and after meter (or manifold) — mm:	
Describe flow straightener installation if used:	

Installation arrangement (see ISO 4064-2:2024|OIML R 49-2:2024, Annex C) — for each test applied, insert the actual pipe dimensions used (as stated by the meter manufacturer):

Table 30

Test No.	Flow-disturber type (location)	Flow-straightener installed	Installation dimensions (see key to Figure 1)						
			mm						
			L_1	L_2	L_3	L_4	L_5	L_6	L_7
1	1 (upstream)	no	—			—	—	—	—
1A	1 (upstream)	yes	—			—		—	
2	1 (downstream)	no		—	—		—	—	—
2A	1 (downstream)	yes		—	—		—		
3	2 (upstream)	no	—			—	—	—	—
3A	2 (upstream)	yes	—			—		—	
4	2 (downstream)	no		—	—		—		—
4A	2 (downstream)	yes		—	—		—		
5	3 (upstream)	no	—			—		—	—
5A	3 (upstream)	yes	—			—		—	
6	3 (downstream)	no		—	—		—	—	—
6A	3 (downstream)	yes		—	—		—		
Comments:									

Direction of flow: forward/reverse

Meter serial No.:_____ Orientation (V, H, other):_____

Flow direction (see Requirement 1): ____ Location of indicating device (see Requirement 2):____

Table 31

Test No.	Actual flow rate $Q_{(t)}$ m ³ /h	Pressure p_w MPa (bar)	Water temperature T_w °C	Initial reading $V_i(i)$ m ³	Final reading $V_i(f)$ m ³	Indicated volume V_i m ³	Actual volume V_a m ³	Meter error E_m %	MPE ^a %
1									
1A									
2									
2A									
3									
3A									
4									
4A									
5									
5A									
6									
6A									

Comments:

^a For a complete water meter, this is the maximum permissible error as defined in ISO 4064-1:2024|OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable sub-assembly, the MPE shall be defined by the manufacturer (ISO 4064-2:2024|OIML R 49-2:2024, 9.4).

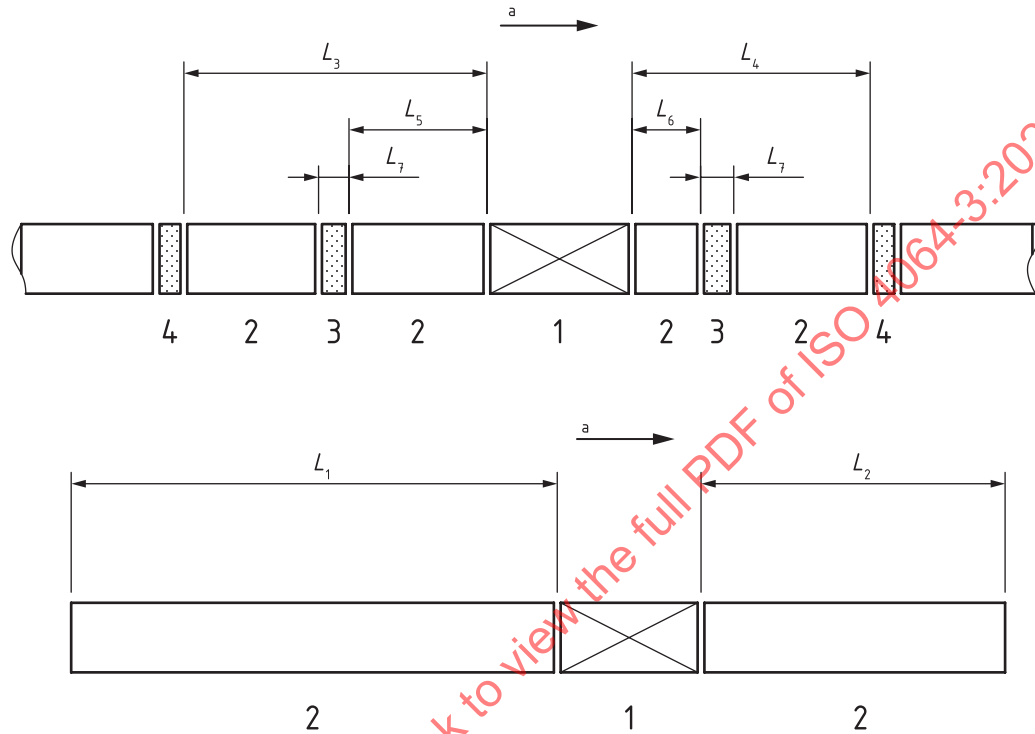
For meters where the manufacturer has specified installation lengths of at least 15 × DN upstream and 5 × DN downstream of the meter, no external straighteners are allowed.

When a minimum straight pipe length (L_2), of $5 \times \text{DN}$ downstream of the meter is specified by the manufacturer, only tests numbers 1, 3 and 5 are required.

Requirements

Requirement 1: If the flow axis is vertical, the flow direction (from bottom to top or from top to bottom) shall be given.

Requirement 2: If the flow axis is horizontal and the meter has an indicating device which is integral with the body of the meter, the location of the indicating device (at the side or at the top of the meter) shall be given.



Key

L_1	straight inlet pipe length, without flow-disturber or flow-straightener	1	water meter
L_2	straight outlet pipe length, without flow-disturber or flow-straightener	2	straight pipe
L_3	length between outlet of upstream flow-disturber and inlet of meter (or manifold)	3	flow straightener
L_4	length between outlet of meter (or manifold) and inlet of downstream flow-disturber	4	flow disturber
L_5	length between outlet of upstream flow-straightener and inlet of meter (or manifold)		
L_6	length between outlet of meter (or manifold) and inlet of downstream flow-straightener		
L_7	flow-straightener length		
a	Flow.		

Figure 1 — Key to relative positions

4.5.10 Durability tests (ISO 4064-2:2024|OIML R 49-2:2024, 7.11)

4.5.10.1 Discontinuous flow test (ISO 4064-2:2024|OIML R 49-2:2024, 7.11.2)

This test is applicable only to meters with values of $Q_3 \leq 16 \text{ m}^3/\text{h}$.

Table 32

Application No.	
Test method:	Gravimetric/volumetric
Volume measures/weighbridge used — m ³ or kg:	
Water conductivity (electromagnetic induction meters only) — S/cm:	
Length of straight pipe before meter (or manifold) — mm:	
Length of straight pipe after meter (or manifold) — mm:	
Nominal diameter DN of pipe before and after meter (or manifold) — mm:	
Describe flow straightener installation if used:	

Readings taken during the test**Meter serial No.:**_____

Readings are recorded every 24 h or once for every shorter period, if so divided.

Ambient conditions at start

Table 33

Ambient temperature	Ambient relative humidity	Ambient atmospheric pressure	Time
°C	%	MPa (bar)	

Table 34

Date	Time	Observer	Up stream pressure	Down stream pressure	Up stream temp.	Actual flowrate	Meter reading	Flow cycle times - s				Total volume discharged	Total no. of flow cycles
			MPa (bar)	MPa (bar)	°C	m ³ /h	m ³	rise	on	fall	off	m ³	
								Totals at end of test =					
								Theoretical total ^a =					

^a Minimum theoretical volume passed during the test is $0,5 \times Q_3 \times 100\,000 \times 32/3\,600$ expressed in m³. Minimum number of test cycles during the test = 100 000.

Ambient conditions at finish

Table 35

Ambient temperature	Ambient relative humidity	Ambient atmospheric pressure	Time
°C	%	MPa (bar)	

Comments:

Observer: _____ Date: _____

Errors (of indication) measured after the discontinuous flow test

Meter serial No.: _____

Table 36

Actual flow-rate	Working pressure	Working temp	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE ^a	Curve variation error ^b	MPE (of curve variation error) ^c
$Q_{()}$ m ³ /h	p_w MPa (bar)	T_w °C	$V_i(i)$ m ³	$V_i(f)$ m ³	V_i m ³	V_a m ³	E_m %	%	$\bar{E}_m(B) - \bar{E}_m(A)$ %	%
									—	—
d									—	—
						$\bar{E}_{m2}$				
						$\bar{E}_{m3}$				
						$\bar{E}_m(B)$				
^a For MPE values refer to ISO 4064-1:2024 OIML R 49-1:2024, 4.2. For acceptance criteria, refer to ISO 4064-2:2024 OIML R 49-2:2024, 7.4.5										
^b $\bar{E}_m(A)$ is the mean intrinsic error (of indication) – see test report 5.3; $\bar{E}_m(B)$ is the mean error (of indication) measured after this discontinuous flow test										
^c For MPE values and acceptance criteria refer to ISO 4064-2:2024 OIML R 49-2, 7.11.2.4.										
^d Perform a third test if $Q = Q_1, Q_2$ or Q_3 or if the first or second test is outside the MPE (ISO 4064-2:2024 OIML R 49-2, 7.4.5)										

4.5.10.2 Continuous flow test (ISO 4064-2:2024|OIML R 49-2:2024, 7.11.3)

Table 37

Application No.:	
Test method:	Gravimetric/volumetric
Volume measures/weighbridge used — m ³ or kg:	
Water conductivity (electromagnetic induction meters only) — S/cm:	
Length of straight pipe before meter (or manifold) — mm:	
Length of straight pipe after meter (or manifold) — mm:	
Nominal diameter DN of pipe before and after meter (or manifold) — mm:	
Describe flow straightener installation if used:	

Readings taken during the test

Meter serial No.: _____

Readings are recorded every 24 h or once for every shorter period, if so divided.

Ambient conditions at start

Table 38

Ambient temperature	Ambient relative humidity	Ambient atmospheric pressure	Time
°C	%	MPa (bar)	

Table 39

Date	Time	Observer	Up stream pressure MPa (bar)	Down stream pressure MPa (bar)	Up stream temp °C	Actual flow-rate m ³ /h	Meter reading m ³	Total volume discharged m ³	Hours run h
					Totals at end of test =				
					Minimum volume discharged ^a =				
Comments:									
^a For meters with $Q_3 \leq 16 \text{ m}^3/\text{h}$, total hours run = 100 h at Q_4 (minimum volume discharged at end of test is $[Q_4] \times 100$, expressed in m^3 , where $[Q_4]$ is the number equal to the value of Q_4 , expressed in m^3/h) For meters with $Q_3 > 16 \text{ m}^3/\text{h}$, total hours run = 800 h at Q_3 (minimum volume discharged at end of test is $[Q_3] \times 800$, expressed in m^3 , where $[Q_3]$ is the number equal to the value of Q_3 , expressed in m^3/h) and 200 h at Q_4 (minimum volume discharged at end of test is $[Q_4] \times 200$, expressed in m^3) where $[Q_4]$ is the number equal to the value of Q_4 , expressed in m^3/h .									

Ambient conditions at finish

Table 40

Ambient temperature	Ambient relative humidity	Ambient atmospheric pressure	Time
°C	%	MPa (bar)	

Observer: _____ Date: _____

Errors (of indication) measured after the continuous flow test

Meter serial No.: _____

Table 41

Actual flow-rate	Working pressure	Working temp	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE ^a	Curve variation error ^b	MPE (of curve variation error) ^c
$Q_{()}$ m ³ /h	p_w MPa (bar)	T_w °C	$V_i(i)$ m ³	$V_i(f)$ m ³	V_i m ³	V_a m ³	E_m %	%	$\bar{E}_m(B) - \bar{E}_m(A)$ %	%
									—	—
d									—	—
						$\bar{E}_{m2}$				
						$\bar{E}_{m3}$				
						$\bar{E}_m(B)$				
Comments:										
^a For MPE values refer to ISO 4064-1:2024 OIML R 49-1:2024, 4.2. For acceptance criteria refer to ISO 4064-2:2024 OIML R 49-2:2024, 7.4.5.										
^b $\bar{E}_m(A)$ is the Mean intrinsic error (of indication). See test report 5.3. $\bar{E}_m(B)$ is the mean error (of indication) measured after this continuous flow test (= either $\bar{E}_{m2}$ or $\bar{E}_{m3}$).										
^c For MPE values and acceptance criteria refer to ISO 4064-2:2024 OIML R 49-2:2024, 7.11.3.4.										
^d Perform third test if $Q = Q_1, Q_2$ or Q_3 or if the first or second test is outside the MPE (ISO 4064-2:2024 OIML R 49-2:2024, 7.4.5)										

4.5.10.3 Discontinuous flow test (ISO 4064-2:2024|OIML R 49-2:2024, 7.11.2)

(Applicable only to combination meters)

Table 42

Application No.	
Test method:	Gravimetric/volumetric
Volume measures/weighbridge used — m ³ or kg:	
Water conductivity (electromagnetic induction meters only) — S/cm:	
Length of straight pipe before meter (or manifold) — mm:	
Length of straight pipe after meter (or manifold) — mm:	
Nominal diameter DN of pipe before and after meter (or manifold) — mm:	
Describe flow straightener installation if used:	
Specified changeover flow rate Q_{x2}	
Selected test flow rate (minimum is twice the changeover flow rate Q_{x2})	

Readings taken during the test

Meter serial No.: _____

Readings are recorded every 24 h or once for every shorter period, if so divided.

Ambient conditions at start

Table 43

Ambient temperature	Ambient relative humidity	Ambient atmospheric pressure	Time
°C	%	MPa (bar)	

Table 44

Date	Time	Observer	Up stream pressure	Down stream pressure	Up stream temp	Actual flow-rate	Meter reading	Flow cycle times - s				Total volume discharged	Total no. of flow cycles
			MPa (bar)	MPa (bar)	°C	m ³ /h	m ³	rise	on	fall	off	m ³	
								Totals at end of test =					
								Theoretical total ^a =					

^a Minimum theoretical volume passed by meters during the test is $0,5 \times Q_1 \times 50\,000 \times 32 / 3\,600$ expressed in m³. Minimum number of test cycles during the test = 50 000.

Ambient conditions at finish

Table 45

Ambient temperature	Ambient relative humidity	Ambient atmospheric pressure	Time
°C	%	MPa (bar)	

Comments:

Observer: _____ Date: _____

Errors (of indication) measured after the discontinuous flow test**Meter serial No.:** _____

Table 46

Actual flowrate	Working pressure	Work- ing temp	Initial reading	Final reading	Indicat- ed volume	Actual volume	Meter error	MPE ^a	Curve variation error ^b	MPE (of curve variation error) ^c
$Q_{()}$ m ³ /h	p_w MPa (bar)	T_w °C	$V_i(i)$ m ³	$V_i(f)$ m ³	V_i m ³	V_a m ³	E_m %	%	$\bar{E}_m(B) - \bar{E}_m(A)$ %	%
									—	—
d									—	—
						$\bar{E}_{m2}$				
						$\bar{E}_{m3}$				
						$\bar{E}_m(B)$				
Comments:										
^a For MPE values refer to ISO 4064-1:2024 OIML R 49-1:2024, 4.2. For acceptance criteria refer to ISO 4064-2:2024 OIML R 49-2:2024, 7.4.5.										
^b $\bar{E}_m(A)$ is the Mean intrinsic error (of indication). See test report 5.3. $\bar{E}_m(B)$ is the mean error (of indication) measured after this discontinuous flow test (= either $\bar{E}_{m2}$ or $\bar{E}_{m3}$).										
^c For MPE values and acceptance criteria refer to ISO 4064-2:2024 OIML R 49-2:2024, 7.11.3.4.										
^d Perform third test if $Q = Q_1, Q_2$ or Q_3 or if the first or second test is outside the MPE (ISO 4064-2:2024 OIML R 49-2:2013, 7.4.5).										

4.5.11 Static magnetic field test (ISO 4064-2:2024|OIML R 49-2:2024, 7.12, 8.16)

Application No: _____	Ambient temperature: _____	At start	At end	°C
Model: _____	Ambient relative humidity: _____			%
Date: _____	Ambient atmospheric pressure: _____			MPa
Observer: _____	Time: _____			

Table 47

Test method:	Gravimetric/volumetric
Volume measures/weighbridge used — m ³ or kg::	
Water conductivity (electromagnetic induction meters only) — S/cm:	
Length of straight pipe before meter (or manifold) — mm:	
Length of straight pipe after meter (or manifold) — mm:	
Nominal diameter DN of pipe before and after meter (or manifold) — mm:	
Describe flow straightener installation if used:	

Meter serial No.: _____ Orientation (V, H, other): _____

Flow direction (see Requirement 1): _____ Location of indicating device (see Requirement 2): _____

Table 48

Application conditions	Nominal flow rate m^3/h	Actual flow rate m^3/h	Initial supply pressure MPa (bar)	Initial inlet water temperature $^{\circ}C$	Initial reading $V_i(i)$ m^3	Final reading $V_i(f)$ m^3	Indicated volume V_i m^3	Actual volume V_a m^3	Meter error E_m %	MPE ^a %
Location 1	Q_3									
Location 2 (optional)	Q_3									
Location 3 (optional)	Q_3									
Comments: Note location of magnet										
^a For a complete water meter this is the maximum permissible error as defined in ISO 4064-1:2024 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable sub-assembly, the MPE shall be defined by the manufacturer (ISO 4064-2:2024 OIML R 49-2:2024, 9.4).										

Requirements

Requirement 1: If the flow axis is vertical, the flow direction (from bottom to top or from top to bottom) shall be given.

Requirement 2: If the flow axis is horizontal and the meter has an indicating device which is integral with the body of the meter, the location of the indicating device (at the side or at the top of the meter) shall be given.

4.5.12 Tests on ancillary devices of a water meter (ISO 4064-2:2024|OIML R 49-2:2024, 7.13)

	At start	At end	
Application No: _____			Ambient temperature: _____ $^{\circ}C$
Model: _____			Ambient relative humidity: _____ %
Date: _____			Ambient atmospheric pressure: _____ MPa
Observer: _____			Time: _____

Table 49

Test method:	Gravimetric/volumetric
Volume measures/weighbridge used — m^3 or kg:	
Water conductivity (electromagnetic induction meters only) — S/cm:	
Length of straight pipe before meter (or manifold) — mm:	
Length of straight pipe after meter (or manifold) — mm:	
Nominal diameter DN of pipe before and after meter (or manifold) — mm:	
Describe flow straightener installation if used:	

Meter serial No.: _____ Orientation (V, H, other): _____

Flow direction (see Requirement 3): _____ Location of indicating device (see Requirement 4): _____

Table 50

	Actual flowrate $Q_{()}$ m ³ /h	Initial supply pressure MPa(bar)	Water temp. T_w °C	Initial read- ing $V_i(i)$ m ³	Final read- ing $V_i(f)$ m ³	Indicat- ed volume V_i m ³	Actual vol- ume V_a m ³	Meter error E_m %	MPE ^a %
Water meter									
Ancillary device									
Water meter									
Ancillary device									
Water meter ^b									
Ancillary device ^b									
							$\bar{E}_{m2}$		
							$\bar{E}_{m3}$		
								Stand- ard de- viation %	MPE/3 ^a %
							s^{cd}		

^a For a complete water meter this is the maximum permissible error as defined in ISO 4064-1:2024|OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable sub-assembly the MPE shall be defined by the manufacturer (ISO 4064-2:2024|OIML R 49-2:2024, 9.4). For acceptance criteria refer to ISO 4064-2:2024|OIML R 49-2:2024, 7.4.5.

^b Perform third test if $Q = Q_1, Q_2$ or Q_3 or if the first or second test is outside the MPE (ISO 4064-2:2024|OIML R 49-2:2024, 7.4.5).

^c Calculate standard deviation if $Q = Q_1, Q_2$ or Q_3 (ISO 4064-2:2024|OIML R 49-2:2024, 7.4.5)

^d Standard deviation of three measurements of the error (of indication) taken at the same nominal flowrate

Meter serial No.:_____ Orientation (V, H, other):_____

Flow direction (see Requirement 3):_____ Location of indicating device (see Requirement 4):_____

Table 51

Actual flowrate	Initial supply pressure	Water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE ^a
$Q_{(i)}$ m ³ /h	MPa(bar)	T_w °C	$V_i(i)$ m ³	$V_i(f)$ m ³	V_i m ³	V_a m ³	E_m %	%
Water meter								
Ancillary device								
Water meter								
Ancillary device								
Water meter ^b								
Ancillary device ^b								
						$\bar{E}_{m2}$		
						$\bar{E}_{m3}$		
							Standard deviation %	MPE/3 ^a %
						s^{cd}		
^a For a complete water meter this is the maximum permissible error as defined in ISO 4064-1:2024 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable sub-assembly the MPE shall be defined by the manufacturer (ISO 4064-2:2024 OIML R 49-2:2024, 9.4). For acceptance criteria refer to ISO 4064-2:2024 OIML R 49-2:2024, 7.4.5.								
^b Perform third test if $Q = Q_1, Q_2$ or Q_3 or if the first or second test is outside the MPE (ISO 4064-2:2024 OIML R 49-2:2024, 7.4.5).								
^c Calculate standard deviation if $Q = Q_1, Q_2$ or Q_3 (ISO 4064-2:2024 OIML R 49-2:2024, 7.4.5)								
^d Standard deviation of three measurements of the error (of indication) taken at the same nominal flowrate.								

Meter serial No.:_____ Orientation (V, H, other):_____

Flow direction (see Requirement 3): ____ Location of indicating device (see Requirement 4): ____

Table 52

Actual flowrate $Q_{()}$ m ³ /h	Initial supply pressure MPa(bar)	Water temp. T_w °C	Initial reading $V_i(i)$ m ³	Final reading $V_i(f)$ m ³	Indicated volume V_i m ³	Actual volume V_a m ³	Meter error E_m %	MPE ^a %
Water meter								
Ancillary device								
Water meter								
Ancillary device								
Water meter ^b								
Ancillary device ^b								
^a For a complete water meter this is the maximum permissible error as defined in ISO 4064-1:2024 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable sub-assembly the MPE shall be defined by the manufacturer (ISO 4064-2:2024 OIML R 49-2:2024, 9.4). For acceptance criteria refer to ISO 4064-2:2024 OIML R 49-2:2024, 7.4.5.								
^b Perform third test if $Q = Q_1, Q_2$ or Q_3 or if the first or second test is outside the MPE (ISO 4064-2:2024 OIML R 49-2:2024, 7.4.5).								
^c Calculate standard deviation if $Q = Q_1, Q_2$ or Q_3 (ISO 4064-2:2024 OIML R 49-2:2024, 7.4.5)								
^d Standard deviation of three measurements of the error (of indication) taken at the same nominal flowrate.								

Table 52 (continued)

Actual flowrate $Q_{()}$ m^3/h	Initial supply pressure $\text{MPa}(\text{bar})$	Water temp. T_w $^{\circ}\text{C}$	Initial reading $V_i(i)$ m^3	Final reading $V_i(f)$ m^3	Indicated volume V_i m^3	Actual volume V_a m^3	Meter error E_m $\%$	MPE ^a $\%$
						$\bar{E}_{m2}$		
						$\bar{E}_{m3}$		
							Standard deviation $\%$	MPE/3 ^a $\%$
						s^{cd}		
^a For a complete water meter this is the maximum permissible error as defined in ISO 4064-1:2024 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable sub-assembly the MPE shall be defined by the manufacturer (ISO 4064-2:2024 OIML R 49-2:2024, 9.4). For acceptance criteria refer to ISO 4064-2:2024 OIML R 49-2:2024, 7.4.5. ^b Perform third test if $Q = Q_1, Q_2$ or Q_3 or if the first or second test is outside the MPE (ISO 4064-2:2024 OIML R 49-2:2024, 7.4.5). ^c Calculate standard deviation if $Q = Q_1, Q_2$ or Q_3 (ISO 4064-2:2024 OIML R 49-2:2024, 7.4.5) ^d Standard deviation of three measurements of the error (of indication) taken at the same nominal flowrate.								

Requirements

Requirement 1: Tables for each flow rate according to ISO 4064-2:2024|OIML R 49-2:2024, 7.4.4 shall be added.

Requirement 2: Tables for each orientation, which shall be as specified in ISO 4064-2:2024|OIML R 49-2:2024, 7.4.2.2.7.5 shall be provided for meters not marked either 'H' or 'V'.

Requirement 3: If the flow axis is vertical, the flow direction (from bottom to top or from top to bottom) shall be given.

Requirement 4: If the flow axis is horizontal and the meter has an indicating device which is integral with the body of the meter, the location of the indicating device (at the side or at the top of the meter) shall be given.

Comments:

4.6 Type evaluation tests (for electronic water meters and mechanical water meters with electronic components)

4.6.1 Dry heat (non-condensing) (ISO 4064-2:2024|OIML R 49-2:2024, 8.2)

Application No:	_____	Ambient temperature:	At start	At end	$^{\circ}\text{C}$
Model:	_____	Ambient relative humidity:			$\%$
Date:	_____	Ambient atmospheric pressure:			MPa
Observer:	_____	Time:			

Table 53

Test method:	Gravimetric/volumetric
Volume measures/weighbridge used — m ³ or kg:	
Water conductivity (electromagnetic induction meters only) — S/cm:	
Length of straight pipe before meter (or manifold) — mm:	
Length of straight pipe after meter (or manifold) — mm:	
Nominal diameter DN of pipe before and after meter (or manifold) — mm:	
Describe flow straightener installation if used:	

Meter serial No.:_____ Orientation (V, H, other):_____

Flow direction (see Requirement 1): ____ Location of indicating device (see Requirement 2): ____

Table 54

Application conditions	Actual or simulated flow rate m ³ /h	Working pressure ^a p_w MPa (bar)	Working temperature ^a T_w °C	Initial reading $V_i(i)$ m ³	Final reading $V_f(i)$ m ³	Indicated volume V_i m ³	Actual volume V_a m ³	Meter error E_m %	MPE ^b %
20 °C									
55 °C									
20 °C									
Comments:									
^a Temperature and pressure shall be recorded using a data-logging device to ensure conformity with the relevant IEC standard.									
^b For a complete water meter this is the maximum permissible error as defined in ISO 4064-1:2024 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable part of a water meter, the MPE shall be defined by the manufacturer (ISO 4064-2:2024 OIML R 49-2:2024, 9.4).									

Requirements

Requirement 1: If the flow axis is vertical, the flow direction (from bottom to top or from top to bottom) shall be given.

Requirement 2: If the flow axis is horizontal and the meter has an indicating device which is integral with the body of the meter, the location of the indicating device (at the side or at the top of the meter) shall be given.

4.6.2 Cold (ISO 4064-2:2024|OIML R 49-2:2024, 8.3)

Application No: _____	Ambient temperature: _____	At start	At end	°C
Model: _____	Ambient relative humidity: _____			%
Date: _____	Ambient atmospheric pressure: _____			MPa
Observer: _____	Time: _____			

Table 55

Test method:	Gravimetric/volumetric
Volume measures/weighbridge used — m ³ or kg:	
Water conductivity (electromagnetic induction meters only) — S/cm:	
Length of straight pipe before meter (or manifold) — mm:	
Length of straight pipe after meter (or manifold) — mm:	
Nominal diameter DN of pipe before and after meter (or manifold) — mm:	
Describe flow straightener installation if used:	

Environmental class:_____

Meter serial No.:_____ Orientation (V, H, other):_____

Flow direction (see Requirement 1): ___ Location of indicating device (see Requirement 2):_____

Table 56

Applica- tion condi- tions	Actual or simulat- ed flow rate	Working pressure ^a	Working temperature ^a	Initial read- ing	Final read- ing	Indi- cated volume	Actual vol- ume	Meter error	MPE ^b
	m ³ /h	p_w MPa (bar)	T_w °C	$V_i(i)$ m ³	$V_f(j)$ m ³	V_i m ³	V_a m ³	E_m %	%
20 °C									
+5 °C or -25 °C									
20 °C									
Comments:									
^a Temperature and pressure shall be recorded using a data-logging device to ensure conformity with the relevant IEC standard.									
^b For a complete water meter this is the maximum permissible error as defined in ISO 4064-1:2024 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable part of a water meter, the MPE shall be defined by the manufacturer (ISO 4064-2:2024 OIML R 49-2:2024, 9.4).									

Requirements

Requirement 1: If the flow axis is vertical, the flow direction (from bottom to top or from top to bottom) shall be given.

Requirement 2: If the flow axis is horizontal and the meter has an indicating device which is integral with the body of the meter, the location of the indicating device (at the side or at the top of the meter) shall be given.

4.6.3 Damp heat, cyclic (condensing) (ISO 4064-2:2024|OIML R 49-2:2024, 8.4)

Application No:	_____	Ambient temperature:	_____	°C
Model:	_____	Ambient relative humidity:	_____	%
Date:	_____	Ambient atmospheric pressure:	_____	MPa
Observer:	_____	Time:	_____	

Table 57

Test method:	Gravimetric/volumetric
Volume measures/weighbridge used — m ³ or kg:	
Water conductivity (electromagnetic induction meters only) — S/cm:	
Length of straight pipe before meter (or manifold) — mm:	
Length of straight pipe after meter (or manifold) — mm:	
Nominal diameter DN of pipe before and after meter (or manifold) — mm:	
Describe flow straightener installation if used:	

Environmental class:_____

Meter serial No.:_____ Orientation (V, H, other):_____

Flow direction (see Requirement 1): ____ Location of indicating device (see Requirement 2):____

Table 58

Application conditions	Actual or simulated flow rate	Working pressure	Working temperature ^a	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE ^b	Fault	Significant fault	EUT functioning correctly
	$Q_{()}$ m ³ /h	p_w MPa (bar)	T_w °C	$V_i(i)$ m ³	$V_f(j)$ m ³	V_i m ³	V_a m ³	E_m %	%	$E_{m2) - E_{m1)}$ %	%	
Reference conditions												
1) Before cycling										—	—	—
Precondition meter. Apply damp heat cycles (duration 24 h), two cycles between 25 °C and 40 °C (environmental class B) or 55 °C (environmental classes O and M).												
2) After cycling												yes no
Comments:												
^a Temperature and pressure shall be recorded using a data-logging device to ensure conformity with the relevant IEC standard.												
^b For a complete water meter this is the maximum permissible error as defined in ISO 4064-1:2024 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable part of a water meter, the MPE shall be defined by the manufacturer (ISO 4064-2:2024 OIML R 49-2:2024, 9.4).												

Requirements

Requirement 1: If the flow axis is vertical, the flow direction (from bottom to top or from top to bottom) shall be given.

Requirement 2: If the flow axis is horizontal and the meter has an indicating device which is integral with the body of the meter, the location of the indicating device (at the side or at the top of the meter) shall be given.

4.6.4 Power supply variation (ISO 4064-2:2024|OIML R 49-2:2024, 8.5)

4.6.4.1 General

Application No: _____

Model: _____

Date: _____

Observer: _____

Ambient temperature: _____

Ambient relative humidity: _____

Ambient atmospheric pressure: _____

Time: _____

At start	At end	
		°C
		%
		MPa

Test method:	Gravimetric/volumetric
Volume measures/weighbridge used — m ³ or kg:	
Water conductivity (electromagnetic induction meters only) — S/cm:	
Length of straight pipe before meter (or manifold) — mm:	
Length of straight pipe after meter (or manifold) — mm:	
Nominal diameter DN of pipe before and after meter (or manifold) — mm:	
Describe flow straightener installation if used:	

4.6.4.2 Meters powered by direct AC (single phase) or AC/DC converters, mains power supply (ISO 4064-2:2024|OIML R 49-2:2024, 8.5.2)

Meter serial No.:_____ Orientation (V, H, other):_____

Flow direction (see Requirement 1): ___ Location of indicating device (see Requirement 2):_____

Table 59

Appli- cation conditions (single voltage)	U_i	Actual or simulated flow rate	Working pressure p_w	Working tempera- ture T_w	Initial read- ing $V_i(i)$	Final read- ing $V_i(j)$	Indi- cated volume V_i	Actual vol- ume V_a	Meter error E_m	MPE ^a
	V	m ³ /h	MPa (bar)	°C	m ³	m ³	m ³	m ³	%	%
$U_{nom} + 10\%$										
$f_{nom} + 2\%$										
$U_{nom} - 15\%$										
$f_{nom} - 2\%$										
Comments:										
^a For a complete water meter this is the maximum permissible error as defined in ISO 4064-1:2024 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable part of a water meter, the MPE shall be defined by the manufacturer (ISO 4064-2:2024 OIML R49-2:2013, 9.4).										

Requirements

Requirement 1: If the flow axis is vertical, the flow direction (from bottom to top or from top to bottom) shall be given.

Requirement 2: If the flow axis is horizontal and the meter has an indicating device which is integral with the body of the meter, the location of the indicating device (at the side or at the top of the meter) shall be given.

4.6.4.3 Meters powered by primary batteries or by external DC voltage (ISO 4064-2:2024|OIML R 49-2:2024, 8.5.3)

Meter serial No.:_____ Orientation (V, H, other):_____

Flow direction (see Requirement 1): ___ Location of indicating device (see Requirement 2):_____

Table 60

Application conditions (single voltage)	U_i V	Actual or simulated flow rate m^3/h	Working pressure p_w MPa (bar)	Working temperature T_w $^{\circ}C$	Initial reading $V_i(i)$ m^3	Final reading $V_i(j)$ m^3	Indicated volume V_i m^3	Actual volume V_a m^3	Meter error E_m %	MPE ^a %
U_{max}										
U_{min}										
Comments:										
^a For a complete water meter this is the maximum permissible error as defined in ISO 4064-1:2024 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable part of a water meter, the MPE shall be defined by the manufacturer (ISO 4064-2:2024 OIML R 49-2:2024, 9.4).										

Requirements

Requirement 1: If the flow axis is vertical, the flow direction (from bottom to top or from top to bottom) shall be given.

Requirement 2: If the flow axis is horizontal and the meter has an indicating device which is integral with the body of the meter, the location of the indicating device (at the side or at the top of the meter) shall be given.

4.6.5 Vibration (random) (ISO 4064-2:2024|OIML R 49-2:2024, 8.6)

Application No: _____
 Model: _____
 Date: _____
 Observer: _____

Ambient temperature: _____ $^{\circ}C$
 Ambient relative humidity: _____ %
 Ambient atmospheric pressure: _____ MPa
 Time: _____

At start	At end

Table 61

Test method:	Gravimetric/volumetric
Volume measures/weighbridge used — m^3 or kg:	
Water conductivity (electromagnetic induction meters only) — S/cm:	
Length of straight pipe before meter (or manifold) — mm:	
Length of straight pipe after meter (or manifold) — mm:	
Nominal diameter DN of pipe before and after meter (or manifold) — mm:	
Describe flow straightener installation if used:	

Environmental class: _____

Meter serial No.: _____ Orientation (V, H, other): _____

Flow direction (see Requirement 1): ____ Location of indicating device (see Requirement 2): ____

Table 62

Application conditions	Actual or simulated flow rate $Q_{\text{()}}$ m ³ /h	Working pressure p_w MPa (bar)	Working temperature T_w °C	Initial reading $V_i(i)$ m ³	Final reading $V_i(j)$ m ³	Indicated volume V_i m ³	Actual volume V_a m ³	Meter error E_m %	MPE ^a %	Fault $E_{m2}) - E_{m1})$ %	Significant fault %	EUT functioning correctly —
Reference conditions												
1) Before vibrations										—	—	—
Apply random vibrations to the EUT, over the frequency range 10 Hz to 150 Hz, in three mutually perpendicular axes, for a period of at least 2 min per axis. Total RMS level: 7 m.s ⁻² . ASD level at 10 Hz to 20 Hz = 1 m ² .s ⁻³ and at 20 Hz to 150 Hz = -3 dB/octave.												
2) After vibrations											yes	no
Comments:												
^a For a complete water meter this is the maximum permissible error as defined in ISO 4064-1:2024 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable part of a water meter, the MPE shall be defined by the manufacturer (ISO 4064-2:2024 OIML R 49-2:2024, 9.4).												

Requirements

Requirement 1: If the flow axis is vertical, the flow direction (from bottom to top or from top to bottom) shall be given.

Requirement 2: If the flow axis is horizontal and the meter has an indicating device which is integral with the body of the meter, the location of the indicating device (at the side or at the top of the meter) shall be given.

4.6.6 Mechanical shock (ISO 4064-2:2024|OIML R 49-2:2024, 8.7)

Application No: _____	Ambient temperature: _____	At start	At end	°C
Model: _____	Ambient relative humidity: _____			%
Date: _____	Ambient atmospheric pressure: _____			MPa
Observer: _____	Time: _____			

Table 63

Test method:	Gravimetric/volumetric
Volume measures/weighbridge used — m ³ or kg:	
Water conductivity (electromagnetic induction meters only) — S/cm:	
Length of straight pipe before meter (or manifold) — mm:	
Length of straight pipe after meter (or manifold) — mm:	
Nominal diameter DN of pipe before and after meter (or manifold) — mm:	
Describe flow straightener installation if used:	

Environmental class:_____

Meter serial No.:_____ Orientation (V, H, other):_____

Flow direction (see Requirement 1): ___ Location of indicating device (see Requirement 2):_____

Table 64

Application conditions	Actual or simulated flow rate Q_{I} m ³ /h	Working pressure p_w MPa (bar)	Working temperature T_w °C	Initial reading $V_i(i)$ m ³	Final reading $V_i(j)$ m ³	Indicated volume V_i m ³	Actual volume V_a m ³	Meter error E_m %	MPE ^a %	Fault $E_{m2}) - E_{m1})$ %	Significant fault %	EUT functioning correctly
Reference conditions												
1) Before shock									—	—	—	—
Place the EUT on a rigid level surface in its normal position of use and tilted towards one bottom edge until the opposite edge of the EUT is 50 mm above the rigid surface. The angle made by the bottom of the EUT and the test surface shall not exceed 30°. Allow the EUT to drop freely on to the rigid surface. Repeat the test for each bottom edge of the EUT.												
2) After shock											yes	no
Comments:												
^a For a complete water meter this is the maximum permissible error as defined in ISO 4064-1:2024 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable part of a water meter, the MPE shall be defined by the manufacturer (ISO 4064-2:2024 OIML R 49-2:2024, 9.4).												

Requirements

Requirement 1: If the flow axis is vertical, the flow direction (from bottom to top or from top to bottom) shall be given.

Requirement 2: If the flow axis is horizontal and the meter has an indicating device which is integral with the body of the meter, the location of the indicating device (at the side or at the top of the meter) shall be given.

4.6.7 AC mains voltage dips, short interruptions and voltage variations (ISO 4064-2:2024|OIML R 49-2:2024, 8.8)

Application No: _____	Ambient temperature: _____	°C
Model: _____	Ambient relative humidity: _____	%
Date: _____	Ambient atmospheric pressure: _____	MPa
Observer: _____	Time: _____	

Table 65

Test method:	Gravimetric/volumetric
Volume measures/weighbridge used — m ³ or kg:	
Water conductivity (electromagnetic induction meters only) — S/cm:	
Length of straight pipe before meter (or manifold) — mm:	
Length of straight pipe after meter (or manifold) — mm:	
Nominal diameter DN of pipe before and after meter (or manifold) — mm:	
Describe flow straightener installation if used:	

Meters powered by direct AC (single-phase) mains power supply

Meter serial No.:_____ Orientation (V, H, other):_____

Flow direction (see Requirement 1): ___ Location of indicating device (see Requirement 2): ___

Table 66

Application conditions	Actual or simulated flow rate Q_{I} m ³ /h	Working pressure p_w MPa (bar)	Working temperature T_w °C	Initial reading $V_i(i)$ m ³	Final reading $V_f(j)$ m ³	Indicated volume V_i m ³	Actual volume V_a m ³	Meter error E_m %	MPE ^a %	Fault $E_{m2}) - E_{m1})$ %	Significant fault ^b %	EUT functioning correctly
Reference conditions	No voltage reductions.											
1) Before voltage reductions										—	—	—
2) During voltage reduction	Voltage interruptions and reductions as in ISO 4064-2:2024 OIML R 49-2:2024, 8.8.											
											yes	no
Comments:												
^a For a complete water meter this is the maximum permissible error as defined in ISO 4064-1:2024 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable part of a water meter, the MPE shall be defined by the manufacturer (ISO 4064-2:2024 OIML R 49-2:2024, 9.4).												
^b The significant fault is equal to half the MPE in the upper flow rate zone.												

Requirements

Requirement 1: If the flow axis is vertical, the flow direction (from bottom to top or from top to bottom) shall be given.

Requirement 2: If the flow axis is horizontal and the meter has an indicating device which is integral with the body of the meter, the location of the indicating device (at the side or at the top of the meter) shall be given.

4.6.8 Bursts on signal lines (ISO 4064-2:2024|OIML R 49-2:2024, 8.9)

Application No: _____	Ambient temperature: _____	At start	At end	°C
Model: _____	Ambient relative humidity: _____			%
Date: _____	Ambient atmospheric pressure: _____			MPa
Observer: _____	Time: _____			

Table 67

Test method:	Gravimetric/volumetric
Volume measures/weighbridge used — m ³ or kg:	
Water conductivity (electromagnetic induction meters only) — S/cm:	
Length of straight pipe before meter (or manifold) — mm:	
Length of straight pipe after meter (or manifold) — mm:	
Nominal diameter DN of pipe before and after meter (or manifold) — mm:	
Describe flow straightener installation if used:	

Meters containing electronics and provided with I/O and communication ports (including its external cables)

Meter serial No.: _____ Orientation (V, H, other): _____

Flow direction (see Requirement 1): ____ Location of indicating device (see Requirement 2): ____

Table 68

Application conditions	Actual or simulated flow rate $Q_{(j)}$ m ³ /h	Working pressure p_w MPa (bar)	Working temperature T_w °C	Initial reading $V_i(i)$ m ³	Final reading $V_i(j)$ m ³	Indicated volume V_i m ³	Actual volume V_a m ³	Meter error E_m %	MPE ^a %	Fault E_{m2} E_{m1} %	Significant fault ^b %	EUT functioning correctly
Reference conditions												
1) Before burst										—	—	—
Each spike shall have an amplitude (positive or negative) of 0,5 kV for environmental class E1 instruments, or 1 kV for environmental class E2 instruments (see ISO 4064-2:2024 OIML R 49-2:2024, 8.1.3), phased randomly, with a rise time of 5 ns and a half amplitude duration of 50 ns.												
2) After burst												yes no
Comments:												
^a For a complete water meter this is the maximum permissible error as defined in ISO 4064-1:2024 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable part of a water meter, the MPE shall be defined by the manufacturer (ISO 4064-2:2024 OIML R 49-2:2024, 9.4).												
^b The significant fault is equal to half the MPE in the upper flow rate zone.												

Requirements

Requirement 1: If the flow axis is vertical, the flow direction (from bottom to top or from top to bottom) shall be given.

Requirement 2: If the flow axis is horizontal and the meter has an indicating device which is integral with the body of the meter, the location of the indicating device (at the side or at the top of the meter) shall be given.

4.6.9 Bursts (transients) on AC and DC mains (ISO 4064-2:2024|OIML R 49-2:2024, 8.10)

Application No.:	_____	Ambient temperature:	_____	°C
Model:	_____	Ambient relative humidity:	_____	%
Date:	_____	Ambient atmospheric pressure:	_____	MPa
Observer:	_____	Time:	_____	

Table 69

Test method:	Gravimetric/volumetric
Volume measures/weighbridge used — m ³ or kg:	
Water conductivity (electromagnetic induction meters only) — S/cm:	
Length of straight pipe before meter (or manifold) — mm:	
Length of straight pipe after meter (or manifold) — mm:	
Nominal diameter DN of pipe before and after meter (or manifold) — mm:	
Describe flow straightener installation if used:	

Meters powered by direct AC (single-phase) mains power supply

Meter serial No.:_____ Orientation (V, H, other):_____

Flow direction (see Requirement 1): ___ Location of indicating device (see Requirement 2):_____

Table 70

Application conditions	Actual or simulated flow rate	Working pressure	Working temperature	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE ^a	Fault	Significant fault ^b	EUT functioning correctly
	$Q_{(j)}$ m ³ /h	p_w MPa (bar)	T_w °C	$V_i(i)$ m ³	$V_f(i)$ m ³	V_i m ³	V_a m ³	E_m %	%	$E_{m2} - E_{m1}$ %	%	
Reference conditions												
1) Before burst	With no significant noise in mains supply.											
										—	—	—
2) After burst	Randomly phased bursts (electromagnetic environment, E1 — 1 000 V peak amplitude electromagnetic environment, E2 — 2 000 V peak amplitude) applied asynchronously in asymmetrical mode (common mode).											
												yes no
Comments:												
^a For a complete water meter this is the maximum permissible error as defined in ISO 4064-1:2024 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable part of a water meter, the MPE shall be defined by the manufacturer (ISO 4064-2:2024 OIML R 49-2:2024, 9.4).												
^b The significant fault is equal to half the MPE in the upper flow rate zone.												

Requirements

Requirement 1: If the flow axis is vertical, the flow direction (from bottom to top or from top to bottom) shall be given.

Requirement 2: If the flow axis is horizontal and the meter has an indicating device which is integral with the body of the meter, the location of the indicating device (at the side or at the top of the meter) shall be given.

4.6.10 Electrostatic discharge (ISO 4064-2:2024|OIML R 49-2:2024, 8.11)

Application No: _____	Ambient temperature: _____	At start	At end	°C
Model: _____	Ambient relative humidity: _____			%
Date: _____	Ambient atmospheric pressure: _____			MPa
Observer: _____	Time: _____			

Table 71

Test method:	Gravimetric/volumetric
Volume measures/weighbridge used — m ³ or kg:	
Water conductivity (electromagnetic induction meters only) — S/cm:	
Length of straight pipe before meter (or manifold) — mm:	
Length of straight pipe after meter (or manifold) — mm:	
Nominal diameter DN of pipe before and after meter (or manifold) — mm:	
Describe flow straightener installation if used:	

Meter serial No.: _____ Orientation (V, H, other): _____

Flow direction (see Requirement 1): ____ Location of indicating device (see Requirement 2): ____

Table 72

Test conditions		Actual or simulated flow rate $Q_{(i)}$ m ³ /h	Working pressure p_w MPa (bar)	Working temperature T_w °C	Initial reading $V_i(i)$ m ³	Final reading $V_f(j)$ m ³	Indicated volume V_i m ³	Actual volume V_a m ³	Meter error E_m %	MPE ^a %	Fault $E_{m(2)} - E_{m(1)}$ %	Significant fault ^b %	EUT functioning correctly
Reference conditions (no discharges)											—	—	—
2) Discharge point ^c	Mode ^d												yes no
	C A												yes no
	C A												yes no
	C A												yes no
	C A												yes no
Comments:													
^a For a complete water meter this is the maximum permissible error as defined in ISO 4064-1:2024 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable part of a water meter, the MPE shall be defined by the manufacturer (ISO 4064-2:2024 OIML R 49-2:2024, 9.4). ^b The significant fault is equal to half the MPE in the upper flow rate zone. ^c Indicate by drawings if necessary. ^d C — contact discharge (6 kV); A — air discharge (8 kV).													

Requirements