STANDARD MOLDOVEAN

SM EN ISO 4064-3:2015

ICS 91.140.60

Adoptat la 02.09.2015

Contoare de apă pentru apă potabilă rece şi apă caldă. Partea 3: Formatul raportului de încercare

Счетчики воды для холодной питьевой воды и горячей воды. Часть 3: Формат протокола испытания

Water meters for cold potable water and hot water. Part 3: Test report format

Prezentul standard este identic cu standardul european
EN ISO 4064-3:2014

Prezentul standard înlocuieşte standardele
SM SR EN 14154-1+A1:2010, SM SR EN 14154-2+A1:2010,
SM SR EN 14154-3+A1:2010 care sînt anulate din data de 30.06.2017

INSTITUTUL NAŢIONAL DE STANDARDIZARE (INS)

Republica Moldova, mun. Chişinău, str. E. Coca, 28
Tel.: 22 905 303, fax: 22 905 333
www.standard.md

BS EN ISO 4064-3:2014

Incorporating corrigendum November 2014

BSI Standards Publication

Water meters for cold potable water and hot water

Part 3: Test report format

bsi.

...making excellence a habit.™

National foreword

This British Standard is the UK implementation of EN ISO 4064-3:2014.

The UK participation in its preparation was entrusted by Technical Committee CPI/30, Measurement of fluid flow in closed conduits, to Subcommittee CPI/30/7, Volume flow-rate methods.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Published by BSI Standards Limited 2014

ISBN 978 0 580 88480 1

ICS 91.140.60

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 June 2014.

Amendments/corrigenda issued since publication

Date	Text affected
30 November 2014	Implementation of CEN Correction Notice 20 August 2014: Removal of supersession information from CEN and national forewords
30 November 2014	Implementation of CEN Correction Notice 15 October 2014: Corrected French title in CEN title page

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 4064-3

June 2014

ICS 91.140.60

English Version

Water meters for cold potable water and hot water - Part 3: Test report format (ISO 4064-3:2014)

Compteurs d'eau potable froide et d'eau chaude - Partie 3: Format du rapport d'essais (ISO 4064-3:2014)

Wasserzähler zum Messen von kaltem Trinkwasser und heißem Wasser - Teil 3: Format des Prüfberichtes (ISO 4064-3:2014)

This European Standard was approved by CEN on 21 September 2013.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Foreword

This document (EN ISO 4064-3:2014) has been prepared by Technical Committee ISO/TC 30 “Measurement of fluid flow in closed conduits” in collaboration with Technical Committee CEN/TC 92 “Water meters” the secretariat of which is held by SNV.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2014, and conflicting national standards shall be withdrawn at the latest by June 2017.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 4064-3:2014 has been approved by CEN as EN ISO 4064-3:2014 without any modification.

Contents

Page

Foreword ..... **iv**

Introduction ..... **v**

1 Scope **1**

2 Normative references **1**

3 Terms, definitions, symbols, and abbreviated terms **1**

4 Type evaluation report **1**
4.1 General 1
4.2 Information concerning the type 2
4.3 General information concerning the test equipment 12
4.4 Check list for water meter examinations and performance tests 13
4.5 Type evaluation tests (for all water meters) 23
4.6 Type evaluation tests (for electronic water meters and mechanical water meters with electronic components) 47

5 Initial verification report **68**
5.1 General 68
5.2 Information concerning the EUT verified 68
5.3 Initial verification test report (ISO 4064-2:2014|OIML R 49-2:2013, Clause 10) 68

Annex A (normative) **List of documents concerning the type (ISO 4064-1:2014|OIML R 49-1:2013, 7.2.9)** **73**

Annex B (normative) **Listing of test equipment used in examinations and tests** **74**

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2, www.iso.org/directives.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received, www.iso.org/patents.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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

This fourth edition of ISO 4064-3 cancels and replaces the third edition (ISO 4064-3:2005), which has been technically revised. Provisions of the third edition are addressed in ISO 4064-2:2014|OIML R 49-2:2013.

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

— *Part 1: Metrological and technical requirements*

— *Part 2: Test methods*

— *Part 3: Test report format*

— *Part 4: Non-metrological requirements not covered in ISO 4064-1*

— *Part 5: Installation requirements*

This edition of ISO 4064-3 is identical to the corresponding edition of OIML R 49-3, which has been issued concurrently. OIML R 49-3 was approved for final publication by the International Committee of Legal Metrology at its 48th meeting in Ho Chi Minh City, Vietnam in October 2013. It will be submitted to the International Conference on Legal Metrology in 2016 for formal sanction.

Introduction

Implementation of this test report format is informative with regard to the implementation of ISO 4064-1|OIML R 49-1 and ISO 4064-2|OIML R 49-2 in national regulations; however, its implementation is required within the framework of the OIML Certificate System for Measuring Instruments [ISO 4064-2:2014|OIML R 49-2:2013, 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.

INTERNATIONAL STANDARD **ISO 4064-3:2014(E)**

Water meters for cold potable water and hot water —

Part 3:
Test report format

1 Scope

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

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 4064-1:2014|OIML R 49-1:2013, *Water meters for cold potable water and hot water — Part 1: Metrological and technical requirements*

ISO 4064-2:2014|OIML R 49-2:2013, *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 _____ m^3/h

Q_2 _____ m^3/h

Q_3 _____ m^3/h

Q_4 _____ m^3/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 4064-2:2014|OIML R 49-2:2013, 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: _____

NOTE 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 _____ m^3/h

Q_2 _____ m^3/h

Q_3 _____ m^3/h

Q_4 _____ m^3/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 4064-2:2014|OIML R 49-2:2013, 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

NOTE 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 _____ m^3/h

Q_2 _____ m^3/h

Q_3 _____ m^3/h

Q_4 _____ m^3/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 4064-2:2014|OIML R 49-2:2013, 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 _____ m^3/h

Q_2 _____ m^3/h

Q_3 _____ m^3/h

Q_4 _____ m^3/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 4064-2:2014|OIML R 49-2:2013, 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 4064-2:2014|OIML R 49-2:2013, 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 4064-2:2014|OIML R 49-2:2013, 8.1.8):

Category: _____

Case: _____

Installation details (electrical):

Wiring instructions: _____

Mounting arrangement: _____

Orientation limitations: _____

Approval number(s) of compatible water meters, 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 shall be submitted with the type approval application as in Annex A.

4.3 General information concerning the test equipment

Details of all items of measuring equipment and test instruments used for the type examinations, and initial verifications shall be listed in Annex B, including:

Manufacturer

Model number

Serial number

Date of last calibration

Date of next calibration due of e.g. instruments for measuring:

— linear dimensions

— pressure gauges

— pressure transmitters

— manometers

— temperature transducers

— reference meters

— volume tanks

— weighing machines

— signal generators (for pulse, current or voltage)

4.4 Check list for water meter examinations and performance tests

4.4.1 Check list for water meter examinations

External examination for all water meters				
ISO 4064-1:2014| OIML R 49-1:2013, 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				

External examination for all water meters				
ISO 4064-1:2014| OIML R 49-1:2013, subclause	**Requirement**	**+**	**–**	**Remarks**
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 n is a positive or a negative whole number or zero, thereby establishing a system of consecutive decades.			
6.7.2.1	The scale shall be graduated in values expressed in cubic metres or accompanied by a multiplying factor (×0,001; ×0,01; ×0,1; ×1; ×10; ×100; ×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				

External examination for all water meters				
ISO 4064-1:2014| OIML R 49-1:2013, subclause	**Requirement**	**+**	**–**	**Remarks**
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			
6.7.3.2.1	The indicated volume is given by a line of digits appearing in one or more apertures			
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			

External examination for all water meters				
ISO 4064-1:2014| OIML R 49-1:2013, subclause	**Requirement**	**+**	**–**	**Remarks**
NOTE 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 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			
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			

External examination for all water meters				
ISO 4064-1:2014| OIML R 49-1:2013, subclause	**Requirement**	**+**	**–**	**Remarks**
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			
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 4064-1:2014|OIML R 49-1:2013, 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 4064-1:2014|OIML R 49-1:2013, 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. NOTE 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				

External examination for all water meters				
ISO 4064-1:2014| OIML R 49-1:2013, subclause	**Requirement**	**+**	**–**	**Remarks**
5.1.3	Water meters with electronic devices shall be provided with the checking facilities specified in ISO 4064-1:2014|OIML R 49-1:2013, 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 4064-1:2014|OIML R 49-1:2013, 4.2.7.			

4.4.2 Checklist for water meter performance tests

4.4.2.1 Performance tests for all water meters

ISO 4064-1:2014| OIML R 49-1:2013, 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)			

ISO 4064-1:2014| OIML R 49-1:2013, 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 1,1 Q_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 4064-1:2014|OIML R 49-1:2013, 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 relative errors (of indication) of the water meter have the same sign, at least one of the errors shall not exceed one-half of the MPE. In all cases, this requirement shall be applied equitably with respect to the water supplier and the consumer (see also ISO 4064-1:2014|OIML R 49-1:2013, 4.3.3 3) and 8)			

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 4064-1:2014|OIML R 49-1:2013, 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				

ISO 4064-1:2014| OIML R 49-1:2013, 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 4064-1:2014|OIML R 49-1:2013, 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			

ISO 4064-1:2014| OIML R 49-1:2013, 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) $\overline{E}$ 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 ±1,5 % for meters of temperature class T30 and ±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) $\overline{E}$ 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 ±2,5 % for meters of temperature class T30 and ±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 4064-2:2014|OIML R 49-2:2013, 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)

ISO 4064-1:2014| 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 4064-2:2014|OIML R 49-2:2013, 8.2)			
	Cold			

ISO 4064-1:2014| OIML R 49-1:2013, subclause	Requirement	+	–	Remarks
A.5	To verify compliance with the provisions in 4.2 under conditions of low temperature (see ISO 4064-2:2014|OIML R 49-2:2013, 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 4064-2:2014|OIML R 49-2:2013, 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 4064-2:2014|OIML R 49-2:2013, 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 4064-2:2014|OIML R 49-2:2013, 8.5)			
	Vibration (random)			
A.5	To verify compliance with the provisions in 5.1.1 under conditions of random vibration. (see ISO 4064-2:2014|OIML R 49-2:2013, 8.6)			
	Mechanical shock			
A.5	To verify compliance with the provisions in 5.1.1 under conditions of mechanical shocks. (see ISO 4064-2:2014|OIML R 49-2:2013, 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 4064-2:2014|OIML R 49-2:2013, 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 4064-2:2014|OIML R 49-2:2013, 8.9)			
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 4064-2:2014|OIML R 49-2:2013, 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 4064-2:2014|OIML R 49-2:2013, 8.11)			

ISO 4064-1:2014| OIML R 49-1:2013, subclause	**Requirement**	**+**	**–**	**Remarks**
	Electromagnetic susceptibility — electromagnetic fields			
A.5	To verify compliance with the provisions in 5.1.1 under conditions of radiated electromagnetic fields. (see ISO 4064-2:2014|OIML R 49-2:2013, 8.12)			
A.5	To verify compliance with the provisions in 5.1.1 under conditions of conducted electromagnetic fields. (see ISO 4064-2:2014|OIML R 49-2:2013, 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 4064-2:2014|OIML R 49-2:2013, 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 4064-2:2014|OIML R 49-2:2013, 8.15)			

4.5 Type evaluation tests (for all water meters)

4.5.1 Static pressure test (ISO 4064-2:2014|OIML R 49-2:2013, 7.3)

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

	At start	At end	
Ambient temperature:			°C
Ambient relative humidity:			%
Ambient atmospheric pressure:			MPa
Time:			

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

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 4064-2:2014|OIML R 49-2:2013, 7.4.3)

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

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

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

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 4064-2:2014|OIML R 49-2:2013, 7.4.4)

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

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):___

Actual flow-rate $Q_{(\ )}$ 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] %
[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 4064-1:2014|OIML R 49-1:2013, 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 4064-2:2014|OIML R 49-2: 2013, 9.4). For acceptance criteria refer to ISO 4064-2:2014|OIML R 49-2:2013, 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 4064-2:2014|OIML R 49-2:2013, 7.4.5)

[c] Calculate standard deviation if $Q = Q_1$, Q_2 or Q_3 (ISO 4064-2:2014|OIML R 49-2:2013, 7.4.5)

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

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

Actual flowrate $Q_{(\ )}$ m³/h	Initial supply pressure MPa (bar)	Water temp. T_w °C	Initial reading $V_i(i)$ m³	Final reading $V_i(f)$ m³	Indicated volume V_i m³	Actual volume V_a m³	Meter error E_m %	MPE[a] %
[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 4064-1:2014|OIML R 49-1:2013, 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 4064-2:2014|OIML R 49-2:2013, 9.4). For acceptance criteria refer to ISO 4064-2:2014|OIML R 49-2:2013, 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 4064-2:2014|OIML R 49-2:2013, 7.4.5)

[c] Calculate standard deviation if $Q = Q_1$, Q_2 or Q_3 (ISO 4064-2:2014|OIML R 49-2:2013, 7.4.5)

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

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

Actual flowrate $Q_{(\ )}$ m³/h	Initial supply pressure MPa (bar)	Water temp. T_w °C	Initial reading $V_i(i)$ m³	Final reading $V_i(f)$ m³	Indicated volume V_i m³	Actual volume V_a m³	Meter error E_m %	MPE[a] %
[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 4064-1:2014|OIML R 49-1:2013, 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 4064-2:2014|OIML R 49-2:2013, 9.4). For acceptance criteria refer to ISO 4064-2:2014|OIML R 49-2:2013, 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 4064-2:2014|OIML R 49-2:2013, 7.4.5)

[c] Calculate standard deviation if $Q = Q_1$, Q_2 or Q_3 (ISO 4064-2:2014|OIML R 49-2:2013, 7.4.5)

Requirements

Requirement 1: Tables for each flow rate according to ISO 4064-2:2014|OIML R 49-2:2013, 7.4.4 shall be added.

Requirement 2: Tables for each orientation, which shall be as specified in ISO 4064-2:2014|OIML R 49-2:2013, 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 4064-1:2014|OIML R 49-1:2013, 7.2.7, ISO 4064-2:2014|OIML R 49-2:2013, 7.4.4, 7.4.6)

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

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): ___

Actual flowrate $Q_{(\ )}$ m³/h	Initial supply pressure MPa (bar)	Water temp. T_w °C	Initial reading $V_i(i)$ m³	Final reading $V_i(f)$ m³	Indicated volume V_i m³	Actual volume V_a m³	Meter error E_m %	MPE[a] %
[b]								
						$\bar{E}_{m2}$		
						$\bar{E}_{m3}$		

[a] For a complete water this is the maximum permissible error as defined in ISO 4064-1:2014|OIML R 49-1:2013, 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 4064-2:2014|OIML R 49-2:2013, 9.4). For acceptance criteria refer to ISO 4064-2:2014|OIML R 49-2:2013, 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 4064-2:2014|OIML R 49-2:2013, 7.4.5)

The error variation (see ISO 4064-2:2014|OIML R 49-2:2013, 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): ___

Actual flowrate $Q_{(\ )}$ m³/h	Initial supply pressure MPa(bar)	Water temp. T_w °C	Initial reading $V_i(i)$ m³	Final reading $V_i(f)$ m³	Indicated volume V_i m³	Actual volume V_a m³	Meter error E_m %	MPE[a] %
[b]								
						$\bar{E}_{m2}$		
						$\bar{E}_{m3}$		

[a] For a complete water this is the maximum permissible error as defined in ISO 4064-1:2014|OIML R 49-1:2013, 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 4064-2:2014|OIML R 49-2:2013, 9.4). For acceptance criteria refer to ISO 4064-2:2014|OIML R 49-2:2013, 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 4064-2:2014|OIML R 49-2:2013, 7.4.5)

The error variation (see ISO 4064-2:2014|OIML R 49-2:2013, 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): ___

Actual flowrate $Q_{(\ )}$ m³/h	Initial supply pressure MPa(bar)	Water temp. T_w °C	Initial reading V_i(i) m³	Final reading V_i(f) m³	Indicated volume V_i m³	Actual volume V_a m³	Meter error E_m %	MPE[a] %
[b]								
						$\bar{E}_{m2}$		
						$\bar{E}_{m3}$		

[a] For a complete water this is the maximum permissible error as defined in ISO 4064-1:2014|OIML R 49-1:2013, 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 4064-2:2014|OIML R 49-2:2013, 9.4). For acceptance criteria refer to ISO 4064-2:2014|OIML R 49-2:2013, 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 4064-2:2014|OIML R 49-2:2013, 7.4.5)

The error variation (see ISO 4064-2:2014|OIML R 49-2:2013, 7.4.6.4) shall be checked

Requirements

Requirement 1: Tables for each flow rate according to ISO 4064-2:2014|OIML R 49-2:2013, 7.4.4 shall be added.

Requirement 2: Tables for each orientation, which shall be as specified in ISO 4064-2:2014|OIML R 49-2:2013, 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.

4.5.5 Water temperature test (ISO 4064-2:2014|OIML R 49-2:2013, 7.5) and overload water temperature test (ISO 4064-2:2014|OIML R 49-2:2013, 7.6)

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

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):___

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]
		$Q_{(\ )}$			$V_i(i)$	$V_i(f)$	V_i	V_a	E_m	
	m^3/h	m^3/h	MPa(bar)	°C	m^3	m^3	m^3	m^3	%	%
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 4064-1:2014|OIML R 49-1:2013, 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 4064-2:2014|OIML R 49-2:2013, 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

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 4064-2:2014|OIML R 49-2:2013, 7.7)

Application No: _____

Model: _____

Date: _____

Observer: _____

	At start	At end	
Ambient temperature:			°C
Ambient relative humidity:			%
Ambient atmospheric pressure:			MPa
Time:			

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):___

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]
		$Q_{(\,)}$			V_i(i)	V_i(f)	V_i	V_a	E_m	
	m^3/h	m^3/h	MPa(bar)	°C	m^3	m^3	m^3	m^3	%	%
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 4064-1:2014|OIML R 49-1:2013, 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 4064-2:2014|OIML R 49-2:2013, 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.

4.5.7 Reverse flow test (ISO 4064-2:2014|OIML R 49-2:2013, 7.8)

4.5.7.1 General

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

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 4064-2:2014|OIML R 49-2:2013, 7.8.3.1)

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

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

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]
					V_i(i)	V_i(f)	V_i	V_a	E_m	
	m³/h	m³/h	MPa(bar)	°C	m³	m³	m³	m³	%	%
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 4064-1:2014|OIML R 49-1:2013, 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 4064-2:2014|OIML R 49-2:2013, 9.4).

4.5.7.3 Meters not designed to measure accidental reverse flow (ISO 4064-2:2014|OIML R 49-2:2013, 7.8.3.2)

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

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

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]
		$Q_{(\,)}$			V_i(i)	V_i(f)	V_i	V_a	E_m	
	m³/h	m³/h	MPa(bar)	°C	m³	m³	m³	m³	%	%
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 4064-1:2014|OIML R 49-1:2013, 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 4064-2:2014|OIML R 49-2:2013, 9.4).

4.5.7.4 Meters which prevent reverse flow (ISO 4064-2:2014|OIML R 49-2:2013, 7.8.3.3)

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

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

Application conditions	Nominal flow rate m^3/h	Actual flow rate m^3/h	Initial supply pressure Mpa(bar)	Initial inlet water temperature °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 %	MPEa %
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 4064-1:2014|OIML R 49-1:2013, 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 4064-2:2014|OIML R 49-2:2013, 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.

4.5.8 Pressure-loss test (ISO 4064-2:2014|OIML R 49-2:2013, 7.9)

Application No: _____

Model: _____

Date: _____

Observer: _____

	At start	At end	
Ambient temperature:			°C
Ambient relative humidity:			%
Ambient atmospheric pressure:			MPa
Time:			

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

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

Measurement 1

Flow rate $Q_{(\,)}$	L_1	L_2	L_3	L_4	Initial supply pressure	Water temp.	Measuring section	Pressure loss Δp_1
m^3/h	mm	mm	mm	mm	MPa (bar)	° C	mm	MPa (bar)

Measurement 2

Flow rate $Q_{()}$	L_1	L_2	L_3	L_4	Initial supply pressure	Water temp.	Measuring section	Pressure loss Δp_2	Meter pressure 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 4064-2:2014|OIML R 49-2:2013, 7.10, Annex C)

Application No: _____

Model: _____

Date: _____

Observer: _____

	At start	At end	
Ambient temperature:			°C
Ambient relative humidity:			%
Ambient atmospheric pressure:			MPa
Time:			

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 4064-2:2014|OIML R 49-2:2013, Annex C) — for each test applied, insert the actual pipe dimensions used (as stated by the meter manufacturer):

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):___

Test No.	Actual flow rate $Q_{(\,)}$ m³/h	Pressure p_w MPa (bar)	Water temp T_w °C	Initial reading V_i(i) m³	Final reading V_i(f) m³	Indicated volume V_i m³	Actual volume V_a m³	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 4064-1:2014|OIML R 49-1:2013, 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 4064-2:2014|OIML R 49-2:2013, 9.4).

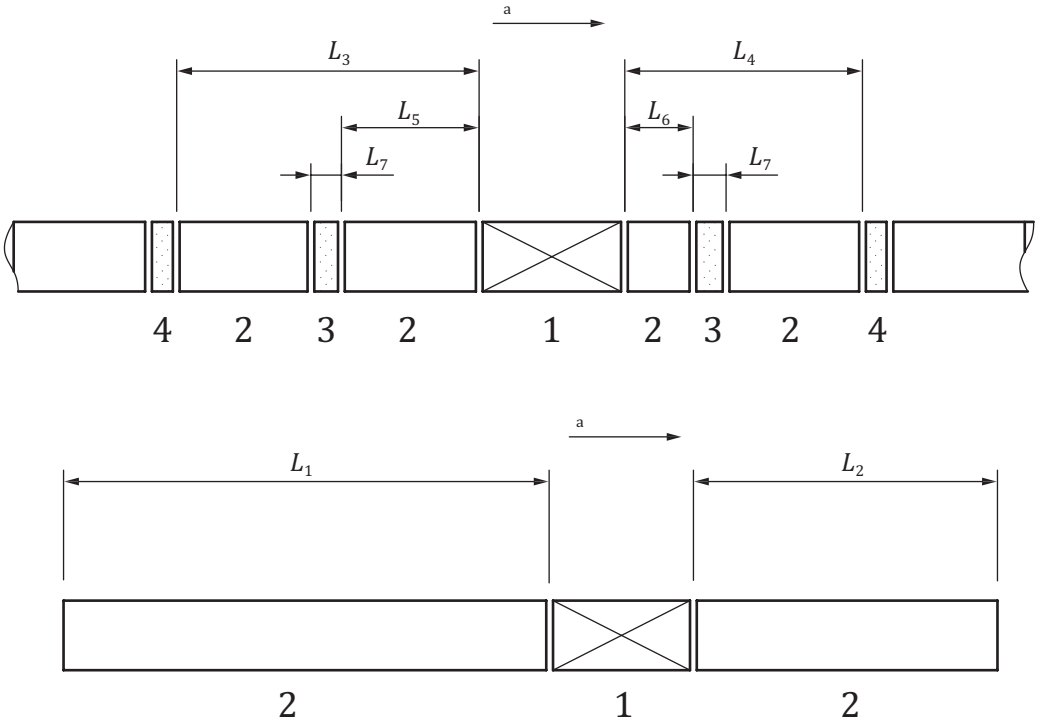
For meters where the manufacturer has specified installation lengths of at least 15 × DN upstream and 5 × DN downstream of the meter, no external straighteners are allowed.

When a minimum straight pipe length (L_2), of 5 × 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 4064-2:2014|OIML R 49-2:2013, 7.11)

4.5.10.1 Discontinuous flow test (ISO 4064-2:2014|OIML R 49-2:2013, 7.11.2)

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

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.:_____

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

Ambient conditions at start

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

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

[a] Minimum theoretical volume passed during the test is 0.5 × Q3 × 100 000 × 32 / 3600 expressed in m3. Minimum number of test cycles during the test = 100 000.

Ambient conditions at finish

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.:_____

Actual flowrate $Q_{(\,)}$ m³/h	Working pressure p_w MPa (bar)	Working temp T_w °C	Initial reading $V_i(i)$ m³	Final reading $V_i(f)$ m³	Indicated volume V_i m³	Actual volume V_a m³	Meter error E_m %	MPE[a] %	Curve variation error[b] $\bar{E}_m(B) - \bar{E}_m(A)$ %	MPE (of curve variation error)[c] %
									—	—
[d]									—	—
						$\bar{E}_{m2}$				
						$\bar{E}_{m3}$				
						$\bar{E}_m(B)$				

[a] For MPE values refer to ISO 4064-1:2014|OIML R 49-1:2013, 4.2. For acceptance criteria, refer to ISO 4064-2:2014|OIML R 49-2:2013, 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 4064-2:2014|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 4064-2:2014|OIML R 49-2, 7.4.5)

4.5.10.2 Continuous flow test (ISO 4064-2:2014|OIML R 49-2:2013, 7.11.3)

Application No.:	
Test method:	Gravimetric/volumetric
Volume measures/weighbridge used — m³ 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.:_____

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

Ambient conditions at start

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

Date	Time	Observer	Up stream pressure MPa (bar)	Down stream pressure MPa (bar)	Up stream temp °C	Actual flowrate 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 $Q_3 \leq 16$ m^3/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 $Q_3 > 16$ m^3/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

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.:_____

Actual flowrate $Q_{(\,)}$ m³/h	Working pressure p_w MPa (bar)	Working temp T_w °C	Initial reading V_i(i) m³	Final reading V_i(f) m³	Indicated volume V_i m³	Actual volume V_a m³	Meter error E_m %	MPE[a] %	Curve variation error [b] $\bar{E}_m$(B) - $\bar{E}_m$(A) %	MPE (of curve variation error) [c] %
									—	—
[d]									—	—
						$\bar{E}_{m2}$				
						$\bar{E}_{m3}$				
						$\bar{E}_m$(B)				
Comments:										

[a] For MPE values refer to ISO 4064-1:2014|OIML R 49-1:2013, 4.2. For acceptance criteria refer to ISO 4064-2:2014|OIML R 49-2:2013, 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 4064-2:2014|OIML R 49-2:2013, 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 4064-2:2014|OIML R 49-2:2013, 7.4.5)

4.5.10.3 Discontinuous flow test (ISO 4064-2:2014|OIML R 49-2:2013, 7.11.2)

(Applicable only to combination meters)

Application No.	
Test method:	Gravimetric/volumetric
Volume measures/weighbridge used — m³ 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.:_____

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

Ambient conditions at start

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

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

[a] Minimum theoretical volume passed by meters during the test is $0.5 \times Q_1 \times 50000 \times 32 / 3600$ expressed in m^3. Minimum number of test cycles during the test = 50000.

Ambient conditions at finish

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.:_____

Actual flowrate $Q_{(\,)}$ m³/h	Working pressure p_w MPa (bar)	Working temp T_w °C	Initial reading V_i(i) m³	Final reading V_i(f) m³	Indicated volume V_i m³	Actual volume V_a m³	Meter error E_m %	MPE[a] %	Curve variation error [b] $\bar{E}_m$(B) - $\bar{E}_m$(A) %	MPE (of curve variation error) [c] %
									—	—
[d]									—	—
						$\bar{E}_{m2}$				
						$\bar{E}_{m3}$				
						$\bar{E}_m$(B)				
Comments:										

[a] For MPE values refer to ISO 4064-1:2014|OIML R 49-1:2013, 4.2. For acceptance criteria refer to ISO 4064-2:2014|OIML R 49-2:2013, 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 4064-2:2014|OIML R 49-2:2013, 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 4064-2:2014|OIML R 49-2:2013, 7.4.5).

4.5.11 Static magnetic field test (ISO 4064-2:2014|OIML R 49-2:2013, 7.12, 8.16)

Application No: _____

Model: _____

Date: _____

Observer: _____

	At start	At end	
Ambient temperature:			°C
Ambient relative humidity:			%
Ambient atmospheric pressure:			MPa
Time:			

Test method:	Gravimetric/volumetric
Volume measures/weighbridge used — m³ 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):____

Application conditions	Nominal flow rate m^3/h	Actual flow rate m^3/h	Initial supply pressure MPa (bar)	Initial inlet water temperature °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 4064-1:2014|OIML R 49-1:2013, 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 4064-2:2014|OIML R 49-2:2013, 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.

4.5.12 Tests on ancillary devices of a water meter (ISO 4064-2:2014|OIML R 49-2:2013, 7.13)

Application No: _____

Model: _____

Date: _____

Observer: _____

	At start	At end	
Ambient temperature:			°C
Ambient relative humidity:			%
Ambient atmospheric pressure:			MPa
Time:			

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):____

Actual flowrate Q ( ) m³/h	Initial supply pressure MPa(bar)	Water temp. T_w °C	Initial reading V_i(i) m³	Final reading V_i(f) m³	Indicated volume V_i m³	Actual volume V_a m³	Meter error E_m %	MPE[a] %
[b]								
						$\bar{E}_{m2}$		
						$\bar{E}_{m3}$		
							Standard deviation %	MPE/3[a] %
						s [c d]		

[a] For a complete water meter this is the maximum permissible error as defined in ISO 4064-1:2014|OIML R 49-1:2013, 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 4064-2:2014|OIML R 49-2:2013, 9.4). For acceptance criteria refer to ISO 4064-2:2014|OIML R 49-2:2013, 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 4064-2:2014|OIML R 49-2:2013, 7.4.5).

[c] Calculate standard deviation if $Q = Q_1$, Q_2 or Q_3 (ISO 4064-2:2014|OIML R 49-2:2013, 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):____

Actual flowrate Q ( ) m³/h	Initial supply pressure MPa(bar)	Water temp. T_w °C	Initial reading V_i(i) m³	Final reading V_i(f) m³	Indicated volume V_i m³	Actual volume V_a m³	Meter error E_m %	MPE[a] %
[b]								
						$\bar{E}_{m2}$		
						$\bar{E}_{m3}$		
							Standard deviation %	MPE/3a %
						s [c d]		

[a] For a complete water meter this is the maximum permissible error as defined in ISO 4064-1:2014|OIML R 49-1:2013, 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 4064-2:2014|OIML R 49-2:2013, 9.4). For acceptance criteria refer to ISO 4064-2:2014|OIML R 49-2:2013, 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 4064-2:2014|OIML R 49-2:2013, 7.4.5).

[c] Calculate standard deviation if $Q = Q_1$, Q_2 or Q_3 (ISO 4064-2:2014|OIML R 49-2:2013, 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):___

Actual flowrate Q ( ) m³/h	Initial supply pressure MPa(bar)	Water temp. T_w °C	Initial reading V_i(i) m³	Final reading V_i(f) m³	Indicated volume V_i m³	Actual volume V_a m³	Meter error E_m %	MPE[a] %
[b]								
						$\bar{E}_{m2}$		
						$\bar{E}_{m3}$		
							Standard deviation %	MPE/3[a] %
						s [c d]		

[a] For a complete water meter this is the maximum permissible error as defined in ISO 4064-1:2014|OIML R 49-1:2013, 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 4064-2:2014|OIML R 49-2:2013, 9.4). For acceptance criteria refer to ISO 4064-2:2014|OIML R 49-2:2013, 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 4064-2:2014|OIML R 49-2:2013, 7.4.5).

[c] Calculate standard deviation if $Q = Q_1$, Q_2 or Q_3 (ISO 4064-2:2014|OIML R 49-2:2013, 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 4064-2:2014|OIML R 49-2:2013, 7.4.4 shall be added.

Requirement 2: Tables for each orientation, which shall be as specified in ISO 4064-2:2014|OIML R 49-2:2013, 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 4064-2:2014|OIML R 49-2:2013, 8.2)

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

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):___

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_i(j) 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 4064-1:2014|OIML R 49-1:2013, 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 4064-2:2014|OIML R 49-2:2013, 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.

4.6.2 Cold (ISO 4064-2:2014|OIML R 49-2:2013, 8.3)

Application No: _____

Model: _____

Date: _____

Observer: _____

	At start	At end	
Ambient temperature:			°C
Ambient relative humidity:			%
Ambient atmospheric pressure:			MPa
Time:			

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):____

Application conditions	Actual or simulated flow rate	Working pressure[a]	Working temperature[a]	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE[b]
		p_w	T_w	V_i(i)	V_i(j)	V_i	V_a	E_m	
	m^3/h	MPa (bar)	°C	m^3	m^3	m^3	m^3	%	%
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 4064-1:2014|OIML R 49-1:2013, 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 4064-2:2014|OIML R 49-2:2013, 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.

4.6.3 Damp heat, cyclic (condensing) (ISO 4064-2:2014|OIML R 49-2:2013, 8.4)

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

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):___

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	
	$Q_{( )}$	p_w	T_w	V_i(i)	V_i(j)	V_i	V_a	E_m		$E_{m2)} - E_{m1)}$			
	m^3/h	MPa (bar)	°C	m^3	m^3	m^3	m^3	%	%	%	%		
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 4064-1:2014|OIML R 49-1:2013, 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 4064-2:2014|OIML R 49-2:2013, 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 Power supply variation (ISO 4064-2:2014|OIML R 49-2:2013, 8.5)

4.6.4.1 General

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

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 4064-2:2014|OIML R 49-2:2013, 8.5.2)

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

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

Application conditions (single voltage)	U_i	Actual or simulated flow rate	Working pressure p_w	Working temperature T_w	Initial reading $V_i(i)$	Final reading $V_i(j)$	Indicated volume V_i	Actual volume 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 4064-1:2014|OIML R 49-1:2013, 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 4064-2:2014|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 4064-2:2014|OIML R 49-2:2013, 8.5.3)

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

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

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 °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 4064-1:2014|OIML R 49-1:2013, 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 4064-2:2014|OIML R 49-2:2013, 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.

4.6.5 Vibration (random) (ISO 4064-2:2014|OIML R 49-2:2013, 8.6)

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

	At start	At end	
Ambient temperature:			°C
Ambient relative humidity:			%
Ambient atmospheric pressure:			MPa
Time:			

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):____

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	EUT functioning correctly	
	$Q_{(\,)}$	p_w	T_w	V_i(i)	V_i(j)	V_i	V_a	E_m		$E_{m2)} - E_{m1)}$			
	m^3/h	MPa (bar)	°C	m^3	m^3	m^3	m^3	%	%	%	%		
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 4064-1:2014|OIML R 49-1:2013, 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 4064-2:2014|OIML R 49-2:2013, 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.

4.6.6 Mechanical shock (ISO 4064-2:2014|OIML R 49-2:2013, 8.7)

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

	At start	At end	
Ambient temperature:			°C
Ambient relative humidity:			%
Ambient atmospheric pressure:			MPa
Time:			

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):____

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	EUT functioning correctly
	$Q_{(\,)}$	p_w	T_w	V_i(i)	V_i(j)	V_i	V_a	E_m		$E_{m2)} - E_{m1)}$		
	m^3/h	MPa (bar)	°C	m^3	m^3	m^3	m^3	%	%	%	%	
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 4064-1:2014|OIML R 49-1:2013, 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 4064-2:2014|OIML R 49-2:2013, 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.

4.6.7 AC mains voltage dips, short interruptions and voltage variations (ISO 4064-2:2014|OIML R 49-2:2013, 8.8)

Application No: _____

Model: _____

Date: _____

Observer: _____

	At start	At end	
Ambient temperature:			°C
Ambient relative humidity:			%
Ambient atmospheric pressure:			MPa
Time:			

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):____

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	
	$Q_{(\ )}$	p_w	T_w	V_i(i)	V_i(j)	V_i	V_a	E_m		$E_{m2)} - E_{m1)}$			
	m³/h	MPa (bar)	°C	m³	m³	m³	m³	%	%	%	%		
Reference conditions 1) Before voltage reductions	No voltage reductions.												
										—	—	—	—
2) During voltage reduction	Voltage interruptions and reductions as in ISO 4064-2:2014|OIML R 49-2:2013, 8.8.												
												yes	no
Comments:													

[a] For a complete water meter this is the maximum permissible error as defined in ISO 4064-1:2014|OIML R 49-1:2013, 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 4064-2:2014|OIML R 49-2:2013, 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 4064-2:2014|OIML R 49-2:2013, 8.9)

Application No: _____

Model: _____

Date: _____

Observer: _____

	At start	At end	
Ambient temperature:			°C
Ambient relative humidity:			%
Ambient atmospheric pressure:			MPa
Time:			

Test method:	Gravimetric/volumetric
Volume measures/weighbridge used — m³ 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):____

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	
	$Q_{(\,)}$	p_w	T_w	V_i(i)	V_i(j)	V_i	V_a	E_m		$E_{m2)} - E_{m1)}$			
	m^3/h	MPa (bar)	°C	m^3	m^3	m^3	m^3	%	%	%	%		
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 4064-2:2014|OIML R 49-2:2013, 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 4064-1:2014|OIML R 49-1:2013, 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 4064-2:2014|OIML R 49-2:2013, 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 4064-2:2014|OIML R 49-2:2013, 8.10)

Application No: _____

Model: _____

Date: _____

Observer: _____

	At start	At end	
Ambient temperature:			°C
Ambient relative humidity:			%
Ambient atmospheric pressure:			MPa
Time:			

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):____

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	
	$Q_{(\ )}$	p_w	T_w	V_i(i)	V_i(j)	V_i	V_a	E_m		$E_{m2)} - E_{m1)}$			
	m^3/h	MPa (bar)	°C	m^3	m^3	m^3	m^3	%	%	%	%		
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 4064-1:2014|OIML R 49-1:2013, 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 4064-2:2014|OIML R 49-2:2013, 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 4064-2:2014|OIML R 49-2:2013, 8.11)

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

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):____

Test 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	
			$Q_{(\ )}$	p_w	T_w	V_i(i)	V_i(j)	V_i	V_a	E_m		$E_{m2)} - E_{m1)}$			
			m³/h	MPa (bar)	°C	m³	m³	m³	m³	%	%	%	%		
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 4064-1:2014|OIML R 49-1:2013, 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 4064-2:2014|OIML R 49-2:2013, 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

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.

4.6.11 Radiated electromagnetic field (ISO 4064-2:2014|OIML R 49-2:2013, 8.12)

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

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):___

Test conditions	Antenna polarization vertical/ horizontal		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	
				p_w	T_w	$V_i(i)$	$V_i(f)$	V_i	V_a	E_m		$E_{m2)} - E_{m1)}$			
			m^3/h	MPa (bar)	°C	m^3	m^3	m^3	m^3	%	%	%	%		
1) Reference conditions (no disturbance)	V	H										—	—	—	—
2) Disturbance															
26–40 MHz	V	H												yes	no
40–60 MHz	V	H												yes	no
60–80 MHz	V	H												yes	no
80–100 MHz	V	H												yes	no
100–120 MHz	V	H												yes	no
120–144 MHz	V	H												yes	no
144–150 MHz	V	H												yes	no
150–160 MHz	V	H												yes	no
160–180 MHz	V	H												yes	no
180–200 MHz	V	H												yes	no
200–250 MHz	V	H												yes	no
250–350 MHz	V	H												yes	no
350–400 MHz	V	H												yes	no
400–435 MHz	V	H												yes	no
435–500 MHz	V	H												yes	no
500–600 MHz	V	H												yes	no
600–700 MHz	V	H												yes	no
700–800 MHz	V	H												yes	no
800–934 MHz	V	H												yes	no
934–1 000 MHz	V	H												yes	no

[a] For a complete water meter this is the maximum permissible error as defined in ISO 4064-1:2014|OIML R 49-1:2013, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable part of water meter, the MPE shall be defined by the manufacturer (ISO 4064-2:2014|OIML R 49-2:2013, 9.4).

[b] The significant fault is equal to half the MPE in the upper flow rate zone.

Test conditions	Antenna polarization vertical/ horizontal		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	
				p_w	T_w	$V_i(i)$	$V_i(f)$	V_i	V_a	E_m		$E_{m2)} - E_{m1)}$			
			m^3/h	MPa (bar)	°C	m^3	m^3	m^3	m^3	%	%	%	%		
1 000–1 400 MHz	V	H												yes	no
1 400–2 000 MHz	V	H												yes	no
Comments:															

[a] For a complete water meter this is the maximum permissible error as defined in ISO 4064-1:2014|OIML R 49-1:2013, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable part of water meter, the MPE shall be defined by the manufacturer (ISO 4064-2:2014|OIML R 49-2:2013, 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.

4.6.12 Conducted electromagnetic field (ISO 4064-2:2014|OIML R 49-2:2013, 8.13)

Application No: _____

Model: _____

Date: _____

Observer: _____

	At start	At end	
Ambient temperature:			°C
Ambient relative humidity:			%
Ambient atmospheric pressure:			MPa
Time:			

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):____

Test 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	
	$Q_{(\ )}$	p_w	T_w	$V_i(i)$	$V_i(f)$	V_i	V_a	E_m		$E_{m2)} - E_{m1)}$			
	m^3/h	MPa (bar)	°C	m^3	m^3	m^3	m^3	%	%	%	%		
1) Reference conditions (no disturbance)										—	—	—	—
2) Disturbance													
0,15–0,30 MHz												yes	no
0,30–0,57 MHz												yes	no
0,57–1,1 MHz												yes	no
1,1–2,2 MHz												yes	no
2,2–3,9 MHz												yes	no
3,9–7,5 MHz												yes	no
7,5–14 MHz												yes	no
14–30 MHz												yes	no
30–50 MHz												yes	no
50–80 MHz												yes	no
Comments:													

[a] For a complete water meter this is the maximum permissible error as defined in ISO 4064-1:2014|OIML R 49-1:2013, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable part of water meter, the MPE shall be defined by the manufacturer (ISO 4064-2:2014|OIML R 49-2:2013, 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.

4.6.13 Surges on signal, data and control lines (ISO 4064-2:2014|OIML R 49-2:2013, 8.14) (applicable only for environmental class E2)

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

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):____

Test conditions			Actual or simulated flow-rate	Working pressure	Working temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE[a]	Fault	Significant fault[b]	EUT functioning correctly	
			Q ( )	P_w	T_w	$V_i(i)$	$V_i(j)$	V_i	V_a	E_m		$E_{m2)} - E_{m1)}$			
			m^3/h	MPa (bar)	°C	m^3	m^3	m^3	m^3	%	%	%	%		
1) Reference conditions (no surges)															
2) Surge	Mode[c]														
Positive	L	L												yes	no
	L	L												yes	no
	L	L												yes	no
Negative	L	L												yes	no
	L	L												yes	no
	L	L												yes	no
Positive	L	E												yes	no
	L	E												yes	no
	L	E												yes	no
Negative	L	E												yes	no
	L	E												yes	no
	L	E												yes	no

Comments:

[a] For a complete water meter this is the maximum permissible error as defined in ISO 4064-1:2014|OIML R 49-1:2013, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable part of the water meter, the MPE shall be defined by the manufacturer (ISO 4064-2:2014|OIML R 49-2:2013, 9.4).

[b] The significant fault is equal to half the MPE in the upper flow rate zone.

[c] L–L — line to line surge; L–E — line to earth surge.

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.

4.6.14 Surges on AC and DC mains power lines (ISO 4064-2:2014|OIML R 49-2:2013, 8.15) (applicable only for environmental class E2)

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

	At start	At end	
Ambient temperature:			°C
Ambient relative humidity:			%
Ambient atmospheric pressure:			MPa
Time:			

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):____

Test 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	
			$Q_{(\ )}$	p_w	T_w	$V_i(i)$	$V_i(j)$	V_i	V_a	E_m		$E_{m2)} - E_{m1)}$			
			m³/h	MPa (bar)	°C	m³	m³	m³	m³	%	%	%	%		
1) Reference conditions (no surges)															
												—	—	—	—
2) DC power	Mode[c]														
Positive	L	L												yes	no
	L	L												yes	no
	L	L												yes	no
Negative	L	L												yes	no
	L	L												yes	no
	L	L												yes	no
Positive	L	E												yes	no
	L	E												yes	no
	L	E												yes	no
Negative	L	E												yes	no
	L	E												yes	no
	L	E												yes	no
Comments:															

[a] For a complete water meter this is the maximum permissible error as defined in ISO 4064-1:2014|OIML R 49-1:2013, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable part of the water meter, the MPE shall be defined by the manufacturer (ISO 4064-2:2014|OIML R 49-2:2013, 9.4).

[b] The significant fault is equal to half the MPE in the upper flow rate zone.

[c] L–L — line to line surge; L–E — line to earth surge.

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

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

Test 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	
	$Q_{(\ )}$	p_w	T_w	$V_i(i)$	$V_i(j)$	V_i	V_a	E_m		$E_{m2)} - E_{m1)}$			
	m³/h	MPa(bar)	°C	m³	m³	m³	m³	%	%	%	%		
1) Reference conditions (no surges)													
										—	—	—	—

[a] For a complete water meter this is the maximum permissible error as defined in ISO 4064-1:2014|OIML R 49-1:2013, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable part of the water meter, the MPE shall be defined by the manufacturer (ISO 4064-2:2014|OIML R 49-2:2013, 9.4).

[b] The significant fault is equal to half the MPE in the upper flow rate zone.

[c] L–L — line to line surge; L–E — line to earth surge.

Test conditions			Actual or simulated flow rate $Q_{(\,)}$ m³/h	Working pressure p_w MPa(bar)	Working temperature T_w °C	Initial reading V_i(i) m³	Final reading V_i(j) m³	Indicated volume V_i m³	Actual volume V_a m³	Meter error E_m %	MPE[a] %	Fault $E_{m2)} - E_{m1)}$ %	Significant fault[b] %	EUT functioning correctly	
AC supply voltage 0°	Mode[c]														
Positive	L	L												yes	no
	L	L												yes	no
	L	L												yes	no
Negative	L	L												yes	no
	L	L												yes	no
	L	L												yes	no
Positive	L	E												yes	no
	L	E												yes	no
	L	E												yes	no
Negative	L	E												yes	no
	L	E												yes	no
	L	E												yes	no
AC supply voltage 90°	Mode[c]														
Positive	L	L												yes	no
	L	L												yes	no
	L	L												yes	no
Negative	L	L												yes	no
	L	L												yes	no
	L	L												yes	no
Positive	L	E												yes	no
	L	E												yes	no
	L	E												yes	no
Negative	L	E												yes	no
	L	E												yes	no
	L	E												yes	no
Comments:															

a For a complete water meter this is the maximum permissible error as defined in ISO 4064-1:2014|OIML R 49-1:2013, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable part of the water meter, the MPE shall be defined by the manufacturer (ISO 4064-2:2014|OIML R 49-2:2013, 9.4).

b The significant fault is equal to half the MPE in the upper flow rate zone.

c L–L — line to line surge; L–E — line to earth surge.

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

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

Test conditions			Actual or simulated flow rate $Q_{()}$ m³/h	Working pressure p_w MPa(bar)	Working temperature T_w °C	Initial reading $V_i(i)$ m³	Final reading $V_i(j)$ m³	Indicated volume V_i m³	Actual volume V_a m³	Meter error E_m %	MPE[a] %	Fault $E_{m2)} - E_{m1)}$ %	Significant fault[b] %	EUT functioning correctly	
1) Reference conditions (no surges)												—	—	—	—
AC supply voltage 180°	Mode[c]														
Positive	L	L												yes	no
	L	L												yes	no
	L	L												yes	no
Negative	L	L												yes	no
	L	L												yes	no
	L	L												yes	no
Positive	L	E												yes	no
	L	E												yes	no
	L	E												yes	no
Negative	L	E												yes	no
	L	E												yes	no
	L	E												yes	no
AC supply voltage 270°	Mode[c]														
Positive	L	L												yes	no
	L	L												yes	no
	L	L												yes	no
Negative	L	L												yes	no
	L	L												yes	no
	L	L												yes	no
Positive	L	E												yes	no
	L	E												yes	no
	L	E												yes	no
Negative	L	E												yes	no
	L	E												yes	no
	L	E												yes	no
Comments:															

[a] For a complete water meter this is the maximum permissible error as defined in ISO 4064-1:2014|OIML R 49-1:2013, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable part of the water meter, the MPE shall be defined by the manufacturer (ISO 4064-2:2014|OIML R 49-2:2013, 9.4).

[b] The significant fault is equal to half the MPE in the upper flow rate zone.

[c] L–L — line to line surge; L–E — line to earth surge.

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.

4.6.15 Absence of flow test (ISO 4064-2:2014|OIML R 49-2:2013, 8.17)

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

	At start	At end	
Ambient temperature:			°C
Ambient relative humidity:			%
Ambient atmospheric pressure:			MPa
Time:			

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):___

Application conditions	Working pressure p_w MPa (bar)	Working temperature T_w °C	Initial reading $V_i(i)$ m^3	Final reading after 15 min $V_i(j)$ m^3	Indicated volume V_i m^3	EUT functioning correctly	
Meter filled with water, purging out all air						yes	no
Water fully discharged from the meter						yes	no
Comments:							

The water meter totalization shall not change by more than the value of the verification scale interval during each test interval.

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.

5 Initial verification report

5.1 General

The specific format layout for reporting initial verifications and subsequent verifications of water meters is left largely to the metrological authorities and the individual organizations carrying out verification tests. However, the report (records) shall contain the minimum information detailed in ISO 4064-1:2014|OIML R 49-1:2013, 7.3 and ISO 4064-2:2014|OIML R 49-2:2013, 11.2.2.

In addition to this, any special requirements and/or restrictions for initial verification detailed in the type approval certificate for the EUT shall be applied. A record of equipment and instrumentation used with calibration details (see Annex B) shall be kept.

The following basic information should also be included in the verification report (record) followed by the results of the tests (three examples of how the report may be formatted are given below):

5.2 Information concerning the EUT verified

Type approval number of the EUT

Details of the EUT:

Model number:

Accuracy class:

Meter designation/s Q_3:

Ratio Q_3/Q_1:

Maximum pressure loss Δp_{max} :

Flow rate at Δp_{max}:

Year of manufacture:

The manufacturer:

Authorized representative:

Address

Testing laboratory:

Authorized representative:

Address

5.3 Initial verification test report (ISO 4064-2:2014|OIML R 49-2:2013, Clause 10)

5.3.1 Example 1: Approved water meter (complete or combined) (ISO 4064-2:2014|OIML R 49-2:2013, 10.1)

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

Error (of indication) tests

EUT testing case (ISO 4064-2:2014|OIML R 49-2:2013, 8.1.8)	
Category for testing (ISO 4064-2:2014|OIML R 49-2:2013, <clause number>)	a
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:	

a Enter clause number according to one of the configuration categories for testing the EUT listed in ISO 4064-2:2014|OIML R 49-2:2013, 8.1.8.2 to 8.1.8.5.

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

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

Nominal flow rate[a]	Actual flow rate	Working pressure	Working temperature	Initial reading	Final reading	Indicated volume	Actual volume	Meter error[b]	MPE[c]
	$Q_{(\ )}$			$V_i(i)$	$V_i(f)$	V_i	V_a	E_c	
m^3/h	m^3/h	MPa (bar)	°C	m^3	m^3	m^3	m^3	%	%
Q_1									
Q_2									
Q_3									
Comments:									

a These flow rates shall be applied unless alternatives are specified in the type approval certificate.

b Calculations for the error (of indication) are described in ISO 4064-2:2014|OIML R 49-2:2013, Annex B.

c The maximum permissible error as defined in ISO 4064-1:2014|OIML R 49-1:2013, 4.2.2 or 4.2.3, according to the accuracy class of the meter.

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.

5.3.2 Example 2: Approved calculator (including indicating device) (ISO 4064-2:2014|OIML R 49-2:2013, 10.2)

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

Error (of indication) tests

EUT testing case (ISO 4064-2:2014|OIML R 49-2:2013, 8.1.8)	
Category for testing (ISO 4064-2:2014|OIML R 49-2:2013, <clause number>)	a
a Enter clause number according to one of the configuration categories for testing the EUT listed in ISO 4064-2:2014|OIML R 49-2:2013, 8.1.8.2 to 8.1.8.5.	

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

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

Nominal flow rate[a]	Actual flow rate	Applied pulse frequency[b]	Initial reading	Final reading	Total pulses injected[b]	Indicated volume	Actual volume	Meter error[c]	MPE[d]
	$Q_{(\ )}$		V_i(i)	V_i(f)	T_p	V_i	V_a	E_c	
m³/h	m³/h	Hz	m³	m³		m³	m³	%	%
Q_1									
Q_2									
Q_3									
Comments:									

a These flow rates shall be applied unless alternatives are specified in the type approval certificate.

b Other types of output signal may be appropriate according to the design of the water meter.

c Calculations for the error (of indication) are described in ISO 4064-2:2014|OIML R 49-2:2013, Annex B.

d The maximum error (of indication) allowed for the calculator (including indicating device) is given in the type approval certificate.

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.

5.3.3 Example 3: Approved measurement transducer (including flow or volume sensor) (ISO 4064-2:2014|OIML R 49-2:2013, 10.2)

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

Error (of indication) tests

EUT testing case (ISO 4064-2:2014|OIML R 49-2:2013, 8.1.8)	
Category for testing (ISO 4064-2:2014|OIML R 49-2:2013, <clause number>)	a
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:	

a Enter clause number according to one of the configuration categories for testing the EUT listed in ISO 4064-2:2014|OIML R 49-2:2013, 8.1.8.2 to 8.1.8.5.

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

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

Nominal flow rate[a]	Actual flow rate	Working pressure	Working temperature	Initial reading	Final reading	Total output pulses[b]	Indicated volume	Actual volume	Meter error[c]	MPE[d]
	$Q_{(\ )}$			$V_i(i)$	$V_i(f)$	T_p	V_i	V_a	E_c	
m^3/h	m^3/h	MPa (bar)	°C	m^3	m^3		m^3	m^3	%	%
Q_1										
Q_2										
Q_3										
Comments:										

a These flow rates shall be applied unless alternatives are specified in the type approval certificate.

b Other types of output signal may be appropriate according to the design of the water meter.

c Calculations for the error (of indication) are described in ISO 4064-2:2014|OIML R 49-2:2013, Annex B.

d The maximum error (of indication) allowed for the measurement transducer (including flow or volume sensor) is given in the type approval certificate.

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.

Annex A
(normative)

List of documents concerning the type (ISO 4064-1:2014|OIML R 49-1:2013, 7.2.9)

Document reference	Date	Brief description

Annex B
(normative)

Listing of test equipment used in examinations and tests

Parameter measured or applied	Instrument or equipment	Manufacturer	Model number	Serial number	Calibration date		Used in test No.
					Last	Next	(ISO 4064-2:2014| OIML R 49-2:2013, subclause)
Comments:							

This page deliberately left blank

This page deliberately left blank

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards -based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email bsmusales@bsigroup.com.

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Copyright

Useful Contacts:

Customer Services
Tel: +44 845 086 9001
Email (orders): orders@bsigroup.com
Email (enquiries): cservices@bsigroup.com

Subscriptions
Tel: +44 845 086 9001
Email: subscriptions@bsigroup.com

Knowledge Centre
Tel: +44 20 8996 7004
Email: knowledgecentre@bsigroup.com

Copyright & Licensing
Tel: +44 20 8996 7070
Email: copyright@bsigroup.com

bsi.

...making excellence a habit.™