INTERNATIONAL RECOMMENDATION

OIML R 49-3

Edition 2024 (E)

Water meters for cold potable water and hot water.

Part 3: Test report format

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

Partie 3: Format du rapport d'essai

ORGANISATION INTERNATIONALE DE MÉTROLOGIE LÉGALE

INTERNATIONAL ORGANIZATION OF LEGAL METROLOGY

Contents

Foreword

The International Organization of Legal Metrology (OIML) is a worldwide, intergovernmental organisation whose primary aim is to harmonise the regulations and metrological controls applied by the national metrological services, or related organisations, of its Member States. The main categories of OIML publications are:

- **International Recommendations (OIML R),** which are model regulations that establish the metrological characteristics required of certain measuring instruments and which specify methods and equipment for checking their conformity. OIML Member States shall implement these Recommendations to the greatest possible extent;

- **International Documents (OIML D),** which are informative in nature and which are intended to harmonise and improve work in the field of legal metrology;

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OIML Draft Recommendations, Documents and Guides are developed by Project Groups linked to Technical Committees or Subcommittees which comprise representatives from OIML Member States. Certain international and regional institutions also participate on a consultation basis. Cooperative agreements have been established between the OIML and certain institutions, such as ISO and the IEC, with the objective of avoiding contradictory requirements. Consequently, manufacturers and users of measuring instruments, test laboratories, etc. may simultaneously apply OIML publications and those of other institutions.

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Additionally, the OIML publishes or participates in the publication of **Vocabularies (OIML V)** and periodically commissions legal metrology experts to write **Expert Reports (OIML E)**. Expert Reports are intended to provide information and advice, and are written solely from the viewpoint of their author, without the involvement of a Technical Committee or Subcommittee, nor that of the CIML. Thus, they do not necessarily represent the views of the OIML.

This edition of OIML R 49-3 is the equivalent to the corresponding edition of ISO 4064-3, and was developed by OIML TC 8/SC 5/p5. OIML R 49-3 was approved for final publication by the International Committee of Legal Metrology at its 59th meeting in 2024. It supersedes the previous version of OIML R 49 dated 2013 and will be submitted to the International Conference on Legal Metrology in 2025 for formal sanction.

OIML Publications may be downloaded from the OIML web site in the form of PDF files. Additional information on OIML Publications may be obtained from the Organization’s headquarters:

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Introduction

The “Test report format”, the subject of OIML R 49-3, aims at presenting, in a standardised format, the results of the various tests and examinations to which a type of a [insert instrument type, e.g. non-automatic weighing instrument] shall be submitted with a view to its approval.

The “Test report” is a record of the results of the tests carried out on the instrument. The “test report” forms have been produced based on the tests detailed in the performance test procedures (OIML R 49-2).

The “information concerning the test equipment used for type evaluation” shall cover all test equipment which has been used in determining the test results given in a report. The information may be a short list containing essential data (name, type, reference number for purpose of traceability). For example:

- Verification standards (accuracy or accuracy class, and no.);
- Simulator for testing of modules (name, type, traceability and no.);
- Climatic test and static temperature chamber (name, type and no.);
- Electrical tests, bursts (name of the instrument, type and no.);
- Description of the procedure of field calibration for the electromagnetic susceptibility test.

All metrology services or laboratories evaluating types of water meters for cold potable water and hot water according to OIML R 49-1 and R 49-2 or to national or regional regulations based on OIML R 49-1 and R 49-2 are strongly advised to use this “Test report format”, directly or after translation into a language other than English or French. Its direct use in English or in French, or in both languages, is even more strongly recommended whenever test results may be transmitted by the country performing these tests to the approving authorities of another country, under bi- or multi-lateral cooperation agreements. In the framework of the OIML Certification System (OIML-CS), use of the “Test report format” is mandatory.

Clause 4 shows the required format of a type evaluation report for a complete or combined water meter.

A Test report format

A.1 Explanatory notes

For the purposes of this Recommendation, the terms and definitions given in 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

Explanatory notes (continued)

The name(s) or symbol(s) of the unit(s) used to express test results shall be specified in each form.

For each test, the "SUMMARY OF TYPE EVALUATION" and the "CHECKLIST" shall be completed according to this example:

	P	F
when the instrument has passed the test:	×	
when the instrument has failed the test:		×
when the test is not applicable:	–	–

P = Passed
F = Failed

The white spaces in boxes in the headings of the Report should always be filled according to the following example:

	At start	At end	
Temp.:	20.5	21.1	°C
Rel. h.:			%
Date:	2022-01-29	2022-01-30	yyyy-mm-dd
Time:	16:00:05	16:30:25	hh:mm:ss
Bar. pres.:			hPa

Where Temp. = temperature
Rel. h. = relative humidity

"Date" in the test reports refers to the date on which the test was performed.

Section numbers in brackets refer to the corresponding subclauses of other parts of OIML R 49.

A.2 Identification of the instrument

Application no.: ……..... Type designation: …..…….....

Identification no.: ……..... Manufacturer: …..…….....

Software version: …….....

Report date: …….....

Documentation from the manufacturer

(Record as necessary to identify the equipment under test)

System or module name	Drawing number or software reference	Issue level	Serial no.
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....

Simulator documentation

System or module name	Drawing number or software reference	Issue level	Serial no.
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....

Identification of the instrument (continued)

Application no.:……..... Type designation:…...…….....

Identification no.: ……..... Manufacturer:

…...…….....

Software version: …….....

Report date: …….....

Simulator function (summary)

(Simulator description and drawings, block diagram, etc. should be attached to the report if available).

Identification of the instrument (continued)

Description or other information pertaining to identification of the instrument:

(*attach photograph here if available*)

A.3 General information concerning the type

Application no.:	…..…….....	Type designation:	…..…….....
Identification no.:	…..…….....	Manufacturer:	…..…….....
Software version:	…..…….....	Address:	…..…….....
Report date:	…..…….....	Testing laboratory:	…..…….....
		Authorised representative	…..…….....

☐ Complete instrument ☐ Module[1]

Evaluation period: ……

Date of report: ……

Observer: ……

[1] The test equipment (simulator or part of a complete instrument) connected to the module shall be defined in the test form(s) used.

General information concerning the type (continued)

Application no.:	…..…….....	Type designation:	…..…….....
Identification no.:	…..…….....	Manufacturer:	…..…….....
Software version:	…..…….....	Address:	…..…….....
Report date:	…..…….....	Testing laboratory:	…..…….....
		Authorised representative	…..…….....

☐ Complete instrument ☐ Module[2]

Use this space to indicate additional remarks and/or information: other connected equipment, interfaces and load cells, choice of the manufacturer regarding protection against disturbances, etc.

[2] The test equipment (simulator or part of a complete instrument) connected to the module shall be defined in the test form(s) used.

A.4 Information concerning the test equipment used for test

Configuration for test

Application no.:	…..…….....	Type designation:	…..…….....
Identification no.:	…..…….....	Manufacturer:	…..…….....
Software version:	…..…….....	Address:	…..…….....
Report date:	…..…….....	Testing laboratory:	…..…….....
		Authorised representative	…..…….....

Use this space for additional information relating to equipment configuration, interfaces, data rates, load cells EMC protection options, etc., for the instrument and/or simulator.

A.5 Selection of sample(s)

Application no.:	…..…….....	Type designation:	…..…….....
Identification no.:	…..…….....	Manufacturer:	…..…….....
Software version:	…..…….....	Address:	…..…….....
Report date:	…..…….....	Testing laboratory:	…..…….....
		Authorised representative	…..…….....

Use this space for additional information relating to the identification for the selection of sample(s), in particular in case of a family of instruments or modules or if specific requirements are mentioned in OIML R 49-1 and OIML R 49-2.

A.6 Adjustments or modifications

Application no.:	…..…….....	Type designation:	…..…….....
Identification no.:	…..…….....	Manufacturer:	…..…….....
Software version:	…..…….....	Address:	…..…….....
Report date:	…..…….....	Testing laboratory:	…..…….....
		Authorised representative	…..…….....

Use this space for additional information relating to the identification of any authorised and agreed upon adjustments or modifications made to the sample or samples during the evaluation.

A.7 Summary of type evaluation tests

Application no.: …..……..... Type designation: …..…….....

Identification no.: …..……..... Manufacturer: …..…….....

Test Report Number	Report page	Remarks *
	Determination of intrinsic errors (of indication) (OIML R 49-1:2024, 7.2.3)	
	Water temperature test (OIML R 49-1:2024, 4.2.8)	
	Overload water temperature test (OIML R 49-1:2024, 7.2.5)	
	Water pressure test (OIML R 49-1:2024, 4.2.8)	
	Reverse flow test (OIML R 49-1:2024, 4.2.7)	
	Pressure loss test (OIML R 49-1:2024, 6.5)	
	Flow disturbance tests (OIML R 49-1:2024, 6.3.4)	
	Durability tests (OIML R 49-1:2024, 7.2.6)	
	Magnetic field testing (OIML R 49-1:2024, 7.2.8)	
	Tests on ancillary devices of a water meter (OIML R 49-1:2024, 4.3)	
	Environmental testing (OIML R 49-1, A.2)	
	Performance tests related to influence factors and disturbances (OIML R 49-1:2024, 7.2.12.2)	
	General requirements (OIML R 49-1, A.1)	
	Dry heat (non-condensing) (OIML R 49-1:2024, A.5)	
	Cold (OIML R 49-1:2024, A.5)	
	Damp heat, cyclic (condensing) (OIML R 49-1:2024, A.5)	

	Power supply variation (OIML R 49-1:2024, A.5)	
	Vibration (random) (OIML R 49-1:2024, A.5)	
	Mechanical shock (OIML R 49-1:2024, A.5)	
	AC mains voltage dips, short interruptions and voltage variations (OIML R 49-1:2024, A.5)	
	Bursts on signal lines (OIML R 49-1:2024, A.5)	
	Bursts (transients) on AC and DC mains (OIML R 49-1:2024, A.5)	
	Electrostatic discharge (OIML R 49-1:2024, A.5)	
	Radiated electromagnetic fields (OIML R 49-1:2024, A.5)	
	Conducted electromagnetic fields (OIML R 49-1:2024, A.5)	
	Surges on signal, data and control lines (OIML R 49-1:2024, A.5)	
	Surges on AC and DC mains power lines (OIML R 49-1:2024, A.5)	
	Static magnetic field (OIML R 49-1:2024, 7.2.8)	
	Absence of flow test (OIML R 49-1:2024, 4.2.9)	
	Mains power frequency electromagnetic fields test (OIML R 49-1:2024, A.5)	

*Use this column to record if the test report was issued:

- Under the OIML Certificate System (OIML-CS), the OIML Mutual Acceptance Arrangement (MAA), or the OIML Certificate System scheme A or B. Where the test report was used as the basis for issuing an existing OIML certificate, the relevant OIML certificate number should be noted.
- By a Manufacturer Test Laboratory (MTL).
- Where the test report was issued outside the scope of an ISO/IEC 17025 accreditation, an explanation and justification of the use of the test report is required.

1 Scope

This part 3 of OIML R 49 specifies a test report format to be used in conjunction with OIML R 49-1 and OIML R 49-2 for water meters for cold potable water and hot water.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this Recommendation. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

OIML R 49-2, *Water meters for cold potable water and hot water - Part 2: Test procedures*

OIML R 49-4, *Water meters for cold potable water and hot water - Part 4: Type evaluation report format*

3 Terms, definitions, symbols, and abbreviated terms

For the purposes of this Recommendation, the terms and definitions given in OIML R 49-1:2024 apply. Some symbols and abbreviated terms used in the tables are given above under “Explanatory Notes”.

4 Type evaluation report

4.1 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)			

Submitted for approval tests	Yes[a]	No[a]	Remarks
Supplementary electronic device(s) for data transmission (temporarily attached to meter)			
Ancillary devices			

a) Tick as appropriate.

4.1.1 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:	_
	Pressure loss class:	
	Reverse flow: a) Meters designed to measure reverse flow b) Meters not designed to measure reverse flow c) Meters which prevent reverse flow	

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

Category: _

Case: _

Installation details:

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

Minimum straight length of inlet pipe: mm

Minimum straight length of outlet pipe: mm

Flow conditioner (details if required): _

Mounting: _

Orientation: _

Other relevant information: _

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

4.1.2 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 _

Maximum sampling interval in user mode:

for combination meters

	Q_{x1}	_ m^3/h
	Q_{x2}	_ m^3/h
	Measuring principle:	
	Accuracy class:	_
	Temperature class:	_
	Environmental class:	_
	Electromagnetic environment:	_
	Maximum admissible temperature:	_ °C
	Maximum admissible pressure:	_ MPa (_ bar)
	Orientation limitation:	_
	Pressure loss class:	
	Reverse flow: a) Meters designed to measure reverse flow	

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

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

Category: _

Case: _

Installation details (mechanical):

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

Minimum straight length of inlet pipe: mm

Minimum straight length of outlet pipe: mm

Flow conditioner (details if required): _

Mounting: _

Orientation: _

Other relevant information: _

Installation details (electrical):

Wiring instructions: _

Mounting arrangement: _

Orientation limitations: _

Power supply:

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

U_{max}: V

U_{min}: V

Frequency: _ Hz

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

4.1.3 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:	_
	Pressure loss class:	

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

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

Category: _

Case: _

Maximum relative error specified by the manufacturer:

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

Installation details (electrical):

Wiring instructions: _

Mounting arrangement: _

Orientation limitations: _

Power supply:

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

U_{max}: V

U_{min}: V

Frequency: _ Hz

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

4.1.4 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 (OIML R 49-2:2024, 8.1.8):

Category: _

Case: _

Maximum relative error specified by the manufacturer:

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

Installation details (mechanical):

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

Minimum straight length of inlet pipe: mm

Minimum straight length of outlet pipe: mm

Flow conditioner (details if required): _

Mounting: _

Orientation: _

Other relevant information: _

Installation details (electrical):

Wiring instructions: _

Mounting arrangement: _

Orientation limitations: _

Power supply:

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

U_{max}: V

U_{min}: V

Frequency: _ Hz

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

4.1.5 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: _

4.1.6 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: _

4.1.7 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: _

4.1.8 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 (OIML R 49-2:2024, 8.1.8):

Category: _

Case: _

Installation details (electrical):

Wiring instructions: _

Mounting arrangement: _

Orientation limitations: _

4.1.9 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 (OIML R 49-2:2024, 8.1.8):

Category: _

Case: _

Installation details (electrical):

Wiring instructions: _

Mounting arrangement: _

Orientation limitations: _

Approval number(s) of compatible water meters, calculator(s) (including indicating device) and measurement transducer(s) (including flow or volume sensor): _

4.1.10 Documents concerning the type

A list of documents shall be submitted with the type approval application as in Annex A.

4.2 General information concerning the test equipment

Details of the main items of measuring equipment and test instruments used for the type examinations, or initial verifications are listed in Table 2

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

Manufacturer	Model	Serial number	Used in performance test No. (OIML R 49-2:2024, subclause)	Comments

All calibration periods of test equipment used in examinations and tests listed above are in the quality system documentation of the test laboratory. Measurement equipment are traceable to the International System of Units.

4.3 Type evaluation tests (for all water meters)

4.3.1 Static pressure test (OIML R 49-2:2024, 7.3)

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

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

Table 3

Meter serial no.	MAP × 1.6	Start time	Initial pressure	End time	Final pressure	Remarks
	MPa (bar)		MPa (bar)		MPa (bar)	

Table 4

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

Comments:

4.3.2 Determination of changeover flow rates for combination meters (OIML R 49-2:2024, 7.4.3)

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

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

Table 5

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:	

Table 6: Increasing flow rate

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

Table 7: 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:

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

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

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

Table 8

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

Meter serial no.:

Orientation (V, H, other):

Flow direction (see Requirement 3):

Location of indicating device (see Requirement 4):

Table 9

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

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

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

[c] Calculate standard deviation if $Q = Q_1$, Q_2 or Q_3 (OIML R 49-2:2024, 7.4.5)

Meter serial no.:

Orientation (V, H, other):

Flow direction (see Requirement 3):

Location of indicating device (see Requirement 4):

Table 10

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

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

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

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

Meter serial no.:

Orientation (V, H, other):

Flow direction (see Requirement 3):

Location of indicating device (see Requirement 4):

Table 11

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

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

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

Requirements

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

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

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

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

Comments:

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

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

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

Table 12

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

Meter serial no.:

Orientation (V, H, other):

Flow direction (see Requirement 3):

Location of indicating device (see Requirement 4):

Table 13

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

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

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

c) The error variation (see OIML R 49-2:2024, 7.4.6.4) shall be checked

Meter serial no.:

Orientation (V, H, other):

Flow direction (see Requirement 3):

Location of indicating device (see Requirement 4):

Table 14

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

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

c) The error variation (see OIML R 49-2:2024, 7.4.6.4) shall be checked

Meter serial no.:

Orientation (V, H, other):

Flow direction (see Requirement 3):

Location of indicating device (see Requirement 4):

Table 15

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

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

c) The error variation (see OIML R 49-2:2024, 7.4.6.4) shall be checked

Requirements

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

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

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

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

4.3.5 Water temperature test (OIML R 49-2:2024, 7.5) and overload water temperature test (OIML R 49-2:2024, 7.6)

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

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

Table 16

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

Meter serial no.:

Orientation (V, H, other):

Flow direction (see Requirement 1):

Location of indicating device (see Requirement 2):

Table 17

Application conditions	Nominal flow rate Q_2 m^3/h	Actual flow rate $Q_{(\ )}$ 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] %
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 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable sub-assembly, the MPE shall be defined by the manufacturer (OIML R 49-2:2024, 9.4).

b) Applicable to temperature classes T30 to T180.

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

d) Applicable to meters with an MAT ≥50 °C. After exposing the meter to a flow of water at a temperature of MAT +10 °C ± 2.5 °C for a period of 1 h after the meter has reached temperature stability; and after recovery, the meter functionality with regard to volume totalisation 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.

4.3.6 Water pressure test (OIML R 49-2:2024, 7.7)

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

Table 18

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

Meter serial no.:

Orientation (V, H, other):

Flow direction (see Requirement 1):

Location of indicating device (see Requirement 2):

Table 19

Application conditions	Nominal flow rate	Actual flow rate	Initial supply pressure	Initial inlet water tempera-ture	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 OIML R 49-1:2024, 4.2.1 or 4.2.2 according to the accuracy class of the meter. If the EUT is a separable sub-assembly, the MPE shall be defined by the manufacturer (OIML R 49-2:2024, 9.4).

Requirements

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

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

4.3.7 Reverse flow test (OIML R 49-2:2024, 7.8)

4.3.7.1 General

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

Table 20

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:	

4.3.7.2 Meters designed to measure accidental reverse flow (OIML R 49-2:2024, 7.8.3.1)

Meter serial no.:

Orientation (V, H, other):

Flow direction (see Requirement 1):

Location of indicating device (see Requirement 2):

Table 21

Application conditions	Nominal flow rate	Actual flow rate	Initial supply pressure	Initial inlet water tempera-ture	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE[a]
					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	%	%
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 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable sub-assembly the MPE shall be defined by the manufacturer (OIML R 49-2:2024, 9.4).

4.3.7.3 Meters not designed to measure accidental reverse flow (OIML R 49-2:2024, 7.8.3.2)

Meter serial no.:

Orientation (V, H, other):

Flow direction (see Requirement 1):

Location of indicating device (see Requirement 2):

Table 22

Application conditions	Nominal flow rate	Actual flow rate	Initial supply pressure	Initial inlet water tempera-ture	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	%	%
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 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable sub-assembly, the MPE shall be defined by the manufacturer (OIML R 49-2:2024, 9.4).

4.3.7.4 Meters which prevent reverse flow (OIML R 49-2:2024, 7.8.3.3)

Meter serial no.:

Orientation (V, H, other):

Flow direction (see Requirement 1):

Location of indicating device (see Requirement 2):

Table 23

Application conditions	Nominal flow rate	Actual flow rate	Initial supply pressure	Initial inlet water tempera-ture	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPEa
					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	%	%
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 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable sub-assembly, the MPE shall be defined by the manufacturer (OIML R 49-2:2024, 9.4).

Requirements

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

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

4.3.8 Pressure-loss test (OIML R 49-2:2024, 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):

Table 24

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

Table 25

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.

4.3.9 Flow disturbance tests (OIML R 49-2:2024, 7.10, Annex C)

Application No: _____

Model: _____

Date: _____

Observer: _____

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

Table 26

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

Table 27

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

Direction of flow: forward / reverse

Meter serial no.:

Orientation (V, H, other):

Flow direction (see Requirement 1):

Location of indicating device (see Requirement 2):

Table 28

Test No.	Actual flow rate $Q_{( )}$ m^3/h	Pressure p_w 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] %
1									
1A									
2									
2A									
3									
3A									
4									
4A									
5									
5A									
6									
6A									
Comments:									

Test No.	Actual flow rate $Q_{()}$	Pressure p_w	Water temp T_w	Initial reading V_i(i)	Final reading V_i(f)	Indicated volume V_i	Actual volume V_a	Meter error E_m	MPE[a]
	m^3/h	MPa (bar)	°C	m^3	m^3	m^3	m^3	%	%

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

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

When a minimum straight pipe length (L_2), of 5 × 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.

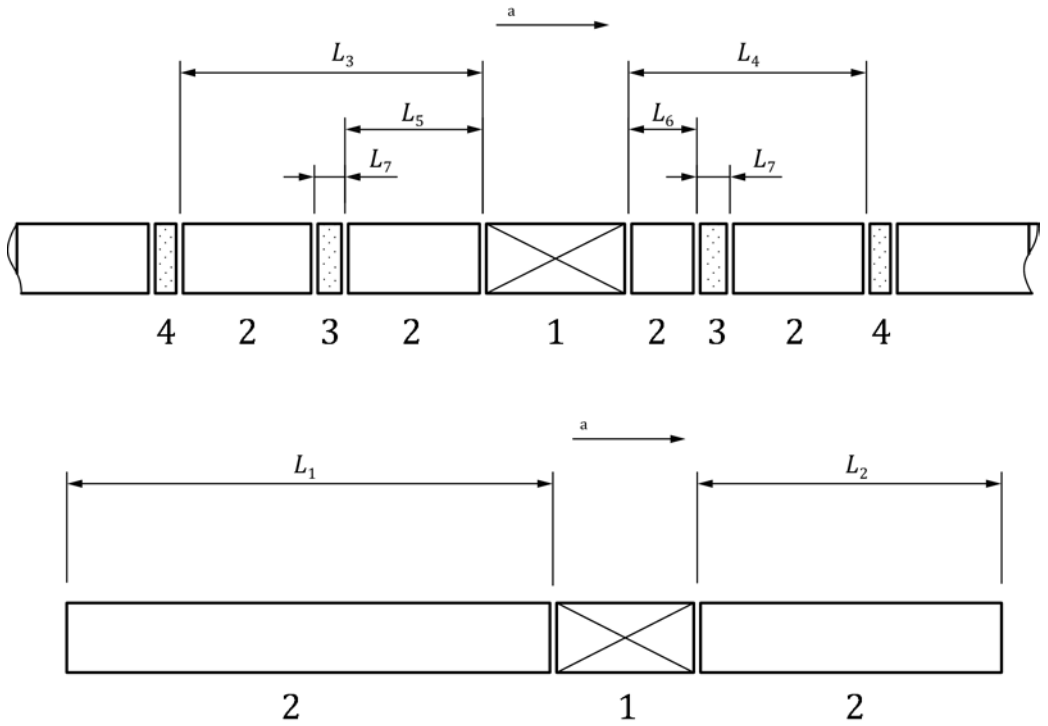

Figure 1 — Key to relative positions

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		

4.3.10 Durability tests (OIML R 49-2:2024, 7.11)

4.3.10.1 Discontinuous flow test (OIML R 49-2:2024, 7.11.2)

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

Table 29

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

Readings taken during the test

Meter serial no.:

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

Ambient conditions at start:

Table 30

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

Table 31

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 $0.5 \times Q_3 \times 100\,000 \times 32 / 3600$ expressed in m^3. Minimum number of test cycles during the test = 100 000.

Ambient conditions at finish

Table 32

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

Comments:

Observer: _ Date: _

Errors (of indication) measured after the discontinuous flow test

Meter serial no.:

Table 33

Actual flowrate $Q_{(\,)}$ m^3/h	Working pressure p_w MPa (bar)	Working 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] %	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 OIML R 49-1:2024, 4.2. For acceptance criteria, refer to OIML R 49-2:2024, 7.4.5

b) $\bar{E}_m(A)$ is the mean intrinsic error (of indication) – see test report 5.3; $\bar{E}_m(B)$ is the mean error (of indication) measured after this discontinuous flow test

c) For MPE values and acceptance criteria refer to 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 (OIML R 49-2, 7.4.5)

4.3.10.2 Continuous flow test (OIML R 49-2:2024, 7.11.3)

Table 34

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

Readings taken during the test

Meter serial no.:

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

Ambient conditions at start

Table 35

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

Table 36

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] =				

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
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)

[b] 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

Table 37

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

Observer: _ Date: _

Errors (of indication) measured after the continuous flow test

Meter serial no.:

Table 38

Actual flowrate $Q_{(\,)}$ m^3/h	Working pressure p_w MPa (bar)	Working 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] %	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 OIML R 49-1:2024, 4.2. For acceptance criteria refer to OIML R 49-2:2024, 7.4.5.

b) $\bar{E}_m(A)$ is the Mean intrinsic error (of indication). See test report 5.3. $\bar{E}_m(B)$ is the mean error (of indication) measured after this continuous flow test (= either $\bar{E}_{m2}$ or $\bar{E}_{m3}$).

c) For MPE values and acceptance criteria refer to OIML R 49-2:2024, 7.11.3.4.

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

4.3.10.3 Discontinuous flow test (OIML R 49-2:2024, 7.11.2)

(Applicable only to combination meters)

Table 39

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

Readings taken during the test

Meter serial no.:

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

Ambient conditions at start

Table 40

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

Table 41

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

Table 42

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

Comments:

Observer: _ Date: _

Errors (of indication) measured after the discontinuous flow test

Meter serial no.:

Table 43

Actual flowrate $Q_{(\,)}$ m^3/h	Working pressure p_w MPa (bar)	Working 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] %	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 OIML R 49-1:2024, 4.2. For acceptance criteria refer to OIML R 49-2:2024, 7.4.5.

b) $\bar{E}_m(A)$ is the Mean intrinsic error (of indication). See test report 5.3. $\bar{E}_m(B)$ is the mean error (of indication) measured after this discontinuous flow test (= either $\bar{E}_{m2}$ or $\bar{E}_{m3}$).

c) For MPE values and acceptance criteria refer to OIML R 49-2:2024, 7.11.3.4.

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

4.3.11 Static magnetic field test (OIML R 49-2:2024, 7.12, 8.16)

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

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

Table 44

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

Meter serial no.:

Orientation (V, H, other):

Flow direction (see Requirement 1): _

Location of indicating device (see Requirement 2):

Table 45

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 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable sub-assembly, the MPE shall be defined by the manufacturer (OIML R 49-2:2024, 9.4).

Requirements

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

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

4.3.12 Tests on ancillary devices of a water meter (ISO 4064-2:2014|OIML R 49-2:2024, 7.13)

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

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

Table 46

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

Meter serial no.:

Orientation (V, H, other):

Flow direction (see Requirement 3):

Location of indicating device (see Requirement 4):

Table 47

	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] %
Water meter									
Ancillary device									
Water meter									
Ancillary device									
Water meter									
Ancillary device									
							$\bar{E}_{m2}$		
							$\bar{E}_{m3}$		
								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 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable sub-assembly the MPE shall be defined by the manufacturer (OIML R 49-2:2024, 9.4). For acceptance criteria refer to OIML R 49-2:2024, 7.4.5.

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

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

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

Meter serial no.:

Orientation (V, H, other):

Flow direction (see Requirement 3):

Location of indicating device (see Requirement 4):

Table 48

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] %
Water meter								
Ancillary device								
Water meter								
Ancillary device								
Water meter								
Ancillary device								
[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 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable sub-assembly the MPE shall be defined by the manufacturer (OIML R 49-2:2024, 9.4). For acceptance criteria refer to OIML R 49-2:2024, 7.4.5.

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

[c] Calculate standard deviation if $Q = Q_1$, Q_2 or Q_3 (OIML R 49-2:2024, 7.4.5)

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

Meter serial no.:

Orientation (V, H, other):

Flow direction (see Requirement 3):

Location of indicating device (see Requirement 4):

Table 49

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] %
Water meter								
Ancillary device								
Water meter								
Ancillary device								
Water meter								
Ancillary device								
[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 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable sub-assembly the MPE shall be defined by the manufacturer (OIML R 49-2:2024, 9.4). For acceptance criteria refer to OIML R 49-2:2024, 7.4.5.

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

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

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

Requirements

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

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

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

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

Comments:

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

4.4.1 Dry heat (non-condensing) (OIML R 49-2:2024, 8.2)

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

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

Table 50

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

Meter serial no.:

Orientation (V, H, other):

Flow direction (see Requirement 1):

Location of indicating device (see Requirement 2):

Table 51

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 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable part of a water meter, the MPE shall be defined by the manufacturer (OIML R 49-2:2024, 9.4).

Requirements

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

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

4.4.2 Cold (OIML R 49-2:2024, 8.3)

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

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

Table 52

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

Environmental class:

Meter serial no.:

Orientation (V, H, other):

Flow direction (see Requirement 1):

Location of indicating device (see Requirement 2):

Table 53

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]
	m^3/h	p_w MPa (bar)	T_w °C	$V_i(i)$ m^3	$V_i(j)$ m^3	V_i m^3	V_a m^3	E_m %	%
20 °C									
+5 °C or −25 °C									
20 °C									
Comments:									

a) Temperature and pressure shall be recorded using a data-logging device to ensure conformity with the relevant IEC standard.

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

Requirements

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

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

4.4.3 Damp heat, cyclic (condensing) (OIML R 49-2:2024, 8.4)

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

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

Table 54

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

Environmental class:

Meter serial no.:

Orientation (V, H, other):

Flow direction (see Requirement 1):

Location of indicating device (see Requirement 2):

Table 55

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 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable part of a water meter, the MPE shall be defined by the manufacturer (OIML R 49-2:2024, 9.4).

Requirements

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

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

4.4.4 Power supply variation (OIML R 49-2:2024, 8.5)

4.4.4.1 General

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

Table 56

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:	

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

Meter serial no.:

Orientation (V, H, other):

Flow direction (see Requirement 1):

Location of indicating device (see Requirement 2):

Table 57

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 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable part of a water meter, the MPE shall be defined by the manufacturer (OIML R 49-2:2024, 9.4).

Requirements

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

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

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

Meter serial no.:

Orientation (V, H, other):

Flow direction (see Requirement 1):

Location of indicating device (see Requirement 2):

Table 58

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 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable part of a water meter, the MPE shall be defined by the manufacturer (OIML R 49-2:2024, 9.4).

Requirements

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

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

4.4.5 Vibration (random) (OIML R 49-2:2024, 8.6)

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

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

Table 59

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

Environmental class:

Meter serial no.:

Orientation (V, H, other):

Flow direction (see Requirement 1):

Location of indicating device (see Requirement 2):

Table 60

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 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable part of a water meter, the MPE shall be defined by the manufacturer (OIML R 49-2:2024, 9.4).

Requirements

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

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

4.4.6 Mechanical shock (OIML R 49-2:2024, 8.7)

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

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

Table 61

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

Meter serial no.:

Orientation (V, H, other):

Flow direction (see Requirement 1):

Location of indicating device (see Requirement 2):

Table 62

Application conditions	Actual or simulated flow rate $Q_{(\,)}$ 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 %	EUT functioning correctly
Reference conditions												
1) Before shock									—	—	—	—
Place the EUT on a rigid level surface in its normal position of use and tilted towards one bottom edge until the opposite edge of the EUT is 50 mm above the rigid surface. The angle made by the bottom of the EUT and the test surface shall not exceed 30°. Allow the EUT to drop freely on to the rigid surface. Repeat the test for each bottom edge of the EUT.												
2) After shock											yes	no
Comments:												

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

Requirements

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

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

4.4.7 AC mains voltage dips, short interruptions and voltage variations (OIML R 49-2:2024, 8.8)

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

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

Table 63

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

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

Meter serial no.:

Orientation (V, H, other):

Flow direction (see Requirement 1):

Location of indicating device (see Requirement 2):

Table 64

Application 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	
Reference conditions	No voltage reductions.												
1) Before voltage reductions										—	—	—	—
2) During voltage reduction	Voltage interruptions and reductions as in OIML R 49-2:2024, 8.8.												
												yes	no
Comments:													

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

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

Requirements

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

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

4.4.8 Bursts on signal lines (OIML R 49-2:2024, 8.9)

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

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

Table 65

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

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

Meter serial no.:

Orientation (V, H, other):

Flow direction (see Requirement 1):

Location of indicating device (see Requirement 2):

Table 66

Application 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	
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 OIML R 49-2:2024, 8.1.3), phased randomly, with a rise time of 5 ns and a half amplitude duration of 50 ns.													
2) After burst												yes	no
Comments:													

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

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

Requirements

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

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

4.4.9 Bursts (transients) on AC and DC mains (OIML R 49-2:2024, 8.10)

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

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

Table 67

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

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

Meter serial no.:

Orientation (V, H, other):

Flow direction (see Requirement 1):

Location of indicating device (see Requirement 2):

Table 68

Application 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	
Reference conditions													
1) Before burst	With no significant noise in mains supply.												
										—	—	—	—
2) After burst	Randomly phased bursts (electromagnetic environment, E_1 — 1 000 V peak amplitude electromagnetic environment, E_2 — 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 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable part of a water meter, the MPE shall be defined by the manufacturer (OIML R 49-2:2024, 9.4).

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

Requirements

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

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

4.4.10 Electrostatic discharge (OIML R 49-2:2024, 8.11)

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

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

Table 69

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

Meter serial no.:

Orientation (V, H, other):

Flow direction (see Requirement 1):

Location of indicating device (see Requirement 2):

Table 70

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		$E_{m2)} - E_{m1)}$			
			m^3/h	MPa (bar)	°C	m^3	m^3	m^3	m^3	%	%	%	%		
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 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable part of a water meter, the MPE shall be defined by the manufacturer (OIML R 49-2:2024, 9.4).

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

c) Indicate by drawings if necessary.

d) C — contact discharge (6 kV); A — air discharge (8 kV).

Requirements

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.

4.4.11 Radiated electromagnetic field (OIML R 49-2:2024, 8.12)

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

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

Table 71

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

Meter serial no.:

Orientation (V, H, other):

Flow direction (see Requirement 1):

Location of indicating device (see Requirement 2):

Table 72

Test conditions	Antenna polarisation 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

Test conditions	Antenna polarisation vertical/ horizontal		Actual or simulated flow rate	Work-ing pres-sure	Working temperature	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE[a]	Fault	Signi-ficant 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	%	%	%	%		
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
1 000–1 400 MHz	V	H												yes	no
1 400–2 000 MHz	V	H													
2 000–2 400 MHz	V	H													
2 400–2 500 MHz	V	H													
2 500 – 3000 MHz	V	H												yes	no
Comments:															

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

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

Requirements

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

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

4.4.12 Conducted electromagnetic field (OIML R 49-2:2024, 8.13)

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

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

Table 73

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

Meter serial no.:

Orientation (V, H, other):

Flow direction (see Requirement 1):

Location of indicating device (see Requirement 2):

Table 74

Test conditions	Actual or simulated flow rate $Q_{( )}$ m^3/h	Working pressure p_w MPa (bar)	Working temperature T_w °C	Initial reading $V_i(i)$ m^3	Final reading $V_i(f)$ m^3	Indicated volume V_i m^3	Actual volume V_a m^3	Meter error E_m %	MPE[a] %	Fault $E_{m2)} - E_{m1)}$ %	Signi-ficant fault[b] %	EUT functioning correctly	
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:													

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	%	%	%	%	

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

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

Requirements

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

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

4.4.13 Surges on signal, data and control lines (OIML R 49-2:2024, 8.14) (applicable only for environmental class E_2)

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

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

Table 75

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

Meter serial no.:

Orientation (V, H, other):

Flow direction (see Requirement 1):

Location of indicating device (see Requirement 2):

Table 76

Test conditions			Actual or simulated flowrate Q ( ) m^3/h	Working pressure P_w MPa (bar)	Working temp. T_w °C	Initial reading $V_i(i)$ m^3	Final reading $V_i(j)$ m^3	Indicated volume V_i m^3	Actual volume V_a m^3	Meter error E_m %	MPE[a] %	Fault $E_{m2)} - E_{m1)}$ %	Significant fault[b] %	EUT functioning correctly	
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

Test conditions	Actual or simulated flowrate	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	%	%	%	%	

a) Comments:

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

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

d) 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.

4.4.14 Surges on AC and DC mains power lines (OIML R 49-2:2024, 8.15) (applicable only for environmental class E_2)

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

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

Table 77

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

Meter serial no.:

Orientation (V, H, other):

Flow direction (see Requirement 1):

Location of indicating device (see Requirement 2):

Table 78

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)															
												—	—	—	—
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

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	
	L	E												yes	no
Comments:															

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

Table 79

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 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

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 $E_{m2)} - E_{m1)}$ %	Signi-ficant fault[b] %	EUT functioning correctly	
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:															

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		$E_{m2)} - E_{m1)}$		
	m^3/h	MPa(bar)	°C	m^3	m^3	m^3	m^3	%	%	%	%	

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

Table 80

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

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	
	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 OIML R 49-1:2024, 4.2.2 or 4.2.3 according to the accuracy class of the meter. If the EUT is a separable part of the water meter, the MPE shall be defined by the manufacturer (OIML R 49-2:2024, 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.

4.4.15 Absence of flow test (OIML R 49-2:2024, 8.17)

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

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

Table 81

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

Meter serial no.:

Orientation (V, H, other):

Flow direction (see Requirement 1):

Location of indicating device (see Requirement 2):

Table 82

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 totalisation 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.

4.4.16 Mains power frequency electromagnetic fields test (OIML R 49-2:2024, 8.18)

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

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

Table 83

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

Meter serial no.:

Orientation (V, H, other):

Flow direction (see Requirement 1):

Location of indicating device (see Requirement 2):

Table 84

Test conditions	Actual or simulated flow rate $Q_{( )}$	Working pressure p_w	Working temperature T_w	Initial reading V_i(i)	Final reading V_i(f)	Indicated volume V_i	Actual volume V_a	Meter error E_m	MPE[a]	Fault $E_{m2)} - E_{m1)}$	Significant fault[b]	EUT functioning correctly
	m^3/h	MPa (bar)	°C	m^3	m^3	m^3	m^3	%	%	%	%	
Exposure to a power frequency magnetic field (50 Hz or 60 Hz)												
Magnetic field strength	Continuous field	30	A/m									
Short duration (1 s to 3 s)	n/a	300	A/m									

1) Reference conditions													
Continuous field												Y	N
												Y	N
												Y	N
												Y	N
												Y	N
Short duration (1 s to 3 s)												Y	N
												Y	N
												Y	N
												Y	N
												Y	N
Comments:													

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

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

Requirements

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

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

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 organisations carrying out verification tests. However, the report (records) shall contain the minimum information detailed in OIML R 49-1:2024, 7.3 and OIML R 49-2:2024, 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 Table 2) 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: _____

Authorised representative: _____

Address _____

_____

_____

_____

Testing laboratory: _____

Authorised representative: _____

Address _____

_____

_____

5.3 Initial verification test report (OIML R 49-2:2024, Clause 10)

5.3.1 Example 1: Approved water meter (complete or combined) (OIML R 49-2:2024, 10.1)

Application No: _____

Model: _____

Date: _____

Observer: _____

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

Error (of indication) tests

Table 85

EUT testing case (OIML R 49-2:2024, 8.1.8)	
Category for testing (OIML R 49-2:2024, <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 OIML R 49-2:2024, 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):

Table 86

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 OIML R 49-2:2024, Annex B.

c) The maximum permissible error as defined in OIML R 49-1:2024, 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) (OIML R 49-2:2024, 10.2)

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

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

Error (of indication) tests

Table 87

EUT testing case (OIML R 49-2:2024, 8.1.8)	
Category for testing (OIML R 49-2:2024, <clause number>)	[a]

a) Enter clause number according to one of the configuration categories for testing the EUT listed in OIML R 49-2:2024, 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):

Table 88

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	
m^3/h	m^3/h	Hz	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 OIML R 49-2:2024, 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) (OIML R 49-2:2024, 10.2)

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

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

Error (of indication) tests

Table 89

EUT testing case (OIML R 49-2:2024, 8.1.8)	
Category for testing (OIML R 49-2:2024, <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 OIML R 49-2:2024, 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):

Table 90

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 OIML R 49-2:2024, 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

(Mandatory)

List of documents concerning the type (OIML R 49-1:2024, 7.2.9)

Table Annex A.1

Document reference	Date	Brief description

ANNEX B

(Informative)

Comparison table

OIML R 49-3:2024		OIML R 49-3:2013		Remarks
Ref.	**Description**	**Ref.**	**Description**	
-	Summary of type evaluation tests	-	-	New test report table
4.2	General information concerning the test equipment	4.3	General information concerning the test equipment	New Table Table 2 — Listing of test equipment used in examinations and tests. List of items of measuring equipment and test instruments used for the type examinations, and initial verifications deleted.
4.4.11	Radiated electromagnetic field	4.6.11	Radiated electromagnetic field	New requirements Test conditions increased to 3000 MHz.
4.5.12	Tests on ancillary devices of a water meter	4.5.12	Tests on ancillary devices of a water meter	New rows added to Table 48 and Table 49: Ancillary device Water meter
Annex B	Comparison Table	Annex B	Listing of test equipment used in examinations and tests	Deleted: Table for Listing of test equipment used in examinations and tests
-	-	4.4.2	Check list for water meter examinations and performance tests	Checklist moved to OIML R 49:2024 Part 4