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Vodomeri - 1. del: Splošne zahteve

Water meters - Part 1: General requirements

Wasserzähler - Teil 1: Allgemeine Anforderungen

Compteurs d'eau - Partie 1: Exigences générales

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Water meters - Part 1: General requirements

Compteurs d'eau - Partie 1: Exigences générales

Wasserzähler - Teil 1: Allgemeine Anforderungen

This European Standard was approved by CEN on 26 August 2004 and includes Amendment 1 approved by CEN on 6 March 2007 and Amendment 2 approved by CEN on 3 January 2011.

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

Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (EN 14154-1:2005+A2:2011) has been prepared by Technical Committee CEN/TC 92 “Water meters”, the secretariat of which is held by SNV.

This document shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2011 and conflicting national standards shall be withdrawn at the latest by October 2011.

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

This document includes Amendment 1, approved by CEN on 2007-03-06 and Amendment 2, approved by CEN on 2011-01-03.

This document supersedes ▌A2⟩ EN 14154-1:2005+A1:2007 ⟨A2▌.

The start and finish of text introduced or altered by amendment is indicated in the text by tags ▌A1⟩ ⟨A1▌ and ▌A2⟩ ⟨A2▌.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

The standard consists of 3 parts. The other parts are:

— Part 2: *Installation and conditions of use*

— Part 3: *Test methods and equipment*

In developing a new Standard, CEN/TC 92 aimed to harmonise it with existing standards and recommendations for water meters, to accommodate new technologies and anticipating the requirements of the Directive 22/2004/EC on Measuring Instruments.

In respect of potential adverse affects on the quality of water intended for human consumption, caused by the product covered in this standard:

1. This standard provides no information as to whether the product may be used without restriction in any of the Member States of the EU of EFTA;

2. It should be noted that, while awaiting the adoption of verifiable European criteria, existing national regulations concerning the use and/or the characteristics of this product remain in force.

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

1 Scope

This document applies to water meters intended for residential, commercial, light industrial and industrial use, and specifies the requirements and certification procedures for water meters, irrespective of the design technologies used to meter the actual volume of clean cold potable water or heated water, flowing through a fully charged, closed conduit. These water meters shall incorporate devices, which indicate the integrated volume.

This document also applies to water meters based on electrical or electronic principles, and to water meters based on mechanical principles incorporating electronic devices, used to meter the actual volume flow of cold potable water or heated water. It provides metrological requirements for electronic ancillary devices when they are subject to metrological control. As a rule the ancillary devices are optional. However national or international regulations make some ancillary devices mandatory in relation to the utilisation of the water meter.

2 Normative references

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

EN 1333:1996, *Pipework components — Definition and selection of PN*

▌A2⟩ EN 14154-2:2005+A2:2011 ⟨A2▌, *Water meters — Part 2: Installation and condition of use*

▌A2⟩ EN 14154-3:2005+A2:2011 ⟨A2▌, *Water meters — Part 3: Test methods and equipment*

EN ISO 228-1:2000, *Pipe threads where pressure-tight joints are not made on the threads — Part 1: Dimensions, tolerances and designation (ISO 228-1:2000)*

EN ISO 6708:1995, *Pipe components — Definition and selection of DN (nominal size) (ISO 6807:1995)*

ISO 3:1973, *Preferred numbers — Series of preferred numbers*

ISO 7005-2:1988, *Metallic flanges — Part 2: Cast iron flanges*

ISO 7005-3:1988, *Metallic flanges — Part 3: Copper alloy and composite flanges*

3 Terms and definitions

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

3.1
water meter (OIML R49-1:2000)
an instrument intended to measure continuously, memorise and display the volume of water passing through it within rated operating conditions

NOTE A meter includes at least a measurement transducer, a calculator (including adjustment or correction devices if present) and an indicating device. These three devices may be in different housings.

3.2
in-line meter (OIML R49-2:2001)
a type of water meter fitted into a closed conduit by means of the meter end connections (either threaded or flanged) provided

3.3
complete meter (OIML R49-2:2001)
a meter which does not have separable measurement transducer (including flow sensor) and calculator (including indicating device)

3.4
combined meter (OIML R49-2:2001)
a meter which has separable measurement transducer (including flow sensor) and calculator (including indicating device)

3.5
combination meter (ISO 7858-1:1998)
an in-line type of water meter comprising one large flowrate meter, one small flowrate meter, and a changeover device that, depending on the magnitude of the flowrate passing through the meter, automatically directs the flow through either the small or large meter or both

Meter reading is obtained from two independent totalizers or 1 totalizer which adds up the values from both water meters.

3.6
concentric meter (OIML R49-2:2001)
a type of water meter fitted into a closed conduit by means of an intermediate fitting called a manifold. The inlet and outlet passages of the meter and the manifold, at the interface between them, are coaxial

3.7
concentric meter manifold (OIML R49-2:2001)
the pipefitting specific to the connection of a concentric meter

[A2] 3.8
cartridge meter
type of water meter fitted into a closed conduit by means of an intermediate fitting called a connection interface

NOTE The inlet and outlet passages of the meter and the connection interface are either concentric or axial as detailed in EN 14154-2:2005+A2:2011, Annex B.

3.9
cartridge meter connection interface
pipefitting specific to the connection of an axial or concentric cartridge meter

3.10
meters with exchangeable metrological unit
meter with $Q_3 \geq 16$ m^3/h comprising a connection interface and an exchangeable metrological unit, from the same pattern approval, i.e. from the identical manufacturer as a matter of principle

3.11
exchangeable metrological unit
self contained unit comprising a measurement transducer and an indicating device or alternatively a calculator including indicating device where applicable

3.12
connection interfaces for meters with exchangeable metrological units
pipefitting specific to the connection of exchangeable metrological units [A2]

3.13
measurement transducer (OIML R49-1:2000)
a part of the meter which transforms the flow or the volume of the water to be measured into signals which are passed to the calculator. It can be based on a mechanical or an electrical or an electronic principle. It may be autonomous or use an external power source

NOTE For the purposes of this document, the measurement transducer includes the flow sensor or volume sensor.

3.14
flow sensor or volume sensor (OIML R49-1:2000)
that part of the water meter (such as a disc, piston, wheel, turbine element, or electromagnetic coil) which senses the flowrate or volume of water passing through the meter

3.15
calculator (OIML R49-1:2000)
a part of the meter which receives the output signals from the transducer(s) and, possibly, from associated measuring instruments, transforms them and, if appropriate, stores the results in memory until they are used. In addition, the calculator may be capable of communicating both ways with ancillary devices

3.16
indicating device (OIML R49-1:2000)
a part of the meter which displays the measurement results either continuously or on demand

NOTE A printing device which provides an indication at the end of the measurement is not an indicating device.

3.17
sub-assembly (OIML R49-2:2001)
the measurement transducer, (including flow sensor) and the indicating device (including calculator) of a combined meter

3.18
adjustment device (OIML R49-1:2000)
a device incorporated in the meter, that only allows the error curve to be shifted generally parallel to itself, with a view to bringing errors (of indication) within the maximum permissible errors

3.19
correction device (OIML R49-1:2000)
a device connected to or incorporated in the meter for automatically correcting the volume at metering conditions, by taking into account the flowrate and/or the characteristics of the water to be measured (e.g. temperature and pressure) and the pre-established calibration curves. The characteristics of the water to be measured may either be measured using associated measuring instruments, or be stored in a memory in the instrument

3.20
ancillary device (OIML R49-1:2000)
a device intended to perform a particular function, directly involved in elaborating, transmitting or displaying measurement results

The main ancillary devices are:

— zero setting device;

— price indicating device;

— repeating indicating device;

— printing device;

— memory device;

— tariff control device;

— pre-setting device; and

— self service device.

3.21
associated measuring instruments (OIML R49-1:2000)
instruments connected to the calculator, the correction device or the conversion device, for measuring certain quantities which are characteristic of water, with a view to making a correction and/or a conversion

3.22
primary indication
indication, (displayed, printed or memorized), which is subject to legal metrological control

3.23
first element of the indicating device (OIML R49-1:2000)
the element which, in an indicating device comprising several elements, carries the graduated scale with the verification scale interval

3.24
verification scale interval (OIML R49-1:2000)
the lowest value scale division of the first element of the indicating device

3.25
equipment under test (EUT) (OIML R49-2:2001)
a complete water meter, a sub-assembly of a water meter or an ancillary device.

3.26
actual volume, V_a (OIML R49-1:2000)
total volume of water passing through the water meter, disregarding the time taken. This is the measurand

3.27
indicated volume, V_i (OIML R49-1:2000)
volume of water indicated by the meter, corresponding to the actual volume

3.28
flowrate, Q (OIML R49-1:2000)
quotient of the actual volume of water passing through the water meter and the time taken for this volume to pass through the water meter. It is expressed in m^3/h

3.29
minimum flowrate, Q_1 (OIML R49-1:2000)
the lowest flowrate at which the water meter is required to operate within the maximum permissible error

3.30
transitional flowrate, Q_2 (OIML R49-1:2000)
flowrate which occurs between the permanent flowrate Q_3 , and minimum flowrate Q_1, that divides the flowrate range into two zones, the “upper zone” and the “lower zone”, each characterized by its own maximum permissible error

3.31
permanent flowrate, Q_3 (OIML R49-1:2000)
the highest flowrate within the rated operating conditions, at which the water meter is required to operate in a satisfactory manner within the maximum permissible error

3.32
overload flowrate, Q_4 (OIML R49-1:2000)
the highest flowrate at which the water meter is required to operate, for a short period of time, within its maximum permissible error, whilst maintaining its metrological performance when it is subsequently operated within its rated operating conditions

3.33
combination meter change-over flowrate, Q_x (ISO 7858-1:1998)
change-over flowrate Q_{x1} occurs at decreasing flowrates when the pressure drop in the combination meter increases suddenly in parallel with a cessation of flow in the larger meter and a visible increase in the flow in the smaller meter

Change-over flowrate Q_{x2} occurs at increasing flowrates when the pressure drop in the combination meter decreases suddenly in parallel with a start-up of flow in the larger meter and a visible reduction in the flow in the smaller meter.

3.34
test flowrate (OIML R49-2:2001)
the mean flowrate during a test, calculated from the indications of a calibrated reference device. The quotient of the actual volume passing through the water meter divided by the time for that volume to pass through the water meter

3.35
Maximum Permissible Error (MPE) (OIML R49-1:2000)
extreme values of the relative error (of indication) of a water meter permitted by this document

3.36
error of indication (VIM:1993, 5.20 adapted)
indicated volume minus the actual volume

3.37
relative error, ε (VIM:1993, 3.12 adapted)
error (of indication) divided by the actual volume

3.38
intrinsic error (OIML R49-1:2000)
the error (of indication) of a meter determined under reference conditions

3.39
initial intrinsic error (OIML R49-1:2000)
the intrinsic error of a water meter as determined prior to all performance tests

3.40
fault (OIML R49-1:2000)
the difference between the error of indication and the intrinsic error of a water meter

3.41
significant fault (OIML R49-1:2000)
a fault, the magnitude of which is greater than one half of the MPE in the upper zone

EXAMPLE If the MPE is ± 2 %, the value of the significant fault is a fault which absolute value is larger than 1 %.

The following are not considered to be significant faults:

— faults arising from simultaneous and mutually independent causes in the water meter itself or in its checking facilities; and

— transitory faults being momentary variations in the indication which cannot be interpreted, memorised or transmitted as a measurement result.

3.42
influence quantity (VIM:1993, 2.7)
quantity that is not the measurand but that affects the result of measurement

3.43
influence factor (OIML R49-1:2000)
influence quantity having a value within the Rated Operating Conditions (ROC) of the water meter, as specified in this document

3.44
disturbance (OIML R49-1:2000)
an influence quantity having a value within the limits specified in this document, but outside the specified Rated Operating Conditions (ROC) of the water meter

NOTE An influence quantity is a disturbance if for that influence quantity the Rated Operating Conditions are not specified.

3.45
Rated Operating Conditions (ROC) (VIM:1993, 5.5 adapted)
conditions of use giving the range of values of the influence factors, for which the errors (of indication) of the water meter are required to be within the MPE

For an influence quantity, the ranges of values within ROC are limited by Lower Rated Conditions (LRC) and Upper Rated Conditions (URC).

3.46
Reference Conditions (RC) (VIM:1993, 5.7 adapted)
set of reference values, or reference ranges of influence quantities, prescribed for testing the performance of a water meter, or for the intercomparison of results of measurements

For an influence quantity, the reference value is within the Rated Operating Conditions.

3.47
Limiting Conditions (LC) (VIM:1993, 5.6 adapted)
extreme conditions which a water meter can withstand without damage and without degradation of its metrological characteristics when it is subsequently operated under its Rated Operating Conditions

NOTE The limiting conditions for storage, transport and operation may be different.

For an influence quantity, two limiting conditions may be defined, the Lower Limiting Condition (LLC) and Upper Limiting Condition (ULC).

3.48
working pressure, P_w (OIML R49-1:2000)
the average water pressure in the pipe, measured upstream and downstream of the water meter

3.49
minimum Admissible working Pressure (mAP) and Maximum Admissible working Pressure (MAP)
the minimum admissible working pressure mAP and the maximum admissible working pressure (MAP) are respectively the minimum and maximum pressures that a water meter can withstand permanently within Rated Operating Conditions, without deterioration of its metrological performance

mAP and MAP are respectively the lower and upper limits of the rated operating conditions for working pressure.

3.50
working temperature, T_w (OIML R49-1:2000)
the average water temperature in the pipe, measured upstream and downstream of the water meter

3.51
minimum Admissible working Temperature (mAT) and Maximum Admissible working Temperature (MAT)
the minimum admissible working temperature and the maximum admissible working temperature are respectively the minimum and maximum temperatures that a water meter can withstand permanently at a given internal pressure, without deterioration of its metrological performance

mAT and MAT are respectively the lower and upper limits of the rated operating conditions for working temperature.

3.52
pressure loss, ΔP (OIML R49-1:2000)
the head loss, at a given flowrate, caused by the presence of the water meter in the pipeline

3.53
upper limiting pressure
highest pressure at which a water meter operates for a short period of time without deteriorating

3.54
Nominal Diameter (DN) (EN ISO 6708:1995)
an alphanumeric designation of size for components of a pipe work system, which is used for reference purposes. It comprises the letters DN followed by a dimensionless whole number, which is indirectly related to the physical size in mm of the bore, or outside diameter of the end connections

3.55
Nominal Pressure (PN) (EN 1333:1996)
a numerical designation, which is a convenient rounded number for reference purposes

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

3.56
electronic device (OIML R49-1:2000)
a device employing electronic sub-assemblies and performing a special function. Electronic devices are usually manufactured as separate units and are capable of being tested independently

NOTE Electronic devices, as defined above, may be complete meters or parts of meters.

3.57
electronic sub-assembly (OIML R49-1:2000)
a part of an electronic device, employing electronic components and having a recognizable function of its own

3.58
electronic component (OIML R49-1:2000)
the smallest physical entity which uses electron or hole conduction in semi-conductors, gases, or in a vacuum

3.59
checking facility (OIML R49-1:2000)
a facility which is incorporated in a water meter with electronic devices and which enables significant faults to be detected and acted upon

NOTE The checking of a transmission device aims at verifying that all the information which is transmitted (and only that information) is fully received by the receiving equipment.

3.60
automatic checking facility (OIML R49-1:2000)
a checking facility operating without the intervention of an operator

3.61
permanent automatic checking facility (type P) (OIML R49-1:2000)
an automatic checking facility operating during the entire measurement operation

3.62
intermittent automatic checking facility (type I) (OIML R49-1:2000)
an automatic checking facility operating at certain time intervals or per fixed number of measurement cycles

3.63
non-automatic checking facility (type N) (OIML R49-1:2000)
a checking facility which requires the intervention of an operator

3.64
power supply device (OIML R49-1:2000)
a device which provides the electronic devices with the required electrical energy, using one or several sources of AC or DC

4 Technical characteristics

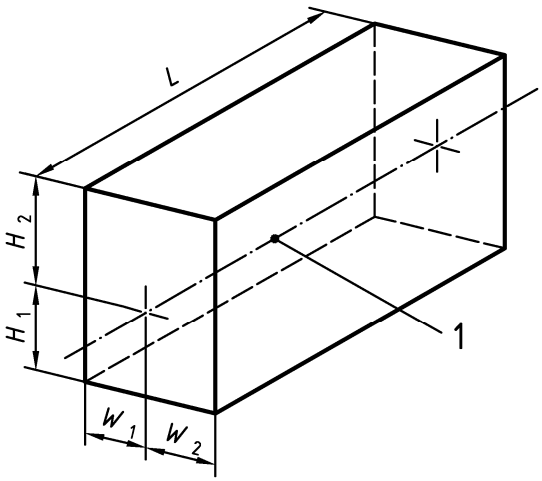
4.1 Meter size and overall dimensions

4.1.1 Meter size

The meter size is characterised by the nominal diameter (DN). For each meter size there is a corresponding fixed set of overall dimensions (see Figures 1 and 2). The dimensions are given in Tables 1, 2 and 3. For threaded meter end connections the minimum dimensions for the thread are given in ▌A2⟩ Table 8 ⟨A2▐.

4.1.2 Dimensions of in-line meters

Meter dimensions are defined by a cuboid into which the water meter fits (see Figure 1 and Table 1 and Table 2). The orientation of the cuboid is defined by the pipe axis and by the prescribed or the preferred downward direction, if such exists. To achieve the necessary overall length adapter pieces may be fitted.



H_1, H_2, L, W_1 and W_2 define the height, length and width respectively of a cuboid within which the water meter can be contained (the cover being at right angles to its closed position).

H_1, H_2, W_1 and W_2 are maximum dimensions.

L is a fixed value with specified tolerances.

NOTE 1 Where there is a separate indicating device or calculator, the overall size specified in Figure 1 applies only to the housing of the measurement transducer (flow sensor).

NOTE 2 Flange diameter sizes of in-line meters with flanges may lay outside the W and/or H sizes of the cuboid.

Key

1 Pipe axis

Figure 1 — In-line meter dimensions