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Water meters - Part 2: Installation and conditions of use

Wasserzähler - Teil 2: Einbau und Voraussetzungen für die Verwendung

Compteurs d'eau - Partie 2: Installation et conditions d'utilisation

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91.140.60 Sistemi za oskrbo z vodo Water supply systems

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English Version

Water meters - Part 2: Installation and conditions of use

Compteurs d'eau - Partie 2: Installation et conditions d'utilisation

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

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN Management Centre has the same status as the official versions.

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Contents

Foreword

This document (EN 14154-2:2005+A1:2007) 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of an identical text or by endorsement, at the latest by October 2007 and conflicting national standards shall be withdrawn at the latest by October 2007.

This document includes Amendment 1, approved by CEN on 2007-03-06.

This document supersedes EN 14154-2:2005.

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

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 1: *General requirements*

— 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 anticipate the requirements of the forthcoming EU Measuring Instruments Directive.

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, 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 specifies criteria for selection of water meters, installation requirements and the first operation of new or repaired meters to ensure accurate constant measurement and reliable reading of the meter.

In applications where a water meter is legally required to conform to the requirements of the Measuring Instruments Directive, this document may be used to demonstrate conformity.

Where legal national requirements exist they shall in all cases take precedence over or supplement the specifications given in this part of this document.

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.

▌A1⟩ EN 14154-1:2005+A1 ⟨A1▌, *Water meters – Part 1: General requirements*

3 Terms and definitions

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

3.1
parallel operation
operation of two or more meters grouped together and connected to a common source and a common delivery.

3.2
multiple meter operation
operation of several meters grouped together where their inlets are connected to a common source, or their outlets to a common delivery, but not both at same time.

NOTE examples of the use of meters operating in parallel or multiple meter operation:

— water meters operated in parallel where the installation of one large meter, to meet the maximum water demand or to cover the required flowrate range, is impractical;

— water meters installed in parallel where "stand by" meters are necessary to ensure continuity of delivery and flow measurement in the case of filter blockage or water meter breakdown;

— meters grouped in multiple operation for ease of access, servicing and reading or where it is necessary to split the water supply into a number of branches. For instance, in a block of flats or where a number of separately metered tributary flows are united into a common main, as in a water treatment plant.

4 Criteria for the selection of water meters

4.1 General considerations

The type, metrological characteristics, size, and flowrate range of the meter are determined according to the operating conditions of the installation and the environmental class(es) demanded, taking into account the following conditions :

— expected flowrates: the typical flowrates of the meter, as defined in [A1] EN 14154-1:2005+A1 [A1], shall be compatible with the expected flowrate conditions of the installation; including the water flow direction or directions. When using

— combination meters, care should be taken that 'cross-over' flowrates are different from (and below) normal operating flowrates;

— available supply pressure;

— physical and chemical characteristics of the water;

— possibility of deposition of substances from solution within the water meter;

— acceptable pressure loss across the meter;

— available space and pipe work to install the meter and fittings;

— sustainability of the power supply of the water meter (where applicable).

4.2 Information to be provided by the manufacturer

The manufacturer shall supply sufficient information to enable the correct choice and installation of a meter: such that influencing factors shall not lead to either failure or non conformance with the specified metrological characteristics. This is particularly important for hydraulic disturbances.

Specifically, the manufacturer shall determine the influence factors, which affect the indicating error and state of the individual meter design. For each influence factor the manufacturer shall state the relevant rated operating conditions applicable to the meter.

4.3 Meters operating in parallel or in a group

For meters operating in parallel, means shall be provided so that the unserviceability of one or more meters within a group shall not cause the remaining meters to operate at a flowrate in excess of each individual meter's limit of operation.

In order to ensure that water meters of different types will operate satisfactorily in parallel, the individual characteristics of all the meters operating in parallel shall be compatible. This may be achieved, for example, by grouping them according to pressure loss, flowrate range and maximum working pressure. However, the installation conditions for each type shall be respected.

For meters operating in parallel and multiple meter operation, the possibilities of interaction between one meter or meter type and another, to the detriment of their life and accuracy shall be considered; for example pressure surges and vibration.

5 Installation requirements

The installation characteristics of the selected meter and its sub-assemblies shall ensure:

— correct metering in compliance with its specific metrological characteristics;

— protection of the meter;

— safety of personnel and user;

— comfort of personnel during installation, removal and maintenance of the meter;

— easy reading of the meter index and relevant markings both by personnel and users.

5.1 Compliance with specified metrological characteristics

5.1.1 General

The water meter shall be so installed that it is completely filled with water under normal conditions.

Installation at a high point, leading to a risk of air accumulation, shall therefore be forbidden.

If an entry of air is liable to occur which can either damage the water meter or alter its accuracy, an air eliminating device shall be placed at a sufficient distance upstream of the meter.

The following influence quantities shall be taken into consideration when installing the water meter:

I. meter operating position;

II. hydraulic disturbances;

III. water temperature;

IV. ambient relative humidity;

V. water pressure;

VI. transmission of vibrations;

VII. water quality (suspended particles);

VIII. electrostatic discharge;

IX. continuous magnetic field;

X. electromagnetic disturbances;

XI. any other relevant mechanical, chemical, climatic, electrical or hydraulic conditions.

The installation and environmental conditions shall be such that the water meter remains within its rated operating conditions for all influence quantities during the product lifetime specified by the manufacturer.

5.1.2 Meter operating position

The position and orientation of the water meter shall be appropriate to its type, as marked, and shall not change following installation. Where it can only be used in limited operating positions the manufacturer shall specify the positional limits within which the meter can operate satisfactorily in terms of:

— angles of the pipe axis related to the horizontal;

— permissible angular rotation of the meter about the pipe axis related to the vertical ; applicable where the meter is read from above, looking downward.

5.1.3 Hydraulic disturbances

5.1.3.1 General considerations

Many types of meters are sensitive to upstream flow disturbances, which cause large errors and premature wear. This comment also applies, although to a lesser extent, to downstream flow disturbances.

It should be realised that proper functioning of a particular design of water meter is related not only to its construction but to its specific installation conditions.

The installer shall comply with the manufacturer's recommendations and, if applicable, the type approval certificate.

5.1.3.2 Types of disturbances

A flow can be subject to two types of disturbances: velocity-profile distortion and swirl; both of which may affect the errors of indication of the particular water meter.

Velocity-profile distortion is typically caused by an obstruction partially blocking the pipe, for instance the presence of a partly closed valve; a misaligned flange joint; an incorrectly positioned or dimensioned washer/gasket; a butterfly valve; an orifice; a flow or pressure regulator, etc…

Swirl can be caused in many ways, for example by two or more bends in different planes; a single bend in combination with a reducer or partly closed valve; a centrifugal pump; a tangential inlet of supply line into the main line in which the water meter is installed.

5.1.3.3 Methods to eliminate disturbances

The circumstances leading to flow disturbances are by nature complex and too numerous to detail in this document. However, potential causes should be eliminated prior to the implementation of remedial devices such as flow straightening devices.

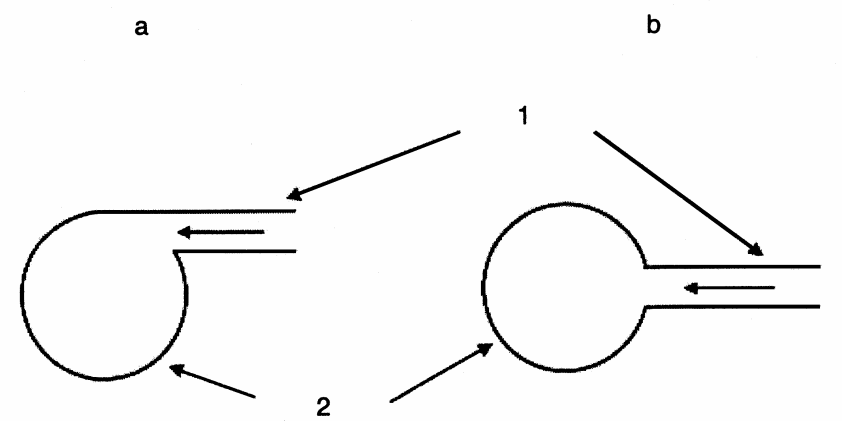
For example:

a) Velocity-profile distortion can easily be eliminated by careful application of installation procedures. This is particularly true in the case of "coning" down, abrupt section reduction and the mal-installation of joint washers/gaskets. In addition, when the water meter is in service, it is essential to ensure that the upstream and downstream valves remain in the fully open position. These valves require to be of a type which do not cause any disturbance to the water flow whilst in the open position;

b) Swirl can be controlled either by ensuring an adequate length of straight pipe upstream of the water meter, or by installing a straightening device, or by a combination of the two;

c) Swirl caused by two or more bends in different planes may be controlled by either installing the bends downstream or, when the bends are located upstream, moving them as far as possible from the water meter or by separating the bends as far as possible from each other;

d) Swirl caused by the connection of a minor feed to the main pipe work may be controlled by optimising the flow as shown in Figure 1. However, wherever possible, pipe work configurations which are known to generate swirl should be avoided.



Key

a Bad
b Good
1 Feed line
2 Main line

Figure 1

A compatible flow straightening device may be used upstream of the water meter to reduce or even eliminate the straight lengths of pipe detailed above. However, the instructions of the meter manufacturer shall be followed.

NOTE Special consideration should be given to bi-directional applications.

5.1.4 Water quality (suspended particles)

If, for the specific installation conditions, the accuracy of measurement of volume flow by the water meter is likely to be affected by the presence of suspended particles in the water, then it may be installed with a strainer or filter. The strainer or filter should be placed either at the inlet of the water meter or in the pipework upstream.

5.1.5 Electromagnetic meters

To ensure accurate measurement and prevent galvanic corrosion at the electrodes the meter and the measured fluid shall be electrically connected at the same potential. Whilst in general this means grounding the water, the manufacturer's individual installation instructions for a particular meter design shall be followed.

On a conducting but uninsulated fluid pipe, without a non-conducting internal coating, the connecting point(s) of the meter's primary element shall be electrically linked to the secondary element and both connected to ground.

On non-conducting pipes, or pipes isolated from the fluid, metal grounding rings shall be interposed between the pipe and the primary element of the meter. These shall be electrically linked to the secondary element and both to ground.

Where the fluid cannot be grounded for technical reasons, the meter may be connected without referencing the fluid potential but only when the meter model and manufacturer's instructions permit.

5.1.6 Meters operating in parallel or in a group

Means shall be provided to permit installation, reading, servicing, *in situ* dismantling and removal of any meter without interference from, or interfering with, the operation of any other parallel or group meter.

For multiple meter operation, with common outlet, check valves shall be installed, downstream of each meter, to prevent back flow through the meter.

For multiple meter operation means shall be provided immediately adjacent to, or affixed on, each water meter, to identify the source or delivery, which each water meter is registering.

5.2 Protection of the meter

5.2.1 General considerations

The meter shall be protected from the risk of damage that may be caused by :

a) frost;

b) flooding or rain leaking in;

c) shock or vibration either transmitted from or induced by the installation;

d) reverse water flow;

e) adverse hydraulic conditions (cavitation, overpressure, water hammer);

f) excessive water or ambient air temperatures;

g) damp heat and dry heat;

h) installation induced stress and unbalance;

i) external electrolytic or environmental corrosion;

j) intentional fraud;

k) electromagnetic disturbances;

l) electrostatic discharge;

m) electrical bursts;

n) short time power reduction;

o) power voltage variation;

p) sinusoidal vibration.

5.2.2 Frost

Special arrangements shall be made to avoid freezing of the water meter but without restricting access. Insulating materials, where applied, shall be rot-proof.

5.2.3 Shock or vibration either transmitted from or induced by the installation

Special arrangements shall be made to ensure that the meter is not affected by vibration in accordance with the manufacturer's specifications.