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Measurement of water flow in closed conduits — Meters for cold potable water —

Part 2: Installation requirements and selection

Mesurage de débit d'eau dans les conduites fermées — Compteurs d'eau potable froide —

Partie 2: Conditions d'installation et choix

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Foreword

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

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO 4064 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 4064-2 was prepared by Technical Committee ISO/TC 30, *Measurement of fluid flow in closed conduits*, Subcommittee SC 7, *Volume methods including water meters*.

This second edition cancels and replaces the first edition (ISO 4064-2:1978) which has been technically revised.

ISO 4064 consists of the following parts, under the general title *Measurement of water flow in closed conduits — Meters for cold potable water*:

— *Part 1: Specifications*

— *Part 2: Installation requirements and selection*

— *Part 3: Test methods and equipment*

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Measurement of water flow in closed conduits — Meters for cold potable water —

Part 2:
Installation requirements and selection

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1 Scope

This part of ISO 4064 specifies criteria for the selection of water meters, associated fittings, installation, special requirements for some meters and the first operation of new or repaired meters to ensure accurate constant measurement and reliable reading of the meter.

This part of ISO 4064 deals only with single water meter installations and is also applicable to single meters operating either in parallel or grouped together in one location. It is not applicable to “combination” meters, for which specifications are given in ISO 7858-1.

Where legal national requirements exist, they will in all cases take precedence over the specifications in this part of ISO 4064.

ISO 4064-1 deals with terminology, technical and dimensional characteristics, metrological characteristics and pressure loss.

ISO 4064-3 deals with test methods and equipment.

2 Normative reference

The following normative document contains provisions which, through reference in this text, constitute provisions of this part of ISO 4064. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 4064 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 4064-1:1993, *Measurement of water flow in closed conduits — Meters for cold potable water — Part 1: Specifications*.

3 Terms and definitions

For the purposes of this part of ISO 4064, 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

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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

4 Examples of use of meters operating in parallel and multiple meter operation

Water meters may be 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 may be 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 are grouped in multiple operation for ease of access, service and reading, where it is necessary to split a water supply into a number of branches, e.g. in a block of flats, or where it is necessary to unite a number of metered tributary flows into a common main, as in a water treatment plant.

5 Criteria for the selection of water meters

5.1 General considerations

The type, metrological class and sizes of water meters are determined according to the operating conditions of the installation, particularly taking into account the following:

— the available supply pressure;

— physical and chemical characteristics of the water;

— acceptable pressure loss across the meter;

— the expected flowrates: the flowrates q_{min}, q_p, q_s of the meter (as defined in clause 3 of ISO 4064-1:1993) shall be compatible with the expected flowrate conditions of the installations;

— the suitability of the meter type for the intended installation conditions.

5.2 Meters operating in parallel or in group

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

5.2.2 In order to ensure that water meters of different types will operate satisfactorily in parallel, the individual characteristics of meters operating in parallel shall be compatible, e.g. by grouping them according to pressure loss, flowrate range and maximum working pressure. However, the installation conditions (see 5.2.3) for each type shall be respected.

5.2.3 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, e.g. pressure surges and vibration, shall be considered.

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6 Associated fittings

6.1 Upstream side

The water meter installation shall include the following accessories as applicable:

a) a stopcock or valve, preferably with the direction of the valve operation indicated;

b) for Woltmann meters and single jet meters, a full-bore valve;

c) a flow-straightening device and/or a straight length of pipe fitted between the valve and the meter;

d) a strainer fitted between the stop valve and the meter and, in the case of a Woltmann or single jet type meter, upstream of the straight length or the straightening device;

e) means of sealing the connection of the water meter to the water supply line in order to detect any unauthorized removal of the water meter.

6.2 Downstream side

The water meter installation shall include the following accessories as applicable.

a) an adjustable length device to allow for easy installation and removal of the water meter. This device is specially recommended for meters having $q_p \geqslant 15$ m^3/h;

b) a device including a drain valve which may be used for pressure monitoring, sterilization and water sampling;

c) a stopcock or a valve for meters having $q_p > 2{,}5$ m^3/h; this valve shall be operated in the same sense as the upstream valve. For Woltmann meters and single jet meters, a full-bore valve is recommended;

d) a check valve, except for bi-directional flow applications.

6.3 Meters operating in parallel or in groups

The installation of water meters operating in parallel or in a group shall also consider the following requirements.

a) a means for isolating the flow through each individual water meter shall be provided. In this respect, the provisions concerning the requirements for isolation of the water meter installation shall apply to each individual meter;

b) a filter with an isolating valve upstream may be included in the common supply. During operation of the water meter, the upstream isolating valve shall be kept fully open.

7 Installation

7.1 General requirements

7.1.1 Every water meter, single or in a group, shall be easily accessible for reading (without, e.g. the use of mirror or ladder), for fitting, for maintenance, for removal and for *in situ* dismantling of the mechanism if required.

In addition, for water meters of mass in excess of 25 kg, clear access to the installation site to allow the water meter to be brought to, or removed from, its working position, and adequate space around the working position for the installation of lifting gear, shall be provided.

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The following points shall be taken into account:

— adequate illumination of the installation site is required;

— the floor shall be clear of obstacles and shall be even, rigid and not slippery.

7.1.2 All fittings specified in clause 6 shall also be readily accessible and the requirerments of 7.1.1 relating to large meters are also applicable for the fittings.

7.1.3 In all cases, contamination shall be avoided, especially when the meter is installed in a pit, by mounting the water meter and the fittings at a sufficient height above the floor.

If necessary, the pit shall be provided with a sump or drain for water removal.

7.2 Installation requirements

7.2.1 For correct operation and long service an installed water meter shall be constantly full of water.

7.2.2 The meter shall be protected from the risk of damage by shock or vibration induced by the surroundings at the place of installation.

7.2.3 The meter shall not be subjected to undue stresses caused by pipes and fittings. If necessary, it shall be mounted on a plinth or bracket.

Furthermore, the water pipe lines upstream and downstream shall be adequately anchored to ensure that no part of the installation can be displaced under water thrust when the meter is dismantled or disconnected on one side.

7.2.4 The meter shall be protected from the risk of damage by extreme temperature of water and ambient air.

7.2.5 If there is a risk of air entering the meter or a group of water meters, an upstream air release valve shall be incorporated and installed in accordance with the manufacturer's instructions.

7.2.6 The meter pit shall be protected from flooding and rainwater.

7.2.7 The orientation of the meter shall be appropriate to its type.

7.2.8 The meter shall be protected from the risk of damage due to external environmental corrosion.

7.2.9 National legislation and local rules in force concerning the use of water pipes for earthing shall always be consulted.

In the case where the water meter is part of an electrical earthing, in order to minimize the risk to operational staff, there shall be a permanent shunt for the water meter and its associated fittings.

7.2.10 Precautions shall be taken to prevent damage to the meter by unfavourable hydraulic conditions (cavitation, surging, water hammer).

7.3 Meters operating in parallel or in group

7.3.1 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 meter in the group.

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

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

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8 Special requirements governing the installation of Woltmann meters and single jet meters

8.1 General considerations

These types of meter are sensitive mainly to upstream flow disturbances, which cause large errors and premature wear and – though to a lesser extent – by downstream flow disturbances as well.

It should be realized that proper functioning of these water meters is related not only to their construction but also to their installation conditions.

8.2 Types of disturbance

A flow can be subject to two types of disturbance: velocity profile distortion and swirl.

Velocity profile distortion is caused typically by an obstruction partially blocking the pipe, e.g., the presence of a partly closed valve, a butterfly valve, a check valve, an orifice, a flow or pressure regulator, etc.

Swirl may be caused in many ways; e.g., by two or more bends of the pipe in different plans, by centrifugal pumps, by tangential inlet of supply line into the main line in which the water meter is installed, etc.

8.3 Methods to eliminate disturbances

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

The following list may serve as a guide-line, for new installations.

a) It is a commonly accepted rule of thumb that straight sections of pipes of the same diameter D as the water meter, having lengths of $10D$ and $5D$ upstream and downstream of the water meter, respectively, are required and sufficient. It should be clarified that this is just a practical compromise. The longer the pipe the better, particularly on the upstream side of the water meter.

b) Any device like a check-valve, orifice, flow or pressure regulators, etc. may create a flow profile disturbance that will exist well after a pipe length of $10D$. Whenever possible such devices should be installed downstream of the water meter, at the far end of the straight section.

c) The water feeding line connection to a main line in which a water meter is installed shall not create a swirl (see Figure 1):

a) Bad connection **b) Good connection**

Key

1 Feed line
2 Mean line

Figure 1 — Types of feeding line connections

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