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Agricultural irrigation equipment — Meters for irrigation water

Matériel d'irrigation agricole — Compteurs pour l'eau d'irrigation

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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.

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

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

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 18, *Irrigation and drainage equipment and systems*.

This second edition cancels and replaces the first edition (ISO 16399:2014), which has been technically revised.

The main changes are as follows:

— the range of pressure regulators sizes has been extended up to DN 100 (4");

— the water temperature of the irrigation system has been harmonized to 60 °C;

— the normative references have been updated;

— the terms and definitions have been updated;

— the testing water temperature range has been updated to 4 °C to 35 °C;

— the face-to-face distance of the flanged bodies of the pressure regulators has been updated to ±4 mm for plastics-body regulators.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Agricultural irrigation equipment — Meters for irrigation water

1 Scope

This document specifies the requirements and certification procedures for water meters, irrespective of the design technologies used to meter the actual volume of cold water or heated water flowing through a fully charged closed conduit. These water meters incorporate devices, which indicate the integrated volume. It applies to water meters intended for irrigation use (herein after referred to as water meters), regardless of the water quality used for this purpose.

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 water. It provides metrological requirements for electronic ancillary devices when they are subject to metrological control.

NOTE Clean water meters are different from irrigation water meters. This document is based on clean water meters standards but, it is important to develop a specific standard for irrigation water meters indicating their specific requirements.

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 document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

ISO 4064-2:2014, *Water meters for cold potable water and hot water — Part 2: Test methods*

ISO 9644, *Agricultural irrigation equipment — Pressure losses in irrigation valves — Test method*

ISO/IEC Guide 98-3, *Uncertainty of measurement — Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
actual volume
total volume of water passing through the meter, disregarding the time taken

Note 1 to entry: The actual volume is calculated from a reference volume as determined by a suitable measurement standard taking into account differences in metering conditions, as appropriate.

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3.2
adjustment device
part of the meter that allows adjustment of the indicated values such that the error curve of the meter is generally shifted parallel to itself to find in the envelope of *maximum permissible errors* (3.17)

3.3
ancillary device
device intended to perform a specific function, directly involved in elaborating, transmitting or displaying measured values

Note 1 to entry: The main ancillary devices are:

a) zero-setting device;

b) price-indicating device;

c) repeating indicating device;

d) printing device;

e) memory device;

f) tariff control device;

g) pre-setting device;

h) self-service device;

i) flow sensor movement detector (for detecting movement of the flow sensor before this is clearly visible on the indicating device);

j) remote reading device (which may be incorporated permanently or added temporarily).

3.4
bounce
momentary re-opening of a contact after initial closing, or a momentary closing after initial opening

3.5
bounce time
interval of time between the instant of the first closing (or opening) and the instant of the final closing (or opening) of the *reed contact unit* (3.28)

3.6
calculator
part of the meter that transforms the output signals from the measurement transducer(s) and, possibly, form associated measuring instruments and, if appropriate, stores the results in memory until they are used

Note 1 to entry: The gearing is considered to be the calculator in a mechanical meter.

Note 2 to entry: The calculator may be capable of communicating both ways with ancillary devices.

3.7
correction device
device connected to or incorporated in the meter for automatic correction of the volume of water at metering conditions, by taking into account the *flow rate* (3.10) and/or the characteristics of the water to be measured and the pre-established calibration curves

3.8
durability
ability of a meter to maintain its performance characteristics over a period of use

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3.9
error
measured quantity value minus a reference quantity value

$$\frac{V_i - V_a}{V_a} \times 100\ (\%)$$

3.10
flow rate
volume of water flowing through the meter per unit time

3.11
indicating device
part of the meter that provides an indication corresponding to the volume of water passing through the meter

3.12
indicated volume
volume of water indicated by the meter, corresponding to the *actual volume* (3.1)

3.13
influence factor
influence variable (3.14) having a value within the *rated operating conditions* (3.27) specified for a *water meter* (3.32)

3.14
influence variable
quantity that, in a direct measurement, does not affect the quantity that is actually measured, but affects the relation between the indication and the measurement result

3.15
maximum admissible pressure
maximum internal pressure that the meter can withstand permanently, within its *rated operating conditions* (3.27), without deterioration of its metrological performance

Note 1 to entry: MAP is equivalent to nominal pressure (PN).

3.16
maximum admissible temperature
MAT
maximum water temperatures that a meter can withstand permanently, within its *rated operating conditions* (3.27), without deterioration of its metrological performance

3.17
maximum permissible error
MPE
extreme value of error, with respect to a known reference quantity value, permitted by the specifications given in this document

3.18
measurement transducer
part of the meter that transforms the *flow rate* (3.10) or volume of water to be measured into signals which are passed to the *calculator* (3.6) and includes the *sensor* (3.29)

Note 1 to entry: The measurement transducer may function autonomously or use an external power source and may be based on a mechanical, electrical or electronic principle.

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3.19
metering conditions
conditions of the water, the volume of which is to be measured, at the point of measurement

EXAMPLE Water temperature, water pressure.

3.20
minimum admissible temperature
mAT
minimum water temperatures that a meter can withstand permanently, within its *rated operating conditions* (3.27), without deterioration of its metrological performance

3.21
minimum flow rate
Q_1
lowest *flow rate* (3.10) at which the meter is designed to operate within the *maximum permissible error* (3.17)

3.22
nominal diameter
alphanumeric designation of the size of pipe work components, used for reference purposes, comprising the letters DN followed by a dimensionless round number which is loosely related to the effective dimensions, in millimetres, of the bore or external diameter of the end connections

3.23
operate position time
interval of time between the instant the *reed contact unit* (3.28) is in the operate position and the instant of the removal of the applied magnetic field to the contact

Note 1 to entry: It includes the closing *bounce time* (3.5) in a normally open contact or the opening bounce time in a normally closed contact.

3.24
overload flow rate
Q_4
highest *flow rate* (3.10) at which the *water meter* (3.32) is designed to operate for a short period of time within its *maximum permissible error* (3.17), while maintaining its metrological performance when it is subsequently operating within the *rated operating conditions* (3.27)

3.25
permanent flow rate
Q_3
highest *flow rate* (3.10) within the *rated operating conditions* (3.27) at which the meter is designed to operate within the *maximum permissible errors* (3.17)

3.26
pressure loss
difference in pressure due to water flow between two specified points in a system or in part of a system

3.27
rated operating condition
operating conditions requiring fulfilment during measurement in order that a meter performs as designed

[SOURCE: VIM:2012, 4.9]

3.28
reed contact unit
assembly containing contact blades, some or all of magnetic material, hermetically sealed in an envelope and controlled by means of externally generated magnetic field (e.g. a pulse generator)

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3.29
sensor
element of a meter that is directly affected by a phenomenon, body or substance carrying a quantity to be measured

Note 1 to entry: For a water meter, the sensor may be a disc, piston, wheel or turbine element, the electrodes on an electromagnetic meter, or another element. The element senses the flow rate or volume of water passing through the meter an is referred to as a "flow sensor" or "volume sensor".

3.30
test flow rate
mean *flow rate* (3.10) during a test, calculated from the indications of a calibrated reference device

3.31
transitional flow rate
Q_2
flow rate (3.10) between the *permanent flow rate* (3.25) and the *minimum flow rate* (3.21) that divides the flow rate range into two zones, the upper zone and the lower zone, each characterized by its own *maximum permissible error* (3.17)

3.32
water meter
instrument intended to measure continuously, memorize and display the volume of water passing through the measurement transducer at metering conditions

Note 1 to entry: When a device claiming to be a water meter has the intended use of documenting water flow for payment purposes, then that device must include, 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. Water meters not intended for payment purposes only need to be compatible, in some way, with all the aforementioned three devices.

[SOURCE: OIML R49-1:2006]

3.33
working pressure
average water pressure in the pipe measured upstream and downstream of the meter

3.34
working temperature
T_w
water temperature in the pipe measured upstream of a *water meter* (3.32)

[SOURCE: OIML R49-1:2006]

4 Metrological requirements

4.1 Values of Q_1, Q_2, Q_3 and Q_4

4.1.1 Permanent flow rate (Q_3)

The value of Q_3, in (m^3/h), shall be chosen from the following list:

1,0	1,6	2,5	4,0	6,3
10	16	25	40	63
100	160	250	400	630
1 000	1 600	2 500	4 000	6 300

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