INTERNATIONAL STANDARD

ISO 18471

First edition
2015-10-15

Agricultural irrigation equipment — Filters — Verification of filtration grade

Matériel agricole d'irrigation — Filtres — Vérification du grade de filtration

Reference number
ISO 18471:2015(E)

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Foreword

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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).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information.

The committee responsible for this document is ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 18, *Irrigation and drainage equipment and systems*.

Agricultural irrigation equipment — Filters — Verification of filtration grade

1 Scope

This International Standard specifies a test method for the verification of filtration grade of filters intended for operation in agricultural irrigation systems. It is intended to be used for verifying the filter manufacturer's declaration about the filtration grade of a specific filter.

This test method uses a Clogging Capacity Meter (CCM) device to compare the filtration grade of the filter under test against the filtration grade of a test filtration screen.

NOTE This test method may also be used by a filter manufacturer to determine the filtration grade.

2 Normative references

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

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

3 Terms and definitions

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

3.1
filtration grade
number, declared by the manufacturer, that represents the size of water passages in a filter and is related to its ability to stop particles

Note 1 to entry: The filtration grade is expressed in micrometres (µm, microns).

3.2
clogging capacity meter
CCM
device used for measuring the time to reach a specified pressure loss across a standard filter screen, at a constant flow rate

3.3
aperture width
distance between two adjacent parallel wires in a square-mesh wire cloth screen plain-weave

3.4
mesh count
number of apertures per unit of linear measure in a woven wire cloth or wire screen

[SOURCE: ISO 9045:1990, 3.2.8]

3.5
flow rate
volume of water flowing through a device per unit time

3.6
pressure loss
difference in pressure due to water flow between two specified points in a system or in part of a system

Note 1 to entry: It is expressed in pascals (Pa) according to ISO 80000–1, in kilopascals (kPa) or in bar.

4 Summary of the test method

Two CCM units, using identical test screens, are connected to the water mains, one upstream and one downstream of the filter under test.

Water at a flow rate of 10 l/min is passed through each CCM screen and the time required for each CCM to reach a predetermined pressure loss (0,5 bar) across its own screen is recorded.

The ratio between the two time periods, measured at the downstream and the upstream CCM units, is calculated. A ratio equal to or greater than five indicates that the filtration grade declared by the manufacturer is correct.

5 CCM structure and operation

5.1 Construction

The CCM device consists of two main parts (see Figure 1).

5.1.1 Sampler (1)

The sampler is the part of the CCM through which water used for testing flows. It includes the following:

— **screen housing** (3), capable of being opened and closed for cleaning and for easy replacement of the **filtering screen** (4);

— **flow rate regulator** (5), accurate to ±2 %, limiting the flow rate to 10 l/min.

5.1.2 Control unit (2)

The control unit includes the following measuring instruments:

— **pressure gauge** (9) accurate to ±1 %, measuring up to 10 bar;

— **differential pressure gauge**, digital or analog (10) accurate to ±1 %;

— **count up digital timer** (6) with a resolution of 0,01 min, preferably starting automatically when the pressure reaches a pre-determined level;

— **timer start switch** (12);

— **timer reset button** (11), setting the timer back to zero;

— **tubes** (7 and 8) connecting the control unit to the sampler. Pressure tap construction shall be in accordance with ISO 9644.

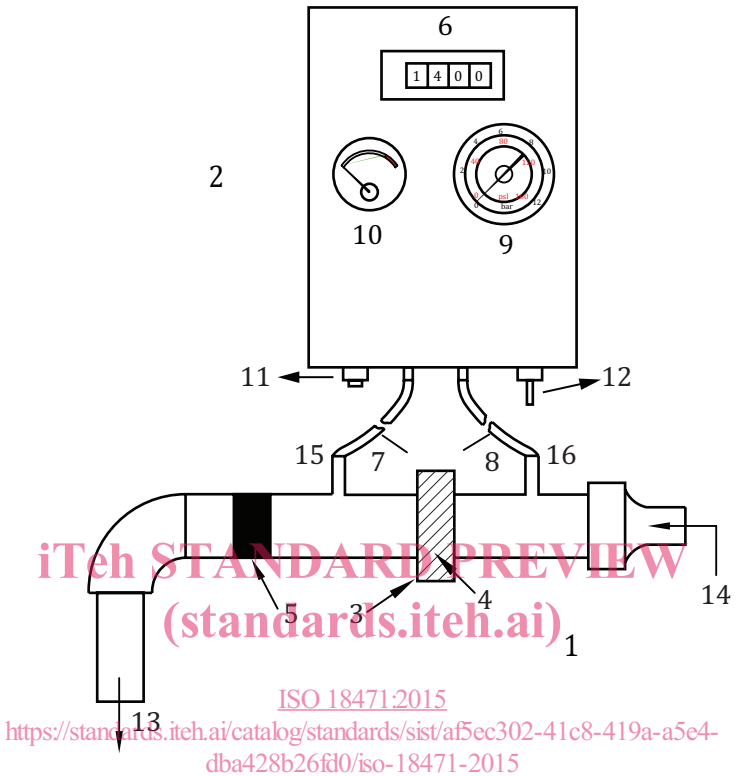
5.2 Mode of operation

5.2.1 Insert a “sealed” screen, same as that used for testing but that is covered and sealed by a thin plastic film into the screen housing. Apply an inlet pressure of $(1^{+0,2})$ bar. Make certain that no water is emerging from the CCM outlet.

5.2.2 Replace the "sealed" screen with a CCM test screen, having filtration grade equal to that declared by the manufacturer of the filter under test.

5.2.3 Set the timer to zero by pressing the reset button.

5.2.4 To begin the test, open the water inlet to the sampler and activate the timer start switch.



Key

1	sampler	9	pressure gauge
2	control unit	10	differential pressure gauge
3	screen housing	11	timer reset button
4	filtering screen	12	timer start switch
5	flow rate regulator	13	water outflow
6	count up digital timer	14	water inflow
7	pressure tube	15	low pressure
8	pressure tube	16	high pressure

Figure 1 — CCM schematic construction

6 CCM test screen characteristics

The screens used in the CCM shall be made of 316 stainless steel and have plain weave of square mesh with the characteristics specified in Table 1.

Table 1 — CCM test filter screens characteristics

Aperture width[a] µm (micron)	**Mesh count**[a] apertures/in	**Wire diameter** mm
60	250	0,04
80	200	0,05
100	140	0,08
120	120	0,09
140	100	0,11
150	120	0,065
165	105	0,076
180	94	0,09
200	88	0,09
250	62	0,16
300	50	0,20

[a] In case of a discrepancy between **Aperture width** and **Mesh count** data, the **Aperture width** takes precedence.

7 ccuracy of measurements

— **Pressure** shall be measured with an accuracy of ±1 %.

— **Pressure loss** shall be measured with an accuracy of ±1 %, using a differential pressure gauge.

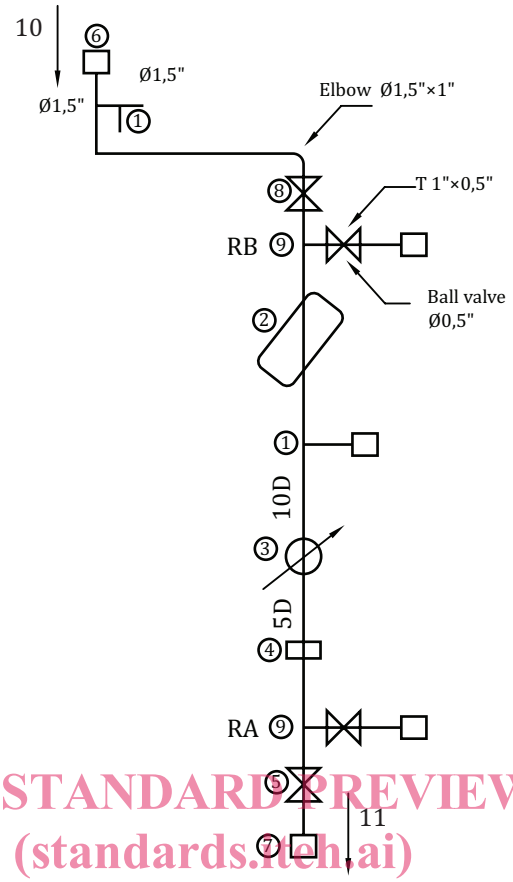
— **Flow rate** shall be measured with an accuracy of ±2 %.

— At the beginning of the test (see 9.2), the flow rate shall not deviate by more than ±2 % from the required flow rate.

— The difference in flow rate between the two CCM devices in the test system shall not exceed 4 %.

8 Test system layout

Prepare the test system as per Figure 2.



Key

1	pressure point – data logger	7	connection union P.E. ⌀32
2	filter to be tested ⌀1”	8	ball valve ⌀1”
3	water meter ⌀1”	9	water checkpoint – CCM
4	flow regulator ⌀1”	10	water inlet
5	pressure reg. valve ⌀1”	11	water outlet
6	connection union P.E. ⌀32		

Figure 2 — Test system layout

9 Test procedure

9.1 Adjust system inlet pressure to 4,0 bar, while water flow to the CCM units is blocked.

9.2 Allow water to flow through the test system. Adjust the flow rate through the tested filter to the mid-point of the flow rate range declared by the filter manufacturer. Then adjust the pressure at the system inlet to between 3,0 bar and 4,0 bar.

9.3 Record the pressure upstream and downstream of the filter and calculate the pressure loss across the clean filter.

9.4 Stop the water flow in the system. Replace the filter medium with a new, unused medium of the same type and characteristics.

9.5 Resume water flow in the system and open the valves to both CCM units.