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Agricultural irrigation equipment — Filters —

Part 3:
Automatic self-cleaning strainer-type filters

Matériel agricole d'irrigation — Filtres —

Partie 3: Filtres à tamis à autonettoyage automatique

Reference number
ISO 9912-3:1992(E)

Foreword

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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.

International Standard ISO 9912-3 was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Sub-Committee SC 18, *Irrigation and drainage equipment and systems*.

ISO 9912 consists of the following parts, under the general title *Agricultural irrigation equipment — Filters*:

— *Part 1: Classification*

— *Part 2: Strainer-type filters*

— *Part 3: Automatic self-cleaning strainer-type filters*

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Agricultural irrigation equipment — Filters —

Part 3:
Automatic self-cleaning strainer-type filters

1 Scope

This part of ISO 9912 specifies the general construction requirements and test methods for automatic self-cleaning strainer-type filters (hereinafter called filters), intended for operation in agricultural irrigation systems.

It does not cover filtration ability, efficiency and capacity (quality of filtration water, time of operation before filter becomes entirely clogged, etc.).

NOTE 1 ISO 9912-2 covers strainer-type filters in general.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 9912. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 9912 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 2859-1:1989, *Sampling procedures for inspection by attributes — Part 1: Sampling plans indexed by acceptable quality level (AQL) for lot-by-lot inspection.*

ISO 9912-2:1992, *Agricultural irrigation equipment — Filters — Part 2: Strainer-type filters.*

3 Definitions

For the purposes of this part of ISO 9912, the definitions given in ISO 9912-2 and the following definitions apply.

3.1 automatic self-cleaning strainer-type filter: Filter having automatic flushing capability as determined by pressure differential, duration of filtration, volume of water filtered, or by some other physical quantity or by any combination of these.

3.2 duration of automatic flushing cycle of filter: Period of time during which water and dirt is flushed out of the filter via the flushing valve during each automatic flushing cycle.

3.3 flushing control mechanism: Mechanism which controls the flushing action of the filter, as determined by one or a combination of physical quantities, such as pressure differential, duration of filtration, volume of water filtered, etc.

3.4 flushing pressure differential: Pressure differential between two points, one upstream and one downstream of the filter element, which initiates the flushing cycle.

3.5 flushing valve: Valve through which flushing water is discharged from the filter.

NOTE 2 This is not the same valve as that defined in ISO 9912-2:1992, definition 3.6 "drain valve; flush valve".

3.6 minimum working pressure: Lowest working pressure declared by the manufacturer which ensures the proper functioning of the device (automatic self-cleaning strainer-type filter, valve, etc.) without an additional high-pressure source.

3.7 preliminary filter element: Body having larger aperture openings than the filter element, designed to protect the cleaning mechanism.

3.8 protective mechanism: Mechanism that prevents repeated flushings of a filter caused either by mechanical failure in the flushing control mech-

anism or by some other factor defined by the manufacturer.

3.9 volume of flushing water: Volume of water flushed from the filter during one flushing cycle.

4 Marking

Each filter shall bear all the markings specified in ISO 9912-2:1992, clause 4. The filter markings shall also include a notched scale which shows the individual setting, where these exist, for the possible choices of adjustment of the automatic self-cleaning cycle.

5 General requirements

All the requirements specified in ISO 9912-2 apply to automatic self-cleaning strainer-type filters, in addition to the requirements and tests specified in this part of ISO 9912.

6 Technical characteristics

A model of a typical automatic self-cleaning strainer filter is given in figure 1.

The construction of an automatic self-cleaning strainer-type filter shall comply with the following specific requirements.

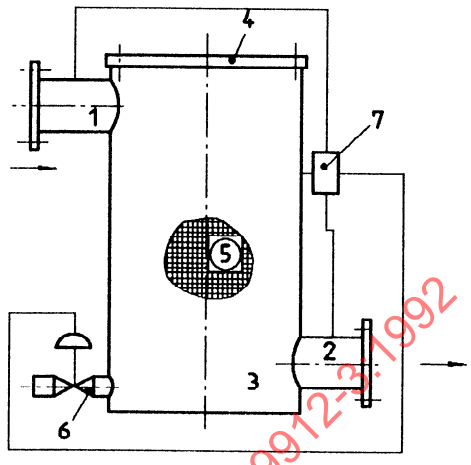
a) The flushing control mechanism shall be included as part of the filter assembly and shall be supplied by the manufacturer together with the filter.

b) The filter control mechanism shall permit manual flushing at any time, irrespective of the conditions that apply to automatic flushing.

c) The construction of the filter shall allow for manual operation in the event of failure of the automatic flushing control mechanism.

d) The construction of the filter body shall permit dismantling for maintenance (or for cleaning if the filter is also designed for manual cleaning).

e) The coordination of the cleaning operation and the opening of the flushing valve shall prevent water flowing out of the flushing valve unless the filter is being cleaned; no cleaning shall be possible unless the flushing valve is open.



Key

1 Inlet
2 Outlet
3 Strainer (filter) housing
4 Strainer (filter) housing cover
5 Filter element
6 Flushing valve
7 Filter flushing control mechanism

Figure 1 — Typical automatic self-cleaning strainer-type filter

In addition, the following construction features are recommended.

f) The filter may be fitted with a device to enable adjustment of the preset value of the filter flushing control mechanism for activation of the flushing control mechanism and for control of the duration of the automatic flushing cycle of the filter.

g) The filter may be equipped with a protective mechanism that prevents repeated flushings (see 3.8).

h) It is recommended that all the hydraulically operated accessories of the filter should be operated by filtered water, with the exception of the inlet pressure signal which may come from the prefiltered water.

7 Sampling and acceptance requirements

The type-tests and acceptance tests shall be as specified in 7.1 and 7.2, and tables 1 and 2. [Table 1 is a repetition for convenience from ISO 9912-2:1992 (table 2).]

7.1 Type-tests

If the filters are produced as a regular product series, the test specimens shall be taken at random by the representative of the test laboratory from a quantity of at least 20 automatic self-cleaning strainer-type filters. The number of test specimens required for each test shall be as specified in tables 1 and 2.

If the filters are not produced as a regular production series and the number of filters produced is less than 20, no requirement is stipulated as to the sampling procedure.

If the number of defective specimens in the sample is equal to or less than the acceptance numbers shown in tables 1 and 2, the lot shall be accepted. If the number of defective specimens in the sample is greater than the acceptance number, the lot shall be rejected.

Table 1 — Required number of test specimens and acceptance number

Clause[1)]	Name of test	No. of test specimens	Acceptance No.
7.2[2)]	Resistance of strainer to internal hydrostatic pressure	3	1[3)]
7.3	Resistance of strainer to internal hydrostatic pressure at high temperature	3	1[3)]
7.4	Resistance of filter element to buckling or tearing	2	0
7.5	Tightness of filter element	3	0
7.6	Clean pressure drop	1	0

1) All clause numbers in this table refer to ISO 9912-2:1992.

2) For metal-body strainers, see ISO 9912-2:1992, subclauses 7.2.1 and 7.2.2; for plastics body strainers, see ISO 9912-2:1992, subclauses 7.2.1 and 7.2.3.

3) Refers only to leakage at joints; leakage through the strainer housing or damage to the filter element is cause for rejection of the lot.

7.2 Acceptance tests

When acceptance of manufacturing lots or of shipments of strainers is required, the sampling shall be conducted in accordance with ISO 2859-1:1989, based on AQL 2,5 and special inspection level S-4.

All test specimens in the sample, selected at random in accordance with table II-A of ISO 2859-1:1989 shall be tested in accordance with ISO 9912-2:1992, subclause 7.2.

The shipment or manufacturing lot is considered to comply with this part of ISO 9912 if the number of defective specimens found in the test does not exceed the acceptance number specified in ISO 2859-1:1989.

For the other tests, the number of test specimens shall be selected at random from the sample in accordance with tables 1 and 2. The shipment or manufacturing lot is considered to comply with this part of ISO 9912 if the number of defective specimens found in the other tests does not exceed the acceptance number specified in tables 1 and 2.

Table 2 — Required number of test specimens and acceptance number

Clause[1)]	Name of test	No. of test specimens	Acceptance No.
8.1.1	Volume of flushing water and duration of flushing	3	0 [8.1.1 a)] 1 [8.1.1 b)]
8.1.2	Volume of flushing water and duration of flushing	2	0
8.2	Flushing control mechanism		
8.2.1	Mechanism activated by pressure differential sensor	3	1
8.2.2	Mechanism activated by duration of operation	3	1
8.2.3	Mechanism activated by volume of filtered water	3	1
8.2.4	Mechanism activated by some other physical quantity	3	1
8.3	Test of protective mechanism	2	0
9.2	Tests following completion of simulated-use performance test	1	0
9.2.2	Visual test	1	0

1) All clause numbers in this table refer to this part of ISO 9912.

8 Performance tests of new filters

The concepts of flushing cycle and/or flushing duration may not apply to all filters within the scope of this part of ISO 9912 (e.g. automatic filters which flush continuously by flushing the clogging materials from the area of the filter body together with some of the water).

The tests and the requirements given in clauses 8 to 10 shall not apply to filters whose construction or manner of operation do not accord with the concept inferred by the test process described in the applicable clause.

8.1 Volume of flushing water and duration of flushing

8.1.1 Connect the filter as described in the manufacturer's instructions to a test assembly to simulate field installation. The test assembly shall be capable of supplying at least twice the maximum flushing volume as declared by the manufacturer at the nominal pressure. Attach a collecting vessel to the flushing opening of the filter for collection of the flush water. Set the pressure at the filter inlet to the minimum working pressure and perform the flushing cycle manually. Measure the time from the moment the flush valve begins to open to the time it shuts.

Repeat the test once at the critical pressure drop before failure and once at the nominal pressure.

The following requirements shall be met.

a) The volume of water measured in each of the tests shall not exceed the volume of flushing water declared by the manufacturer by more than 7 %.

b) The duration of flushing measured shall not deviate from the flushing duration declared by the manufacturer by more than ± 15 %.

8.1.2 Connect the filter as described in 8.1.1. The test assembly shall be capable of supplying at least the maximum flow-rate within the range of recommended flow-rates at a pressure equal to the safe maximum pressure drop. Attach a collecting vessel to the flushing opening of the filter for collection of the flush water. Operate the filter at a flow-rate equal to the flow at the middle of the range of recommended flow-rates with the pressure at the filter equal in value to the safe maximum pressure drop. Manually activate the flushing mechanism twice. At each activation, measure the flushing duration and the volume of flush water (from the moment the flushing valve opens to the moment it closes).

The following requirements shall be met.

a) The flushing mechanism shall operate satisfactorily.

b) The volume of water measured in each of the tests shall not exceed the volume of flushing water declared by the manufacturer by more than 7 %.

c) The duration of flushing measured shall not deviate from the flushing duration declared by the manufacturer by more than ± 15 %.

8.2 Flushing control mechanism

8.2.1 Mechanism activated by pressure differential sensor

Disconnect the "low" pressure connection of the differential valve and connect it to an external pressure source. Leave the "high" pressure connection as connected for regular filter operation.

Apply a pressure equal to the minimum working pressure at the filter inlet and at the external pressure source. Gradually reduce the pressure at the external pressure source until the flushing operation is performed.

Repeat the test once with a filter inlet pressure of 350 kPa and once more with a filter inlet pressure equal to the nominal pressure.

The pressure differential (the filter inlet pressure minus the external source pressure) that causes flushing shall not deviate from the pressure differential declared by the manufacturer by more than ± 10 %.

8.2.2 Mechanism activated by duration of operation

Preset the flushing control mechanism to three different time intervals — short, long and intermediate — within the range of possibilities declared by the manufacturer.

Operate the filter with an inlet pressure equal to the minimum working pressure. Measure the time interval between one activation and the next one. Repeat the test with a filter inlet pressure equal to the nominal pressure.

The time interval between the two activations shall not deviate from the preset time intervals by more than ± 10 %.

8.2.3 Mechanism activated by volume of filtered water

Preset the flushing control mechanism to two different volumes of water within the range specified by the manufacturer. One volume is selected from the lower 20 % of the range declared by the manufacturer and the second volume from the upper 20 % of the range declared by the manufacturer. Operate the filter and measure the volume of water flowing through the filter up to activation of the automatic flushing control mechanism.

The measured volume of water flowing through the filter shall not deviate from the preset quantity of water by more than ± 10 %.

8.2.4 Mechanism activated by some other physical quantity

Connect the filter to a water source and make all the adjustments necessary in accordance with the manufacturer's instructions.

Maintain the pressure at the inlet to the filter at the minimum recommended working pressure.

If the control mechanism is adjustable, conduct the test three times with the control mechanism preset differently each time to the lowest, the highest and the mid-range setting, respectively. Otherwise, conduct the test only once.

Operate the filter according to the manufacturer's instructions until three flushing cycles have been completed.

Measure the value of the determining quantity at the initiation of each flushing cycle.

Repeat the entire process with the pressure at the inlet of the filter readjusted to the maximum recommended working pressure.

The following requirements shall be met.

a) The flushing cycle shall be initiated and shall proceed as prescribed by the manufacturer.

b) The value of the determining quantity at the initiation of any flushing cycle shall not deviate by more than $\pm$ 10 % from the preset value for an adjustable mechanism, or from the value declared by the manufacturer for a non-adjustable mechanism.

8.3 Test of protective mechanism

If the filter is equipped with a protective mechanism to prevent repeated flushing, this mechanism shall be tested as described below.

Operate the filter with an inlet pressure equal to the minimum working pressure. Perform three consecutive flushings manually.

The filter shall flush satisfactorily.

Continue to operate the flushing control mechanism manually several times until the protective mechanism stops the flushing cycle or create by artificial means the conditions declared by the manufacturer which will activate the protective mechanism.

The number of flushings until activation of the protective mechanism, or (according to type of control mechanism) the time that elapses until activation of the protective mechanism, shall not deviate from the manufacturer's declaration by more than $\pm$ 20 %.

9 Performance test of filters following simulated use

These tests are designed to evaluate the performance of a filter after 10 000 flushing cycles under the simulated-use conditions in 9.1.

9.1 Simulated-use conditions

Operate the filter using sediment-free water.

Initiate each flushing cycle by appropriate means to be determined and described by the laboratory. Since the automatic flushing control capability will generally not be usable in the tests, wear of the flushing control mechanism is not taken into account.

Activate each flushing cycle 10 000 times by the following procedure.

a) Establish the pressure at the filter inlet and maintain it for at least 10 s at the nominal pressure and ensuring an acceptable flow-rate.

b) Carry out the following operation: while maintaining the pressure at the filter inlet at not less than the minimum working pressure (3.6), allow the flushing cycle to conclude without internal intervention.

9.2 Tests following completion of simulated-use performance test

9.2.1 Tests after simulated use

After completion of the 10 000 cycles, carry out the tests in a) and b):

a) resistance of filter to internal hydrostatic pressure (ISO 9912-2:1992, subclause 7.2);

b) volume of flushing water and duration of flushing (8.1).

The filter shall meet the requirements specified in each of these tests.

9.2.2 Visual test

Dismantle the filter and examine its internal parts for damage. The parts shall show no damage such as damage to filter body or to moving parts, damage to filtering elements (screens, filtering discs), cracks or fractures.

Signs of wear of the moving parts or seals which do not detract from the functioning of the filter shall not be considered as damage.

10 Information to be supplied by manufacturer

In addition to the information specified in ISO 9912-2:1992, clause 8, the manufacturer shall supply the following information, as applicable:

a) minimum working pressure;

b) pressure differential required to initiate flushing;

c) maximum flow-rate;

d) minimum flow-rate;

e) duration of flushing;

f) volume of flush water;

g) range of possibilities for flushing control according to time, volume, etc.;

h) number of repeat flushings (in the event of failure) until flushing stops in filters equipped with a protective mechanism;

i) size of pipe for disposal of flush water.

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