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Agricultural irrigation equipment — Filters —

Part 2:
Strainer-type filters

Matériel agricole d'irrigation — Filtres —

Partie 2: Filtres à tamis

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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.

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 9912-2 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 2:
Strainer-type filters

1 Scope

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

It does not cover filtration ability, efficiency and capacity (quality of filtered water, time of operation before strainer becomes entirely clogged, etc.), nor does it deal with strainer-type filters that have integrated automatic self-cleaning devices (which are covered in ISO 9912-3).

NOTE 1 Requirements and methods for testing filtration ability are under study, and will be added later.

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 7-1:1982, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Designation, dimensions and tolerances.*

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 7005-1:1992, *Metallic flanges — Part 1: Steel flanges.*

ISO 7005-2:1988, *Metallic flanges — Part 2: Cast iron flanges.*

3 Definitions

For the purposes of this part of ISO 9912, the following definitions apply.

3.1 strainer-type filter; strainer: Appliance containing one or more filtering elements, used for separating suspended solids from the water flowing through the appliance by collecting them on the face of the filter element.

3.2 filter element: Strainer internal component, consisting of a perforated plate, screen, mesh, discs, or a combination of these, intended to retain solid contaminants.

3.3 clogged filter element: Filter element which has collected a quantity of solid contaminants such that it cannot maintain the highest flow-rate recommended by the manufacturer without exceeding the safe maximum pressure drop.

3.4 strainer housing: That part of the strainer that contains all the strainer components, except for the control equipment.

3.5 strainer housing cover: Removable cover permitting assembly, disassembly and cleaning of the strainer elements.

3.6 drain valve; flush valve: Valve normally installed at the bottom of the strainer and intended for draining or flushing the strainer housing.

3.7 nominal pressure: Maximum static water pressure immediately upstream of the strainer inlet at which the strainer is required to operate.

3.8 clean pressure drop: Pressure drop in a clean strainer measured with a flow of clean water under normal conditions.

3.9 safe maximum pressure drop: Maximum allowable difference between inlet and outlet pressures across the strainer when the filter element has become clogged to the extent of requiring cleaning or replacement.

3.10 critical pressure drop before failure: Maximum allowable pressure difference across each filtering element of the strainer which will not cause failure of the filter element.

3.11 range of recommended flow-rates: Range of flow-rates declared by the manufacturer for proper operation of the strainer supplied.

3.12 nominal size: Conventional numerical designation to indicate the size of the strainer. This designation equals the nominal diameter or threaded size of a pipe to which the strainer can be connected without intermediate fittings.

NOTE 2 A single number designation is adequate if the inlet and outlet ports are the same size.

3.13 aperture size: Dimension, expressed in microns, of the aperture in the filter element, such as the diameter of a round opening or the side of a square opening.

3.14 strainer length: Overall length between the extremities of the connecting threads of the strainer, the face-to-face distance between the connecting flanges, or the distance between centre-lines of the parallel inlet and oulet ports, either threaded or flanged.

4 Marking

Each strainer shall bear a readily visible, durable marking giving the particulars specified in 4.1 and 4.2.

4.1 Strainer housing

a) name of manufacturer and/or registered trademark;

b) model identification;

c) nominal size;

d) nominal pressure;

e) arrow indicating the direction of water flow;

f) (optional marking) aperture size (if the strainer is supplied with the filter element already assembled). The aperture size may be marked on an adhesive label affixed to the strainer housing in a prominent position.

4.2 Filter element

a) name of manufacturer and/or registered trademark;

b) aperture size. The size of the aperture may be indicated by a marking such as a colour that is defined in the manufacturer's catalogue.

5 Technical characteristics

5.1 General

The strainer parts that are in contact with water shall be of non-toxic materials, and shall be resistant to or protected against degradation caused by existing working conditions and types of water used in agricultural irrigation. The strainer housing shall also be resistant to environmental conditions. Components belonging to strainers of the same size, type and model, and produced by the same manufacturer, shall be interchangeable.

Plastics parts of the strainer that are exposed to ultra-violet (UV) radiation under the normal working conditions in which the strainer operates shall include additives to improve their resistance to UV radiation. Plastics parts that enclose waterways shall be opaque or shall be provided with an opaque cover designed to block all light from reaching clear waterway enclosures.

The construction of the strainer shall be such as to facilitate its proper installation in its intended location and position.

The strainer shall be so designed that, after assembly of the filter element in the strainer housing, all the water flowing through the strainer flows through the filter element.

5.2 Strainer housing

Where the size of a thread-connected strainer housing or its configuration does not allow for easy handling of the housing while connecting or disconnecting pipework, the strainer housing shall be provided with a boss or with other means of facilitating connection and disconnection of the strainer housing to and from the network.

The strainer shall be so designed that contaminants accumulated on the filter element or in the strainer housing do not enter the supply line when cleaning

or replacing the filter element. Construction of the filter element should allow disassembly, cleaning and reassembly of the filter element without removal of the strainer from the supply line.

The strainer housing cover shall be attached to the strainer housing by means of threads or bolts or in a manner that ensures full and uniform tightness around the cover periphery. Means shall be provided to ensure the tightness of the filter element ends.

The length of strainers of the same length, size, type and model, and produced by one manufacturer, shall not deviate from the length listed in the manufacturer's catalogue by more than the tolerance specified in table 1.

Table 1 — Length tolerances

Dimensions in millimetres

Length of strainer	Permissible deviation[1]
⩽ 400	± 2
> 400	± 3

1) The length tolerance only concerns filter housings where the axes of the inlet and outlet ports are parallel.

5.3 Connections

The threads of strainers with threaded ends for direct connection to the supply line shall comply with ISO 7-1. However, other threads shall be allowed provided that a suitable adapter is supplied with each threaded connection, so that it complies with ISO 7-1.

Flanged connections shall comply with ISO 7005-1 or ISO 7005-2, according to the material from which the strainer housing is made.

For other types of connections, the ends of the strainers shall be designed to match.

A suitable connection shall be provided on the drain outlet to facilitate connection of drainage means from the strainer site.

6 Sampling and acceptance requirements

6.1 Type-tests

If the filters are produced as a regular product series, the test specimens shall be taken at random by the test laboratory representative from a quantity of at least 20 strainers. The number of test specimens required for each test shall be as specified in table 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 number specified in table 2, the lot shall be considered acceptable. If the number of defective specimens in the sample is greater than the acceptance number, the lot shall be rejected.

Table 2 — Required number of test specimens and acceptance number

Clause	Name of test	No. of test specimens	Acceptance No.
7.2 [1]	Resistance of strainer to internal hydrostatic pressure	3	1[2]
7.3	Resistance of strainer to internal hydrostatic pressure at high temperature	3	1[2]
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) For metal strainer housings, 7.2.1 and 7.2.2; for plastics strainer housings, 7.2.1 and 7.2.3.

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

6.2 Acceptance tests

The test specified in 7.3 is only performed as part of the type-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 7.2.

The shipment or manufacturing lot complies 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, except for the test specified in 7.3, the test specimen shall be selected at random to accord with the number specified in table 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 table 2.

7 Mechanical tests

7.1 General

All tests shall be performed with water at a temperature of between 20 °C and 30 °C, except for the test in 7.3, where the water temperature shall be 60 °C ± 2 °C.

The instruments used for measuring the various parameters shall permit measurements to an accuracy of within ± 2 % of the actual values.

7.2 Resistance of strainer to internal hydrostatic pressure

7.2.1 Preparation

Perform this test on the strainer with all its parts assembled for normal operation.

Close the strainer housing cover according to the manufacturer's instructions. Measure the force or moment required to do so.

Before conducting the test on strainers equipped with a drain valve, open and close the valve 100 times while applying a water pressure at the valve inlet equal to the nominal operating pressure multiplied by 0,75 at the valve inlet.

Close the strainer outlet by suitable means. Apply a hydraulic pressure at the strainer inlet and check that no air remains trapped in the system and that the water reaches all places that may be under pressure during strainer operation.

7.2.2 Metal strainer housing

Raise the pressure gradually to the declared nominal pressure multiplied by 1,5, and maintain this pressure for 1 min.

The strainer shall withstand the test pressure without suffering damage or permanent deformation.

If the seal of the housing cover swells or is dislodged, apply the pressure for an additional 15 min and recheck for leakages.

No signs of leakage shall appear through the strainer housing, the strainer housing cover seal or the drain valve.

7.2.3 Plastics strainer housing

Test methods and requirements for resistance to hydrostatic pressure of the plastics strainer housing are under study and will be added at a later stage.

Until these test methods are determined, strainer filters with plastics strainer housings shall be tested according to the procedure described in 7.2.2.

7.3 Resistance of strainer to internal hydrostatic pressure at high temperature

This test is only performed for strainer filters with nominal sizes up to and including 152,4 mm (6 in).

Proceed as described in 7.2.1 and 7.2.2, but fill the strainer with water at a temperature of 60 °C ± 2 °C, while immersing the strainer in a bath in which the water is kept at a constant temperature of 60 °C ± 2 °C, and raise the internal pressure to the nominal pressure. Maintain the pressure and temperature for 15 min.

The strainer shall withstand the test without showing any signs of leakage.

After completing the test, disassemble the strainer and check the parts for damage.

The parts of the strainer shall show no signs of damage or permanent deformation.

7.4 Resistance of filter element to buckling or tearing

This test is only performed for strainer filters with nominal sizes up to and including 152,4 mm (6 in).

7.4.1 Use a thin film of impermeable plastics, for example polyethylene or polyvinyl chloride, to seal the filter element against the passage of water through it.

In strainers in which the unfiltered water passes normally from the outside to the inside of the filter element, wrap the film around the outside of the filter element. In strainers where the unfiltered water flows normally from the inside to the outside of the filter element, its inside is lined with the plastics film.

The filter element may be sealed in any other manner, provided the seal does not increase or decrease the resistance of the filter element to buckling or tearing.

Assemble the sealed filter element in the strainer housing and close the strainer housing cover as described in 7.2.1.

Keeping the outlet open, apply a hydraulic pressure at the inlet of the strainer and raise the pressure gradually to the nominal pressure. Maintain this pressure for 5 min.

The leakage allowed at the strainer outlet shall not exceed 0,1 % of the maximum recommended flow-rate. This leakage shall remain steady or lessen during the test.

In strainers containing several filter elements in series, perform the test on each filter element separately.

7.4.2 Open the strainer housing cover as specified in the manufacturer's instructions and measure the force or moment required to do so.

The force or moment required to open the cover shall not exceed the closing force or moment, measured in 7.2.1, multiplied by 1,5.

Examine the filter element visually.

The filter element shall show no signs of permanent deformation, cracks or tears.

7.4.3 Test those strainers which, according to the manufacturer's declaration, can be cleaned during operation by means of full flow reverse flushing, again as described in 7.4.1 and 7.4.2, but with the following modifications.

a) In strainers in which the normal water flow is from the outside to the inside of the filter element, line the inside of the filter element with a plastics film.

b) In strainers in which the normal water flow is from the inside to the outside of the filter element, wrap the plastics film around the outside of the filter element.

c) Keeping the inlet open, apply a hydraulic pressure at the outlet of the strainer and raise the pressure gradually from zero to that equal to the critical drop before failure.

7.5 Tightness of filter element

NOTE 3 The test specified in this clause is not performed on strainers in which no leakage has been observed in the test performed according to 7.4.1. Also this test is not performed on strainers whose strainer element or whose construction does not enable the strainer element to be replaced, as required in this clause, or where the water-tightness of the strainer element consisting of plastics screens could affect the test results.

This test is only performed for strainer filters with nominal sizes up to and including 152,4 mm (6 in).

Instead of the regular filter element, install in the strainer a solid impermeable element identical in size to the regular filter element. Close the cover of the housing as described in 7.2.1.

Repeat the test described in 7.4.1.

The leakage allowed at the strainer outlet shall not exceed 0,05 % of the maximum recommended flow-rate. This leakage shall remain steady or lessen during the test.

In strainers containing several filter elements, perform the test on each filter element separately.

7.6 Clean pressure drop

Measure the pressure drop of the clean strainers in the range of flow-rates declared by the manufacturer plus 20 % beyond each end of the range. Prescreen the water used for testing pressure loss in clean filter elements by passing the water through a filter element with an aperture size at least 50 % smaller than the filter elements being tested.

The measured pressure drop shall not be more than 10 % greater than the pressure drop declared by the manufacturer.

8 Information to be supplied by manufacturer

The following information shall be supplied by the manufacturer:

a) name of manufacturer and address of manufacturer or supplier;

b) model and catalogue number of strainer;

c) strainer data:

1) nominal size,

2) nominal pressure,

3) critical pressure drop before failure for each type of filter element,

4) range of recommended flow-rates,

5) dimensions of strainer,

6) type of connections to piping network,

7) strainer length,

8) aperture size,

9) curve of clean pressure drop in the range of recommended flow-rates plus 20 % beyond each end of the range,

10) safe maximum pressure drop;

d) closing instructions;

e) instructions for assembly, operation, cleaning and maintenance, including limitations and prohibitions;

f) list of spare parts;

g) resistance to chemicals commonly used in agricultural irrigation.

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