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Agricultural irrigation equipment — Filters for micro-irrigation —

Part 1: Terms, definitions and classification

Matériel agricole d'irrigation — Filtres pour micro-irrigation — Partie 1: Termes, définitions et classification

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Foreword

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

— *Part 1:Terms, definitions and classification*

— *Part 2: Strainer-type filters*

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

Introduction

Clogging of irrigation system components and, in particular, of drip emitters, is one of the main problems encountered in micro-irrigation. Materials causing clogging include debris, suspended particles of organic and inorganic origin (sand, silt, clay, plastics, algae and water-borne insects), chemical deposits (calcium carbonate and magnesium carbonate, calcium sulphate, metal oxides and metal hydroxides) and biological suspensions (slime secretions and fibres). Severe clogging problems are often the result of a combination of a number of these.

The effect of the clogging materials differs according to the water source (see Annex A for a list of irrigation water sources). With surface water supplies, water quality may also vary from one season to another and with chemical injection. In addition, clogging hazards depend on the operating conditions, pumping regime, irrigation system and chemical injection program.

The function of the filter in an irrigation system is to remove materials from the water that can clog or otherwise foul the various components of the system. However, under typical irrigation conditions, and in view of the wide range of size and hardness of suspended particles in irrigation water, complete removal of all suspended particles cannot be expected.

Moreover, under conditions of alkaline or hard water when accompanied by conditions of high biological activity and/or high suspended organic particle content, the materials passing through the filter are liable to coalesce in the piping system and/or in the emitters and to cause clogging. Hence, depending on the water quality, it could be necessary to use two or more filters in series in different parts of the system to minimize clogging.

Under conditions of problematic water and high filtration efficiency, clogging of the filters themselves may prove to be the main problem and completion of an irrigation set may be impeded due to the need for their frequent cleaning.

Various operating methods, using either absorption or separation, are employed in order to separate and/or remove clogging materials from irrigation water. In turn, separation can be by means of surface separation (gravity surface separation, pressurized surface separation or self-circulating separation), centrifugal separation, entrapment or interception.

Agricultural irrigation equipment — Filters for micro-irrigation —

Part 1: Terms, definitions and classification

1 Scope

This part of ISO 9912 defines terms used in relation to filters intended for agricultural micro-irrigation systems — in particular, pressurized systems — and provides a means of classifying those filters according to filtration method, structure, operating principle and function. It does not deal with classification according to the type of water intended to be filtered; nor does it apply to the classification of filters for potable or domestic water use.

2 Terms and definitions

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

2.1
filtration
process employing a permeable medium and/or spinning component to separate, from water, materials that would clog an irrigation system, also employing a means for removing those materials from the permeable medium or spinning component such that the capacity of the medium or component to separate the materials is renewed

2.2
pre-filtration
process for separating primarily large particles from water to be filtered with the object of reducing the clogging of the filter elements and, consequently, the head loss across the filter elements

2.3
interception
method of removing suspended particles from water, by gravity, employing gravel partitions between reservoir basins to separate the suspended particles from the water

2.4
surface separation
method of unpressurized separation that depends on gravity and employs an inclined separating element, such as a screen, mesh or strainer, to separate suspended particles and larger clogging material from the water

2.5
centrifugal separation
method of separation that separates, from water, clogging material heavier than water and that employs a spinning technique using centrifugal forces exerted by the filtered water, as in a hydrocyclone

2.6
entrapment
method of filtration in which clogging material is captured within the interior of a three-dimensional filter medium

2.7
self-circulating separation
method of filtration that employs a screen, or any other suitable filter medium, and a spinning technique used with or without flow adjustment, for separating clogging materials from water

2.8
strainer-type filter
strainer
device containing one or more filter elements, such as a screen or mesh, used for separating clogging materials from water flowing through the device by collecting it on the surface of the filter element, or elements

2.9
filtrate
debris, suspended particles of organic or inorganic origin, or other contaminants removed from water in the filtration process

2.10
flushing
method of removing clogging material from a filter using water without removal of the filter element or, following removal of the element, by manually removing clogging material from the filter element using water

2.11
back flushing
reverse flushing
method of removing filtrates from a filter by passing filtered water through the filter medium or over the surface of the filter element, in a direction opposite to the normal flow of water, to remove accumulated, trapped or separated filtrates from the filter, without disassembling the filter

2.12
continuous flushing
method of removing clogging material from a filter element by controlled continuous flow of purge water

2.13
through flushing
flushing by means of high-velocity, high-pressure flow through a discharge valve or outlet used for filters especially designed for this type of flushing

2.14
simultaneous back flushing
flushing occurring simultaneously through all areas of the filter element or through all the individual elements of a multi-element filter

2.15
sequential back flushing
back flushing of one or more individual filter elements functioning in parallel after their removal from service for back flushing, frequently using filtered water from some or all of the remaining filter elements

2.16
directed jet flushing
flushing that employs a high-velocity stream of clean water directed at a portion of the area of a filter element on the downstream side of the filter, thus causing a localized reverse flow that flushes the filtrate from a portion of the filter element, and which then moves over the entire area of the element to progressively back flush all of it

2.17
disposable element filter
filter that cannot be flushed or cleaned from which clogging material is removed when the filter element is replaced

2.18
automatic flushing filter
filter in which both the initiation and the termination of discrete flushing cycles are activated automatically by different means (pressure drop, time, volume of water passing through the filter, etc.)

2.19
semi-automatic flushing filter
filter in which the flushing sequence or cycle is manually activated, followed by automatic termination of flushing, generally by means of time or volume of flushing water

2.20
manual flushing filter
filter constructed so that manual opening of a valve causes a discharge appropriately oriented and of sufficient volume and velocity to flush the filter without disassembly

2.21
manually cleaned filter
filter that must be disassembled and manually washed using water to remove filtrates from the filter element

2.22
disc filter
filter in which the filter element is composed of discs with grooved or textured surfaces arranged one on top of the other to form a stack, creating a porous space between adjacent discs within which the filtrate is trapped or deposited

2.23
cartridge filter
filter using a media filter element held together as a single replaceable component of the filter for cleaning purposes

2.24
filter element
component or assembly that embodies or holds together the filter medium or surface separation device that removes the filtrates from water by entrapment or separation

2.25
strainer filter element
component of a strainer-type filter consisting of a perforated plate, screen, mesh, or a combination of these, intended to retain clogging materials larger than a specified size from the water flowing through the component

2.26
media filter element
depth filter element
component, housing or assembly containing a three-dimensional filter medium such as sand, gravel, textile, fibres or a porous mass of bonded particles, employing entrapment as a method of filtration

2.27
filter medium
porous permeable material employed in filtration within which the filtrate is trapped or deposited

2.28
pressurized filter
filter designed for operation with an inlet pressure greater than atmospheric pressure

2.29
gravity filter
filter that does not employ pressure or a vacuum to produce a high differential pressure but in which the driving force for filtration is provided solely by the elevation of the free surface of water contained in the filter above the filter medium

2.30
vacuum filter
filter designed for operation in which the discharge side of the filter is below atmospheric pressure, as on the suction side of a pump

2.31
hydrocyclone
device in which clogging material is separated from water by a centrifugal force resulting from rotation of the water, generally by introducing the water so that it flows in a tight vortex and the clogging material is thrown to the walls, causing the bulk of the water to exit from the chamber at the centre of the vortex and the clogging material and the rest of the water to exit from the chamber through its apex or bottom

2.32
in-line filter
co-axial filter
filter for which the inlet and the outlet are coaxial

2.33
on-line filter
non-coaxial filter
filter in which the inlet and the outlet are not coaxial

2.34
filter housing
component of a filter that houses or supports the filter medium

2.35
media filter
depth filter
filter in which clogging material is trapped within the interior of a three-dimensional filter medium, such as sand, gravel, textile, fibres or a porous mass of bonded particles

2.36
sand filter
media filter in which the filter medium consists of sand, gravel or other natural or synthetic particles, in some cases employing layers of the filter medium, each of a different particle size

2.37
nominal flow rate of filtration
flow rate through a filter for proper filtration, as declared by the manufacturer

3 Classification

3.1 General

Filtration devices for irrigation water shall be classified under the following major categories and according to any particular characteristic(s) the device possesses, as specified in 3.2 to 3.11. The intention is to cover all possibilities for different types of devices by classifying them according to

— filtration method, configuration and filter medium,

— system used to remove filtrates from the filter,

— method used to achieve flushing of the filter,

— pressure requirements for operation of the filter,

— velocity of filtration,

— filter structure and flushing arrangement,

— location of the filter inlet and outlet,

— orientation of the filter housing,

— principal material of the filter housing, and

— planned location of the filter in the irrigation system.

3.2 According to filtration method, configuration and filter medium

3.2.1 Strainer-type filters

3.2.1.1 Single-element filters

3.2.1.2 Multi-element filters

3.2.1.3 Configured-element filters

3.2.2 Hydrocyclones

3.2.2.1 Single-centrifuge

3.2.2.2 Dual-centrifuge

3.2.3 Media filters

3.2.3.1 Sand filters

3.2.3.1.1 Uniform-particle filters (single-media)

3.2.3.1.2 Filters with layers of graduated particle sizes (multi-media)

3.2.3.2 Disc filters

3.2.3.3 Cartridge filters

3.2.3.4 Other media filters