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Agricultural irrigation equipment — Control heads

Matériel agricole d'irrigation — Installations de tête

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 734 10 79
E-mail copyright@iso.ch
Web www.iso.ch

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 11738 was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 18, *Irrigation and drainage equipment and systems*.

Annex A of this International Standard is for information only.

Agricultural irrigation equipment — Control heads

1 Scope

This International Standard specifies requirements for the components and method of installation of pressurized irrigation system control heads, referred to hereinafter as irrigation control heads, with a nominal size of up to and including 200 mm.

This International Standard is applicable only to the above-ground components of irrigation control heads for sprinkler irrigation and micro-irrigation (mini-sprinklers, drip irrigation, etc.). It is applicable to the basic irrigation control head, on which other irrigation control and command components (electrical, electronic and hydraulic) may be assembled, but does not deal with these additional components.

This International Standard is not applicable to systems and/or components that may be required to prevent the water from freezing in the irrigation control head, such as dry-barrel hydrants or other types of hydrants.

This International Standard does not specify construction or operating requirements for the individual components that make up the irrigation control head. These requirements are specified in the relevant standards for each component.

Systems whose irrigation control heads contain components for the injection of agricultural chemicals should be protected by backflow prevention system interlocks, injection line check valves and other safety devices in accordance with local standards or regulations. This International Standard does not cover such equipment.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 7-1:1994, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Dimensions, tolerances and designation.*

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

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

ISO 4064-1:1993, *Measurement of water flow in closed conduits — Meters for cold potable water — Part 1: Specifications.*

ISO 4064-3:1999, *Measurement of water flow in closed conduits — Meters for cold potable water — Part 3: Test methods and equipment.*

ISO 4422 (all parts), *Pipes and fittings made of unplasticized poly(vinyl chloride) (PVC-U) for water supply — Specifications.*

ISO 4427:1996, *Polyethylene (PE) pipes for water supply — Specifications.*

ISO 7714:—[1], *Agricultural irrigation equipment — Volumetric valves — General requirements and test methods.*

ISO/TR 8059:1986, *Irrigation equipment — Automatic irrigation systems — Hydraulic control.*

ISO 9625:1993, *Mechanical joint fittings for use with polyethylene pressure pipes for irrigation purposes.*

ISO 9635:1990, *Irrigation equipment — Hydraulically operated irrigation valves.*

ISO 9911:1993, *Agricultural irrigation equipment — Manually operated small plastics valves.*

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

ISO 9912-3:1992, *Agricultural irrigation equipment — Filters — Part 3: Automatic self-cleaning strainer-type filters.*

ISO 9952:1993, *Agricultural irrigation equipment — Check valves.*

ISO 10522:1993, *Agricultural irrigation equipment — Direct-acting pressure-regulating valves.*

ISO 11419:1997, *Agricultural irrigation equipment — Float type air release valves.*

3 Terms and definitions

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

3.1
activating valve
manually operated valve, hydraulically operated valve, electrically operated valve, volumetric valve or any other type of valve that is used to initiate and shut off the flow of water through an irrigation control head

3.2
automatic self-cleaning strainer-type filter
filter having automatic flushing capability that automatically activates flushing by pressure differential, by duration of filtration, by volume of water filtered, or by some other physical quantity or by any combination of these

3.3
air release valve
valve which opens automatically to allow air from the atmosphere to enter the water pipeline during drainage of the line and/or venting of air from the water pipeline to the atmosphere during filling or during normal operation of the pipeline under pressure

3.4
backflow preventer
mechanical assembly designed to prevent unintended flow of water backwards into the distributing pipes of a water supply system in order to protect against entry of substances that may constitute a hazard to health or the environment

3.5
check valve
valve which is opened by the flow of water and closed by the weight of a check mechanism or by mechanical pressure caused, for example, by a spring, permitting flow in one direction only and preventing reversal of flow

3.6
fertilizer injector tank
pressure vessel connected to an irrigation system in an in-line or on-line configuration, together with the pipes and fittings connecting it to the irrigation system, for the purpose of injecting chemicals into the irrigation system

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1) To be published. (Revision of ISO 7714:1995)

3.7
water-driven chemical injector pump
hydraulic pump intended to inject chemicals into an irrigation system, powered by a single source energy supplied by irrigation water through a hydraulic motor, such as a piston or turbine

3.8
irrigation control head
assembly of components and pipes installed at the head of an irrigated area which serves to control the functioning of an irrigation system from the aspect of initiating and shutting off the flow of water, pressure regulation, water metering, filtration, and injection of chemicals

3.9
irrigation system
assembly of field-installed equipment (pipes, components, devices) which is intended to irrigate a specific area

3.10
irrigation water
water at a temperature not exceeding 60 °C which is of potable quality, water which may contain chemicals of a type and concentration generally used in agricultural irrigation, or water of a quality approved for use in irrigation by national or local standards or codes

3.11
nominal size of an irrigation control head
numerical designation used to refer to the diameter of the pipe at the inlet or the outlet, whichever is smaller, of an irrigation control head

3.12
nominal size of a component
numerical designation used to refer to the size of an irrigation control head which is identical to the nominal diameter of the pipe or pipes to which the irrigation control head is intended to be connected directly without an intermediate fitting

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

3.13
pressure regulator
direct-acting pressure-regulation valve
valve in which the water passage widens or narrows automatically to maintain the pressure at the outlet of the valve under varying pressures or flow rates at the inlet of the valve

3.14
union
threaded coupling which is used to connect two pipes and which does not require rotation of the pipes during assembly and disassembly

3.15
media filter
depth filter
media 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

3.16
strainer-type filter
filter containing a filter element that consists of a perforated plate, screen or mesh, or a combination of these, intended to retain suspended particles larger than a given size from the water flowing through the component

3.17
volumetric valve
valve designed to deliver automatically pre-set quantities of water for irrigation purposes at various rates of flow by measuring volumetrically the quantities of water flowing through the valve

3.18
pressure regulation
reduction of pressure prevailing in a supply line to maintain it close to a pre-set value in an irrigation system

3.19
filtration
process which employs a permeable medium and/or a spinning component to separate from the water any materials that would clog an irrigation system and which also employs a means for removing these materials from the permeable medium or the spinning component in order to renew the capacity of the permeable medium or the spinning component to separate these materials from the water

3.20
chemigation
injection of chemicals, including fertilizers, into irrigation water and conveyance of these chemicals to plants

3.21
automation
methods and means of activating or terminating operation of an irrigation system or of changing its operating conditions according to a pre-set plan without direct manual intervention

3.22
flow regulation
controlling the flowrate of water to reduce it to that required in an irrigation system and maintain it at a relatively constant value

4 Classification

Irrigation control heads are classified according to their main function, as indicated in 4.1 to 4.6.

NOTE Most irrigation control heads fulfil a number of functions simultaneously. The following classification is made principally in order to facilitate reference to these functions in this International Standard.

4.1 Irrigation control head for filtration

Strainer-type filter, automatic filter, media filter, etc.

See examples in Figures A.1, A.3 and A.4.

4.2 Irrigation control head for automation

Volumetric valve-controlled, hydraulically operated, electrically operated, electronically operated, computer-controlled, etc.

See examples in Figures A.2 and A.3.

4.3 Irrigation control head for pressure or flow regulation

See examples in Figures A.2 and A.3.

4.4 Irrigation control head for chemigation

With chemical injection tank unit or electrically or hydraulically operated chemical injection pump.

See example in Figure A.5.

4.5 Irrigation control head for measuring flow rate and/or volume

With water meter, flow meter.

See examples in Figures A.2 and A.3.

4.6 Irrigation control head for safety

With check valve, backflow preventer, vacuum relief valve or air-release valve.

See example in Figure A.5.

5 General requirements

5.1 The components comprising an irrigation control head shall comply with the relevant International Standards (see clause 2 for the relevant International Standards in effect at the time of publication of this International Standard).

5.2 The irrigation control head shall be located in a place which is convenient for access and operation, free from weeds or other objectionable growth, such as tall brush and heavy vines, and which is protected from accidental mechanical damage by vehicles, tractors or livestock, and fire.

In medium-textured and fine-textured soils, or in poor drainage conditions, gravel or a similar material shall be spread around the area of the irrigation control head in order to avoid accumulation of mud and maintain stable soil conditions around the irrigation control head. Alternatively, the irrigation control head may be assembled on a rigid platform made of concrete or other suitable material.

Drainage facilities shall be provided in the area of the irrigation control head, especially for those irrigation control heads that contain a filtration device, a chemical injector pump or tank, or a discharging backflow preventer.

The drainage shall be such that spills of chemicals or irrigation water containing injected chemicals cannot return directly to ground or surface water supplies and shall contain them in an environmentally sound manner.

The irrigation control head shall be installed in a manner to prevent access to it by children or unauthorized persons who might tamper with the components or with the chemicals. This can be accomplished with fenced enclosures or locking mechanisms on the various components and containers.

5.3 The height of the installation shall provide for convenient disassembly and assembly of the various components for the purpose of cleaning, repair and replacement while preventing entry of dirt or debris into the irrigation system. The components shall be installed at a minimum height of 0,4 m above the ground surface. This requirement does not apply to system components standing on the ground surface such as media filters.

5.4 Irrigation control heads shall be supported to prevent or reduce structural stresses in their components and to prevent vibration of the irrigation control heads during operation.

The required stabilization shall be obtained by a thrust block at the inlet and outlet pipes and/or suitable supports, if necessary, especially beneath the heavy components of the irrigation control head.

5.5 The distance of the different components of the irrigation control head from each other shall be sufficient to ensure reliable function of meters and gauges in accordance with manufacturer requirements and to facilitate operation of the system, maintenance and cleaning of filters and dismantling and replacement of those parts which are replaceable in the field. The exposed length of the threaded nipples after their assembly shall be sufficient to enable convenient gripping with a pipe wrench.

Water meters shall be installed in accordance with the general specifications concerning these meters.

5.6 The components of an irrigation control head shall be connected to the piping by means of threads, flanges or other suitable means of connection.