INTERNATIONAL STANDARD

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Agricultural irrigation equipment — Irrigation valves —

Part 3: Check valves

Matériel agricole d'irrigation — Vannes d'irrigation —

Partie 3: Clapets antiretour

Reference number
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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.

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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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*.

This second edition cancels and replaces the first edition (ISO 9635-3:2006), which has been technically revised.

ISO 9635 consists of the following parts, under the general title *Agricultural irrigation equipment — Irrigation valves*:

— *Part 1: General requirements*

— *Part 2: Isolating valves*

— *Part 3: Check valves*

— *Part 4: Air valves*

— *Part 5: Control valves*

Agricultural irrigation equipment — Irrigation valves —

Part 3: Check valves

1 Scope

This part of ISO 9635 specifies construction and performance requirements and test methods for check valves, intended for operation in irrigation systems with water at temperatures not exceeding 60 °C, which can contain fertilizers and other chemicals of the types and concentrations used in agriculture.

It is applicable to hydraulically operated check irrigation valves of DN 15 diameter or greater, designed to operate in the fully open and fully closed positions, but which can also operate for extended time periods in any intermediate position.

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 9635-1:2014, *Agricultural irrigation equipment — Irrigation valves — Part 1: General requirements*

ISO 9644:2008, *Agricultural irrigation equipment — Pressure losses in irrigation valves — Test method*

3 Terms and definitions

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

3.1
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

3.2
flow coefficient
K_v
proportionality factor equal to the flow rate, in cubic metres per hour, of water at a temperature between 5 °C and 50 °C, passing through a fully open valve and causing a loss of static head of 1 bar

Note 1 to entry: $Q = K_v \sqrt{\Delta p}$, where Q is the flow rate in cubic metres per hour (m^3/h), and Δp is the pressure across the valve in bar or kilopond/kilogram-force per square centimetre (kp/cm^2, kgf/cm^2).

Note 2 to entry: 1 bar = 0,1 MPa = 105 Pa; 1 MPa = 1 N/mm^2.

Note 3 to entry: Adapted from EN 736–3.

4 Design requirements

Check valves shall be designed in accordance with ISO 9635-1:2014, Clause 4.

Check valves may be equipped with a device to assist closure or balance the weight of the obturator. However, such valves are not considered to have a mechanically-operated obturator.

The manufacturer shall indicate in the relevant technical documentation the orientations in which the check valves fulfil the requirements of this International Standard.

It is recommended that the valves be designed to permit integral repair and maintenance without removing the valve body from the line.

5 Performance requirements

5.1 Mechanical strength

5.1.1 Resistance of shell and all pressure-containing components to internal pressure

Carry out testing in accordance with ISO 9635-1:2014, 5.2.1. Test results shall comply with the requirements of ISO 9635-1:2014, 5.2.1.

5.1.2 Resistance of obturator to differential pressure

Carry out testing in accordance with ISO 9635-1:2014, 5.2.2.

Perform the test with the pressure applied to the downstream side of the obturator.

Test results shall comply with the requirements of ISO 9635-1:2014, 5.2.2.

After testing, the obturator shall not be jammed nor wedged. The differential pressure and flow rate necessary to open the obturator shall not exceed the initial values declared by the manufacturer by more than 10 %. After completion of the test, the differential pressure and flow rate necessary to fully open the obturator shall not exceed the initial values by more than 10 %.

5.1.3 Resistance of valve to bending

Carry out testing in accordance with ISO 9635-1:2014, 5.2.3.

Perform the test with the pressure applied to the downstream side of the obturator.

Test results shall comply with the requirements of ISO 9635-1:2014, 5.2.3.

The bending moment, *M*, to be applied during the test shall be in accordance with Table 1, as a function of DN. The bending moment should be equal to the moment applied for a standard length (6 m) pipe.

Table 1 — Bending moments

DN	Bending moment *M* N · m
8	610
10	615
20	640
25	670
32	730
40	825

NOTE For plastic-bodied valves, the applied bending moment should be equal to the bending moment exerted by a 6 m long plastic tube of the same diameter (DN).

Table 1 *(continued)*

DN	Bending moment *M* N · m
50	1 050
65	1 400
80	1 500
100	2 200
125	3 200
150	4 800
200	7 200
250	11 000
300	15 000
350	19 000
400	24 000
450	28 000
500	33 000
NOTE For plastic-bodied valves, the applied bending moment should be equal to the bending moment exerted by a 6 m long plastic tube of the same diameter (DN).	

5.2 Watertightness and airtightness

5.2.1 Watertightness and airtightness of shell and all pressure-containing components

5.2.1.1 Internal pressure

Requirements and testing shall be in accordance with ISO 9635-1:2014, 5.3.1.1.

5.2.1.2 External pressure

Carry out testing in accordance with ISO 9635-1:2014, 5.3.1.2.

Test results shall comply with the requirements of ISO 9635-1:2014, 5.3.1.2.

5.2.2 Seat tightness

5.2.2.1 Seat tightness at high differential pressure

Carry out testing in accordance with ISO 9635-1:2014, 5.3.2.1. For a type test, continue the test for at least 10 min.

Perform the test with the pressure applied to the downstream side of the obturator.

Test results shall comply with the requirements of ISO 9635-1:2014, 5.3.2.1.

5.2.2.2 Seat tightness at low differential pressure

Carry out testing in accordance with ISO 9635-1:2014, 5.3.2.2. For a type test, continue the test for at least 10 min.

Perform the test with the pressure applied to the downstream side of the obturator.

Test results shall comply with the requirements of ISO 9635-1:2014, 5.3.2.2.

5.3 Hydraulic characteristics

Test results shall comply with the requirements of ISO 9635-1:2014, 5.4. The characteristic given by the manufacturer shall be the head loss as a function of flow or the K_V value.

When measured in accordance with ISO 9644:2008, Clause 4, the head loss shall not be more than 1,1 times the value indicated by the manufacturer.

5.4 Resistance to chemicals and fertilizers

Carry out testing in accordance with ISO 9635-1:2014, 5.5.

Test results shall comply with the requirements of ISO 9635-1:2014, 5.5.

5.5 Endurance

Check valves shall keep their functional capacity after an actual number per Annex A (2 500 cycles) of operations (opening/closing cycles).

The velocity should be approximately 1 m/s.

In order to verify this requirement, test the check valve as set out in Annex A for 2 500 opening/closing cycles. Following this, it shall still pass the leak-tightness tests as set out in 5.2.1 and 5.2.2, and no breakage of any part shall be detected by visual inspection after the dismantling of the valve. Testing is not required for check valves greater than DN 300.

6 Conformity assessment

6.1 General

Test results shall comply with the requirements of ISO 9635-1:2014, 6.1.

6.2 Type tests

Test results shall comply with the requirements of ISO 9635-1:2014, 6.2. Perform the type tests specified in Table 2. Carry them out with the valve in the horizontal position, or in the possible positions as indicated by the manufacturer, depending on the possible uses of the check valve.

6.3 Control of production process and quality system

Test results shall comply with the requirements of ISO 9635-1:2014, 6.3.

NOTE The production control tests given in Table 2 are for information only.

Table 2 — Requirements and testing

Subclause of ISO 9635-1:2014	Corresponding requirement	Type tests[a]	Production tests (informative)
4.1	Materials	See drawings and part lists	—
4.2	DN	See drawings	—
4.3	Pressures	See technical documentation	—
4.4	Temperatures	See materials	—

[a] References to subclauses in this column are to this part of ISO 9635.

Table 2 *(continued)*

Subclause of ISO 9635-1:2014	Corresponding requirement	Type tests[a]	Production tests (informative)
4.5	Design of shell and obturator	See test report or calculation report	—
4.6	End types and interchangeability	See drawings and marking	—
4.7	Operating direction	See drawings	—
4.8	Maximum water velocity	See Clause 4	—
4.9	All materials, including lubricants, in contact with water intended for human consumption	See test reports in accordance with national regulations	—
4.10	Internal corrosion and ageing resistance	See drawings, part lists and technical documentation	Visual inspection of coatings
4.11	External corrosion and ageing resistance	See drawings, part lists and technical documentation	Visual inspection of coatings
5.2.1	Resistance of shell and of all pressure-containing components to internal pressure	See 5.1.1	See 5.2.1
5.2.2	Resistance of obturator to differential pressure	See 5.1.2	—
5.2.3	Resistance of valves to bending	See 5.1.3	—
5.3.1.1	Leak-tightness to internal pressure	See 5.2.1.1	See 5.3.1.1
5.3.1.2	Leak-tightness to external pressure	See 5.2.1.2	—
5.3.2.1	Seat tightness at high differential pressure	See 5.2.2.1	See 5.3.2.1
5.3.2.2	Seat tightness at low differential pressure	See 5.2.2.2	—
5.4	Hydraulic or airflow characteristics	See 5.3	—
5.5	Resistance to chemicals and fertilizers	See 5.4	—
5.6	Endurance	See 5.5	—

[a] References to subclauses in this column are to this part of ISO 9635.

7 Marking

Requirements shall be in accordance with ISO 9635-1:2014, Clause 7. In addition, the direction of flow shall be marked.

8 Packaging

Requirements shall be in accordance with ISO 9635-1:2014, Clause 8.