INTERNATIONAL STANDARD

ISO 9635-2

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Agricultural irrigation equipment — Irrigation valves —

Part 2: Isolating valves

Matériel agricole d'irrigation — Vannes d'irrigation —

Partie 2: Vannes d'isolation

Reference number
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Contents

Page

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 2.

The main task of technical committees is to prepare International Standards. 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 document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 9635-2 was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 18, *Irrigation and drainage equipment and systems*.

This first edition of ISO 9635-2, together with ISO 9635-1, ISO 9635-3, ISO 9635-4 and ISO 9635-5, cancels and replaces ISO 9635:1990, of which it constitutes a technical revision.

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 2: Isolating valves

1 Scope

This part of ISO 9635 specifies construction and performance requirements and test methods for isolating 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 isolating irrigation valves of DN 8 (1/4 inch) 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 referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 9635-1:2006, *Agricultural irrigation equipment — Irrigation valves — Part 1: General requirements*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 9635-1 and the following apply.

3.1
isolating valve
valve intended for use only in the fully closed or fully open position

[EN 736-1]

3.2
full bore valve
valve with a seat diameter of not less than 90 % of the internal diameter of the body end port

[EN 736-3]

3.3
clear way valve
valve designed to have an unobstructed flow path which allows the passage of a theoretical sphere with a diameter which is not less than the inside diameter of the body end port

[EN 736-3]

3.4
flow coefficient
K_V
coefficient equal to the flow rate, in cubic metres per hour, of water at a temperature between 5 °C and 50 °C, passing through the valve and causing a loss of static head of 1 bar

NOTE 1 $Q = K_V\sqrt{\Delta p}$, where Q is the flow rate in cubic metres per hour (m^3/h), and p is the pressure in kilopascals per square centimetre (kPa/cm^2).

NOTE 2 1 bar = 0,1 MPa = 10^5 Pa; 1 MPa = 1 N/mm^2.

NOTE 3 Adapted from EN 736-3.

4 Design requirements

Isolating valves shall be designed in accordance with the requirements given in clause 4 of ISO 9635-1.

5 Performance requirements

All tests are to be performed on the valve as it was delivered to the test facility.

5.1 Mechanical strength

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

Requirements and testing shall be in accordance with ISO 9635-1:2006, 5.1.1.

5.1.2 Resistance of obturator to differential pressure

Requirements and testing shall be in accordance with ISO 9635-1:2006, 5.1.2.

Except for valves to be used for a single flow direction, the test shall be performed successively in each flow direction.

5.1.3 Resistance of valve to bending

The requirement and testing shall be in accordance with ISO 9635-1:2006, 5.1.3.

The bending moment, M, to be applied during the test shall be in accordance with Table 1, as a function of DN.

Table 1 — Bending moments

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

5.1.4 Resistance of valves to operating loads

Requirements shall be in accordance with ISO 9635-1:2006, 5.1.4.

In order to verify this requirement, the valve shall be tested in accordance with Annex A, with the application of a closing torque and an opening torque equal to the minimum strength torque (mST), following which it shall pass the operating tests in accordance with 5.2.3, and the seat tightness tests in accordance with 5.2.2.1 and 5.2.2.2.

The mST shall be equal to twice the maximum operating torque (MOT) given in 5.2.3. In the case of gate valves as specified in 5.2.3 c), the mST to be applied in the test in accordance with Annex A shall be equal to 5 × MOT. In the case of valves as specified in 5.2.3 d), the test is only applicable when there is an additional manual operating element.

5.2 Watertightness and air-tightness

5.2.1 Watertightness and air-tightness of shell and all pressure-containing components

5.2.1.1 Internal pressure

Requirements and testing shall be in accordance with ISO 9635-1:2006, 5.2.1.1.

5.2.1.2 External pressure

Requirements and testing shall be in accordance with ISO 9635-1:2006, 5.2.1.2.

5.2.2 Seat tightness

5.2.2.1 Seat tightness at high differential pressure

Requirements and testing shall be in accordance with ISO 9635-1:2006, 5.2.2.1.

After closing the valve by application of MOT (see 5.2.3), the leakage rate shall be rate A for resilient seated valves and shall not exceed rate B for metallic seated valves. For a type test, the test duration shall not be less than 10 min.

Except for valves to be used in a single flow direction, the test shall be performed successively in each flow direction.

5.2.2.2 Seat tightness at low differential pressure

Requirements and testing shall be in accordance with ISO 9635-1:2006, 5.2.2.2

After closing the valve by application of MOT (see 5.2.3), the leakage rate shall be rate A for resilient seated valves and shall not exceed rate B for metallic seated valves. For a type test, the test duration shall not be less than 10 min.

Except for valves to be used in a single flow direction, the test shall be performed successively in each flow direction.

5.2.3 MOT for operation and watertightness and air-tightness

In order to verify this requirement, an isolating valve shall be tested in accordance with Annex C. The measured torque shall not exceed the MOT as specified in a) to d) below.

a) Valves delivered with their operating element

— In the case of a hand wheel:

$$\text{MOT} = 0{,}5 \times F \times D$$

expressed in newton metres (N · m),

where

F is the maximum operating manual force (F refers to operating the valve, F_{max} to seating and unseating the valve, see Annex E), expressed in newtons (N);

D is the diameter of the hand wheel, in metres (m).

— In the case of a lever:

MOT = $F \times L$

expressed in newton metres (N · m),

where

F is the maximum operating manual force (F refers to operating the valve, F_{max} to seating and unseating the valve, see Annex E), expressed in newtons (N);

L is the length of the lever, in metres (m).

b) Valves delivered without operating element and intended to be operated by T-shaped key

— For butterfly valves:

MOT = 125 · m

— For gate valves:

MOT = 1 × DN, in N · m

— For other types of valve:

MOT = value given by the manufacturer.

c) Gate valves delivered without operating element and intended to be operated by ring key and bar

See Annex B.

d) Valves operated electrically, hydraulically or pneumatically

MOT = value given by the manufacturer.

5.2.4 Watertightness and air-tightness of gearboxes to external pressure

Requirements and testing shall be in accordance with ISO 9635-1:2006, 5.2.1.2.

5.3 Hydraulic characteristics

Requirements shall be in accordance with ISO 9635-1:2006, 5.3. The characteristic given by the manufacturer shall be the flow coefficient, K_V.

It is recommended that the manufacturer show the head loss of valves in the form of a table or graph.

When measured in accordance with ISO 9644, K_V resulting from the head loss curve shall be greater than 0,9 times the value indicated by the manufacturer. Testing is not required for full bore gate valves or clear way valves.

5.4 Resistance to chemicals and fertilizers

Requirements and testing shall be in accordance with ISO 9635-1:2006, 5.4.

5.5 Endurance

The endurance of isolating valves is evaluated as follows:

a) the isolating valve shall be subjected to an endurance test in accordance with Annex D at a differential pressure equal to the PFA across the obturator;

b) the isolating valve shall be tested in accordance with 5.2.1, 5.2.2 and 5.2.3, with the application of a torque not exceeding either

   — 1,2 times MOT (with the same leakage rate), or

   — MOT (with leakage allowed to increase by one rate level)

See ISO 9635-1:2006, Table G.2, for leakage rates.

The number of opening/closing cycles to be applied during the endurance test shall be as follows:

— for manually operated valves, 250 cycles;

— for electrically, hydraulically or pneumatically operated valves, 2 500 cycles.

This test shall be applied to isolating valves of DN 8 up to and including DN 500.

6 Conformity assessment

6.1 General

Requirements shall be in accordance with ISO 9635-1:2006, 6.1.

6.2 Type tests

Requirements shall be in accordance ISO 9635-1:2006, 6.2. The type tests to be performed shall be those according to Table 2.

6.3 Control of production process and quality system

Requirements shall be in accordance with ISO 9635-1:2006, 6.3.

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

7 Marking

Requirements shall be in accordance with ISO 9635-1:2006, Clause 7.

8 Packaging

Requirements shall be in accordance with ISO 9635-1:2006, Clause 8.

Table 2 — Requirements and tests

Subclause of ISO 9635-1:2006	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	—
4.5	Design of shell 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
5.1.1	Resistance of shell and all pressure containing components to internal pressure	See 5.1.1	See 5.1.1
5.1.2	Resistance of obturator to differential pressure	See 5.1.2	—
5.1.3	Resistance of valves to bending	See 5.1.3	—
5.1.4	Resistance of valves to operating loads	See 5.1.4	—
5.2.1.1	Leak-tightness to internal pressure	See 5.2.1.1	See 5.2.1.1
5.2.1.2	Leak-tightness to external pressure	See 5.2.1.2	—
5.2.2.1	Seat tightness at high differential pressure	See 5.2.2.1 and 5.2.3	See 5.2.2.1 and 5.2.3
5.2.2.2	Seat tightness at low differential pressure	See 5.2.2.2 and 5.2.3	—
5.2.3	Maximum operating torque (MOT)	See 5.2.2.1, 5.2.2.2 and 5.2.3	See 5.2.2.1
5.2.1.2	Leak-tightness of gearboxes to external pressure	See 5.2.4	—
5.3	Hydraulic or airflow characteristics	See 5.3	—
5.4	Resistance to chemicals and fertilizers	See 5.4	—
5.5	Endurance	See 5.5	—

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