INTERNATIONAL STANDARD

ISO 10522

Second edition
2021-08

Agricultural irrigation equipment — Direct-acting pressure-regulating valves

Matériel agricole d'irrigation — Vannes de régulation de la pression à action directe

Reference number
ISO 10522:2021(E)

© ISO 2021



COPYRIGHT PROTECTED DOCUMENT

© ISO 2021

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword ... **iv**

1 Scope ... **1**

2 Normative references ... **1**

3 Terms and definitions ... **1**

4 Pressure regulator classification ... **3**
4.1 According to construction of regulation assembly ... 3
4.2 According to construction of pressure regulator ... 3
4.3 According to regulated pressure at zero flow ... 3
4.4 According to accuracy level [see 7.5.2.4 b)] ... 3

5 Marking ... **4**

6 Technical characteristics ... **4**
6.1 General ... 4
6.2 Pressure regulator body ... 4
6.3 Adjustment assembly ... 5
6.4 Connections ... 5
6.5 Adjustable stop ... 5

7 Mechanical and functional tests ... **5**
7.1 Overview ... 5
7.2 General ... 6
7.3 Regulation uniformity (in non-adjustable pressure regulators) ... 6
7.4 Tightness of pressure regulator with adjustable stop ... 7
7.5 Regulation curve ... 7
7.5.1 Installation ... 7
7.5.2 Test results and requirements ... 8
7.5.3 Single-range pressure regulators (class 4.1.1) ... 9
7.5.4 Multi-range pressure regulators (class 4.1.2) ... 9
7.5.5 Single-range adjustable pressure regulators (class 4.1.3) ... 9
7.5.6 Multi-range adjustable pressure regulators (class 4.1.4) ... 9
7.6 Regulated pressure as function of pressure regulator adjustment in pressure regulators of classes 4.1.3 and 4.1.4 ... 9
7.7 Regulated pressure at zero flow (in pressure regulators of class 4.3.2) ... 9
7.8 Regulated pressure as function of inlet pressure at constant flow rate ... 10
7.8.1 General ... 10
7.8.2 Plotting pressure curves ... 10
7.9 Regulation curve of integral pressure regulators (class 4.2.2) ... 10
7.10 Pressure loss ... 11
7.11 Resistance of pressure regulator body to internal hydrostatic pressure ... 11
7.11.1 General ... 11
7.11.2 Metal-body pressure regulators ... 11
7.11.3 Plastics-body pressure regulators ... 11

8 Durability ... **12**
8.1 On/off cycles ... 12
8.2 Changing condition cycles ... 12
8.2.1 General ... 12
8.2.2 For ordinary pressure regulators ... 12
8.2.3 For integral pressure regulators ... 12
8.2.4 Requirement for ordinary and integral pressure regulators ... 13

9 Information to be supplied by the manufacturer ... **13**
9.1 General information ... 13
9.2 Operational data ... 13

Annex A (informative) **Figures** ... **14**

© ISO 2021 – All rights reserved

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 of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document 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 second edition cancels and replaces the first edition (ISO 10522:1993), which has been technically revised.

The main changes compared to the previous edition are as follows.

— The range of pressure regulators sizes has been extended up to DN 100 (4").

— The water temperature of the irrigation system has been harmonized to 60 °C.

— The normative references have been updated.

— The terms and definitions have been updated.

— The testing water temperature range has been updated to 4 °C to 35 °C.

— The face-to-face distance of the flanged bodies of the pressure regulators has been updated to ±4 mm for plastics-body regulators.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

© ISO 2021 – All rights reserved

Agricultural irrigation equipment — Direct-acting pressure-regulating valves

1 Scope

This document specifies construction and performance requirements and test methods for direct-acting pressure-regulating valves (hereinafter "pressure regulators") intended for operation in irrigation systems, with water at temperatures not exceeding 60 °C, which can contain fertilizers and chemicals of types and in concentrations commonly used in agricultural irrigation.

This document applies to pressure regulators in nominal sizes up to and including 100 mm (4 in).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 7-1, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Dimensions, tolerances and designation*

ISO 7005-1, *Pipe flanges — Part 1: Steel flanges for industrial and general service piping systems*

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

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

ISO 24649:—,[1)] *Agricultural irrigation equipment — Manually and hydraulically operated plastics valves*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
direct-acting pressure-regulating valve
pressure regulator
valve in which the water passage widens or narrows automatically without an external device to maintain the pressure at the outlet of the valve close to a pre-set value under varying pressures or flow rates at the inlet of the valve

Note 1 to entry: It is also called direct-acting pressure regulator.

3.2
ordinary pressure regulator
pressure regulator intended for installation upstream from an irrigation device and not integrated into the irrigation device or fitted specifically to it

1) Under preparation. Stage at the date of publication: ISO/DIS 24649:2021.

© ISO 2021 – All rights reserved

3.3
single-range pressure regulator
pressure regulator with a fixed non-adjustable pressure setting which cannot be varied

Note 1 to entry: See also see Annex A, Figure A.1.

3.4
multi-range pressure regulator
pressure regulator with alternative pressure settings and regulation ranges that may be changed by replacing pressure regulator components such as springs and discs but not by external adjustment

3.5
adjustable pressure regulator
pressure regulator in which the pressure setting can be adjusted externally without requiring replacement of parts in the regulation assembly

3.6
integral pressure regulator
pressure-regulating valve which is an integral part of an irrigation device or is fitted specifically to the particular irrigation device

3.7
regulated pressure
water pressure at the outlet of a pressure regulator

3.8
regulation range
all of the working pressures at the inlet of a pressure regulator within which the pressure regulator is declared by the manufacturer to regulate pressure within a specified accuracy

Note 1 to entry: See also Annex A, Figure A.2.

3.9
nominal pressure
PN
maximum static working pressure at which a piping component is stated to operate under normal service conditions

3.10
nominal diameter
DN
numerical designation used to refer to the size of a pressure regulator approximately equal to the diameter of the pipe or pipes to which the pressure regulator is to be connected directly

3.11
minimum flow rate
q_{min}
lowest flow rate at which the pressure regulating valve is designed to operate within the maximum permissible error

3.12
initial regulation pressure
lowest pressure at the inlet of a pressure regulator at which the *regulated pressure* (3.7) is within the range of regulation

3.13
declared pre-set pressure
P_s
pressure at the outlet of a pressure regulator pre-set and declared by the manufacturer using a *reference velocity* (3.16) of 1 m/s

© ISO 2021 – All rights reserved

3.14
regulated pressure at zero flow
regulated pressure (3.7) when pressure is applied at the inlet of a pressure regulator and the outlet of the pressure regulator is closed

3.15
regulation assembly
portion of the pressure regulator consisting mainly of working parts that narrow or widen the water passages in the pressure regulator to maintain a constant pressure

3.16
reference velocity
v_{ref}
velocity of flow through the valve calculated from the actual flow rate through the valve divided by the area of a circle with diameter equal to the nominal DN

3.17
accuracy level
deviation of the outlet pressure from the pressure setting or from the setting declared by the manufacturer

3.18
adjustable stop
device used for adjusting the range of movement of the operating mechanism up to full opening or closing of a hydraulically operated valve

4 Pressure regulator classification

4.1 According to construction of regulation assembly

Class 4.1.1 Single-range pressure regulator

Class 4.1.2 Multi-range pressure regulator

Class 4.1.3 Single-range adjustable pressure regulator

Class 4.1.4 Multi-range adjustable pressure regulator

4.2 According to construction of pressure regulator

Class 4.2.1 Ordinary pressure regulator

Class 4.2.2 Integral pressure regulator

4.3 According to regulated pressure at zero flow

Class 4.3.1 Pressure regulator in which the regulated pressure equals the inlet pressure at zero flow

Class 4.3.2 Pressure regulator in which the regulated pressure does not equal (is less than) the inlet pressure at zero flow

4.4 According to accuracy level [see 7.5.2.4 b)]

Class 4.4.1 Pressure regulators with accuracy level A (±10 %)

Class 4.4.2 Pressure regulators with accuracy level B (±20 %)

© ISO 2021 – All rights reserved