TECHNICAL REPORT

ISO/TR 15155-1

First edition
2018-08

Agricultural irrigation equipment — Test facilities for agricultural irrigation equipment —

Part 1: General

Matériel agricole d'irrigation — Installations d'essais pour le matériel agricole d'irrigation —
Partie 1: Général

Reference number
ISO/TR 15155-1:2018(E)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

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.

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*.

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.

This first edition cancels and replaces ISO/TR 15155:2005, which has been technically revised to include sprayers (ISO 8026) and water meters (ISO 16399).

A list of all parts in the ISO/TR 15155 series can be found on the ISO website.

Agricultural irrigation equipment — Test facilities for agricultural irrigation equipment —

Part 1: General

1 Scope

This document gives guidelines for the design, selection, installation and use of the equipment required to establish basic test facilities for irrigation equipment evaluation. It provides the information sufficient to complement the detailed procedures included in ISO 7714, ISO 8026, ISO 9261, ISO 9635 (all parts), ISO 9644, ISO 9911, ISO 10522, ISO 15886 and ISO 16399 for the testing of agricultural irrigation system components, specifically emitters, sprinklers, valves, sprayers and water meters.

2 Normative references

There are no normative references in this document.

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 http://www.electropedia.org/

3.1
test bench
collection of components, including water supply/receiving reservoir, piping, fittings and instrumentation, assembled to test an agricultural irrigation component

3.2
test facility
collection of components, including water supply, *test bench(es)* (3.1) and shelter, used to test agricultural irrigation valves, sprinklers and emitters

3.3
net positive suction head available
NPSHa
arithmetic difference between the available *total suction head at the impeller of a centrifugal pump* (3.6) and the *vapour pressure head* (3.7)

3.4
net positive suction head required
NPSHr
arithmetic difference between the *total suction head at the impeller of a centrifugal pump* (3.6) required for the pump to operate properly and the *vapour pressure head* (3.7), as specified by the manufacturer

3.5
static pressure head
sum of the head associated with atmospheric pressure and the gauge pressure head measured approaching the inlet of the impeller of a centrifugal pump

3.6
total suction head at the impeller of a centrifugal pump
sum of the *static pressure head* (3.5) and the velocity head measured approaching the inlet of the impeller of a centrifugal pump and corrected to the centreline of the impeller for a centrifugal pump mounted horizontally or to the datum of the tip of the inlet vanes for a centrifugal pump mounted vertically

3.7
vapour pressure head
head associated with the absolute pressure at which a liquid vaporizes, as determined by the physical properties of the liquid and its temperature

4 System components

4.1 Pumps and pump environment

4.1.1 General

For specific information prior to selecting a pump, see Annex A for sprinklers, Annex B for emitters and emitting pipe, Annex C for valves, Annex D for sprayers and Annex E for meters.

4.1.2 Selection

The size and type of pump selected depend on the requirements of the equipment to be tested. More than one pump may be required depending on the range of flows and pressures required by the equipment to be tested. The equipment, test flow range and test pressure range should be selected before selecting a pump.

A centrifugal pump or a turbine pump is selected based on the desired configuration of the test bench.

The pumps and controls should be selected to provide the required hydraulic characteristics continuously and without vibration to avoid affecting the measurement accuracy. Turbulence should be dampened or flow-straightening vanes should be used in critical locations, such as the inlet to a sprinkler test riser. A variable-frequency drive (VFD) should be employed to control the VFD rated motor, allowing the pump to operate over a wider range of flows and pressures.

The flow is controlled using equipment installed on the test bench (nozzle, emitters, valve, regulator and pipe size) and/or by the speed at which the pump is operated. The flow and/or pressure should be controlled with regulating valves on the inlet or outlet pipe, as needed.

The pump should provide at least 110 % of the maximum pressure at 110 % of the maximum flow rate required for the device being tested. The pump curve for the selected pump should be reviewed to ensure it will operate over the required range.

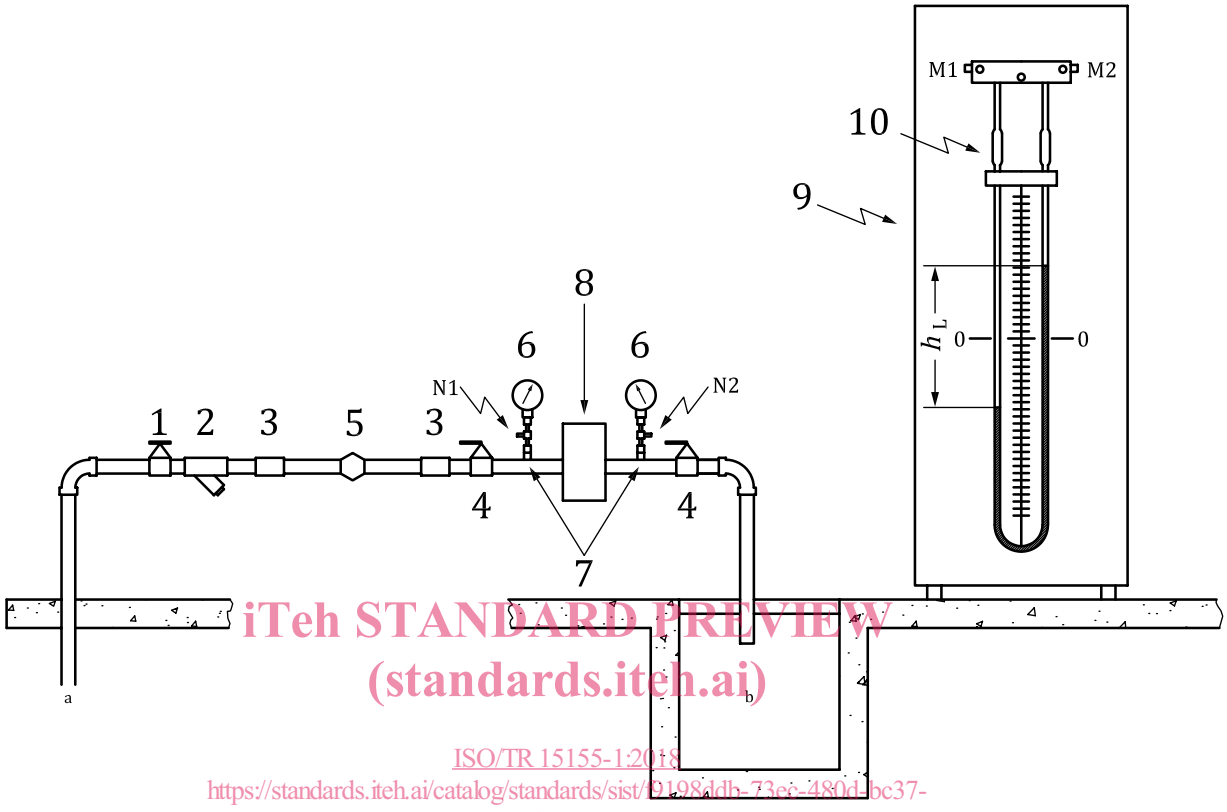
4.1.3 Installation

The pump should be installed in a configuration that does not require priming and in which the water supply/receiving tank has sufficient volume so that temperature change of the water during a test does not exceed the testing criteria.

Filtration should maintain the quality of the water supply and is necessary to meet the requirements of the equipment to be tested. If no specific filtration standard is required, the equivalent of a 200 mesh

(75 microns) filter is recommended. A by-pass circuit should be provided to effectively increase the operating range of the test bench.

See Figures 1, 2, 3, 4 and 5 for typical test bench configurations for testing valves, sprinklers, emitters, sprayers and meters, respectively.



Key

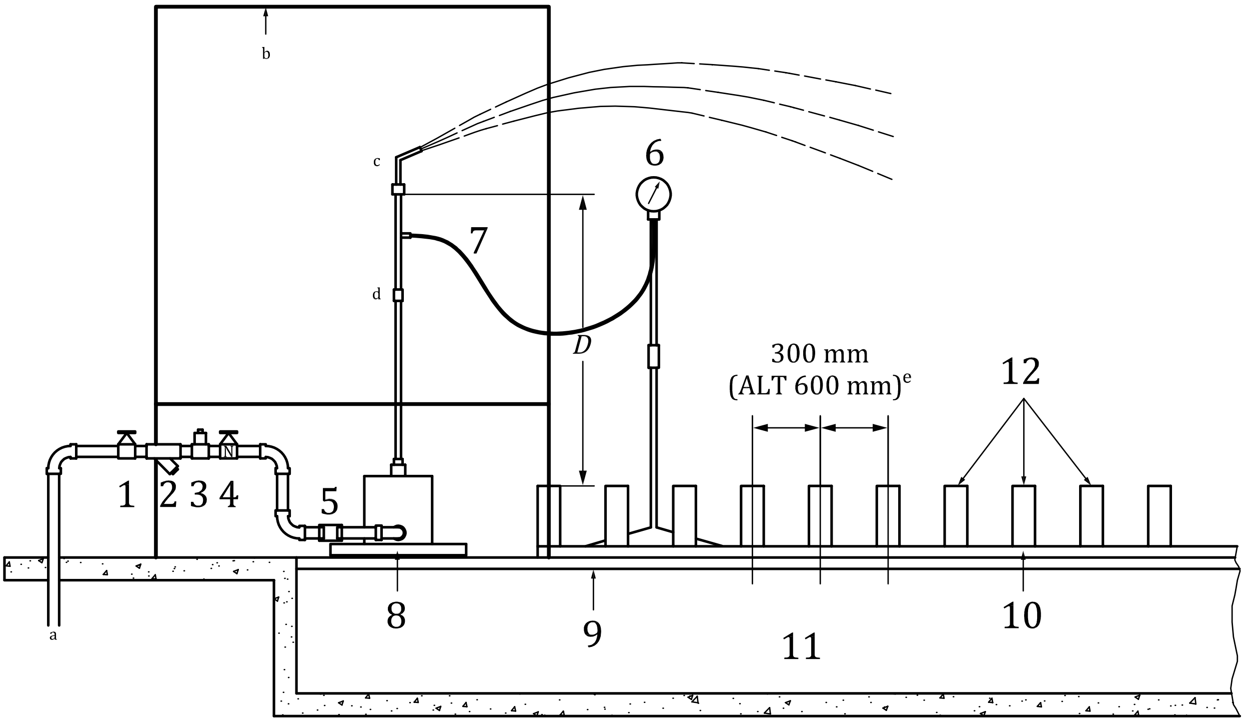
1	isolation valve	8	component under test
2	“y” strainer 100-mesh	9	portable manometer
3	coupler/reducer	10	mercury traps
4	ball valve	a	Pressurized supply.
5	flow meter	b	Waste flow.
6	pressure gauge selected to operate in middle third of its range		
7	pressure taps		

NOTE 1 N1 is connected to M1 and N2 is connected to M2 with flexible instrument tubing.

NOTE 2 The flow meter should be sized to match the range of test conditions.

NOTE 3 Pressure taps are sized to match the component under test.

Figure 1 — Typical test bench configurations for testing valves



Key

1 isolation valve
2 “y” strainer 100-mesh
3 pressure regulator
4 needle valve
5 union
6 pressure gauge selected to operate in middle third of its range
7 flexible instrument tubing
8 sprinkler mounting stand with mounting bolts to provide a stable and plumb riser support
9 grating over channel
10 steel channels with collector locations marked
11 drain
12 standard collectors

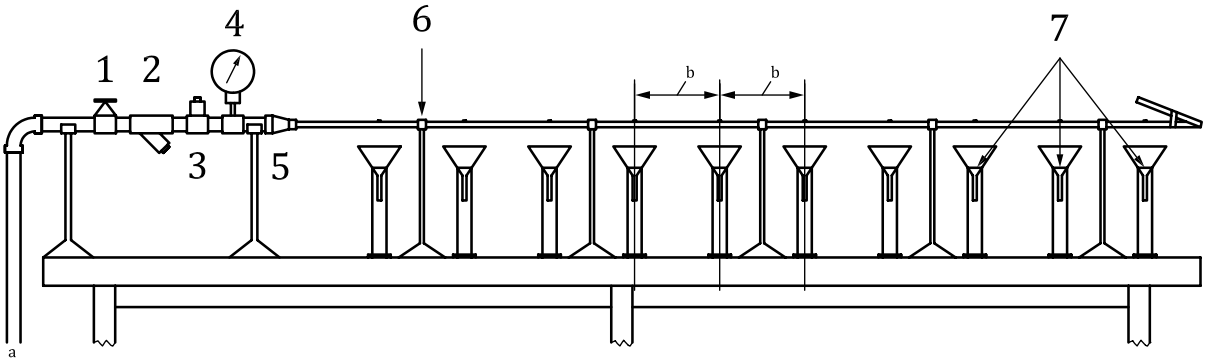
a Pressurized supply.
b Approximate outline of splash shelter.
c Sprinkler under test.
d Pressure tap sized to match sprinkler.
e Collector spacing.

NOTE 1 Dimension “D” corresponds to the geometry of field application (riser height).

NOTE 2 The pressure is adjusted vertically so that the centre of the gauge corresponds to the sprinkler base.

NOTE 3 The pressure regulator is set to 500 kPa for normal testing.

Figure 2 — Typical test bench configurations for testing sprinklers



Key

1 isolation valve
2 "y" strainer – mesh meeting manufacturer's specifications
3 pressure regulator
4 pressure gauge selected to operate in middle third of its range
5 union
6 drip tube support
7 graduated cylinders

a Pressurized supply.
b Graduated cylinder spacing to match emitter spacing.

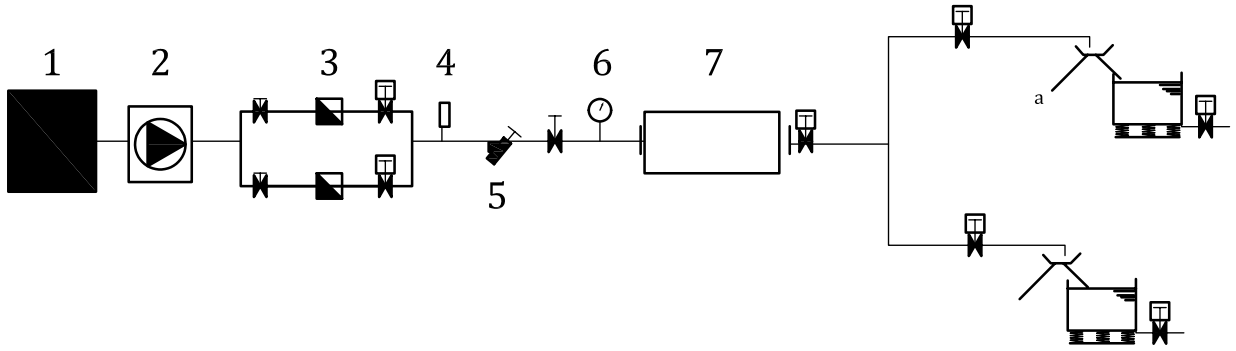
Figure 3 — Typical test bench configurations for testing emitters

Key

1 needle valve
2 pump
3 filter
4 globe valve
5 flow measurement
6 manometer
7 standard collectors

a Pressurized supply.
b Collector spacing.
c Sprayer under test.

Figure 4 — Typical test bench configurations for testing sprayers



Key

1	reservoir	5	filter
2	pumping station	6	pressure
3	flow meters	7	tested equipment
4	temp.	a	To reservoir.

Figure 5 — Typical test bench configurations for testing meters

4.1.4 Use

Proper safety equipment should be installed and operational procedures should be documented. Local codes ensure that installation and use meet safety standards.

4.2 Pressure measurement

4.2.1 General

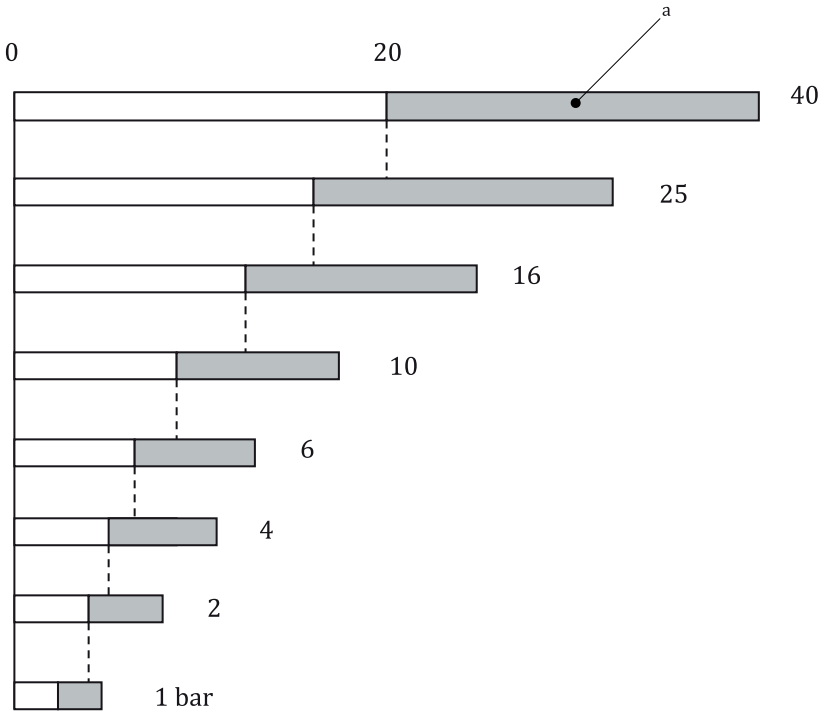
Pressure is measured using a manometer filled with mercury or another calibrated liquid. It is recommended to manually read gauges or recording transducers with an analogue or digital display, or record directly using a data-logger. The gauge pressure range should be higher than the expected pressures to prevent over-ranging of the gauge. See Annexes A, B and C for recommended specifications.

4.2.2 Selection

The size and type of gauges required depend on the requirements of the equipment to be tested. More than one gauge could be required, depending on the range of pressures dictated by the equipment to be tested. A gauge should be selected that operates in the middle of its operating range for the test procedure and which is large enough to be easily read with increments as required by the accuracy indicated in the test procedure. A 100 mm dial face and a minimum accuracy of ±0,5 % of reading are recommended unless otherwise specified in the relative test procedure of the International Standard being used (see Clause 1 for mention of the relevant standards). An electronic pressure transmitter can be used over a wide range of pressures.

Figure 6 illustrates eight consecutive pressure gauges for the range of 0 MPa to 4 MPa (0 bar to 40 bar), where the grey area defines the range of the pressure with accuracy higher than ±0,5 %.

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



Key

a Area with accuracy higher than ±0,5 %.

Figure 6 — Example of a range of pressure gauges for a test facility

4.2.3 Installation and location of sensors

The pressure taps should be provided at varying locations, as required by the equipment being tested. Figure 7 shows information for design and installation of pressure taps. The gauges should be located away from areas of excessive vibration.

It is preferable to have pressure measurements made at the same elevation as the pressure tap, and at the exact location at which the pressure information is required, to eliminate mathematical calculations and approximations. If this is not physically possible, a correction should be made for the elevation difference. A correction should also be made if differential pressure measurements are made in pipes of a different size.