
**Agricultural irrigation equipment —
Emitters and emitting pipe —
Specification and test methods**

*Matériel agricole d'irrigation — Distributeurs et tuyaux-distributeurs —
Spécifications et méthodes d'essai*

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO 9261:2004](https://standards.iteh.ai/catalog/standards/sist/38a403c5-5040-4cfb-b94b-3d9833447a37/iso-9261-2004)

<https://standards.iteh.ai/catalog/standards/sist/38a403c5-5040-4cfb-b94b-3d9833447a37/iso-9261-2004>



PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO 9261:2004](#)

<https://standards.iteh.ai/catalog/standards/sist/38a403c5-5040-4cfb-b94b-3d9833447a37/iso-9261-2004>

© ISO 2004

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword.....	iv
1 Scope.....	1
2 Normative references	1
3 Terms and definitions	1
4 Classification	4
4.1 Reusability (emitting pipes)	4
4.2 Type of pressure regulation.....	4
4.3 Type of operation at low pressure	5
4.4 Type of emitter connection to the pipe.....	5
4.5 Type of multiple-outlet emitter	5
5 Designation (emitting pipes).....	5
6 Marking.....	5
6.1 Emitting pipe	5
6.2 Emitter	6
6.3 Fittings	6
6.4 Packaging of emitting pipes	6
6.5 Packaging of fittings.....	7
7 Construction and materials.....	7
7.1 General	7
7.2 Dimensions (emitting pipe).....	7
7.3 Materials.....	7
7.4 Fittings (emitting pipe)	7
7.5 Connection to irrigation lateral (in-line emitter).....	8
8 Test specimens and conditions	8
8.1 Test specimens	8
8.2 Order of tests.....	8
8.3 Test conditions.....	8
8.4 Accuracy of measuring devices	8
9 Test methods and requirements	8
9.1 Uniformity of flow rate	8
9.2 Flow rate as a function of inlet pressure	9
9.3 Determination of emitter/emitting unit exponent.....	10
9.4 Dimensions	11
9.5 Resistance to hydraulic pressure	12
9.6 Resistance to tension (emitting pipe)	12
9.7 Resistance to pull-out of joints between fittings and polyethylene reusable emitting pipes	13
9.8 Emitter pull-out.....	13
9.9 Watertightness of the emitter-pipe assembly	14
9.10 Resistance of polyethylene (PE) emitting pipe to environmental stress-cracking	15
10 Data supplied by manufacturer	15
Bibliography	16

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 9261 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 of ISO 9261 cancels and replaces ISO 9261:1991 and ISO 9260:1991, of which it constitutes a technical revision.

ITeH STANDARD PREVIEW
(standards.iteh.ai)
<https://standards.iteh.ai/catalog/standards/sist/38a403c5-5040-4cfb-b94b-3d9833447a37/iso-9261-2004>

Agricultural irrigation equipment — Emitters and emitting pipe — Specification and test methods

1 Scope

This International Standard gives mechanical and functional requirements for agricultural irrigation emitters and emitting pipes, and, where applicable, their fittings, and provides methods for testing conformity with such requirements. It also specifies the data to be supplied by the manufacturer to permit correct information, installation and operation in the field.

It is applicable to emitters, emitting and dripping (trickling) pipes, hoses, including collapsible hoses (“tapes”) and tubing of which the emitting units form an integral part, to emitters and emitting units with or without pressure regulation and with flow rates not exceeding 24 l/h per outlet (except during flushing), and to fittings dedicated to the connection of emitting pipes, hoses and tubing. It is not applicable to porous pipe (pipe that is porous along its entire length), nor does it cover the performance of pipes as regards clogging.

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 3501, *Assembled joints between fittings and polyethylene (PE) pressure pipes — Test of resistance to pull out*¹⁾

ISO 8796:—²⁾, *Polyethylene PE 32 and PE 40 pipes for irrigation laterals — Susceptibility to environmental stress cracking induced by insert-type fittings — Test method and specification*

3 Terms and definitions

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

3.1

emitter

dripper

device fitted to an irrigation lateral and intended to discharge water in the form of drops or continuous flow at flow rates not exceeding 24 l/h except during flushing

3.2

in-line emitter

emitter intended for installation between two lengths of pipe in an irrigation lateral

1) Requirements for connections of insert-type fittings are to be included in a future edition.

2) To be published. (Revision of ISO 8796:1989)

3.3 on-line emitter
emitter intended for installation in the wall of an irrigation lateral, either directly or indirectly by means such as tubing

3.4 multiple-outlet emitter
emitter in which the output flow is divided and directed to several distinctly different locations

3.5 multiple emitter
multiple-outlet emitter in which every outlet is a secondary emitter with its own flow rate

NOTE The pressure relationship ($q = kp^m$), and the flow rate of each outlet is not generally dependent on the flow rate of other emitters.

3.6 emitting pipe
continuous pipe, hose or tubing, including collapsible hose (“tape”) with perforations or other hydraulic devices formed or integrated in the pipe, hose or tubing during production and intended to discharge water in the form of drops or continuous flow, at flow rates not exceeding 24 l/h except during flushing

3.7 regulated emitter/emitting pipe
pressure compensating emitter/emitting pipe
emitter/emitting pipe which maintains a relatively constant flow rate at varying water pressures at the emitter/emitting pipe inlet within the limits specified by the manufacturer

3.8 regular emitter/emitting pipe
emitter/emitting pipe whose flow rate is different from zero when the inlet pressure is different from zero

3.9 non-leakage emitter/emitting pipe
emitter/emitting pipe whose flow is zero whenever the pressure at the inlet of the emitter/emitting pipe is lower than a value (other than zero) declared by the manufacturer

3.10 unregulated emitter/emitting pipe
non-pressure compensating emitter/emitting pipe
emitter/emitting pipe whose flow rate varies with inlet water pressure

3.11 flow rate
emission rate of an emitter or an emitting pipe

3.12 minimum working pressure
lowest working pressure at the inlet to an emitter/emitting pipe recommended by the manufacturer to ensure proper operation of the emitter/emitting pipe

3.13 maximum working pressure
highest water pressure at the inlet to an emitter/emitting pipe recommended by the manufacturer to ensure proper operation of the emitter/emitting pipe

3.14 non-reusable emitting pipe
emitting pipe not intended for removal from the field and reinstallation

3.15**reusable emitting pipe**

emitting pipe designed for removal from the field and reinstallation with proper handling from one season to another or under other circumstances

3.16**emitting unit**

section of an emitting pipe, including all its hydraulic devices formed or integrated in the pipe during production and all of the emitter inlets, repeated at intervals, from which water is discharged to one clearly distinguishable location

3.17**unit emitting pipe**

length of emitting pipe containing one emitting unit

3.18**clamping band**

ring-like or band-like device used for obtaining a watertight joint between an emitting pipe and a fitting

3.19**fitting**

connecting device suitable for attachment to an emitting pipe with or without a clamping band

3.20**inlet fitting**

fitting having one end suitable for connection to a standard irrigation pipe or appliance and the other end or ends suitable for connection to an emitting pipe

3.21**in-line fitting**

fitting having both ends suitable for connection to an emitting pipe

3.22**nominal diameter**

numerical designation used to refer to the size of an emitting pipe, approximately equal to the outside diameter of the emitting pipe

3.23**nominal size**

numerical designation used to refer to the size of an in-line emitter, approximately equal to the inside diameter of an irrigation lateral pipe to which it is intended to be connected

3.24**nominal test pressure**

p_n

reference pressure, to be used for test purposes, of 100 kPa at the inlet of an unregulated emitter/emitting unit, or any other pressure as designated in manufacturer's publications

3.25**nominal flow rate**

q_n

(unregulated emitter/emitting pipe) flow rate, expressed in litres per hour, of an emitter/emitting unit operating at the nominal test pressure and at a water temperature of 23 ± 3 °C, as specified by the manufacturer

3.26**nominal flow rate**

q_n

(regulated emitter/emitting pipe) flow rate, expressed in litres per hour, of an emitter/emitting unit operating in the range of regulation and at a water temperature of 23 ± 3 °C, as specified by the manufacturer

**3.27
nominal flow rate**

q_n
(multiple outlet emitter) flow rate of each outlet, as specified in 3.25 and 3.26, accordingly

**3.28
range of working pressures**

all water pressures at the emitter/emitting unit inlet between and including the minimum working pressure, p_{\min} , and the maximum working pressure, p_{\max} , recommended by the manufacturer to ensure proper operation

**3.29
range of regulation**

(regulated emitter/emitting pipe) all water pressures at the emitter/emitting unit inlet in which each emitter/emitting unit is expected to discharge the nominal flow rate

**3.30
emitter/emitting unit exponent**

m
numerical value that defines the exponential relationship between emission rate and pressure

NOTE $q \approx kp^m$: for an exponent (m) of 0, the emission rate does not vary with pressure; for an exponent of 1, the emission rate varies linearly with pressure.

**3.31
collapsible hose
"tape"**

emitting pipe whose structure causes its cross-section (which is generally round or rounded when the pressure at the inlet of the emitting pipe is within the range of working pressures recommended by the manufacturer) to alter itself when the pressure is zero, generally because of a small wall thickness or because of the flexible nature of the material from which the emitting pipe is made

**3.32
spacing [of emitting units]**

distance between two successive emitting units along an emitting pipe

4 Classification

Emitters/emitting pipes are classified according to the following criteria (see 4.1 to 4.5).

4.1 Reusability (emitting pipes)

Two categories of duration of use are classified:

- 4.1.1 non-reusable emitting pipes;
- 4.1.2 reusable emitting pipes.

4.2 Type of pressure regulation

Two categories of operation are classified:

- 4.2.1 unregulated emitters/emitting pipes;
- 4.2.2 regulated emitters/emitting pipes.

4.3 Type of operation at low pressure

Two categories of operation at low pressure are classified:

- 4.3.1 regular
- 4.3.2 non-leakage

4.4 Type of emitter connection to the pipe

Three types of emitter connection are classified:

- 4.4.1 on-line (emitter)
- 4.4.2 in-line (emitter)
- 4.4.3 formed or integrated in the pipe (emitting pipe)

4.5 Type of multiple-outlet emitter

- 4.5.1 multiple emitter
- 4.5.2 regular multiple-outlet emitter.

5 Designation (emitting pipes)

Emitting pipes shall be designated by

- a) the words "emitting pipe",
- b) reference to this International Standard,
- c) the nominal diameter, in millimetres,
- d) nominal flow rate, in litres per hour,
- e) maximum working pressure, in multiples of 100 kPa units.

EXAMPLE An emitting pipe complying with this International Standard, of 16-mm nominal diameter, 2 l/h nominal flow rate, intended for operation at working pressures up to a maximum of 120 kPa is designated as follows:

Emitting pipe ISO 9261 16 - 2 - 1,2

6 Marking

6.1 Emitting pipe

Each emitting pipe shall bear clear and permanent markings including the following details:

- a) name of manufacturer or registered trademark;
- b) mark for identification of year of manufacture;
- c) designation according to Clause 5;

- d) arrow indicating direction of flow (if it affects operation of the emitting pipe);
- e) spacing of emitting units, in centimetres.

These details shall be marked at intervals not exceeding 5 m.

Notwithstanding the above, the marking on non-reusable emitting pipes (Class 4.1.1) does not have to be permanent but shall appear on the package in accordance with the marking requirements of 6.4.

6.2 Emitter

Each emitter shall bear clear and permanent markings including the following details:

- a) name of the manufacturer or registered trademark;
- b) nominal flow rate, in litres per hour;
- c) nominal size (in-line emitters), in millimetres;
- d) arrow indicating direction of flow (if important for proper operation).

Nominal flow rate [see b) of this subclause] may be indicated by the colour of any part of the emitter, or by any other method described in the manufacturer's literature.

6.3 Fittings

Each emitting pipe fitting shall bear a clear and permanent marking of the name of the manufacturer or registered trademark.

6.4 Packaging of emitting pipes

When emitting pipes are supplied in coils, each coil shall carry an attached tag bearing the following clear, legible and permanent information:

- a) name of manufacturer or registered trademark;
- b) designation according to Clause 5;
- c) nominal diameter of emitting pipe, in millimetres;
- d) catalogue number of emitting pipe, or other catalogue identification;
- e) classification according to 4.1, 4.2 and 4.3;
- f) length of emitting pipe in coil, in metres;
- g) year of production and manufacturing lot;
- h) nominal flow rate of unit emitting pipe, in litres per hour, and nominal test pressure (unregulated emitting pipe), p_n ;
- i) spacing of emitting units, in metres.

6.5 Packaging of fittings

Fittings shall be supplied in package form, each bearing the following clear, legible and permanent information:

- a) name of manufacturer;
- b) catalogue number;
- c) nominal diameter of emitting pipe and, if applicable, nominal diameter of the irrigation lateral or the nominal size of the thread for which the fittings are intended;
- d) year of manufacture and manufacturing lot.

7 Construction and materials

7.1 General

The emitter/emitting pipe, its parts and fittings shall have no manufacturing defects that could impair performance.

The construction of the emitter/emitting pipe and its fittings shall permit their easy connection, with or without clamping bands, whether the connection is made manually or by means of suitable tools supplied by the manufacturer.

7.2 Dimensions (emitting pipe)

7.2.1 The manufacturer shall specify the outside diameter, inside diameter and wall thickness of the product, in millimetres, and the actual dimensions of the product shall comply with those declared by the manufacturer in accordance with 9.4.2.

7.2.2 The dimensions of the connecting fittings shall fit the dimensions of the emitting pipe, to ensure easy and reliable connection.

7.3 Materials

The material used in the manufacture of emitters/emitting pipes and their fittings shall be resistant to fertilizers and other chemicals commonly employed in agricultural irrigation and shall be suitable for use with water at temperatures up to 60 °C and at operating pressures designated by the manufacturer.

The materials shall, insofar as possible, not support the growth of algae and bacteria. The parts that are exposed to light shall be opaque and protected against UV degradation.

7.4 Fittings (emitting pipe)

The manufacturer shall be able to supply, for each type and size of emitting pipe, fittings suitable in size and shape to make secure connections to the emitting pipe.

The jointing, made with or without the use of clamping bands, shall be of sufficient strength to withstand the full range of working pressures.

Clamping components, such as bands and screws, shall be of non-corroding materials or of materials protected against corrosion.