
**Plastics piping systems — Polyethylene
(PE) pipes and fittings for water supply —**

**Part 2:
Pipes**

*Systèmes de canalisations en plastique — Tubes et raccords en
polyéthylène (PE) destinés à l'alimentation en eau —*

Partie 2: Tubes

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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.

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 4427-2 was prepared by Technical Committee ISO/TC 138, *Plastics pipes, fittings and valves for the transport of fluids*, Subcommittee SC 2, *Plastics pipes and fittings for water supplies*.

This first edition, together with ISO 4427-1, cancels and replaces ISO 4427:1996, of which it constitutes a technical revision.

ISO 4427 consists of the following parts, under the general title *Plastics piping systems — Polyethylene (PE) pipes and fittings for water supply*:

- Part 1: General
- Part 2: Pipes
- Part 3: Fittings
- Part 5: Fitness for purpose of the system

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Introduction

ISO 4427, the system standard, specifies the requirements for a piping system and its components when made from polyethylene (PE). The piping system is intended to be used for water supply intended for human consumption, including the conveyance of raw water prior to treatment and that of water for general purposes.

In respect of potential adverse effects on the quality of water intended for human consumption caused by the products covered by ISO 4427:

- a) ISO 4427 provides no information as to whether the products may be used without restriction;
- b) existing national regulations concerning the use and/or the characteristics of these products are in force.

NOTE Guidance for assessment of conformity can be found in Bibliographical references [5] and [6].

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Plastics piping systems — Polyethylene (PE) pipes and fittings for water supply —

Part 2: Pipes

1 Scope

This part of ISO 4427 specifies the pipes made from polyethylene (PE) intended for the conveyance of water for human consumption, including raw water prior to treatment and water for general purposes.

It also specifies the test parameters for the test methods to which it refers.

In conjunction with the other parts of ISO 4427, it is applicable to PE pipes, their joints, to joints with components of PE and to mechanical joints with components of other materials, intended to be used under the following conditions:

- a) a maximum operating pressure (MOP) up to and including 25 bar¹⁾;
- b) an operating temperature of 20 °C as the reference temperature.

NOTE 1 For applications operating at constant temperatures greater than 20 °C and up to 40 °C, see ISO 4427-1:2007, Annex A.

NOTE 2 ISO 4427 covers a range of maximum operating pressures and gives requirements concerning colours and additives. It is the responsibility of the purchaser or specifier to make the appropriate selections from these aspects, taking into account their particular requirements and any relevant national guidance or regulations and installation practices or codes.

Three types of pipe are specified:

- PE pipes (outside diameter d_n), including any identification stripes;
- PE pipes with co-extruded layers on either or both the outside and/or inside of the pipe (total outside diameter d_n), as specified in Annex A, where all layers have the same MRS rating.
- PE pipes (outside diameter d_n) having a peelable, contiguous, thermoplastics additional layer on the outside of the pipe ("coated pipe"), see Annex A.

1) 1 bar = 0,1 MPa = 10⁵ Pa; 1 MPa = 1 N/mm².

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 1133:2005, *Plastics — Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics*

ISO 1167-1, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure — Part 1: General method*

ISO 1167-2, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure — Part 2: Preparation of pipe test pieces*

ISO 2505, *Thermoplastics pipes — Longitudinal reversion — Test method and parameters*

ISO 3126, *Plastics piping systems — Plastics components — Determination of dimensions*

ISO 4065, *Thermoplastics pipes — Universal wall thickness table*

ISO 4427-1:2007, *Plastics piping systems — Polyethylene (PE) pipes and fittings for water supply — Part 1: General*

ISO 4427-5:2007, *Plastics piping systems — Polyethylene (PE) pipes and fittings for water supply — Part 5: Fitness for purpose of the system*

ISO 4433-1:1997, *Thermoplastics pipes — Resistance to liquid chemicals — Classification — Part 1: Immersion test method*

ISO 4433-2:1997, *Thermoplastics pipes — Resistance to liquid chemicals — Classification — Part 2: Polyolefin pipes*

ISO 6259-1:1997, *Thermoplastics pipes — Determination of tensile properties — Part 1: General test method*

ISO 6259-3:1997, *Thermoplastics pipes — Determination of tensile properties — Part 3: Polyolefin pipes*

ISO 11357-6:2002, *Plastics — Differential scanning calorimetry (DSC) — Part 6: Determination of oxidation induction time*

ISO 11922-1:1997, *Thermoplastics pipes for the conveyance of fluids — Dimensions and tolerances — Part 1: Metric series*

3 Terms, definitions, symbols and abbreviated terms

For the purposes of this document, the terms, definitions, symbols and abbreviated terms given in ISO 4427-1 apply.

4 Material

4.1 Compound

The material from which the pipes are made shall be in accordance with ISO 4427-1.

4.2 Identification compound

Where applicable, the compound used for identification stripes and co-extruded layers (see 5.2) shall be manufactured from a PE polymer manufactured from the same type of base polymer as used in the compound for pipe production.

For co-extruded layers used for identification purposes, Annex A applies.

5 General characteristics

5.1 Appearance

When viewed without magnification, the internal and external surfaces of pipes shall be smooth, clean and free from scoring, cavities and other surface defects such as would prevent conformity of the pipe to this part of ISO 4427. The pipe ends shall be cut cleanly and square to the axis of the pipe.

5.2 Colour

The pipes shall be either blue or black, or black with blue stripes. For coated pipes in accordance with Annex A, this applies to the coating.

Blue pipes or black pipes with blue stripes are intended for drinking water only.

For above-ground installations, all blue components and components with non-black layers should be protected from direct UV light.

5.3 Effect on water quality

Attention is drawn to the requirements of national regulations (see also the Introduction). See ISO 4427-1:2007, Clause 5.

6 Geometrical characteristics

6.1 Measurements

The dimensions of the pipe shall be measured in accordance with ISO 3126. In case of dispute, the measurements of dimensions shall be made not less than 24 h after manufacture and after conditioning for at least 4 h at $(23 \pm 2) ^\circ\text{C}$.

6.2 Mean outside diameter and out-of-roundness (ovality)

The mean outside diameters, d_{em} , and the out-of-roundness (ovality) shall be in accordance with Table 1.

Table 1 — Mean outside diameters and out-of-roundness

Dimensions in millimetres

Nominal size DN/OD	Nominal outside diameter d_n	Mean outside diameter ^a		Maximum out-of-roundness (ovality) ^b
		$d_{em \text{ min}}$	$d_{em \text{ max}}$	
16	16	16,0	16,3	1,2
20	20	20,0	20,3	1,2
25	25	25,0	25,3	1,2
32	32	32,0	32,3	1,3
40	40	40,0	40,4	1,4
50	50	50,0	50,4	1,4
63	63	63,0	63,4	1,5
75	75	75,0	75,5	1,6
90	90	90,0	90,6	1,8
110	110	110,0	110,7	2,2
125	125	125,0	125,8	2,5
140	140	140,0	140,9	2,8
160	160	160,0	161,0	3,2
180	180	180,0	181,1	3,6
200	200	200,0	201,2	4,0
225	225	225,0	226,4	4,5
250	250	250,0	251,5	5,0
280	280	280,0	281,7	9,8
315	315	315,0	316,9	11,1
355	355	355,0	357,2	12,5
400	400	400,0	402,4	14,0
450	450	450,0	452,7	15,6
500	500	500,0	503,0	17,5
560	560	560,0	563,4	19,6
630	630	630,0	633,8	22,1
710	710	710,0	716,4	—
800	800	800,0	807,2	—
900	900	900,0	908,1	—
1 000	1 000	1 000,0	1 009,0	—
1 200	1 200	1 200,0	1 210,8 ^c	—
1 400	1 400	1 400,0	1 412,6 ^c	—
1 600	1 600	1 600,0	1 614,4 ^c	—
1 800	1 800	1 800,0	1 816,2 ^c	—
2 000	2 000	2 000,0	2 018,0 ^c	—

For coiled pipe and for straight lengths with diameters ≥ 710 , the maximum out-of-roundness shall be agreed between manufacturer and purchaser.

^a In accordance with ISO 11922-1:1997, grade B, for sizes ≤ 630 and grade A for sizes ≥ 710 .

^b In accordance with ISO 11922-1:1997, grade N, for sizes ≤ 630 , is measured at the point of manufacture.

^c Tolerance calculated as $0,009 d_{em}$ and does not conform to grade A in ISO 11922-1:1997.

NOTE Tolerance bands in accordance with ISO 11922-1 are calculated as follows, as applicable.

- a) Grade A: $0,009d_n$ rounded to the next greater 0,1 mm with a minimum value of 0,3 mm and a maximum value of 10,0 mm.
- b) Grade B: $0,006d_n$ rounded up to the next greater 0,1 mm with a minimum value of 0,3 mm and a maximum value of 4,0 mm.
- c) Grade N:
 - for diameters ≤ 75 mm $(0,008 d_n + 1)$ mm,
 - for diameters ≥ 90 mm and ≤ 250 mm $(0,02 d_n)$ mm,
 - for diameters > 250 mm $(0,035 d_n)$ mm,

rounded up to the next 0,1 mm.

6.3 Wall thicknesses and their tolerances

The wall thickness shall be in accordance with Table 2.

NOTE The relationship between PN, MRS, S and SDR is given in Annex B.

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