



SLOVENSKI STANDARD
kSIST FprEN 12201-1:2023

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Cevni sistemi iz polimernih materialov za oskrbo z vodo in za odvodnjavanje in kanalizacijo pod tlakom - Polietilen (PE) - 1. del: Splošno

Plastics piping systems for water supply, and for drainage and sewerage under pressure - Polyethylene (PE) - Part 1: General

Kunststoff-Rohrleitungssysteme für die Wasserversorgung und für Entwässerungs- und Abwasserdruckleitungen - Polyethylen (PE) - Teil 1: Allgemeines

Systèmes de canalisations en plastique pour l'alimentation en eau et pour les branchements et les collecteurs d'assainissement avec pression - Polyéthylène (PE) - Partie 1: Généralités

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Allgemeines

This draft European Standard is submitted to CEN members for formal vote. It has been drawn up by the Technical Committee CEN/TC 155.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (FprEN 12201-1:2023) has been prepared by Technical Committee CEN/TC 155 “Plastics piping systems and ducting systems”, the secretariat of which is held by NEN.

This document is currently submitted to the Formal Vote.

This document will supersede EN 12201-1:2011.

System Standards are based on the results of the work being undertaken in ISO/TC 138 “Plastics pipes, fittings and valves for the transport of fluids”, which is a Technical Committee of the International Organization for Standardization (ISO).

They are supported by separate standards on test methods to which references are made throughout the System Standard.

The System Standards are consistent with general standards on functional requirements and on recommended practice for installation.

EN 12201 consists of the following parts:

- EN 12201-1, *Plastics piping systems for water supply, and for drains and sewers under pressure — Polyethylene (PE) — Part 1: General* (this document);
- EN 12201-2, *Plastics piping systems for water supply, and for drains and sewers under pressure — Polyethylene (PE) — Part 2: Pipes*;
- EN 12201-3, *Plastics piping systems for water supply, and for drains and sewers under pressure — Polyethylene (PE) — Part 3: Fittings*;
- EN 12201-4, *Plastics piping systems for water supply, and for drains and sewers under pressure — Polyethylene (PE) — Part 4: Valves for water supply systems*;
- EN 12201-5, *Plastics piping systems for water supply, and for drains and sewers under pressure — Polyethylene (PE) — Part 5: Fitness for purpose of the system*.

In addition the following document provides guidance on the assessment of conformity:

- CEN/TS 12201-7, *Plastics piping systems for water supply — Polyethylene (PE) — Part 7: Assessment of conformity*.

The revision of this System Standard has been carried out to add the PE 100-RC type materials with enhanced resistance to slow crack growth. Annex C discusses the performance of this type of material and gives additional information for non-conventional installation techniques. The size range has been increased to 3 000 mm diameter, test methods have been updated, and new test methods have been added for PE 100-RC materials.

FprEN 12201-1:2023 (E)

Introduction

This document specifies the requirements for a piping system and its components 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, drains and sewers under pressure, vacuum sewer systems, and water for other purposes.

In respect of potential adverse effects on the quality of water intended for human consumption, caused by the products covered by the EN 12201 series:

- this document provides no information as to whether the products may be used without restriction in any of the Member States of the EU or EFTA;

NOTE Attention is drawn to the presence of national regulations and testing arrangements in relation to products intended for use in water supply to ensure fitness for contact with drinking water.

Requirements and test methods for components of the piping system are specified in FprEN 12201-2, FprEN 12201-3 and FprEN 12201-4.

Characteristics for fitness for purpose of the system are covered in FprEN 12201-5 [1]. CEN/TS 12201-7 [2] gives guidance for assessment of conformity.

This part of EN 12201 covers the general aspects of the plastics piping system.

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1 Scope

This document specifies materials and the general aspects of polyethylene (PE) pressure piping systems (mains and service pipes) for buried or above ground applications, intended for the conveyance of water for human consumption, raw water prior to treatment, drains and sewers under pressure, vacuum sewer systems, and water for other purposes, with the exception of industrial application.

NOTE 1 For PE components intended for the conveyance of water intended for human consumption and raw water prior to treatment attention is drawn to Clause 6 of this document. Components manufactured for water for other purposes, drains and sewers, and vacuum systems are possibly not suitable for water supply for human consumption.

NOTE 2 Industrial application is covered by EN ISO 15494 [6].

The intended use includes sea outfalls, laid in water and pipes suspended below bridges.

It also specifies the test parameters for the test methods referred to in this document.

In conjunction with EN 12201-2, EN 12201-3, EN 12201-4 and EN 12201-5, this document is applicable to PE pipes, fittings and valves, their joints and joints with components of PE and other materials intended to be used under the following conditions:

- a) allowable operating pressure, PFA, up to 25 bar ¹;
- b) an operating temperature of 20 °C as a reference temperature.

NOTE 3 For applications operating at constant temperatures greater than 20 °C and up to and including 50 °C, see Annex A.

The EN 12201 series covers a range of allowable operating pressures and gives requirements concerning colours.

NOTE 4 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.

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.

FprEN 12201-2:2023, *Plastics piping systems for water supply, and for drains and sewers under pressure — Polyethylene (PE) — Part 2: Pipes*

FprEN 12201-3, *Plastics piping systems for water supply, and for drains and sewers under pressure — Polyethylene (PE) — Part 3: Fittings*

FprEN 12201-4, *Plastics piping systems for water supply, and for drains and sewers under pressure — Polyethylene (PE) — Part 4: Valves for water supply systems*

EN 12099, *Plastics piping systems - Polyethylene piping materials and components - Determination of volatile content*

EN ISO 472, *Plastics — Vocabulary (ISO 472)*

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

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EN ISO 1043-1, *Plastics – Symbols and abbreviated terms — Part 1: Basic polymers and their special characteristics (ISO 1043-1)*

EN ISO 1133-1, *Plastics - Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics - Part 1: Standard method (ISO 1133-1)*

EN 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 1167-1)*

EN 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 1167-2)*

EN ISO 1183-1, *Plastics - Methods for determining the density of non-cellular plastics - Part 1: Immersion method, liquid pycnometer method and titration method (ISO 1183-1)*

EN ISO 1183-2, *Plastics - Methods for determining the density of non-cellular plastics - Part 2: Density gradient column method (ISO 1183-2)*

EN ISO 6259-1, *Thermoplastics pipes - Determination of tensile properties - Part 1: General test method (ISO 6259-1)*

EN ISO 6259-3, *Thermoplastics pipes - Determination of tensile properties - Part 3: Polyolefin pipes (ISO 6259-3)*

EN ISO 9080, *Plastics piping and ducting systems - Determination of the long-term hydrostatic strength of thermoplastics materials in pipe form by extrapolation (ISO 9080)*

EN ISO 11357-6, *Plastics - Differential scanning calorimetry (DSC) - Part 6: Determination of oxidation induction time (isothermal OIT) and oxidation induction temperature (dynamic OIT) (ISO 11357-6)*

EN ISO 12162, *Thermoplastics materials for pipes and fittings for pressure applications - Classification, designation and design coefficient (ISO 12162)*

EN ISO 13477, *Thermoplastics pipes for the conveyance of fluids - Determination of resistance to rapid crack propagation (RCP) - Small-scale steady-state test (S4 test) (ISO 13477)*

EN ISO 15512, *Plastics - Determination of water content (ISO 15512)*

EN ISO 16871, *Plastics piping and ducting systems - Plastics pipes and fittings - Method for exposure to direct (natural) weathering (ISO 16871)*

ISO 6964, *Polyolefin pipes and fittings — Determination of carbon black content by calcination and pyrolysis — Test method*

ISO 11413:2019, *Plastics pipes and fittings — Preparation of test piece assemblies between a polyethylene (PE) pipe and an electrofusion fitting*

ISO 11414:2009, *Plastics pipes and fittings — Preparation of polyethylene (PE) pipe/pipe or pipe/fitting test piece assemblies by butt fusion*

ISO 13479:2022, *Polyolefin pipes for the conveyance of fluids — Determination of resistance to crack propagation — Test method for slow crack growth on notched pipes*

ISO 13953, *Polyethylene (PE) pipes and fittings — Determination of the tensile strength and failure mode of test pieces from a butt-fused joint*

ISO 13954, *Plastics pipes and fittings — Peel decohesion test for polyethylene (PE) electrofusion assemblies of nominal outside diameter greater than or equal to 90 mm*

ISO 16770, *Plastics — Determination of environmental stress cracking (ESC) of polyethylene — Full-notch creep test (FNCT)*

ISO 18488, *Polyethylene (PE) materials for piping systems — Determination of Strain Hardening Modulus in relation to slow crack growth — Test method*

ISO 18489:2015, *Polyethylene (PE) materials for piping systems — Determination of resistance to slow crack growth under cyclic loading — Cracked Round Bar test method*

ISO 18553, *Method for the assessment of the degree of pigment or carbon black dispersion in polyolefin pipes, fittings and compounds*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 472 and EN ISO 1043-1 and the following 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 Geometrical characteristics

3.1.1

nominal size

DN/OD

numerical designation of the size of a component related to the outside diameter

Note 1 to entry: It is a convenient round number approximately equal to the manufacturing dimension in millimetres (mm). It is not applicable to components designated by thread size.

3.1.2

nominal outside diameter

d_n

specified outside diameter assigned to a *nominal size* (3.1.1)

Note 1 to entry: Nominal outside diameter is expressed in millimetres.

3.1.3

outside diameter at any point

d_e

value of the measurement of the outside diameter through its cross-section at any point of the pipe or spigot end, rounded to the next greater 0,1 mm

FprEN 12201-1:2023 (E)**3.1.4****mean outside diameter** d_{em}

value of the measurement of the outer circumference of the pipe or spigot end of a fitting in any cross section divided by π (= 3,142), rounded to the next greater 0,1 mm

3.1.5**minimum mean outside diameter** $d_{em,min}$

minimum value for the mean outside diameter as specified for a given nominal size

3.1.6**maximum mean outside diameter** $d_{em,max}$

maximum value for the mean outside diameter as specified for a given nominal size

3.1.7**out-of-roundness****ovality**

difference between the maximum and the minimum outside diameter in the same cross-section of a pipe or spigot

3.1.8**nominal wall thickness** e_n

numerical designation of the wall thickness of a component, which is a convenient round number, approximately equal to the manufacturing dimension in millimetres (mm)

Note 1 to entry: For thermoplastics components conforming to the EN 12201 series, the value of the nominal wall thickness, e_n , is identical to the specified minimum wall thickness at any point, e_{min} .

3.1.9**wall thickness at any point** e

wall thickness at any point around the circumference of a component rounded to the next greater 0,1 mm

Note 1 to entry: The symbol for the wall thickness of a fitting and valve body at any point is E .

3.1.10**minimum wall thickness at any point** e_{min}

minimum value for the *wall thickness at any point* (3.1.9) around the circumference of a component as specified

3.1.11**maximum wall thickness at any point** e_{max}

maximum value for the *wall thickness at any point* (3.1.9) around the circumference of a component as specified

3.1.12**mean wall thickness** e_m

arithmetical mean of a number of measurements of the wall thickness, regularly spaced around the circumference and in the same cross-section of a component, including the measured minimum and the measured maximum values of the wall thickness in that cross-section

3.1.13**tolerance**

permitted variation of the specified value of a quantity expressed as the difference between the permitted maximum and the permitted minimum values

3.1.14**wall thickness tolerance** t_y

permitted difference between the *wall thickness at any point, e*, (3.1.9) and the nominal wall thickness, e_n (3.1.8)

Note 1 to entry: $e_n \leq e \leq e_n + t_y$

3.1.15**pipe series****S**

dimensionless number for pipe designation

Note 1 to entry: The relationship between the pipe series, S , and the *standard dimension ratio*, SDR, (3.1.16) is given by the following equation as specified in ISO 4065:2018 [9].

$$S = \frac{\text{SDR} - 1}{2}$$

3.1.16**standard dimension ratio****SDR**

numerical designation of a *pipe series* (3.1.15), which is a convenient round number, approximately equal to the dimension ratio of the *nominal outside diameter*, d_n , (3.1.2) and the *nominal wall thickness*, e_n (3.1.8)

3.2 Material definitions**3.2.1****compound**

clearly defined homogenous extruded mixture of *base polymer* (3.2.5) (polyethylene) and additives (i.e. anti-oxidants, pigments, carbon black, UV-stabilizers and others) at a dosage level necessary for the processing and use of components

3.2.2**virgin material**

plastics material in the form of pellets or granules that has not been subjected to use or processing other than that required for its initial manufacture

Note 1 to entry: Does not contain any reworked plastics material and/or plastics recyclate.