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Cevni sistemi iz polimernih materialov za oskrbo z vodo in za odvodnjavanje in kanalizacijo pod tlakom - Polietilen (PE) - 2. del: Cevi

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

Kunststoff-Rohrleitungssysteme für die Wasserversorgung und für Entwässerungs- und Abwasserdruckleitungen - Polyethylen (PE) - Teil 2: Rohre

Systèmes de canalisations en plastique pour l'alimentation en eau et pour les branchements et les collecteurs d'assainissement avec pression - Polyéthylène (PE) - Partie 2 : Tubes

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l'alimentation en eau et pour les branchements et les
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Wasserversorgung und für Entwässerungs- und
Abwasserdruckleitungen - Polyethylen (PE) - Teil 2:
Rohre

This European Standard was approved by CEN on 10 December 2023.

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EN 12201-2:2024 (E)**European foreword**

This document (EN 12201-2:2024) has been prepared by Technical Committee CEN/TC 155 “Plastics piping systems and ducting systems”, the secretariat of which is held by NEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 2024, and conflicting national standards shall be withdrawn at the latest by July 2024.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 12201-2:2011+A1:2013.

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*;
- EN 12201-2, *Plastics piping systems for water supply, and for drains and sewers under pressure — Polyethylene (PE) — Part 2: Pipes* (this document);
- 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, and for drainage and sewerage under pressure — Polyethylene (PE) — Part 7: Guidance for the 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. EN 12201-1:2024, 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.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

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EN 12201-2:2024 (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 product covered by the EN 12201 series:

- this document provides no information as to whether the product 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 material and components, other than pipes, are specified in EN 12201-1, EN 12201-3 [1] and EN 12201-4 [2].

Characteristics for fitness of purpose of the system are covered in EN 12201-5. CEN/TS 12201-7 [3] gives guidance for the assessment of conformity.

This part of EN 12201 covers the characteristics of pipes.

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1 Scope

This document specifies the characteristics of pipes made from polyethylene (PE) for buried and 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 for human consumption and raw water prior to treatment, attention is drawn to 6.3 of this document. Components manufactured for water for general purposes, drains and sewers, and vacuum sewer systems are possibly not suitable for water supply for human consumption.

NOTE 2 Industrial application is covered by EN ISO 15494 [4].

The intended uses include sea outfalls, laid in water and pipes suspended below bridges.

For use in contaminated soils special consideration is taken for pipes intended for the transport of water intended for human consumption or raw water prior to treatment.

NOTE 3 Pipes constructions including barrier layers are not covered by this document. ISO 21004 provides an alternative solution for use in contaminated soils [10].

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

In conjunction with EN 12201-1, EN 12201-3, EN 12201-4 and EN 12201-5, this document is applicable to PE pipes, fitting 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 4 For applications operating at constant temperatures greater than 20 °C and up to and including 50 °C, see EN 12201-1:2024, Annex A.

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

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This document is applicable to three types of pipes:

- 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 B, where all PE layers have the same MRS rating;
- PE pipes (outside diameter d_n) with a peelable and contiguous thermoplastics additional layer on the outside of the pipe (“coated pipe”) as specified in Annex C.

NOTE 5 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.

NOTE 6 Assessment of the resistance to slow crack growth of the PE pipe compound used for the manufacture of products conforming to this document is required in accordance with EN 12201-1:2024, Table 2.

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

EN 12201-2:2024 (E)**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.

EN 12201-1:2024, *Plastics piping systems for water supply, and for drains and sewers under pressure — Polyethylene (PE) — Part 1: General*

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*

CEN/TR 15438, *Plastics piping systems — Guidance for coding of products and their intended uses*

EN ISO 178, *Plastics — Determination of flexural properties (ISO 178)*

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 1167-1:2006, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure — Part 1: General method (ISO 1167-1:2006)*

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

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

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)*

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EN ISO 9969, *Thermoplastics pipes — Determination of ring stiffness (ISO 9969)*

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 13968, *Plastics piping and ducting systems — Thermoplastics pipes — Determination of ring flexibility (ISO 13968)*

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

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

ISO 11922-1:2018, *Thermoplastics pipes for the conveyance of fluids — Dimensions and tolerances — Part 1: Metric series*

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 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*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12201-1 apply.

ISO and IEC maintain terminology 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/>

4 Symbols and abbreviations

For the purposes of this document, the symbols and abbreviations given in EN 12201-1 apply.

5 Material

5.1 Compound for pipes

The PE compound from which the pipes are made shall conform to EN 12201-1.

The pipes shall be made from virgin material, reworked material from the extrusion process or reworked material from the injection moulding process from the same PE compound from one of the manufacturer's own plants, or a mixture of the three. Reworked material from the base pipe of peelable layer pipe (coated pipe) and reworked material from pipes with or without identification stripes may be used.

Reworked material from co-extruded pipes or from pipes reworked with the peelable layer attached shall not be used for monolayer pipes.

A pipe can only be designated as an PE 100-RC pipe if it is produced from PE 100-RC materials, which fulfil the requirements of EN 12201-1:2024, Table 1 and 2, and is declared as PE 100-RC by the raw material producer, and fulfils the requirements of Table 3 and 5 of this document for PE 100-RC. A co-extruded pipe made of a combination of PE 100 and PE 100-RC layers shall be regarded as PE 100 and marked accordingly.

5.2 Compound for identification stripes

The stripe compound (see 6.2) shall be manufactured from a PE base polymer in accordance with EN 12201-1, which is used for a pipe compound for which fusion compatibility has been proven. Fusion compatibility is not applicable for PE 40 materials.

The compound used for identification stripes in form of a pipe shall conform to the following test requirements of resistance to weathering as described in EN 12201-1:2024, Table 2:

- Decohesion test requirement for PE 80, PE 100 and PE 100-RC stripe compound;
- Hydrostatic strength test (1 000 h at 80 °C and 2,0 MPa) and the elongation at break test requirements for PE 40 stripe compound (to be performed on pipe d_n : 32 mm SDR 11).

The OIT of the stripe compound shall be ≥ 10 min at 210 °C, measured by the compound supplier in accordance with EN ISO 11357-6 (table footnote d of Table 5 applies).