
Cevni sistemi iz polimernih materialov za oskrbo z vodo in za odvodnjavanje in kanalizacijo pod tlakom - Polietilen (PE) - 5. del: Ustrežanje zahtevam za uporabnost sistema

Plastics piping systems for water supply, and for drainage and sewerage under pressure - Polyethylene (PE) - Part 5: Fitness for purpose of the system

Kunststoff Rohrleitungssysteme für die Wasserversorgung und für Entwässerungs- und Abwasserdruckleitungen - Polyethylen (PE) - Teil 5: Gebrauchstauglichkeit des Systems

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Systèmes de canalisations en plastique pour l'alimentation en eau et pour les branchements et les collecteurs d'assainissement avec pression - Polyéthylène (PE) - Partie 5 : Aptitude à l'emploi du système

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Systèmes de canalisations en plastique pour l'alimentation en eau et pour les branchements et les collecteurs d'assainissement avec pression - Polyéthylène (PE) - Partie 5 : Aptitude à l'emploi du système

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This draft European Standard is submitted to CEN members for enquiry. 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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Contents	Page
European foreword	3
Introduction	4
1 Scope.....	5
2 Normative references.....	6
3 Terms and definitions.....	7
4 Symbols and abbreviations	7
5 Fitness for purpose of the system	7
5.1 Method of preparation of assemblies for testing	7
5.1.1 General.....	7
5.1.2 Butt fusion joints.....	7
5.1.3 Electrofusion joints.....	7
5.1.4 Mechanical joints	8
5.2 Requirements for fitness for purpose	8
5.2.1 General.....	8
5.2.2 Fitness for purpose for butt fusion joints (C).....	8
5.2.3 Fitness for purpose for electrofusion assemblies (A) (B)	9
5.2.4 Fitness for purpose of mechanical assemblies (D)	10
5.2.5 Fitness for purpose of socket fusion assemblies (E).....	10
5.3 Conditioning	10
5.4 Requirements.....	11
5.5 Testing of pipe with coextruded layers.....	12
Bibliography.....	13

European foreword

This document (prEN 12201-5:2021) 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 will supersede EN 12201-5:2011.

In comparison with the previous edition, the following technical modifications have been made:

- The revision of this System Standard has been carried out principally to add the PE 100-RC type materials with enhanced resistance to slow crack growth. prEN 12201-1:2021, Annex C discusses the performance of this type of material and gives additional information for non-conventional installation techniques. In addition test methods have been updated.

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

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: Guidance for the assessment of conformity*.

prEN 12201-5:2021 (E)**Introduction**

The System Standard, of which this is Part 5, specifies the requirements for a piping system and its components when made from polyethylene (PE).

It is intended to be used for water supply intended for human consumption, including the conveyance of raw water prior to treatment, drainage and sewerage 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:

- a) 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;
- b) products intended for use in water supply systems should comply, when existing, with national regulations and testing arrangements that ensure fitness for contact with drinking water.

Requirements and test methods for components of the piping system are specified in prEN 12201-1, prEN 12201-2, prEN 12201-3 and prEN 12201-4:2021. CEN/TS 12201-7 [1] gives guidance for the assessment of conformity.

This Part of EN 12201 covers the characteristics of the fitness for purpose of the system.

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1 Scope

This document specifies the characteristics of the fitness for purpose of the assembled piping systems intended for the conveyance of water intended for human consumption, raw water prior to treatment, drainage and sewerage under pressure, vacuum sewer systems, and water for other purposes.

It also specifies the method of preparation of test piece joints, and the tests to be carried out on these joints for assessing the fitness for purpose of the system under normal and extreme conditions.

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

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

NOTE 2 This document is intended only to be used by the product manufacturer to assess the performance of components according to prEN 12201-2, prEN 12201-3, or prEN 12201-4 when joined together under normal and extreme conditions. It is not intended for on-site testing of pipe systems.

In conjunction with Parts 1 to 4 of prEN 12201 it is applicable to PE pipes, fittings, valves, their joints and to joints with components of other materials intended to be used under the following conditions:

- a) allowable operating pressure, PFA, up to 25 bar¹⁾;
- b) an operating temperature of 20 °C as a reference temperature for design purposes;
- c) buried in the ground;
- d) sea outfalls;
- e) laid in water;
- f) above ground, including pipes suspended below bridges.

NOTE 3 For applications operating at constant temperatures greater than 20 °C up to 40 °C, see prEN 12201-1:2021, 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.

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

prEN 12201-5:2021 (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.

prEN 12201-1:2021, *Plastics piping systems for water supply, and for drainage and sewerage under pressure — Polyethylene (PE) — Part 1: General*

prEN 12201-2, *Plastics piping systems for water supply, and for drainage and sewerage under pressure - Polyethylene (PE) - Part 2: Pipes*

prEN 12201-3, *Plastics piping systems for water supply, and for drainage and sewerage under pressure - Polyethylene (PE) - Part 3: Fittings*

prEN 12201-4:2021, *Plastics piping systems for water supply, and for drainage and sewerage under pressure - Polyethylene (PE) - Part 4: Valves for water supply systems*

EN ISO 3501, *Plastics piping systems - Mechanical joints between fittings and pressure pipes - Test method for resistance to pull-out under constant longitudinal force (ISO 3501)*

EN ISO 3503, *Plastics piping systems - Mechanical joints between fittings and pressure pipes - Test method for leaktightness under internal pressure of assemblies subjected to bending (ISO 3503)*

EN ISO 3458, *Plastics piping systems - Mechanical joints between fittings and pressure pipes - Test method for leaktightness under internal pressure (ISO 3458)*

EN ISO 3459, *Plastic piping systems - Mechanical joints between fittings and pressure pipes - Test method for leaktightness under negative pressure (ISO 3459)*

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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 1167-4, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids - Determination of the resistance to internal pressure - Part 4: Preparation of assemblies (ISO 1167-4)*

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 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 13955, *Plastics pipes and fittings — Crushing decohesion test for polyethylene (PE) electrofusion assemblies*

ISO 13956, *Plastics pipes and fittings — Decohesion test of polyethylene (PE) saddle fusion joints — Evaluation of ductility of fusion joint interface by tear test*

ISO 17885:2015, *Plastics piping systems — Mechanical fittings for pressure piping systems — Specifications*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

4 Symbols and abbreviations

For the purpose of this document the symbols and abbreviations given in prEN 12201-1-2021 apply.

5 Fitness for purpose of the system

5.1 Method of preparation of assemblies for testing

5.1.1 General

The joints shall be made by using pipes conforming to prEN 12201-2, fittings conforming to prEN 12201-3 or valves conforming to prEN 12201-4:2021.

Test pieces for pressure tests shall be closed with pressure-tight, end-load-bearing end caps, plugs or flanges which shall be provided with connections for the entry of water and release of air.

Butt fusion and electrofusion joints are applicable for components in PE 100, PE 100-RC, and PE 80 materials. Pipes in PE 40 materials are joined using mechanical fittings only.

The peelable layer of peelable layer pipe shall be removed in the area of the joint prior to jointing.

5.1.2 Butt fusion joints

PE pipes, spigot end fittings and valves intended to be used for jointing by butt fusion shall be prepared and assembled in accordance with ISO 11414:2009. The conditions for the preparation of the joints are given in 5.2.2.1 for the assessment of fitness for purpose under normal conditions and in 5.2.2.2 for the assessment of fitness for purpose under extreme conditions.

5.1.3 Electrofusion joints

PE pipes, fittings and valves intended to be used for jointing by electrofusion shall be prepared and assembled in accordance with ISO 11413:2019. The conditions for the preparation of the joints are given in 5.2.3.1 for the assessment of fitness for purpose under normal conditions and in 5.2.3.2 for the assessment of fitness for purpose under extreme conditions.

For joints with electrofusion saddle fittings, the electrofusion saddle fitting shall be fused to the pipe, while it is pressurized to the allowable maximum operating pressure. The pipe shall be cut immediately after the manufacturer prescribed cooling time has elapsed.

These joints with electrofusion saddle fitting should be prepared taking into consideration national safety regulations when being prepared.

For electrofusion couplers test joints on selected diameters out of the product range shall be prepared with a gap of $0,05d_n$ between the pipe end and the maximum theoretical depth of penetration of the fitting, where for diameters greater than 225 mm, the adjoining pipes shall be arranged to provide the maximum angular deflection possible for the fitting, limited to $1,5^\circ$.

prEN 12201-5:2021 (E)**5.1.4 Mechanical joints**

For mechanical joints the assembly of the PE pipe and the fitting shall be prepared in accordance with ISO 17885.

5.2 Requirements for fitness for purpose**5.2.1 General**

When tested in accordance with the test methods as specified in Table 5 using the indicated parameters, pipes and fittings shall have mechanical characteristics conforming to the requirements given in Table 5, as applicable to the following types of joint assemblies with pipe:

- (A) electrofusion socket joints;
- (B) electrofusion saddle joints;
- (C) butt fusion joints;
- (D) mechanical joints;
- (E) socket fusion joints.

5.2.2 Fitness for purpose for butt fusion joints (C)**5.2.2.1 Under normal conditions (ambient temperature 23 °C)**

For the assessment of fitness for purpose under normal conditions, butt fusion joints shall have the characteristic of tensile strength and hydrostatic strength conforming to the requirement given in Table 5, using the parameters as specified in ISO 11414:2009, Annex B, Condition 1 at an ambient temperature of (23 ± 2) °C and the scheme listed in Table 1.

Table 1 — Scheme for butt-fused joints

Pipe/spigot end fitting Valve with spigot ends	Pipe	
	PE 80	PE 100 or PE 100-RC
PE 80	X	X ^a
PE 100 or PE 100-RC	X ^a	X

^a Only when requested by the purchaser. For example, a PE100 pipe shall be tested with a PE 100 or PE 100-RC pipe, Only when requested by the purchaser a PE 80 pipe shall be incorporated in the test assembly.

The pipe manufacturer shall declare which pipes from his own product range manufactured from different compounds conforming to prEN 1555-2:2021 are compatible to each other for butt fusion.

The fitting or valve manufacturer shall declare the SDR range and MRS values of pipes conforming to which his spigot end fittings and/or his spigot end valves can be fused by using the same procedures (e.g. times, temperatures, fusion pressures) to conform to this document. If there is a need for deviation in fusion procedures the fitting or valve manufacturer shall state this clearly.