



SLOVENSKI STANDARD
oSIST prEN 12201-3:2021
01-julij-2021

**Cevni sistemi iz polimernih materialov za oskrbo z vodo in za odvodnjavanje in
kanalizacijo pod tlakom - Polietilen (PE) - 3. del: Fitingi**

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

Kunststoff-Rohrleitungssysteme für die Wasserversorgung und für Entwässerungs- und
Abwasserdruckleitungen - Polyethylen (PE) - Teil 3: Formstücke

Systèmes de canalisations en plastique pour l'alimentation en eau et pour les
branchements et les collecteurs d'assainissement avec pression - Polyéthylène (PE) -
Partie 3 : Raccords

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

Systèmes de canalisations en plastique pour
l'alimentation en eau et pour les branchements et les
collecteurs d'assainissement avec pression -
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Kunststoff-Rohrleitungssysteme für die
Wasserversorgung und für Entwässerungs- und
Abwasserdruckleitungen - Polyethylen (PE) - Teil 3:
Formstücke

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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COMITÉ EUROPÉEN DE NORMALISATION
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Contents	Page
European foreword	4
Introduction	5
1 Scope.....	6
2 Normative references.....	7
3 Terms and definitions.....	8
4 Symbols and abbreviations	9
5 Material	9
5.1 Compound for fittings	9
5.2 Material for non-polyethylene parts.....	9
5.2.1 General.....	9
5.2.2 Metal parts.....	10
5.2.3 Sealing materials.....	10
5.2.4 Other materials.....	10
6 General characteristics.....	10
6.1 Appearance	10
6.2 Design.....	10
6.3 Colour.....	10
6.4 Electrical characteristics for electrofusion fittings.....	10
6.5 Appearance of factory made joints.....	11
6.6 Effect on water quality.....	11
7 Geometrical characteristics	11
7.1 Measurement of dimensions	11
7.2 Dimensions of electrofusion socket fittings.....	11
7.2.1 Diameters and lengths of electrofusion sockets.....	11
7.2.2 Wall thicknesses.....	13
7.2.3 Out-of-roundness of the bore of a fitting (at any point)	14
7.3 Dimensions of electrofusion saddle fittings.....	14
7.4 Dimensions of spigot end fittings.....	15
7.4.1 Diameters and lengths	15
7.4.2 Wall thickness of fusion end	18
7.4.3 Wall thickness of the fitting body	18
7.4.4 Other dimensions	18
7.5 Dimensions of socket fusion fittings.....	18
7.6 Design and dimensions of mechanical fittings.....	18
7.6.1 General.....	18
7.6.2 Mechanical fittings with polyethylene spigot ends	18
7.6.3 Mechanical fittings with polyethylene electrofusion sockets.....	18
7.6.4 Threads.....	18
7.6.5 Dimensions of loose backing flanges and flange adapters	18
7.6.6 Dimensions of fabricated fittings.....	18
8 Mechanical characteristics.....	19
8.1 General.....	19
8.2 Requirements.....	19

8.3	Performance requirements	22
9	Physical characteristics.....	22
9.1	Conditioning	22
9.2	Requirements.....	22
10	Chemical resistance of fittings in contact with chemicals	23
11	Performance requirements	23
12	Technical file	23
13	Marking	24
13.1	General	24
13.2	Minimum required marking of fittings.....	24
13.3	Additional marking.....	25
13.4	Fusion system recognition	25
14	Delivery Conditions	25
	Annex A (normative) Socket fusion fittings	26
	Annex B (normative) Fabricated fittings.....	28
	Annex C (informative) Examples of typical terminal connection for electrofusion fittings.....	35
	Annex D (normative) Short-term pressure test method	38
	Annex E (normative) Tensile test for fitting/pipe assemblies.....	40
	Bibliography	41

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[oSIST prEN 12201-3:2021](https://standards.iteh.ai/catalog/standards/sist/f89ef0c1-6ccf-43d8-819b-ce94b7ee289e/osist-pren-12201-3-2021)

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prEN 12201-3:2021 (E)**European foreword**

This document (prEN 12201-3:2021) 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 12201-3:2011+A1:2012

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 A discusses the performance of this type of material and gives additional information for non-conventional installation techniques. In addition the size range has been increased to 800 mm diameter, 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:

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- 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 (this document)*;
 - 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*;

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*.

Introduction

The System Standard, of which this is Part 3, specifies the requirements for a piping system and its components when made from polyethylene (PE), 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 material and components, other than fittings, are specified in prEN 12201-1, prEN 12201-2 and prEN 12201-4.

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

This Part of EN 12201 covers the characteristics of fittings.

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prEN 12201-3:2021 (E)**1 Scope**

This document specifies the characteristics of fittings made from polyethylene (PE) for buried and above ground applications, intended for the conveyance of water for human consumption, raw water prior to treatment, drainage and sewerage under pressure, vacuum sewer systems, and water for other purposes.

NOTE 1 For PE components intended for the conveyance of water for human consumption and raw water prior to treatment, attention is drawn to 6.6 of this document. Components manufactured for water for other purposes, drainage and sewerage are possibly not suitable for water supply for human consumption.

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

In conjunction with Parts 1, 2, 4 and 5 of EN 12201, it is applicable to PE fittings, their joints and to 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;
- c) buried in the ground;
- d) sea outfalls;
- e) laid in water;
- f) above ground, including pipes suspended below bridges.

NOTE 2 For applications operating at constant temperature greater than 20 °C and 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 3 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.

These fittings can be of the following types:

- a) fusion fittings;
 - 1) electrofusion fittings;
 - 2) spigot end fittings (for butt fusion using heated tools and electrofusion socket fusion);
 - 3) socket fusion fittings (see Annex A);
- b) mechanical fittings;
 - 1) compression fittings;
 - 2) flanged fittings;
- c) fabricated fittings (see Annex B).

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

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 681-1, *Elastomeric seals - Materials requirements for pipe joint seals used in water and drainage applications - Part 1: Vulcanized rubber*

EN 1716, *Plastics piping systems - Polyethylene (PE) tapping tees - Test method for impact resistance of an assembled tapping tee*

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

prEN 12201-2:2021, *Plastics piping systems for water supply, and for drainage and sewerage under pressure — Polyethylene (PE) — Part 2: Pipes*

prEN 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*

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

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 1167-3, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids - Determination of the resistance to internal pressure - Part 3: Preparation of components (ISO 1167-3)*

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)*

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

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)*

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 9624, *Thermoplastics piping systems for fluids under pressure — Flange adapters and loose backing flanges — Mating dimensions*

ISO 12176-1, *Plastics pipes and fittings — Equipment for fusion jointing polyethylene systems — Part 1: Butt fusion*

ISO 13950, *Plastics pipes and fittings — Automatic recognition systems for electrofusion joints*

ISO 13951, *Plastics piping systems — Test method for the resistance of plastic pipe/pipe or pipe/fitting assemblies to tensile loading*

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

prEN 12201-3:2021 (E)

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*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions, symbols and abbreviations given in prEN 12201-1 and the following 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>

3.1**electrofusion socket fitting**

polyethylene (PE) fitting which contains one or more integral heating elements that are capable of transforming electrical energy into heat to realise a fusion joint with a spigot end or pipe

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3.2**electrofusion saddle fitting**

polyethylene (PE) fitting which contains one or more integral heating elements that are capable of transforming electrical energy into heat to realise a fusion joint on to a pipe

3.2.1**tapping tee**

electrofusion saddle fitting (top-loading or wraparound) which contains an integral cutter to cut through the wall of the main pipe, which remains in the body of this fitting

3.2.2**branch saddle**

electrofusion saddle fitting (top loading or wrap round) which requires an ancillary cutting tool for drilling the hole in the adjoining main pipe

3.3**spigot end fitting**

polyethylene (PE) fitting where the outside diameter of the spigot end is equal to the nominal outside diameter, d_n , of the corresponding pipe

3.4

mechanical fitting

fitting, that generally includes a compression part to provide pressure integrity, leaktightness and resistance to end loads, for assembling polyethylene (PE) pipe to another PE pipe or any other element of the piping system

Note 2 to entry: A pipe-supporting sleeve providing a permanent support for a polyethylene (PE) pipe to prevent creep in the pipe wall under radial compressive forces, may be applicable. The metallic parts of the fitting can be assembled to metallic pipes by screw-threads, compression joints, welded or flanged connections, including PE flanges. In some cases, the supporting sleeve at the same time constitutes a grip ring.

Note 3 to entry: The fitting can allow either a dismountable or permanently assembled joint.

Note 4 to entry: The mechanical fitting can be supplied for field assembly, typically as a material transition fitting, or pre-assembled by the manufacturer.

3.5

fabricated fitting

fitting produced from pipe conforming to prEN 12201-2 and/or from injection-moulded fittings in accordance with this document

4 Symbols and abbreviations

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

5 Material

5.1 Compound for fittings

The PE compound from which the fittings are made shall be in accordance with prEN 12201-1.

The stress bearing parts of injection moulded fittings shall only be made from virgin material conforming to prEN 12201-1.

Non-stress bearing PE parts shall be made from virgin material or own reworked material from a compound with the same MRS or a mixture of both materials.

5.2 Material for non-polyethylene parts

5.2.1 General

All components shall conform to the relevant European Standard(s). Alternative standards may be utilized in cases where suitable European Standards do not exist provided that the fitness for purpose shall be demonstrated.

The materials and constituent elements used in making the fitting (including elastomers, greases, and any metal parts) shall be as resistant to the external and internal environments as the other elements of the piping system and shall have an expected lifetime under the following conditions at least equal to that of the PE pipe conforming to prEN 12201-2 with which they are intended to be used:

- a) during storage;
- b) under the effect of the fluids being conveyed;
- c) with respect to the service environment and operating conditions.

The requirements for the level of material performance for non-polyethylene parts shall be at least as stringent as that of the PE compound for the piping system. Reworked materials shall not be used for stress bearing polymeric parts.

prEN 12201-3:2021 (E)

Other materials used in fittings in contact with the PE pipe shall not adversely affect the pipe performance or initiate stress cracking.

NOTE 5.2 does not apply to non-stress bearing fitting parts.

5.2.2 Metal parts

All metal parts susceptible to corrosion shall be adequately protected, provided this is necessary for durability and function of the system.

When dissimilar metallic parts are used, which can be in contact with moisture, steps shall be taken to avoid the possibility of galvanic corrosion.

5.2.3 Sealing materials

Elastomeric materials used for the manufacture of seals shall conform to EN 681-1.

If other sealing materials are used, they need to be proven for water supply systems.

5.2.4 Other materials

Greases or lubricants shall not exude on to the fusion areas, and shall not affect the long-term performance of the fitting nor have any adverse effect on the quality of the water.

6 General characteristics**6.1 Appearance**

When viewed without magnification, the internal and external surfaces of the fitting shall be smooth, clean and free from scoring, cavities and other surface defects to an extent that would prevent conformity of the fitting to this document.

No component of the fitting shall show any signs of damage, scratches, pitting, bubbles, blisters, inclusions or cracks to an extent that would prevent conformity of the fittings to the requirements of this document.

6.2 Design

The design of the fitting shall be such that, when assembling the fitting onto the pipe or other components in accordance with the manufacturer's recommendations, the electrical coils and/or seals are not displaced.

6.3 Colour

The fitting shall be black or blue. For fabricated fittings the colour characteristics of pipes according to EN 12201-2 applies.

The blue colour is intended for components for the conveyance of water for human consumption only.

For above ground installations, all non-black components shall be protected from direct UV light.

6.4 Electrical characteristics for electrofusion fittings

The electrical protection that shall be provided by the system depends on the voltage and the current intensity used and on the characteristics of the electrical power source.

For voltages greater than 25 V, direct human contact with the energised parts shall not be possible when the fitting is in the fusion cycle during assembly in accordance with the instructions of the manufacturer of the fittings and the assembly equipment, as applicable.

NOTE 1 This type of fitting is a part of an electrical system as defined in EN 60335-1 [3], IEC 60364-1 [5] and IEC 60449 [6].

The tolerance on the electrical resistance of the fitting at 23 °C shall be stated by the manufacturer. The resistance shall be in between nominal resistance (-10 %) and nominal resistance (+10 %) + 0,1 Ω.

NOTE 2 $0,1 \Omega$ is the assumed value of the contact resistance.

The surface finish of the terminal pins shall allow a minimum contact resistance in order to satisfy the resistance tolerance requirements.

NOTE 3 See Annex C for examples of typical electrofusion terminal connectors.

6.5 Appearance of factory made joints

The internal and external surfaces of the pipe and fitting after fusion jointing, examined visually without magnification, shall be free from melt exudation outside the confines of the fitting, apart from that which may be declared acceptable by the fitting manufacturer or used as a fusion marker.

Any melt exudation shall not cause wire movement in electrofusion fittings such that it leads to short-circuiting, when jointed in accordance with the manufacturer's instructions. There shall be no excessive creasing of the internal surfaces of the adjoining pipes.

6.6 Effect on water quality

For fittings intended for the conveyance of water for human consumption attention is drawn to the requirements of national regulations (see Introduction).

7 Geometrical characteristics

7.1 Measurement of dimensions

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

Additionally, for spigot end fittings provided with temporary supports, perform dimensional measurement at least 1 h after removal of the supports.

Indirect measurement at the stage of production is allowed at shorter time periods providing evidence is shown of correlation.

7.2 Dimensions of electrofusion socket fittings

7.2.1 Diameters and lengths of electrofusion sockets

For electrofusion sockets (see Figure 1) having a nominal diameter given in Table 1, the socket diameter and lengths shall be given by the manufacturer and shall conform to Table 1 with the following conditions:

- a) $L3 \geq 5 \text{ mm}$;
- b) $D2 \geq d_n - 2e_{\text{min}}$