



# SLOVENSKI STANDARD

## SIST EN 1555-3:2003

01-oktober-2003

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### Cevni sistemi iz polimernih materialov za oskrbo s plinastimi gorivi - Polietilen (PE) - 3. del: Fitingi

Plastics piping systems for the supply of gaseous fuels - Polyethylene (PE) - Part 3: Fittings

Kunststoff-Rohrleitungssysteme für die Gasversorgung - Polyethylen (PE) - Teil 3: Formstücke

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Systemes de canalisations en plastique pour la distribution de combustibles gazeux - Polyéthylène (PE) - Partie 3: Raccords

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## Plastics piping systems for the supply of gaseous fuels - Polyethylene (PE) - Part 3: Fittings

Systèmes de canalisations en plastique pour la distribution  
de combustibles gazeux - Polyéthylène (PE) - Partie 3:  
Raccords

Kunststoff-Rohrleitungssysteme für die Gasversorgung -  
Polyethylen (PE) - Teil 3: Formstücke

This European Standard was approved by CEN on 1 November 2002.

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

Management Centre: rue de Stassart, 36 B-1050 Brussels

## EN 1555-3:2002 (E)

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**EN 1555-3:2002 (E)****Foreword**

This document EN 1555-3:2002 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of an identical text or by endorsement, at the latest by June 2003, and conflicting national standards shall be withdrawn at the latest by December 2004.

It has been prepared in liaison with Technical Committee CEN/TC 234 "Gas supply".

This standard is a part of a System Standard for plastics piping systems of a particular material for a specified application. There are a number of such System Standards.

System Standards are based on the results of the work 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 1555 consists of the following parts, under the general title *Plastics piping systems for the supply of gaseous fuels – Polyethylene (PE)*:

— Part 1: General

— Part 2: Pipes

— Part 3: Fittings (this standard)

— Part 4: Valves

— Part 5: Fitness for purpose of the system

— Part 7: Guidance for assessment of conformity (to be published as CEN/TS).

NOTE The document dealing with recommended practice for installation which was initially submitted for CEN enquiry as prEN 1555-6 was withdrawn when EN 12007-2<sup>[1]</sup>, prepared by CEN/TC 234 Gas supply, was published with the title "Gas supply systems - Pipelines for maximum operating pressure up to and including 16 bar – Part 2: Specific functional recommendations for polyethylene (MOP up to and including 10 bar)".

This document includes an informative annex A and a Bibliography.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard : Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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## Introduction

The System Standard, of which this is Part 3, specifies the requirements for a piping system and its components made from polyethylene (PE) and which is intended to be used for the supply of gaseous fuels.

Requirements and test methods for material and components, other than fittings, are specified in EN 1555-1, EN 1555-2 and EN 1555-4. Characteristics for fitness for purpose are covered in EN 1555-5. PrCEN/TS 1555-7 gives guidance for assessment of conformity. Recommended practice for installation is given in EN 12007-2<sup>[1]</sup> prepared by CEN/TC 234.

This part of EN 1555 covers the characteristics of fittings.

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**EN 1555-3:2002 (E)****1 Scope**

This part of EN 1555 specifies the characteristics of fusion fittings made from polyethylene (PE) as well as of mechanical fittings made from PE and other materials for piping systems in the field of the supply of gaseous fuels. It also specifies the test parameters for the test methods referred to in this standard.

In conjunction with the other parts of EN 1555 (see Foreword), 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) a maximum operating pressure, MOP, up to and including 10 bar <sup>1)</sup>;
- b) an operating temperature of 20 °C as reference temperature.

NOTE 1 For other operating temperatures, derating coefficients should be used, see EN 1555-5.

EN 1555 covers a range of maximum operating pressures and gives requirements concerning colours and additives.

NOTE 2 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 regulations and installation practices or codes.

This standard is applicable for fittings of the following types:

- a) electrofusion socket fittings;
- b) electrofusion saddle fittings;
- c) spigot end fittings (for butt fusion using heated tools and electrofusion socket fusion);
- d) mechanical fittings.

The fittings can e.g. be in the form of couplers, equal and reduced tees, reducers, bends or caps.

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**2 Normative references**

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 682, *Elastomeric seals - Materials requirements for seals used in pipes and fittings carrying gas and hydrocarbon fluids.*

EN 728, *Plastics piping and ducting systems — Polyolefin pipes and fittings — Determination of oxidation induction time.*

EN 921, *Plastics piping systems — Thermoplastics pipes — Determination of resistance to internal pressure at constant temperature.*

EN 1555-1:2002, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 1: General*

EN 1555-2:2002, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 2: Pipes.*

EN 1555-5:2002, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 5: Fitness for purpose of the system.*

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

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<sup>1)</sup> 1 bar = 0,1 MPa



EN 12117, *Plastics piping systems - Fittings, valves and ancillaries - Determination of gaseous flow rate/pressure drop relationships.*

EN ISO 1133, *Plastics - Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics (ISO 1133:1997).*

prEN ISO 3126, *Plastics piping systems - Plastics piping components - Measurement and determination of dimensions (ISO/DIS 3126:1999).*

ISO 7-1, *Pipe threads where pressure-tight joints are made on the threads - Part 1: Dimensions, tolerances and designation.*

ISO 228-1, *Pipe threads where pressure-tight joints are not made on the threads - Part 1: Dimensions, tolerances and designation.*

ISO 10838-1, *Mechanical fittings for polyethylene piping systems for the supply of gaseous fuels — Part 1: Metal fittings for pipes of nominal outside diameter less than or equal to 63 mm.*

ISO 10838-2, *Mechanical fittings for polyethylene piping systems for the supply of gaseous fuels — Part 2: Metal fittings for pipes of nominal outside diameter greater than 63 mm.*

ISO 10838-3, *Mechanical fittings for polyethylene piping systems for the supply of gaseous fuels — Part 3: Thermoplastic fittings for pipes of nominal outside diameter less than or equal to 63 mm.*

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/DIS 13956, *Plastics pipes and fittings - Determination of cohesive strength - Tear test for polyethylene (PE) assemblies.*

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### 3 Terms and definitions, symbols and abbreviations

For the purposes of this European Standard, the terms and definitions, symbols and abbreviations given in EN 1555-1:2002 apply, together with the following.

#### 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 a pipe

#### 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 onto a pipe

##### 3.2.1

###### **tapping tee**

electrofusion saddle fitting (top loading or wrap round) which contains an integral cutter, to cut through the wall of the main pipe. The cutter remains in the body of the saddle after installation

##### 3.2.2

###### **branch saddle**

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

**EN 1555-3:2002 (E)****3.3****mechanical fitting**

fitting for assembling polyethylene (PE) pipe to another PE pipe or any other element of the piping system. The fitting includes generally a compression part to provide pressure integrity, leaktightness and resistance to end loads. A pipe supporting sleeve providing a permanent support for a polyethylene (PE) pipe to prevent creep in the pipe wall under radial compressive forces, is applicable

NOTE 1 The metallic parts of the fitting can be assembled to metallic pipes by screw-threads, compression joints, welded or flanged connections, including PE flanges. The fitting can allow either a dismantable or permanently assembled joint.

NOTE 2 In some cases the supporting sleeve at the same time constitutes a grip ring.

NOTE 3 The mechanical fitting can be supplied for field assembly or pre-assembled by the manufacturer.

**3.4****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

**3.5****voltage regulation**

control of energy supplied, during the fusion process of an electrofusion fitting, by means of the voltage parameter

**3.6****intensity regulation**

control of energy supplied, during the fusion process of an electrofusion fitting, by means of the current parameter

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**4 Material****4.1 Compound**

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The compound from which the fittings are made shall conform to EN 1555-1.

**4.2 Material for non-polyethylene parts****4.2.1 General**

All components shall conform to the relevant EN standard(s). Alternative standards may be applied in cases where the suitable EN standard(s) do not exist. In all cases fitness for purpose of the components shall be demonstrated.

The materials and the constituent elements used in making the fitting (including rubber, greases and any metal parts as may be used) shall be as resistant to the external and internal environments as the other elements of the piping system and shall have a life expectancy under the following conditions at least equal to that of the PE pipes conforming to EN 1555-2:2002 with which they are intended to be used:

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

The requirements for the level of material performance of non-polyethylene parts shall be at least as stringent as that of the compound for the piping system.

Fittings material in contact with the PE pipe shall not adversely affect pipe performance or initiate stress cracking.

**4.2.2 Metal parts**

All metal parts susceptible to corrosion shall be adequately protected.

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

### 4.2.3 Elastomers

Elastomeric seals shall conform to EN 682.

Other sealing materials are permitted if suitable for gas service.

### 4.2.4 Other materials

Greases or lubricants shall not exude onto fusion areas, and shall not affect the long-term performance of fitting materials.

Other materials conforming to 4.2.1 may be used provided that it is proven that the fittings conform to this standard.

## 5 General characteristics

### 5.1 Appearance

When viewed without magnification, the internal and external surfaces of fittings shall be smooth, clean and shall have no scoring, cavities and other surface defects to an extent that would prevent conformity to this standard.

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 standard.

### 5.2 Colour

The colour of the PE parts of fittings shall be either yellow or black.

### 5.3 Design

The design of the fitting shall be such that, when assembling the fitting onto the corresponding component, electrical coils and/or seals are not displaced.

### 5.4 Appearance of the joint (factory-made)

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 deliberately 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.

### 5.5 Electrical characteristics for electrofusion fittings

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

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

NOTE 1 The fitting is during the fusion process part of an electrical system as defined in EN 60335-1<sup>[2]</sup>, IEC 60364-1:2001<sup>[3]</sup> and IEC 60449:1973<sup>[4]</sup>.

The tolerance on the electrical resistance of the fitting at 23 °C shall be stated by the manufacturer. The resistance shall not exceed the following value: (nominal value  $\pm$  10 %) + 0,1  $\Omega$ .

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