
Cevni sistemi iz polimernih materialov za oskrbo s plinastimi gorivi - Polietilen (PE) - 5. del: Ustreznost sistema namenu

Plastics piping systems for the supply of gaseous fuels - Polyethylene (PE) - Part 5: Fitness for purpose of the system

Kunststoff-Rohrleitungssysteme für die Gasversorgung - Polyethylen (PE) - Teil 5: Gebrauchstauglichkeit des Systems

Systemes de canalisations en plastiques pour la distribution de combustibles gazeux - Polyéthylène (PE) - Partie 5: Aptitude a l'emploi du systeme

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Plastics piping systems for the supply of gaseous fuels - Polyethylene (PE) - Part 5: Fitness for purpose of the system

Systèmes de canalisations en plastique pour la distribution
de combustibles gazeux - Polyéthylène (PE) - Partie 5:
Aptitude à l'emploi du système

Kunststoff-Rohrleitungssysteme für die Gasversorgung -
Polyethylen (PE) - Teil 5: Gebrauchstauglichkeit des
Systems

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

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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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 1555-5:2002 (E)

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Foreword

This document EN 1555-5:2002 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

— Part 4: Valves

— Part 5: Fitness for purpose of the system (this standard)

— 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^[1], 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 informative annexes A and B as well as 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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EN 1555-5:2002 (E)**Introduction**

The System Standard, of which this is Part 5, specifies the requirements of 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 are specified in EN 1555-1, EN 1555-2, EN 1555-3 and EN 1555-4. prCEN/TS 1555-7 gives guidance for assessment of conformity. Recommended practice for installation is given in EN 12007-2^[1] prepared by CEN/TC 234.

This part of EN 1555 covers the characteristics of fitness for purpose of the system.

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1 Scope

This part of EN 1555 specifies requirements of fitness for purpose of the polyethylene (PE) piping system in the field of the supply of gaseous fuels.

It specifies the definitions of electrofusion, butt fusion and mechanical joints.

It also specifies the method of preparation of test piece joints, relating to installation recommendations given in EN 12007-2:2000^[1] and the tests to be carried out on these joints for assessing the fitness for purpose of the system under normal and extreme conditions.

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 pipes, fittings, valves, their joints and to joints with components of other materials intended to be used under the following conditions:

- a) a maximum operating pressure, MOP, up to and including 10 bar ¹⁾;
- b) an operating temperature of 20 °C as reference temperature.

NOTE 1 For other operating temperatures, derating coefficients should be used, see annex A.

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.

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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 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 1555-3:2002, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 3: Fittings.*

EN 1555-4:2002, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 4: Valves.*

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: Thermoplastics fittings for pipes of nominal outside diameter less than or equal to 63 mm.*

ISO 11413:1996, *Plastics pipes and fittings — Preparation of test piece assemblies between a polyethylene (PE) pipe and an electrofusion fitting.*

ISO 11414:1996, *Plastics pipes and fittings — Preparation of polyethylene (PE) pipe/pipe or pipe/fitting test assemblies by butt fusion.*

¹⁾ 1 bar = 0,1 MPa

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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.*

3 Terms and definitions

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 joint**

joint between a PE electrofusion socket or saddle fitting and a pipe or a spigot end fitting. The electrofusion fittings are heated by the Joule effect of the heating element incorporated at their jointing surfaces, causing the material adjacent to them to melt and the pipe and fitting surfaces to fuse

3.2**butt fusion joint (using heated tool)**

joint made by heating the planed ends of the surfaces of which match by holding them against a flat heating plate until the PE material reaches fusion temperature, removing the heating plate quickly and pushing the two softened ends against one another

3.3**mechanical joint**

joint made by assembling a PE pipe with a fitting that generally includes a compression part to provide for pressure integrity, leaktightness and resistance to end loads. A support sleeve inserted into the pipe bore may be used to provide a permanent support for the PE pipe to prevent creep in the pipe wall under radial compressive forces. The metallic part of this fitting can be assembled to a metallic pipe by screw threads, compression joints, welded or brazed flanges or by other means

3.4**fusion compatibility**

ability of two similar or dissimilar polyethylene materials to be fused together to form a joint which conforms to the performance requirements of this standard

4 Fitness for purpose**4.1 Method of preparation of assemblies for testing****4.1.1 General**

The joints shall be made by using pipes conforming to EN 1555-2:2002, fittings conforming to EN 1555-3:2002 or valves conforming to EN 1555-4:2002.

Test pieces for pressure test 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.

4.1.2 Butt fusion joints

PE pipes and spigot end fittings intended to be used for jointing by butt fusion shall be prepared and assembled in accordance with ISO 11414. The conditions for the preparation of the joints are given in 4.2.1.1 for the assessment of fitness for purpose under normal conditions and in 4.2.1.2 for the assessment of fitness for purpose under extreme conditions.

4.1.3 Electrofusion jointing

PE pipes, fittings and valves intended to be used for jointing by electrofusion shall be prepared and assembled in accordance with ISO 11413. The conditions for the preparation of the joints are given in 4.2.2.1 for the assessment of fitness for purpose under normal conditions and in 4.2.2.2 for the assessment of fitness for purpose under extreme conditions.

For joints with electrofusion socket fittings and joints with electrofusion saddle fittings, test joints shall be prepared to check the fitness for purpose of the fittings under extreme jointing conditions.

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

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

For straight equal electrofusion socket fittings (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 $1,5^\circ$.

4.1.4 Mechanical joints

For mechanical joints the assembly of the PE pipe and the fitting shall be prepared in accordance with ISO 10838-1, ISO 10838-2 or ISO 10838-3, as applicable.

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4.2 Requirements for fitness for purpose

4.2.1 Fitness for purpose for butt fusion joints

4.2.1.1 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 conforming to the requirement given in Table 5, using the parameters as specified in annex A of ISO 11414:1996 at an ambient temperature of $(23 \pm 2)^\circ\text{C}$ 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
PE 80	X	X ^a
PE 100	X ^a	X

a Only when requested by the purchaser.

NOTE The table should be interpreted as follows: as an example, for a pipe or a spigot end fitting or a valve with spigot end made from a PE 80 compound, a joint should be tested with a pipe made from PE 80 compound. When requested by the purchaser, for mixed compound joints, test pieces should be used incorporating PE 80 and PE 100 compounds.

The pipe manufacturer shall declare, according to 4.2.1.1, which pipes from his own product range conforming to EN 1555-2 are compatible to each other for butt fusion.

The fitting or valve manufacturer shall declare, according to 4.2.1.1 the SDR range and MRS values of pipes conforming to EN 1555-2 to which his fittings conforming to EN 1555-3 or and his valves conforming to EN 1555-4 can be fused by using the same procedures (e.g. times, temperatures, fusion pressures) to conform to this standard. If there is a need for deviation in fusion procedures the fitting or valve manufacturer shall state this clearly.