BRITISH STANDARD

BS EN
1555-1:2002

Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) —

Part 1: General

The European Standard EN 1555-1:2002 has the status of a British Standard

ICS 01.040.23; 23.040.01; 91.140.40

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BSI
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National foreword

This British Standard is the official English language version of EN 1555-1:2002. Collectively, EN 1555-1, EN 1555-2 and EN 1555-5 comprise a revision of BS 7281:1990 and EN 1555-3 comprises a revision of BS 7336:1990. It is intended that these British Standards will be declared obsolescent by December 2004.

NOTE 1 CEN/TC 234 in co-operation with CEN/TC 155 drafted an installation document for gas applications and this was published as EN 12007-2:2000, *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)*[1]. As a consequence of this, TC 155 agreed that they would not draft a Part 6 in the EN 1555 series.

NOTE 2 Part 7 has been prepared as a CEN/TS to allow further development. CEN/TS 1555-7 is not mandatory under the Public Procurement Directive.

The UK participation in its preparation was entrusted by Technical Committee PRI/88 (previously PRI/61), Plastics piping systems, to Subcommittee PRI/88/2 (previously PRI/61/2), Plastics piping for pressure applications, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

Attention is drawn to any appropriate safety precautions. It is assumed in the drafting of a standard that the execution of its provisions is entrusted to appropriately qualified and competent people.

The UK National Annex NA attached to this standard provides additional information on the selection and installation of piping systems and components in the UK.

Attention is drawn to the following statutory regulations:

Health and Safety at Work etc. Act 1974 and subsequent regulations.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled "International Standards Correspondence Index", or by using the "Search" facility of the *BSI Electronic Catalogue* or of British Standards Online.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

[1] It is the opinion of Technical Committee PRI/88 that the Code of Practice published by the gas industry represents established UK practice, copies of which are available from the current national network distributor, Transco.

This British Standard, was published under the authority of the Standards Policy and Strategy Committee on 7 January 2004

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 15, the National Annex NA page, an inside back cover and a back cover.

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Kunststoff-Rohrleitungssysteme für die Gasversorgung - Polyethylen (PE) - Teil 1: Allgemeines

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.

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

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Contents

Foreword

This document EN 1555-1:2002 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* (this standard)

— *Part 2: Pipes*

— *Part 3: Fittings*

— *Part 4: Valves*

— *Part 5: Fitness for purpose of the system*

— *Part 7: Guidance for assessment of conformity* (to be published as an 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 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.

Introduction

The System Standard, of which this is Part 1, 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 components of the piping system are specified in EN 1555-2, EN 1555-3 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, prepared by CEN/TC 234.

This part of EN 1555 covers the general aspects of the plastics piping system.

1 Scope

This part of EN 1555 specifies the general aspects of polyethylene (PE) 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 pipes, fittings, and 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 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.

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 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 1056, *Plastics piping and ducting systems — Plastics pipes and fittings — Method for exposure to direct (natural) weathering.*

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

EN 12099, *Plastics piping systems — Polyethylene piping materials and components — Determination of volatile content.*

EN 12107, *Plastics piping systems — Injection-moulded thermoplastics fittings, valves and ancillary equipment — Determination of the long-term hydrostatic strength of thermoplastics materials for injection moulding of piping components.*

EN 12118, *Plastics piping systems — Determination of moisture content in thermoplastics by coulometry.*

EN ISO 1043-1:2001,*Plastics - Symbols and abbreviated terms - Part 1: Basic polymers and their special characteristics (ISO 1043-1:2001).*

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

EN ISO 1872-1, *Plastics — Polyethylene (PE) moulding and extrusion materials — Part 1: Designation system and basis for specifications (ISO 1872-1:1993).*

EN ISO 6259-1, Thermoplastics pipes - Determination of tensile properties - Part 1: General test method (ISO 6259-1:1997).

1) 1 bar = 0,1 MPa

EN ISO 12162, *Thermoplastics materials for pipes and fittings for pressure applications — Classification and designation — Overall service (design) coefficient (ISO 12162:1995).*

EN ISO 13478, *Thermoplastics pipes for the conveyance of fluids — Determination of resistance to rapid crack propagation (RCP) — Full-scale test (FST) (ISO 13478:1997).*

EN ISO 13479, *Polyolefin pipes for the conveyance of fluids — Determination of resistance to crack propagation — Test method for slow crack growth on notched pipes (notch test) (ISO 13479:1997).*

ISO 472:1999, *Plastics — Vocabulary.*

ISO 1183, *Plastics — Methods for determining the density and relative density of non-cellular plastics.*

ISO 6259-3, *Thermoplastics pipes — Determination of tensile properties — Part 3: Polyolefin pipes.*

ISO 6964, *Polyolefin pipes and fittings — Determination of carbon black content by calcination and pyrolysis — Test method and basic specification.*

ISO/TR 9080:1992, *Thermoplastics pipes for the transport of fluids — Methods of extrapolation of hydrostatic stress rupture data to determine the long-term hydrostatic strength of thermoplastics pipe materials.*

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

ISO 13477, *Thermoplastics pipes for the conveyance of fluids — Determination of resistance to rapid crack propagation (RCP) — Small-scale steady-state test (S4 test).*

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

ISO 18553, *Method for the assessment of the degree of pigment or carbon black dispersion in polyolefin pipes, fittings and compounds*.

3 Terms and definitions, symbols and abbreviations

For the purposes of this European Standard, the following terms and definitions, symbols and abbreviations apply.

3.1 Terms and definitions

In addition to the terms and definitions given below, the terms and definitions given in ISO 472:1999 and EN ISO 1043-1:2001 apply.

3.1.1 Geometrical definitions

3.1.1.1 Nominal size

3.1.1.1.1
nominal size DN
numerical designation of the size of a component, other than a component designated by thread size, which is a convenient round number, approximately equal to the manufacturing dimension in millimetres (mm)

3.1.1.1.2
nominal size DN/OD
nominal size, related to the outside diameter

3.1.1.2
nominal outside diameter (d_n)
specified outside diameter, in millimetres, assigned to a nominal size DN/OD

3.1.1.3
outside diameter (at any point) (d_e)
value of the measurement of the outside diameter through its cross-section at any point of the pipe, rounded to the next greater 0,1 mm

3.1.1.4
mean outside diameter (d_{em})
value of the measurement of the outer circumference of the pipe or spigot end of a fitting in any cross-section divided by π (= 3,142), rounded to the next greater 0,1 mm

3.1.1.5
minimum mean outside diameter ($d_{em,min}$)
minimum value for the mean outside diameter as specified for a given nominal size

3.1.1.6
maximum mean outside diameter ($d_{em,max}$)
maximum value for the mean outside diameter as specified for a given nominal size

3.1.1.7
out-of-roundness (ovality)
difference between the maximum and the minimum outside diameter in the same cross-section of a pipe or spigot

3.1.1.8
nominal wall thickness (e_n)
numerical designation of the wall thickness of a component, which is a convenient round number, approximately equal to the manufacturing dimension in millimetres (mm)

NOTE For thermoplastics components conforming to EN 1555, the value of the nominal wall thickness, e_n, is identical to the specified minimum wall thickness at any point, e_{min}.

3.1.1.9
wall thickness (at any point) (e)
wall thickness at any point around the circumference of a component

NOTE The symbol for the wall thickness of the fittings and valves body at any point is *E*.

3.1.1.10
minimum wall thickness (at any point) (e_{min})
minimum value for the wall thickness at any point around the circumference of a component, as specified

3.1.1.11
maximum wall thickness (at any point) (e_{max})
maximum value for the wall thickness at any point around the circumference of a component, as specified

3.1.1.12
mean wall thickness (e_m)
arithmetical mean of a number of measurements of the wall thickness, regularly spaced around the circumference and in the same cross-section of a component, including the measured minimum and the measured maximum values of the wall thickness in that cross-section

3.1.1.13
tolerance
permitted variation of the specified value of a quantity, expressed as the difference between the permitted maximum and the permitted minimum value

3.1.1.14
wall thickness tolerance (t_y)
permitted difference between the wall thickness at any point, e, and the nominal wall thickness, e_n

NOTE $e_n \leq e \leq e_n + t_y$

3.1.1.15
standard dimension ratio (SDR)
numerical designation of a pipe series, which is a convenient round number, approximately equal to the dimension ratio of the nominal outside diameter, d_n, and the nominal wall thickness, e_n

3.1.2 Material definitions

3.1.2.1
virgin material
material in a form such as granules or powder that has not been subjected to use or processing other than that required for its manufacture and to which no reprocessable or recyclable materials have been added

3.1.2.2
own reprocessable material
material prepared from clean rejected unused pipes, fittings or valves, including trimmings from the production of pipes, fittings or valves, that will be reprocessed in a manufacturer's plant after having been previously processed by the same manufacturer in the production of components by, for example injection-moulding or extrusion

3.1.2.3
compound
homogenous mixture of base polymer (PE) and additives, i.e. anti-oxidants, pigments, UV-stabilisers and others, at a dosage level necessary for the processing and use of components conforming to the requirements of this standard

3.1.3 Definitions related to material characteristics

3.1.3.1
lower confidence limit (σ_{LCL})
quantity with the dimensions of stress which represents the 97,5 % lower confidence limit of the long-term hydrostatic strength and can be considered as a property of the material under consideration. It equals the mean (average) strength or predicted mean (average) strength at a temperature T and a time t when the factor α has a value of 0,975. It is denoted as :

$\sigma_{LCL} = \sigma_{(T, \log t, 0,975)}$

3.1.3.2
minimum required strength (MRS)
value of LCL, rounded down to the next smaller value of the R10 series or of the R20 series depending on the value of LCL

NOTE R10 and R20 series are the Renard number series according to ISO 3:1973[2] and ISO 497:1973[3].

3.1.3.3
overall service (design) coefficient or safety factor (C)
coefficient with a value greater than 1, which takes into consideration service conditions as well as properties of the components of a piping system other than those represented in the lower confident limit

3.1.3.4
design stress (σ_S)
allowable stress, in megapascals, for a given application. It is derived from the MRS by dividing it by the coefficient C, i.e.:

$$\sigma_S = \frac{MRS}{C}$$

3.1.3.5
melt-mass flow rate (MFR)
value relating to the viscosity of the molten material at a specified temperature and load, expressed in grams per 10 min (g/10 min)

3.1.4 Definitions related to service conditions

3.1.4.1
gaseous fuel
any fuel which is in gaseous state at a temperature of 15 °C, at the atmospheric pressure

3.1.4.2
maximum operating pressure (MOP)
maximum effective pressure of the fluid in the piping system, expressed in bar, which is allowed in continuous use. It takes into account the physical and the mechanical characteristics of the components of a piping system

NOTE It is calculated using the following equation:

$$MOP = \frac{20 \times MRS}{C \times (SDR-1)}$$

3.1.4.3
reference temperature
temperature for which the piping system is designed. It is used as the base for further calculation when designing a piping system or parts of a piping system for operating temperatures different from the reference temperature

3.1.5 Definitions related to joints

3.1.5.1
butt fusion joint (**using heated tool)**
joint made by heating the planed ends of pipes or spigot end fittings, 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

3.1.5.2
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

3.2 Symbols

C : overall service (design) coefficient

d_e : outside diameter (at any point)

d_{em} : mean outside diameter

$d_{em,max}$: maximum mean outside diameter

$d_{em,min}$: minimum mean outside diameter

d_n : nominal outside diameter

E : wall thickness (at any point) of a fitting and valve body

e : wall thickness (at any point) of a pipe

e_m : mean wall thickness

e_{max} : maximum wall thickness (at any point)

e_{min} : minimum wall thickness (at any point)

e_n : nominal wall thickness

t_y : wall thickness tolerance

σ_s : design stress

3.3 Abbreviations

DN : nominal size

DN/OD : nominal size, outside diameter related

LCL : lower confidence limit

MFR : melt mass-flow rate

MOP : maximum operating pressure

MRS : minimum required strength

PE : polyethylene

R : series of preferred numbers, conforming to the Renard series

SDR : standard dimension ratio

4 Material

4.1 Material of the components

The pipes, fittings and valves shall be made of polyethylene compound.

4.2 Compound

4.2.1 Additives

The compound shall be made by adding to the polyethylene base polymer only those additives necessary for the manufacture of pipes, fittings and valves conforming to EN 1555-2, EN 1555-3[5] or EN 1555-4[6], as applicable, and for their fuseability, storage and use.

All additives shall be used according to national legislation (e.g. cadmium). They shall be uniformly dispersed.

4.2.2 Colour

The colour of the compound shall be yellow or black.

4.2.3 Characteristics

4.2.3.1 Characteristics of the compound in the form of granules

The compound in the form of granules used for the manufacture of pipes, fittings and valves shall have characteristics conforming to the requirements given in Table 1.

Table 1 — Characteristics of the compound in the form of granules

Characteristic	Requirements [a]	Test parameters		Test method
		Parameter	Value	
Conventional density conforming to EN ISO 1872-1)	≥ 930 kg/m^3 (base polymer)	Test temperature Number of test pieces[b]	23 °C Shall conform to ISO 1183	ISO 1183
Oxidation induction time (Thermal stability)	> 20 min	Test temperature Number of test pieces[b]	200 °C [c] 3	EN 728
Melt mass-flow rate (MFR)	(0,2 ≤ MFR ≤ 1,4) g/10 min Maximum deviation of ± 20 % of the nominated value [d]	Loading mass Test temperature Time Number of test pieces[b]	5 kg 190 °C 10 min Shall conform to EN ISO 1133	EN ISO 1133
Volatile content	≤ 350 mg/kg	Number of test pieces[b]	1	EN 12099
Water content [e]	≤ 300 mg/kg	Number of test pieces[b]	1	EN 12118
Carbon black content [f]	(2 to 2,5) % (by mass)	Shall conform to ISO 6964		ISO 6964
Carbon black dispersion [f]	Grade ≤ 3	Preparation of test pieces Number of test pieces[b]	Free [g] Shall conform to ISO 18553	ISO 18553
Pigment dispersion [h]	Grade ≤ 3	Preparation of test pieces Number of test pieces[b]	Free [g] Shall conform to ISO 18553	ISO 18553

a Conformity to these requirements shall be proved by the compound producer.

b The numbers of test pieces given indicate the numbers required to establish a value for the characteristic described in the table. The numbers of test pieces required for factory production control and process control should be listed in the manufacturer's quality plan. For guidance see prCEN/TS 1555-7[7].

c Test may be carried out at 210 °C providing that there is a clear correlation with the results at 200 °C. In case of dispute the reference temperature shall be 200 °C.

d Nominated value given by the compound manufacturer.

e Only applicable, if the measured volatile content is not in conformity to its specified requirement. In case of dispute the requirement for water content shall be used. As an alternative method, ISO 760:1978 [4] may apply.

f Only for black compound.

g In case of dispute, the test pieces shall be prepared by the compression method.

h Only for yellow compound.

4.2.3.2 Characteristics of the compound in the form of pipe

Unless otherwise specified by the applicable test method, the test pieces shall be conditioned at (23 ± 2) °C before testing in accordance with Table 2.

The compound in the form of pipe used for the manufacture of pipes, fittings and valves, shall have characteristics conforming to the requirements given in Table 2.

Table 2 — Characteristics of compound in the form of pipe

Characteristic	Requirements [a]	Test parameters		Test method
		Parameter	Value	
Resistance to gas condensate	No failure during the test period of all test pieces	End caps Test temperature Orientation Number of test pieces [b] Circumferential (hoop) stress Pipe dimensions: d_n e_n Type of test Test period Conditioning period	Type a) 80 °C Free 3 2,0 MPa 32 mm 3 mm Synthetic condensate [c] in water 20 h 1500 h in air at 23 °C	EN 921 (incl. corrigendum of 1995)
Resistance to weathering [d]	The weathered test pieces shall fulfil the requirements of the following characteristics:	Preconditioning (weathering): Cumulative solar radiation Number of test pieces [b]	 ≥ 3,5 GJ/m^2 See below	EN 1056
a) oxidation induction time [e] ; b) hydrostatic strength (165 h at 80 °C); c) elongation at break	a) shall conform to Table 1 b) shall conform to Table 4 of EN 1555-2:2002 c) shall conform to Table 4 of EN 1555-2:2002.			a) EN 728 b) EN 921 (incl. corr. of 1995) c) EN ISO 6259-1 and ISO 6259-3
Resistance to rapid crack propagation (Critical pressure, p_c) ($e \geq 15$ mm)	$p_c \geq 1,5$ MOP with $p_c = 3,6\ p_{c,s4} + 2,6$ [f]	Test temperature Number of test pieces [b]	0 °C Shall conform to ISO 13477	ISO 13477
Resistance to slow crack growth (d_n: 110 mm or 125 mm - SDR 11)	No failure during the test period	Test temperature Internal test pressure: for PE 80 PE 100 Test period Type of test Number of test pieces [b]	80 °C 8,0 bar 9,2 bar 165 h Water-in-water Shall conform to EN ISO 13479	EN ISO 13479

a Conformity to these requirements shall be proved by the compound producer.

b The numbers of test pieces given indicate the numbers required to establish a value for the characteristic described in the Table.
The numbers of test pieces required for factory production control and process control should be listed in the manufacturer's quality plan. For guidance see prCEN/TS 1555-7[7].

c 50 % (by mass) n-decane and 50 % (by mass) 1-3-5 trimethylbenzene.

d Only for yellow compound.

e Before sampling for oxidation induction time test, 0,2 mm from the surface should be taken off.

f Full scale/S4 correlation factor is equal to 3,6 and is defined as the full scale/S4 critical absolute pressure ratio:
$(p_{c,full\ scale} + 1) = 3,6\ (p_{c,s4} + 1)$.

NOTE Attention is drawn to the fact that the correlation factor may be modified, when revising this Standard, according to the result of work of ISO/TC 138/SC4 "Plastics pipes, fittings and valves for the supply of gaseous fuels".

If the requirement is not met or S4 test equipment not available, then (re)testing by using the full scale test shall be performed in accordance with EN ISO 13478. In this case: $p_c = p_{c,full\ scale}$.

4.3 Fusion compatibility

4.3.1 The compounds conforming to Table 1 shall be fusible. This shall be demonstrated by the compound manufacturer for each compound of his own product range by checking that the requirement on tensile strength given in Table 3 is fulfilled for a butt fusion joint prepared by using the parameters as specified in annex A of ISO 11414:1996 at an ambient temperature of (23 ± 2) °C from pipes both manufactured from that compound.

4.3.2 Compounds conforming to Table 1 are considered fusible to each other. If requested, the compound manufacturer shall demonstrate this by checking that the requirement on tensile strength given in Table 3 is fulfilled for a butt fusion joint prepared by using the parameters as specified in annex A of ISO 11414:1996 at an ambient temperature of (23 ± 2) °C from two pipes manufactured from the compounds from his own range covered by this request.

Table 3 — Characteristic of compound in the form of butt fusion joint

Characteristic	Requirement[a]	Test parameters		Test method
		Parameter	Value	
Tensile strength for butt fusion (d_n : 110 mm or 125 mm - SDR 11)	Test to failure : Ductile – pass Brittle - fail	Test temperature Number of test pieces [b]	23 °C Shall conform to ISO 13953	ISO 13953
a The conformity to these requirements shall be proved by the compound producer. b The numbers of test pieces given indicate the numbers required to establish a value for the characteristic described in the Table. The numbers of test pieces required for factory production control and process control should be listed in the manufacturer's quality plan. For guidance see prCEN/TS 1555-7[7].				

4.4 Classification and designation

Compounds shall be designated by the type of PE material. The level of minimum required strength (MRS) shall conform to Table 4 when tested in the form of pipe.

Table 4 — Classification and designation of compounds

Classification by MRS (MPa)	Designation
8,0	PE 80
10,0	PE 100

The compound shall be evaluated in accordance with ISO/TR 9080:1992 where a pressure test is made in accordance with EN 921 to find the σ_{LCL}. The MRS-value shall be derived from the σ_{LCL} and the compound shall be classified by the compound producer in accordance with EN ISO 12162.

The conformity of the designation of the compound to the classification given in Table 4 shall be demonstrated by the compound producer.

Where fittings are manufactured from the same compound as pipes, then the material classification shall be the same as for pipes.

For the classification of a compound intended only for the manufacture of fittings, the test piece shall be an injection-moulded pipe in accordance with EN 12107.

4.5 Overall service (design) coefficient and design stress

The minimum value of the overall service (design) coefficient, *C*, for pipes, fittings and valves for the supply of gaseous fuels shall be 2, or a higher value according to national legislation.

The maximum value for the design stress, σ_s, shall be for PE 80, 4,0 MPa and for PE 100, 5,0 MPa.

4.6 External reprocessable and recyclable material

Reprocessable material obtained from external sources and recyclable material shall not be used.

Bibliography

[1] EN 12007-2:2000, *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).*

[2] ISO 3:1973, *Preferred numbers — Series of preferred numbers.*

[3] ISO 497:1973, *Guide to the choice of series of preferred numbers and of series containing more rounded values of preferred numbers.*

[4] ISO 760:1978*, Determination of water — Karl Fischer method (General method)*.

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

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

[7] prCEN/TS 1555-7, *Plastics piping systems for the supply of gaseous fuels - Polyethylene (PE) - Part 7: Guidance for the assessment of conformity*.

BS EN 1555-1:2002

National Annex NA (informative)
Additional information on the selection and installation of piping systems and components in the UK

The responsible UK committee gives the following advice concerning the selection and installation of piping systems and components conforming to this British Standard.

a) Gas supply companies and other entities deemed to be within the scope of the Public Procurement Directive (PPD) are obliged to use EN 1555-1, EN 1555-2, EN 1555-3, EN 1555-4 and EN 1555-5, produced under EC/U mandate, if they wish to purchase PE pipe systems or components within its scope.

b) Where there are options, care should be taken to ensure that agreement is established between suppliers and purchasers, e.g. in terms of colour, size, physical characteristics and quality assurance.

c) For colour it is the practice of UK gas companies to accept the use of yellow PE compounds in the manufacture of PE pipes, fittings and valves[1)] to facilitate identification of buried gas distribution pipelines, in accordance with the recommendations of the National Joint Utilities Group (NJUG) concerning the colour coding of pipelines and other services.

d) This British Standard requires the critical pressure for RCP as measured in accordance with ISO 13477 to be equal to or greater than 1,50 MOP in Table 2. Information regarding the relationship between critical pressure and MOP used in UK gas distribution systems should be sought from the national network distributor(s)[2)].

e) Requirements for Slow Crack Growth (SCG) are specified in Table 2. The PE pipe compound is to be tested in pipe form in accordance with EN ISO 13479, with a test period of 165 h. It is established practice in the UK to use a test period of 1000 h[3)].

f) Clause **4.5** specifies a minimum overall service (design) coefficient, $\underline{C}$. Information regarding the value of C, used in the design of UK gas distribution systems, should be sought from the national network distributor(s)[2)].

[1)] The relevant standards published by the current national network distributor, Transco, are: T/SP/PL2: Parts 1, 4, 6 and 8 and T/SP/V7.

[2)] Currently, the national network distributor is Transco.

[3)] The relevant standards published by the current national network distributor, Transco, is: T/SP/PL2: Parts 2 and 8.

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BSI
389 Chiswick High Road
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W4 4AL