BS EN 12201-2:2011+A1:2013
Incorporating corrigendum January 2012

BSI Standards Publication

Plastics piping systems for water supply, and for drainage and sewerage under pressure — Polyethylene (PE)

Part 2: Pipes

bsi.

...making excellence a habit.™

National foreword

This British Standard is the UK implementation of EN 12201-2:2011+A1:2013. It supersedes BS EN 12201-2:2011, which is withdrawn.

NOTE 1 There is no Part 6 in the EN 12201 series. Instead users of the BS EN 12201 series should refer to Water Industry Specification (WIS) 4-32-08 Specification for the fusion jointing of polyethylene pressure pipeline systems using PE80 and PE100 materials, obtainable from www.water.org.uk. In addition, guidance provided by the manufacturer of the pipes and fittings should be followed.

NOTE 2 Part 7 of the EN 12201 series has been prepared as a CEN/TS to allow further development. CEN/TS 12201-7 is not mandatory under the Public Procurement Directives (2004/18/EC and 2004/17/EC).

As yet there is no pan-European agreement on water quality requirements, so existing UK regulations remain in force for public drinking water suppliers.

The following regulations apply to the approval of substances and products used in the provision of public water supplies within the United Kingdom:

a) England – Regulation 31 of The Water Supply (Water Quality) Regulations 2000 (Statutory Instruments 2000 No 3184)

b) Wales – Regulation 31 of The Water Supply (Water Quality) Regulations 2001 (Welsh Statutory Instrument 2001 No 3911 (W.323)

c) Scotland – Regulation 27 of The Water Supply (Water Quality) (Scotland) Regulations 2001

d) Northern Ireland – Regulation 30 of The Water Supply (Water Quality) (Amendment) Regulations (Northern Ireland) 2009 (Statutory Rules of Northern Ireland 2009 No.246).

For further information, go to: http://www.legislation.gov.uk/browse

As part of the regulations, all pipes and fittings used to convey drinking water supplies are required to be approved under the provisions of Regulation 31, as applicable. In addition, manufacturers may obtain approval under the Water Regulations Advisory Scheme (WRAS) to confirm that use of their products will not cause adverse effect on water quality or a risk to health of consumers.

National Annex NA provides additional information on the selection and installation of piping systems and components in the UK.

Attention is drawn to the following statutory regulation: Health & Safety at Work etc. Act 1974, and subsequent regulations.

The requirements contained in the EN 12201 series of standards are not necessarily indicative of all the performance requirements, or the suitability of pipework for the service conditions, likely to be encountered in the UK.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to CEN text carry the number of the CEN amendment. For example, text altered by CEN amendment A1 is indicated by A1 A1.

The UK participation in its preparation was entrusted by Technical Committee PRI/88, Plastics piping systems, to Subcommittee PRI/88/2, Plastics piping for pressure applications.

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

Published by BSI Standards Limited 2013

ISBN 978 0 580 78253 4

ICS 23.040.20; 91.140.60; 93.030

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 November 2011.

Amendments/corrigenda issued since publication

Date	Text affected
31 January 2012	Implementation of corrigendum January 2012: Revision to National Annex
30 November 2013	Implementation of CEN amendment A1:2013

This page deliberately left blank

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 12201-2:2011+A1

September 2013

ICS 23.040.20

English Version

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

Systèmes de canalisations en plastique pour l'alimentation en eau et pour les branchements et les collecteurs d'assainissement avec pression - Polyéthylène (PE) - Partie 2 : Tubes

Kunststoff-Rohrleitungssysteme für die Wasserversorgung und für Entwässerungs- und Abwasserdruckleitungen - Polyethylen (PE) - Teil 2: Rohre

This European Standard was approved by CEN on 8 July 2011 and includes Amendment 1 approved by CEN on 12 August 2013.

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 CEN-CENELEC 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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. EN 12201-2:2011+A1:2013: E

Licensed copy: Lee Shau Kee Library, HKUST, Version correct as of 03/01/2015, (c) The British Standards Institution 2013

Foreword

This document (EN 12201-2:2011+A1:2013) 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 March 2014, and conflicting national standards shall be withdrawn at the latest by March 2014.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document includes Amendment 1 approved by CEN on 12 August 2013.

This document supersedes [A1] EN 12201-2:2011 [/A1].

The start and finish of text introduced or altered by amendment is indicated in the text by tags [A1] [/A1].

[A1] This document includes Amendment A1 to EN 12201-2:2011 that comprises technical changes to:

— Subclause 6.3, Wall thicknesses and their tolerances;

— Subclause 8.2, Requirements, Table 5, Physical Requirements, physical longitudinal reversion test. [/A1]

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*;

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

— 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*;

— CEN/TS 12201-7, *Plastics piping systems for water supply — Polyethylene (PE) — Part 7: Guidance for the assessment of conformity*.

In this revision, the scope of this standard includes two additional types of pipe;-

Licensed copy: Lee Shau Kee Library, HKUST, Version correct as of 03/01/2015, (c) The British Standards Institution 2013

— PE pipes with co-extruded layers on either or both the outside and/or inside of the pipe as specified in Annex B, where all layers have the same MRS rating;

— PE pipes with a peelable, contiguous thermoplastics additional layer on the outside of the pipe (‘coated pipe’) as specified in Annex C.

In this revision, pipe diameters specified have been increased to 2 500 mm. Test methods have been updated as appropriate and in accordance with other parts of this standard.

According to the CEN/CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Contents

Page

Licensed copy: Lee Shau Kee Library, HKUST, Version correct as of 03/01/2015, (c) The British Standards Institution 2013

Introduction

The System Standard, of which this is Part 2, specifies the requirements for a piping system and its components when made from polyethylene (PE). The piping system 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 EN 12201 (all parts):

a) this standard provides no information as to whether the product 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 must comply, when existing, with national regulations and testing arrangements that ensure fitness for contact with drinking water.

NOTE On April 2006, EC Commission set up a revised mandate (M/136) asking CEN to propose harmonised product standards and support standards for test methods which could be used for assessing the fitness for contact with drinking water. In parallel, EC Commission has launched processes for a regulation of construction products (CPR) to be substituted to CP directive (89/106/EEC) and for the revision of drinking water directive (98/83/EC). If relevant, when the outputs of these processes will be known, European Product Standards will be amended by the addition of an Annex Z under Mandate M136, which will contain formal references to the applicable requirements. Until such amendments, the current national regulations remain applicable.

Requirements and test methods for material and components, other than pipes, are specified in EN 12201-1:2011, EN 12201-3:2011 [1] and prEN 12201-4:2011 [2].

Characteristics for fitness of purpose are covered in EN 12201-5:2011 and CEN/TS 12201-7 [3] gives guidance for the assessment of conformity.

This Part of EN 12201 covers the characteristics of pipes.

Licensed copy: Lee Shau Kee Library, HKUST, Version correct as of 03/01/2015, (c) The British Standards Institution 2013

1 Scope

This part of EN 12201 specifies the characteristics of pipes made from polyethylene (PE 100, PE 80 and PE 40) 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 5.3 of this European Standard. Components manufactured for water for general purposes, drainage and sewerage may not be suitable for water supply for human consumption.

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

In conjunction with Part 1 and Parts 3 to 5 of EN 12201, it is applicable to PE pipes, 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 temperatures greater than 20 °C and up to 40 °C, see Annex A of EN 12201-1:2011.

NOTE 3 Pipes constructions including barrier layers are not covered by this document.

EN 12201 covers a range of allowable operating pressures and gives requirements concerning colours and additives.

It covers three types of pipe:

— PE pipes (outside diameter d_n) including any identification stripes;

— PE pipes with co-extruded layers on either or both the outside and/or inside of the pipe (total outside diameter d_n) as specified in Annex B, where all layers have the same MRS rating;

— PE pipes (outside diameter d_n) with a peelable, contiguous thermoplastics additional layer on the outside of the pipe (‘coated pipe’) as specified in Annex C.

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.

NOTE 5 Assessment of the resistance to slow crack growth of the PE pipe compound used for the manufacture of products to this document is required in accordance with Table 2 of EN 12201-1:2011.

1) 1 bar = 0,1 MPa = 10^5 Pa; 1 MPa = 1 N/mm^2.

2 Normative references

[A1] The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies. [/A1]

EN 12201-1:2011, *Plastics piping systems for water supply, and for drainage and sewerage under pressure — Polyethylene (PE) — Part 1: General*

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*

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

EN ISO 1133, *Plastics — Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics (ISO 1133:2005)*

EN ISO 1167-1, *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 1167-2:2006)*

EN ISO 2505, *Thermoplastics pipes – Longitudinal reversion – Test method and parameters (ISO 2505:2005)*

EN ISO 3126, *Plastics piping systems — Plastics components — Determination of dimensions (ISO 3126:2005)*

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

EN ISO 9969, *Thermoplastics pipes — Determination of ring stiffness (ISO 9969:2007)*

EN ISO 13968, *Plastics piping and ducting systems —Thermoplastics pipes — Determination of ring flexibility (ISO 13968:2008)*

ISO 4433-1:1997, *Thermoplastics pipes — Resistance to liquid chemicals — Classification — Part 1: Immersion test method*

ISO 4433-2:1997, *Thermoplastics pipes — Resistance to liquid chemicals — Classification — Part 2: Polyolefin pipes*

ISO 6259-3:1997, *Thermoplastics pipes — Determination of tensile properties — Part 3: Polyolefin pipes*

ISO 11357-6, *Plastics — Differential scanning calorimetry (DSC) — Part 6: Determination of oxidation induction time (isothermal OIT) and oxidation induction temperature (dynamic OIT)*

3 Terms and definitions, symbols and abbreviations

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

4 Material

4.1 Compound

The pipes shall be made from virgin material or own reprocessable material from the same PE compound or a mixture of both materials. Reprocessable material from pipes reprocessed with the peelable layer attached shall not be used. Own reprocessed material from the base pipe of peelable layer pipes can be used. For information on reprocessed material from coextruded pipe see B.1.

The compound(s) from which the pipes are made shall conform to EN 12201-1.

4.2 Compound for identification stripes

For black pipe with identification stripes (see 5.2), the compound used for these identification stripes shall be made from the same base polymer (PE) as one of the pipe compounds for which fusion compatibility has been proven.

5 General characteristics

5.1 Appearance

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

The ends of the pipe shall be cut cleanly and square to the axis of the pipe.

5.2 Colour

Pipes intended for the conveyance of water for human consumption shall be black or blue. In addition, black pipes may be identified by blue stripes, according to national preference.

Blue pipes or black pipes with blue stripes are intended for the conveyance of water for human consumption only.

Pipes intended for other purposes, drainage and sewerage shall be black or black with brown stripes or according to national preference.

The outer coextruded layer of coextruded pipes (see Annex B) or the outer peelable layer of peelable layer pipes (see Annex C) for pipe intended for the conveyance of water for human consumption shall be either black or blue. In addition identification stripes may be used according to national preference for the application.

The outer coextruded layer of coextruded pipes (see Annex B) or the outer peelable layer of peelable layer pipes (see Annex C) for pipe intended for other purposes shall be either black or black with brown stripes or brown or according to national preference. In addition identification stripes of a different colour may be used according to national preference for the application.

NOTE 1 In some countries, pipes made from non-pigmented compound in conjunction with an external peelable layer are permitted, providing the compound conforms to the requirements of this standard. If this is allowed in a country, this should be clearly stated in the national foreword.

NOTE 2 For above ground installations, all components other than black should be protected from direct UV light.

NOTE 3 The national preference for colour should be stated in the National Foreword.

Licensed copy: Lee Shau Kee Library, HKUST, Version correct as of 03/01/2015, (c) The British Standards Institution 2013

5.3 Effect on water quality

For compounds intended to be used for components in contact with water for human consumption, attention is drawn to the requirements of national regulations.

6 Geometrical characteristics

6.1 Measurements

The dimensions of the pipe shall be measured in accordance with EN ISO 3126 and rounded to the next 0,1 mm. In the case of dispute the measurements of dimensions shall be made not less than 24 h after manufacture after being conditioned for at least 4 h at (23 ± 2) °C.

NOTE 1 Indirect measurement during the stage of production is allowed at shorter time periods providing evidence is shown of correlation.

NOTE 2 The national preference for pipe size and PN rating may be given in the National Foreword.

6.2 Mean outside diameter, out-of-roundness (ovality) and tolerances

The mean outside diameters, d_{em}, and the out-of-roundness (ovality) shall be in accordance with Table 1. For coiled pipes, the maximum out-of roundness shall be specified by agreement between the manufacturer and the end-user.

Pipe extruded from PE 40 materials shall be limited to diameters up to and including 63 mm.

NOTE 1 In some countries pipe in PE 40 materials may be used in diameters up to and including 90 mm. If this is the case this should be stated in the National Foreword.

Licensed copy: Lee Shau Kee Library, HKUST, Version correct as of 03/01/2015, (c) The British Standards Institution 2013

Table 1 — Mean outside diameters and out-of-roundness

Dimensions in millimetres

Nominal size DN/OD	Nominal outside diameter d_n	Mean outside diameter [a] $d_{em,min}$	Mean outside diameter [a] $d_{em,max}$	Maximum out-of-roundness (ovality) [b,d]
16	16	16,0	16,3	1,2
20	20	20,0	20,3	1,2
25	25	25,0	25,3	1,2
32	32	32,0	32,3	1,3
40	40	40,0	40,4	1,4
50	50	50,0	50,4	1,4
63	63	63,0	63,4	1,5
75	75	75,0	75,5	1,6
90	90	90,0	90,6	1,8
110	110	110,0	110,7	2,2
125	125	125,0	125,8	2,5
140	140	140,0	140,9	2,8
160	160	160,0	161,0	3,2
180	180	180,0	181,1	3,6
200	200	200,0	201,2	4,0
225	225	225,0	226,4	4,5
250	250	250,0	251,5	5,0
280	280	280,0	281,7	9,8
315	315	315,0	316,9	11,1
355	355	355,0	357,2	12,5
400	400	400,0	402,4	14,0
450	450	450,0	452,7	15,6
500	500	500,0	503,0	17,5
560	560	560,0	563,4	19,6
630	630	630,0	633,8	22,1
710	710	710,0	716,4	24,9
800	800	800,0	807,2	28,0
900	900	900,0	908,1	—
1 000	1 000	1 000,0	1 009,0	—
1 200	1 200	1 200,0	1 210,8 [c]	—
1 400	1 400	1 400,0	1 412,6 [c]	—
1 600	1 600	1 600,0	1 614,4 [c]	—
1 800	1 800	1 800,0	1 816,2 [c]	—
2 000	2 000	2 000,0	2 018,0 [c]	—
2 250	2 250	2 250,0	2270,3 [c]	—
2 500	2 500	2 500,0	2522,5 [c]	—

[a] In accordance with ISO 11922-1:1997 [7] grade B for sizes ≤ 630 and grade A for sizes > 710 except for dn 40 and 50.

[b] In accordance with ISO 11922-1:1997 [7] grade N for sizes ≤ 630 and is measured at the point of manufacture.

[c] Tolerance calculated as 0,009dn and does not conform to grade A in ISO 11922-1:1997 [7].

[d] For straight lengths of pipe with diameters ≥ 900 the maximum out-of-roundness shall be agreed between the manufacturer and the purchaser.

NOTE 2 Tolerance bands in accordance with ISO 11922-1:1997 [7] are calculated using the following formulae, as applicable.

a) Grade A: $0{,}009d_n$ rounded to the next greater 0,1 mm with a minimum value of 0,3 mm and a maximum value of 10,0 mm;

b) Grade B: $0{,}006d_n$ rounded up to the next greater 0,1 mm with a minimum value of 0,3 mm and a maximum value of 4,0 mm;

c) Grade N:

1) for diameters ≤ 75 mm: $(0{,}008 d_n + 1)$ mm;

2) for diameters ≥ 90 mm and ≤ 250 mm: $(0{,}02 d_n)$ mm;

3) for diameters > 250 mm: $(0{,}035 d_n)$ mm,

4) rounded to next greater 0,1 mm.

6.3 Wall thicknesses and their tolerances

The wall thickness shall be in accordance with Table 2.

NOTE 1 The relationship between PN, MRS, S and SDR is given in Table A.1.

Table 2 — Wall thicknesses

Dimensions in millimetres

	Pipe series											
	SDR 6 S 2,5		SDR 7,4 S 3,2		SDR 9 S 4		SDR 11 S 5		SDR 13,6 S 6,3		SDR 17 S 8	
	Nominal pressure, PN [a] in bar											
PE 40	—		PN 10		—		PN 6		—		PN 4	
PE 80	PN 25		PN 20		PN 16		PN 12,5		PN 10		PN 8	
PE 100	—		PN 25		PN 20		PN 16		PN 12,5		PN 10	
⟨A1⟩												
Nom. size DN/OD	Wall thicknesses [b]											
	e_{min}	e_{max}	e_{min}	e_{max}	e_{min}	e_{max}	e_{min}	e_{max}	e_{min}	e_{max}	e_{min}	e_{max}
16	3,0 [c]	3,4	2,3 [c]	2,7	2,0 [c]	2,3	-	-	-	-	-	-
20	3,4	3,9	3,0 [c]	3,4	2,3	2,7	2,0 [c]	2,3	-	-	-	-
25	4,2	4,8	3,5	4,0	3,0 [c]	3,4	2,3	2,7	2,0 [c]	2,3	-	-
32	5,4	6,1	4,4	5,0	3,6	4,1	3,0 [c]	3,4	2,4	2,8	2,0 [c]	2,3
40	6,7	7,5	5,5	6,2	4,5	5,1	3,7	4,2	3,0	3,5	2,4	2,8
50	8,3	9,3	6,9	7,7	5,6	6,3	4,6	5,2	3,7	4,2	3,0	3,4
63	10,5	11,7	8,6	9,6	7,1	8,0	5,8	6,5	4,7	5,3	3,8	4,3
75	12,5	13,9	10,3	11,5	8,4	9,4	6,8	7,6	5,6	6,3	4,5	5,1
90	15,0	16,7	12,3	13,7	10,1	11,3	8,2	9,2	6,7	7,5	5,4	6,1
110	18,3	20,3	15,1	16,8	12,3	13,7	10,0	11,1	8,1	9,1	6,6	7,4
125	20,8	23,0	17,1	19,0	14,0	15,6	11,4	12,7	9,2	10,3	7,4	8,3
140	23,3	25,8	19,2	21,3	15,7	17,4	12,7	14,1	10,3	11,5	8,3	9,3
160	26,6	29,4	21,9	24,2	17,9	19,8	14,6	16,2	11,8	13,1	9,5	10,6
180	29,9	33,0	24,6	27,2	20,1	22,3	16,4	18,2	13,3	14,8	10,7	11,9
200	33,2	36,7	27,4	30,3	22,4	24,8	18,2	20,2	14,7	16,3	11,9	13,2
225	37,4	41,3	30,8	34,0	25,2	27,9	20,5	22,7	16,6	18,4	13,4	14,9
250	41,5	45,8	34,2	37,8	27,9	30,8	22,7	25,1	18,4	20,4	14,8	16,4
280	46,5	51,3	38,3	42,3	31,3	34,6	25,4	28,1	20,6	22,8	16,6	18,4
315	52,3	57,7	43,1	47,6	35,2	38,9	28,6	31,6	23,2	25,7	18,7	20,7
355	59,0	65,0	48,5	53,5	39,7	43,8	32,2	35,6	26,1	28,9	21,1	23,4
400	-	-	54,7	60,3	44,7	49,3	36,3	40,1	29,4	32,5	23,7	26,2
450	-	-	61,5	67,8	50,3	55,5	40,9	45,1	33,1	36,6	26,7	29,5
500	-	-	-	-	55,8	61,5	45,4	50,1	36,8	40,6	29,7	32,8
560	-	-	-	-	62,5	68,9	50,8	56,0	41,2	45,5	33,2	36,7
630	-	-	-	-	70,3	77,5	57,2	63,1	46,3	51,1	37,4	41,3
710	-	-	-	-	79,3	87,4	64,5	71,1	52,2	57,6	42,1	46,5
800	-	-	-	-	89,3	98,4	72,6	80,0	58,8	64,8	47,4	52,3
900	-	-	-	-	-	-	81,7	90,0	66,1	72,9	53,3	58,8
1000	-	-	-	-	-	-	90,8	100,0	73,5	80,9	59,3	65,4
1200	-	-	-	-	-	-	-	-	88,2	97,2	71,1	78,4
1400	-	-	-	-	-	-	-	-	102,8	113,3	83,0	91,5
1600	-	-	-	-	-	-	-	-	117,5	129,4	94,8	104,4
1800	-	-	-	-	-	-	-	-	-	-	106,6	117,4
2000	-	-	-	-	-	-	-	-	-	-	118,5	130,4
												⟨A1⟩

[a] PN values are based on C = 1,25.

[b] Tolerances in accordance with grade V of ISO 11922-1:1997 [7].

[c] The calculated value of e_{min}. (ISO 4065:1996 [5]) is rounded up to the nearest value of either 2,0, 2,3 or 3,0. This is to satisfy certain national requirements.

Table 2 — Wall thicknesses *(continued)*

Dimensions in millimetres

	Pipe series							
	SDR 21 S 10		SDR 26 S 12,5		SDR 33 S 16		SDR 41 S 20	
Nominal pressure, PN [a] in bar								
PE 40	—		—		—		—	
PE 80	PN 6		PN 5		PN 4		PN 3,2	
PE 100	PN 8		PN 6		PN 5		PN 4	
Nom. size DN/OD	**Wall thicknesses [b]**							
	e_{min}	e_{max}	e_{min}	e_{max}	e_{min}	e_{max}	e_{min}	e_{max}
16	-	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-
32	-	-	-	-	-	-	-	-
40	2,0 [c]	2,3	-	-	-	-	-	-
50	2,4	2,8	2,0	2,3	-	-	-	-
63	3,0	3,4	2,5	2,9	-	-	-	-
75	3,6	4,1	2,9	3,3	-	-	-	-
90	4,3	4,9	3,5	4,0	-	-	-	-
110	5,3	6,0	4,2	4,8	-	-	-	-
125	6,0	6,7	4,8	5,4	-	-	-	-
140	6,7	7,5	5,4	6,1	-	-	-	-
160	7,7	8,6	6,2	7,0	-	-	-	-
180	8,6	9,6	6,9	7,7	-	-	-	-
200	9,6	10,7	7,7	8,6	-	-	-	-
225	10,8	12,0	8,6	9,6	-	-	-	-
250	11,9	13,2	9,6	10,7	-	-	-	-
280	13,4	14,9	10,7	11,9	-	-	-	-
315	15,0	16,6	12,1	13,5	9,7	10,8	7,7	8,6
355	16,9	18,7	13,6	15,1	10,9	12,1	8,7	9,7
400	19,1	21,2	15,3	17,0	12,3	13,7	9,8	10,9
450	21,5	23,8	17,2	19,1	13,8	15,3	11,0	12,2
500	23,9	26,4	19,1	21,2	15,3	17,0	12,3	13,7
560	26,7	29,5	21,4	23,7	17,2	19,1	13,7	15,2
630	30,0	33,1	24,1	26,7	19,3	21,4	15,4	17,1
710	33,9	37,4	27,2	30,1	21,8	24,1	17,4	19,3
800	38,1	42,1	30,6	33,8	24,5	27,1	19,6	21,7
900	42,9	47,3	34,4	38,3	27,6	30,5	22,0	24,3
1000	47,7	52,6	38,2	42,2	30,6	33,5	24,5	27,1
1200	57,2	63,1	45,9	50,6	36,7	40,5	29,4	32,5
1400	66,7	73,5	53,5	59,0	42,9	47,3	34,3	37,9
1600	76,2	84,0	61,2	67,5	49,0	54,0	39,2	43,3
1800	85,8	94,5	68,8	75,8	55,1	60,8	44,0	48,6
2000	95,3	105,0	76,4	84,2	61,2	67,5	48,9	53,9
2250	107,2	118,1	86,0	94,8	68,9	75,9	55,0	60,7
2500	119,1	131,2	95,5	105,2	76,5	84,3	61,2	67,5

[a] PN values are based on C = 1,25.
[b] Tolerances in accordance with grade V of ISO 11922-1:1997 [7].
[c] The calculated value of e_{min}. (ISO 4065:1996 [5]) is rounded up to the nearest value of either 2,0, 2,3 or 3,0. This is to satisfy certain national requirements.

NOTE 2 Grade V tolerances are in accordance with ISO 11922-1:1997 [7] and calculated from the following formula:

$(0,1e_{min} + 0,1)$ mm, rounded to the next 0,1 mm higher.

For certain applications $e_n > 30$ mm tolerance grade T in accordance with ISO 11922-1:1997 [7] can be used and the tolerance calculated from the following formula: $0,15e_{min}$, rounded to next higher 0,1 mm.

6.4 Coiled pipe

During production the pipe shall be coiled such that localised deformation, e.g. buckling and kinking, is prevented.

The minimum internal diameter of the coil shall be not less than $18d_n$.

NOTE If smaller coil diameters are necessary, they shall be agreed between the manufacturer and the end user.

6.5 Pipe lengths

No requirements have been set concerning particular lengths of coiled or straight pipe or the tolerance thereon; hence it is necessary for lengths of pipe to be supplied by agreement between purchaser and manufacturer.

7 Mechanical characteristics

7.1 Conditioning

Unless otherwise specified by the applicable test method, the test pieces shall be conditioned at (23 ± 2) °C before testing in accordance with Table 3.

7.2 Requirements

When tested in accordance with the test method as specified in Table 3 using the indicated parameters, the pipe shall have mechanical characteristics conforming to the requirements given in Table 3.

Licensed copy: Lee Shau Kee Library, HKUST, Version correct as of 03/01/2015, (c) The British Standards Institution 2013

Table 3 — Mechanical characteristics

Characteristics	Requirements	Test parameters		Test method
		Parameters	Value	
Hydrostatic strength at 20 °C	No failure during test period of any test pieces	End caps Conditioning period Number of test pieces [b] Type of test Test temperature Test period Circumferential (hoop) stress for: PE 40 PE 80 PE 100	Type A [a] Shall conform to EN ISO 1167-1 3 Water-in-water 20 °C 100 h 7,0 MPa 10,0 MPa 12,0 MPa	EN ISO 1167-1 and EN ISO 1167-2
Hydrostatic strength at 80 °C	No failure during test period of any test pieces	End caps Conditioning period Number of test pieces [b] Type of test Test temperature Test period Circumferential (hoop) stress for: PE 40 PE 80 PE 100	Type A a Shall conform to EN ISO 1167-1 3 Water-in-water 80 °C 165 h [c] 2,5 MPa 4,5 MPa 5,4 MPa	EN ISO 1167-1 and EN ISO 1167-2
Hydrostatic strength at 80 °C	No failure during test period of any test pieces	End caps Conditioning period Number of test pieces [b] Type of test Test temperature Test period Circumferential (hoop) stress for: PE 40 PE 80 PE 100	Type A a Shall conform to EN ISO 1167-1 3 Water-in-water 80 °C 1000 h 2,0 MPa 4,0 MPa 5,0 MPa	EN ISO 1167-1 and EN ISO 1167-2
Elongation at break for $e_n \leq$ 5 mm	≥ 350 %	Test piece shape Speed of test Number of test pieces [b]	Type 2 100 mm/min Shall conform to EN ISO 6259-1	EN ISO 6259-1 and ISO 6259-3:1997
Elongation at break for 5 mm < $e_n \leq$ 12 mm	≥ 350 %	Test piece shape Speed of test Number of test pieces [b]	Type 1 [d] 50 mm/min Shall conform to EN ISO 6259-1	EN ISO 6259-1 and ISO 6259-3:1997
Elongation at break for $e_n >$ 12 mm	≥ 350 %	Test piece shape Speed of test Number of test pieces [b]	Type 1 [d] 25 mm/min Shall conform to EN ISO 6259-1:	EN ISO 6259-1 and ISO 6259-3:1997
		OR		
		Test piece shape Speed of test Number of test pieces [b]	Type 3 [d] 10 mm/min Shall conform to EN ISO 6259-1	

[a] Type B end caps may be used for batch release tests for diameters ≥ 500 mm.
[b] The number of test pieces given indicate the quantity required to establish a value for the characteristic described in the table. The number of test pieces required for factory production control and process control should be listed in the manufacturer's quality plan (for guidance see CEN/TS 12201-7 [3]).
[c] Premature ductile failures are not taken into account. For retest procedure see 7.3.
[d] Machined type 2 test pieces may be used for pipe wall thicknesses ≤ 25 mm. The test may be terminated when the requirement is met, without continuing until the rupture of the test piece.

7.3 Retest in case of failure at 80 °C

A fracture in a brittle mode in less than 165 h shall constitute a failure; however if a sample in the 165 h test fails in a ductile mode in less than 165 h, a retest shall be performed at a selected lower stress in order to achieve the minimum required time for the selected stress obtained from the line through the stress/time points given in Table 4.

Table 4 — Test parameters for the retest of the hydrostatic strength at 80 °C

PE 40		PE 80		PE 100	
Stress MPa	Test period h	Stress MPa	Test period h	Stress MPa	Test period h
2,5	165	4,5	165	5,4	165
2,4	230	4,4	233	5,3	256
2,3	323	4,3	331	5,2	399
2,2	463	4,2	474	5,1	629
2,1	675	4,1	685	5,0	1 000
2,0	1 000	4,0	1 000		

7.4 Pipe stiffness for vacuum sewer systems

Pipes for use in vacuum sewer systems shall have an initial ring stiffness $S_{calc} \geq 4$. See Annex D.

8 Physical characteristics

8.1 Conditioning

Unless otherwise specified by the applicable test method, the test pieces shall be conditioned at (23 ± 2) °C before testing in accordance with Table 5.

8.2 Requirements

When tested in accordance with the test methods as specified in Table 5 using the indicated parameters, the pipe shall have physical characteristics conforming to the requirements given in Table 5.

Licensed copy: Lee Shau Kee Library, HKUST, Version correct as of 03/01/2015, (c) The British Standards Institution 2013

Table 5 — Physical characteristics

Characteristics	Requirements	Test parameters		Test method
Melt mass-flow rate MFR for PE 40	After processing maximum deviation of ± 20 % of the value measured on the batch used to manufacture the pipe	Load Test temperature Time Number of test pieces [a]	2,16 kg 190 °C 10 min Shall conform to EN ISO 1133	EN ISO 1133
Melt mass-flow rate MFR for PE 80, and PE 100	After processing maximum deviation of ± 20 % of the value measured on the batch used to manufacture the pipe	Load Test temperature Time Number of test pieces [a]	5,0 kg 190 °C 10 min Shall conform to EN ISO 1133	EN ISO 1133
Oxidation induction time	≥ 20 min	Test temperature Test environment Specimen weight Number of test pieces [a,b]	200 °C [c] Oxygen (15±2) mg 3	ISO 11357-6
[A1]				
Longitudinal reversion Wall thickness ≤ 16 mm	≤ 3 % Original appearance of the pipe shall remain.	Test temperature for PE 40 PE 80 PE 100 Length of test piece Immersion time Test method Number of test pieces [a]	 100 °C 110 °C 110 °C 200 mm Shall conform to EN ISO 2505 Free Shall conform to EN ISO 2505	EN ISO 2505
				[A1]
Effect on water quality [d]	National regulations apply.			

[a] The number of test pieces given indicate the quantity required to establish a value for the characteristic described in the table. The number of test pieces required for factory production control and process control should be listed in the manufacturer's quality plan (for guidance see CEN/TS 12201-7 [3]).

[b] Samples to be taken from the outer and inner wall surfaces.

[c] Test may be carried out as an indirect test at 210 °C or 220 °C providing clear correlation has been established. In cases of dispute the reference temperature shall be 200 °C.

[d] Test methods, parameters and requirements for all properties are under preparation. Until these European Standards are published National Regulations apply (see Introduction).

9 Chemical characteristics of pipes in contact with chemicals

If, for a particular installation, it is necessary to evaluate the chemical resistance of the pipe, then the pipe shall be classified in accordance with ISO 4433-1:1997 and ISO 4433-2:1997.

NOTE Guidance for the resistance of polyethylene pipes to chemicals is given in ISO/TR 10358:1993 [6].

10 Performance requirements

When pipes conforming to this standard are assembled to each other or to components conforming to other Parts of EN 12201, the joints shall conform to the requirements of EN 12201-5.

11 Marking

11.1 General

11.1.1 All pipes shall be permanently and legibly marked in such a way that the marking does not initiate cracks or other types of failure and that normal storage, weathering, handling, installation and use shall not affect the legibility of the marking.

NOTE The manufacturer is not responsible for marking becoming illegible due to actions caused during installation and use such as painting, scratching, covering of the components or by use of detergents, etc. on the components unless agreed or specified by the manufacturer.

11.1.2 If printing is used, the colour of the printed information shall differ from the basic colour of the product.

11.1.3 The marking shall be such that it is legible without magnification.

11.2 Minimum required marking of pipes

The minimum required marking shall conform to Table 6, with the frequency of marking being not less than once per metre.

The pipes shall be marked for the intended use by using the appropriate codes in accordance with CEN/TR 15438. For example:

— W for pipes intended for the conveyance of water for human consumption;

— P for pipes intended for the sewer and drainage under pressure;

— W/P for both of the above.

Table 6 — Minimum required marking

Aspects	Marking or symbol
Standard Number	EN 12201
Manufacturer's name or trademark	Name or symbol
Dimensions ($d_n \times e_n$)	e.g. 110 × 10
SDR series	e.g. SDR 11
Intended use	e.g. W, P, or W/P
Material and designation	e.g. PE 100
Pressure rating in bars	e.g. PN 16
Manufacturer's information	e.g. 1009 [a]
Type of pipe if applicable	eg Co-extruded or Peelable Layer

[a] In clear figures or in code providing traceability to production period within year and month and if the manufacturer is producing at different sites, the production site.

The length of coiled pipes is permitted to be indicated on the coil; the remaining length of pipe on drums or coils is permitted to be indicated on the pipe.

Coextruded and peelable pipe shall be marked accordingly, clearly identifying this type of pipe, including any specific instructions related to these types of pipe.

Annex A
(informative)

Relationship between PN, MRS, S and SDR

The relationship between nominal pressure PN, design stress, σ_s, and the series S or SDR is given by the following equations:

$$PN = \frac{10\sigma_S}{S} \quad \text{or} \quad PN = \frac{20\sigma_S}{SDR - 1}$$

Examples of the relationship between PN, MRS, S, and SDR based on:

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

are given in Table A.1, where *C* = 1,25.

Table A.1 — Examples of relationship between PN, MRS, S and SDR at 20 °C with the value of *C* = 1,25

SDR	S	Nominal pressure in bars for material class		
		PE 40	PE 80	PE 100
41	20	-	3,2	4
33	16	-	4	5
26	12,5	-	5	6 [a]
21	10	-	6 [a]	8
17,6	8,3	-	-	-
17	8	4	8	10
13,6	6,3	-	10	12,5
11	5	6	12,5	16
9	4	-	16	20
7,4	3,2	10	20	25
6	2,5	-	25	-

[a] Actual calculated values are 6,4 bar for PE 100 and 6,3 bar for PE 80.

NOTE The nominal pressures "PN" in the table are based on using a design coefficient *C* =1,25. If a higher value for "*C*" is required the "PN" values will have to be recalculated using the above equations, based on the calculated design "σ_s" for each material class. A higher value for "*C*" can also be obtained by choosing a higher PN class.

Annex B
(normative)

Pipes with co-extruded layers

B.1 General

This annex specifies the additional geometrical, mechanical and physical properties of polyethylene (PE) pipes with co-extruded layer(s), intended to be used for water supply, and drainage and sewerage under pressure. Additional marking requirements are given. The outside diameter, d_e, is defined as the total outside diameter, including the coextruded layer(s) at the outside of the pipe (see 5.2), and the wall thickness (e_n) is defined as the total wall thickness including all layers, on either or both the outside and/or inside of the pipe. The PE compounds used for the layer(s) of the pipe shall be in accordance with EN 12201-1 and of the same MRS rating.
Own reprocessed material from coextruded pipes may be used for coextruded pipes not intended for water for human consumption, provided all the requirements of EN 12201-2 are fulfilled.

NOTE Other types of layered pipes are covered by other standards, e.g. ISO 21004:2006 [8].

B.2 Geometrical characteristics

The geometrical characteristics of the pipe, inclusive of the co-extruded layer(s), shall be in accordance with Clause 6. The manufacturer shall declare the thickness of each layer and tolerance in the technical file.

B.3 Mechanical characteristics

The mechanical characteristics of the pipe, inclusive of the co-extruded layer(s), shall be in accordance with Clause 7.

In addition the requirements for RCP and Slow Crack Growth in accordance with 4.4. of EN 12201-1:2011 shall be fulfilled by the manufactured pipe.

B.4 Physical characteristics

The physical characteristics shall be in accordance with Clause 8. The requirements for thermal stability and for melt flow rate shall apply to the individual layers respectively. Longitudinal reversion shall be applicable to the pipe, inclusive of the co-extruded layer(s).

B.5 Marking

The marking of pipes with co-extruded layer(s) shall be in accordance with Clause 11.

B.6 Delamination

No delamination shall occur during all tests of the co-extruded pipe.

Licensed copy: Lee Shau Kee Library, HKUST, Version correct as of 03/01/2015, (c) The British Standards Institution 2013

B.7 Integrity of the structure

When tested in accordance with the test methods as specified in Table B.1, using the indicated parameters, the pipe shall have the structural performance conforming to the requirements given in Table B.1.

Table B.1 — Requirements for integrity of the structure

Characteristic	Requirement	Test parameters		Test method
Integrity of the structure after deflection	> 80% of the initial stiffness value	Deflection Position of test piece	30% of d_{em} When applicable, at 0, 45 and 90 from the upper plate.	EN ISO 13968

For the determination of the integrity of the structure after deflection of coextruded pipes, the following procedure shall be applied:

a) determine the initial ring stiffness of the pipe according to EN ISO 9969;

b) carry out the ring flexibility test according to EN ISO 13968;

c) after a 1 h period for recovery, determine again the ring stiffness according to EN ISO 9969.

The ring stiffness of the coextruded pipe shall be at least 80% of the initial ring stiffness.

Annex C
(normative)

Pipes with peelable layer

C.1 General

This annex specifies the geometrical, mechanical and physical properties of those polyethylene (PE) pipes (outside diameter d_n) having a peelable, contiguous, thermoplastics layer on the outside of the pipe ("coated pipe"), intended to be used for water supply, and drainage and sewerage under pressure. Marking requirements are also given.

The PE-material used for the production of the base pipe shall be in accordance with EN 12201-1 and the base pipe shall fulfil all the requirements of EN 12201-2, after removal of the peelable layer.

The external coating shall be manufactured from a thermoplastic material. When attached, the coating shall not affect the ability of the PE pipe to meet the performance requirements of this European standard.

If additional adhesive layers are used, they shall be easily removed, and without affecting the jointing process. The preparation for the joining process shall follow normal procedures.

NOTE Other types of layered pipes are covered by other standards e.g. ISO 21004:2006 [8].

C.2 Geometrical characteristics

The geometrical characteristics of the pipe, with the coating removed, shall be in accordance with Clause 6.

C.3 Mechanical characteristics

The coating shall not have a detrimental effect on the pipe or vice versa. The mechanical characteristics of the pipe, with the coating removed shall be in accordance with Clause 7, and the attachment of the coating shall not affect the ability of the pipe to conform to those requirements. Requirements for colour are given in 5.2.

When the pipe is tested with the coating attached, conformity with Clause 7 before and after weathering according to Table 2 of EN 12201-1:2011 shall be assessed with the exception of black pipe. The conditions selected shall ensure that pipe is subjected to the specified test stresses.

C.4 Physical characteristics

The physical characteristics of the pipe, with the coating removed, shall be in accordance with Clause 8. The coating shall not have a detrimental effect on the pipe or vice versa.

C.5 Coating adhesion

The coating on the pipe shall be resistant to detachment during storage and installation.

The coating shall be manually removable prior to jointing using simple tools.

Licensed copy: Lee Shau Kee Library, HKUST, Version correct as of 03/01/2015, (c) The British Standards Institution 2013

C.6 Marking

Marking shall be applied to the coating and shall be in accordance with Clause 11.

In addition, the coating shall be provided with marking clearly distinguishing the pipe from non-coated pipe in service, for example identification stripes may be used for this purpose.

The coating shall also carry marking that warns that the coating must be removed prior to electrofusion, buttfusion and mechanical jointing.

NOTE When possible, the base pipe should be marked in accordance with Clause 11.

Annex D
(normative)

Pipe stiffness for vacuum sewer systems

When a calculation of the initial pipe deflection is applied for pipes in vacuum sewer systems (see 7.4), the initial ring stiffness shall be taken from Table D.1.

Table D.1 — Initial ring stiffness of pipes

SDR	Pipe series S	*E*-modulus (MPa)		
		800	1 000	1 200
		Initial ring stiffness (S_{calc}) (kN/m²)		
41	20	1,0	1,3	1,6
33	16	2,0	2,5	3,1
26	12,5	4,3	5,3	6,4
21	10	8,3	10,4	12,5
17	8	16,3	20,3	24,4
13,6	6,3	33,3	41,7	50,0
11	5	66,7	83,3	100,0
9	4	130,2	162,8	195,3
7,4	3,2	254,3	317,9	381,5
6	2,5	533,3	668,7	800,0

The initial ring stiffness S_{calc} in Table D.1 has been calculated using the following equation:

$$S_{calc} = \frac{E \times I}{(d_n - e_n)^3} = \frac{E}{96 S^3}$$

where

S_{calc} is the calculated initial ring stiffness, in kilonewtons per square metre (kN/m²);

E is the modulus of elasticity in flexure (determined in accordance with EN ISO 178:2003 [4]) (MPa);

I is the moment of inertia, in cubic millimetres,
with $\frac{1 \times e_n^{\ 3}}{12}$ for 1 m pipe length;

d_n is the nominal outside diameter, in millimetres;

e_n is the nominal wall thickness, in millimetres;

S is the pipe series.

Licensed copy: Lee Shau Kee Library, HKUST, Version correct as of 03/01/2015, (c) The British Standards Institution 2013

NOTE 1 In practice the initial ring stiffness is always higher than calculated, because the average wall thickness is greater than the nominal wall thickness used for the calculation.

NOTE 2 When pipes with an initial ring stiffness $S_{calc} < 4$ are installed below ground care should be taken to avoid excessive deflection.

Bibliography

[1] EN 12201-3, *Plastics piping systems for water supply, and for drainage and sewerage under pressure — Polyethylene (PE) — Part 3: Fittings*

[2] prEN 12201-4:2011, *Plastics piping systems for water supply, and for drainage and sewerage under pressure — Polyethylene (PE) — Part 4: Valves for water supply systems*

[3] CEN/TS 12201-7, *Plastics piping systems for water supply — Polyethylene (PE) — Part 7: Guidance for the assessment of conformity*

[4] EN ISO 178:2003, *Plastics — Determination of flexural properties (ISO 178:2001)*

[5] ISO 4065:1996, *Thermoplastics pipes — Universal wall thickness table*

[6] ISO/TR 10358:1993, *Plastics pipes and fittings — Combined chemical-resistance classification table*

[7] ISO 11922-1:1997, *Thermoplastics pipes for the conveyance of fluids — Dimensions and tolerances — Part 1: Metric series*

[8] ISO 21004:2006, *Plastics piping systems — Multilayer pipes and their joints, based on thermoplastics, for water supply*

[9] Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of the Member States relating to construction products, OJ L 40, 11.2.1989, p. 12-26

[10] Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption, OJ L 330, 5.12.1998, p. 32-54

National Annex (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) Water supply companies and other entities deemed to be within the scope of the Public Procurement Directives (PPD) are obliged to use BS EN 12201-1:2011, BS EN 12201-2:2011, BS EN 12201-3:2011, BS EN 12201-4:2011 and BS EN 12201-5:2011, produced under European Union mandate, if they wish to purchase PE pipe systems or components within the PPD scope.

b) CE Marking against the Construction Products Directive does apply to pipes and fittings within the scope of BS EN 12201-1:2011, BS EN 12201-2:2011 and BS EN 12201-3:2011 and to valves within the scope of BS EN 12201-4:2011.

c) 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.

d) For colour, it is the practice of UK water companies to use blue PE pipes to facilitate identification of buried water pipelines, in accordance with the recommendations of the National Joint Utilities Group (NJUG) concerning the colour coding of pipelines and other services. Pipes for water for human consumption, installed above ground, are black.

e) Note 5 to Clause 1 refers to the test for resistance to slow crack growth of the PE compound. The PE pipe compound in pipe form is tested in accordance with BS EN ISO 13479:2009, with a test period of 500 h in accordance with BS EN 12201-1:2011, Table 2. It is UK practice to use a test period of 1 000 h, which aligns with WIS 4-32-17 (Issue 2) Polyethylene pressure pipes for pressurised water supply and sewerage duties.

f) To comply with health and safety requirements for safe handling of PE pipes supplied as coils or on drums, guidance should be sought from the pipe manufacturer. Further guidance is given in WIS 4-32-17 (Issue 2).

g) Peelable layer pipes ('coated pipes') manufactured using a non pigmented, blue or black compound for the base pipe in accordance with EN 12201-1 and EN 12201-2, are used in the UK only by agreement with the purchaser.

   Where the use of 'squeeze off' is employed to temporarily stop flow, the pipe manufacturer shall provide guidance on the range of pipe sizes and SDRs that may be "squeezed off" together with full details of any marking or reinforcing requirements. In the case of peelable layer pipe, specific guidance shall be provided for the careful removal of the peelable layer pipe without damage to the base pipe in the area of the 'squeeze off'.

h) This British Standard requires the critical pressure for rapid crack propagation (RCP) as measured in accordance with BS EN ISO 13477:2008 to be equal to or greater than the maximum operation pressure (PFA) in BS EN 12201-2:2011, Table 2.

i) The use of pipes and components manufactured in PE 40 material is not established practice in the UK.

j) The minimum wall thickness specified is 2,0 mm, 2,3 mm or 3,0 mm (see footnote c to Table 2 and footnote c to Table 2 (continued)). It is UK practice to use an absolute minimum wall thickness of 2,3 mm.

k) This Standard permits several wall thicknesses for each diameter. Current UK practice in the case of small diameter pipes is to use only the following nominal sizes: 20 SDR 9, and 25 to 63 (inclusive) SDR 11.

l) Attention is drawn to the necessity of following manufacturer's instructions on correct jointing procedure. Butt-welding parameters for welding pipe to pipe are the responsibility of the pipe manufacturer. Butt-welding parameters for welding pipes to spigot fittings are the responsibility of the fitting manufacturer. Electrofusion welding parameters are the responsibility of the fitting manufacturer. In particular, the need, (or otherwise) to scrape the pipe prior to electrofusion jointing should be established with the manufacturer of the electrofusion fittings. This is even more important in the case of coextruded pipes and pipes with a peelable outer layer.

Further guidance on jointing procedures is given in WIS 4-32-08 (Issue 3) *Specification for the fusion jointing of polyethylene pressure pipeline systems using PE 80 and PE 100 materials*.

This page deliberately left blank

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards -based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email bsmusales@bsigroup.com.

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Copyright

Useful Contacts:

Customer Services
Tel: +44 845 086 9001
Email (orders): orders@bsigroup.com
Email (enquiries): cservices@bsigroup.com

Subscriptions
Tel: +44 845 086 9001
Email: subscriptions@bsigroup.com

Knowledge Centre
Tel: +44 20 8996 7004
Email: knowledgecentre@bsigroup.com

Copyright & Licensing
Tel: +44 20 8996 7070
Email: copyright@bsigroup.com

bsi.

...making excellence a habit.™