

BS EN 1555-5:2010



BSI Standards Publication

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

Part 5: Fitness for purpose of the system

MAHCO

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW

raising standards worldwide[™]

MEHR AB HAYAT SANAAT KERMAN
www.MAHCOpipe.com



National foreword

This British Standard is the UK implementation of EN 1555-5:2010. It supersedes BS EN 1555-5:2002 which is withdrawn. Together with BS EN 1555-1:2010 and BS EN 1555-2:2010, it supersedes BS 7281:1990 which is withdrawn.

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.

NOTE 1 There is no Part 6 in the EN 1555 series. Instead users of BS EN 1555 should refer to EN 12007-2, *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)*. Users of this standard are also referred to the guidance issued by National Grid, for example T/PR/ML/4 - *Work procedure for pipe system construction*.

NOTE 2 Part 7 of the EN 1555 series has been prepared as a CEN/TS to allow further development. CEN/TS 1555-7 is not mandatory under the Public Procurement Directives (2004/18/EC and 2004/17/EC).

Users should be aware of any appropriate safety precautions relating to pipework for combustible gas, such as the National Grid Gas document T/PR/ML/4, *Work procedure for pipe system construction Module 4 – PE main laying up to and including 630 mm diameter at pressures up to and including 2 bar*. It is assumed in the drafting of a standard that the execution of its provisions is entrusted to appropriately qualified and competent people.

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 UK Committee would like to emphasize that compliance with this British Standard does not necessarily mean that products are fit for the purpose of conveying gaseous fuels in the UK. The EN 1555 series of standards are not fully compatible with existing UK practice in terms of applicable pressure tiers, preferred colours for gas pipe recognition, jointing and installation methods.

The requirements contained in the EN 1555 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.

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

© BSI 2010

ISBN 978 0 580 64875 5

ICS 23.040.01; 91.140.40

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 2010.

Amendments issued since publication

Date	Text affected
------	---------------

English Version

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 30 July 2010.

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 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 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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.



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

Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Page

Foreword.....	3
Introduction	4
1 Scope.....	5
2 Normative references	5
3 Terms and definitions.....	6
4 Fitness for purpose.....	7
4.1 Method of preparation of assemblies for testing	7
4.1.1 General.....	7
4.1.2 Butt fusion joints.....	7
4.1.3 Electrofusion jointing	7
4.1.4 Mechanical joints	7
4.2 Requirements for fitness for purpose	7
4.2.1 General.....	7
4.2.2 Fitness for purpose of butt fusion joints.....	8
4.2.3 Fitness for purpose for electrofusion joints	9
4.2.4 Fitness for purpose for mechanical joints	10
4.3 Conditioning.....	10
4.4 Requirements	10
4.5 Retest in case of failure at 80 °C	11
5 Design coefficient	12
Annex A (informative) Derating coefficients for operating temperatures	13
Annex B (normative) Rapid crack propagation (RCP) resistance of pipe at temperature less than 0 °C	14
Bibliography.....	15

MAHCO

Foreword

This document (EN 1555-5:2010) 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 2011 and conflicting national standards shall be withdrawn at the latest by March 2011.

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 supersedes EN 1555-5:2002.

EN 1555 consists of the following parts:

- EN 1555-1, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 1: General*;
- EN 1555-2, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 2: Pipes*;
- EN 1555-3, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 3: Fittings*;
- prEN 1555-4, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 4: Valves*;
- EN 1555-5, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 5: Fitness for purpose of the system (this standard)*;
- CEN/TS 1555-7, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 7: Guidance for assessment of conformity*.

System Standards 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.

NOTE — EN 12007-2:2000 [1] prepared by CEN/TC 234 "Gas infrastructure" deals with the recommended practice for installation of plastics pipes system in accordance with EN 1555 (all parts).

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

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 prEN 1555-4.

CEN /TS 1555-7 [2] gives guidance for assessment of conformity. Recommended practice for installation is given in EN 12007-2:2000 [1] prepared by CEN /TC 234.

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



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 specifies the method of preparation of test piece joints, 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 specifies the test parameters for the test methods referred to in this standard.

In conjunction with Parts 1 to 4 of EN 1555, 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 (all parts) 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

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1555-1:2010, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 1: General*

EN 1555-2:2010, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 2: Pipes*

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

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

EN ISO 1167-1:2006, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure — Part 1: General method (ISO 1167-1:2006)*

EN ISO 1167-2, *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 1167-4, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure — Part 4: Preparation of assemblies (ISO 1167-4:2007)*

1) 1 bar = 0,1 MPa.

EN 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 13477:2008)*

EN ISO 13478, *Thermoplastics pipes for the conveyance of fluids — Determination of resistance to rapid crack propagation (RCP) — Full scale test (FST) (ISO 13478:2007)*

ISO 10838-1²⁾, *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 10838-2²⁾, *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 10838-3²⁾, *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 11413:2008, *Plastics pipes and fittings — Preparation of test piece assemblies between a polyethylene (PE) pipe and an electrofusion fitting*

ISO 11414:2009, *Plastics pipes and fittings — Preparation of polyethylene (PE) pipe/pipe or pipe/fitting test piece assemblies by butt fusion*

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/FDIS 13956, *Plastics pipes and fittings — Determination of cohesive strength — Evaluation of ductility of fusion joint interface by tear test*

3 Terms and definitions

For the purposes of this document, the terms and definitions, symbols and abbreviations given in EN 1555-1:2010 and the following definition apply.

3.1 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

NOTE A support sleeve inserted into the pipe bore should 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.

2) These standards are under revision.

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, fittings conforming to EN 1555-3 or valves conforming to prEN 1555-4.

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.

The peelable layer of peelable layer pipe shall be removed in the area of the joint prior to jointing.

4.1.2 Butt fusion joints

PE pipes, spigot end fittings and valves 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 4.2.2.1 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.

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 4.2.3.1 for the assessment of fitness for purpose under normal conditions and in 4.2.3.2 for the assessment of fitness for purpose under extreme 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.

4.2 Requirements for fitness for purpose

4.2.1 General

When tested in accordance with the test methods as specified in Table 5 using the indicated parameters, fittings shall have mechanical characteristics conforming to the requirements given in Table 5, as applicable to the following types of joints:

- (A) electrofusion socket fittings;
- (B) electrofusion saddle fitting;

— (C) spigot end fitting, pipe.

4.2.2 Fitness for purpose of butt fusion joints

4.2.2.1 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 B, Condition 1 of ISO 11414:2009 at an ambient temperature of (23 ± 2) °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 4.2.2.1, which pipes from his own product range manufactured from different compounds conforming to EN 1555-2 are compatible to each other for butt fusion.

The fitting or valve manufacturer shall declare, according to 4.2.2.1, the SDR range and MRS values of pipes conforming to EN 1555-2:2010 to which his fittings conforming to EN 1555-3 and/or his valves conforming to prEN 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.

4.2.2.2 Under extreme conditions

For butt fusion joints the characteristics to be examined for fitness for purpose under extreme conditions shall conform to Table 2.

Table 2 — Relation between the joints and fitness for purpose characteristics

Butt fusion joint	Associated characteristics
Both components of the joint: same MRS and same SDR Joint: minimum and maximum condition ^a	Hydrostatic strength (80 °C, 165 h)
Both components of the joint: same MRS and same SDR Joint: minimum and maximum condition ^a	Tensile strength for butt fusion joint
^a As specified in Clause 7, item a), of ISO 11414:2009 concerning misalignment and the limit values of fusion parameters conforming to Condition 2 and 3 in Annex B of ISO 11414:2009.	

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

The fitting or valve manufacturer shall declare according to Table 2, as applicable, the fitness for purpose under extreme conditions of his fittings or valves.

The pipe manufacturer shall declare according to Table 2 the fitness for purpose under extreme conditions of his pipes (PE pipes, PE pipes with co-extruded layers, PE pipes with peelable layers).

4.2.3 Fitness for purpose for electrofusion joints

4.2.3.1 Under normal conditions (ambient temperature 23 °C)

For the assessment of fitness for purpose under normal conditions, electrofusion joints shall have the characteristic of decohesive resistance or cohesive strength, as applicable, conforming to the requirement given in Table 5, using the assembly condition 1 as specified in Annex C of ISO 11413:2008 at an ambient temperature of (23 ± 2) °C and the scheme listed in Table 3.

Table 3 — Scheme for electrofused joints

Electrofusion fitting/valve with electrofusion socket	Pipe	
	PE 80 SDR maximum	PE 100 SDR minimum
PE 80	X	X
PE 100	X	X

NOTE The table should be interpreted as follows: as an example, for an electrofusion fitting or a valve with electrofusion socket made from a PE 80 compound, a joint should be tested with a pipe made from PE 80 compound and the SDR maximum as declared by the manufacturer, and another joint should be tested with a pipe made from PE 100 compound and the SDR minimum as declared by the manufacturer.

The fitting or valve manufacturer shall declare, according to 4.2.3.1, the SDR range and MRS values of pipes conforming to EN 1555-2:2010 to which his fittings conforming to EN 1555-3 and/or his valves conforming to prEN 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.

4.2.3.2 Under extreme conditions

For electrofusion joints the characteristics to be examined for fitness for purpose under extreme conditions shall conform to Table 4.

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

Table 4 — Relation between the joints and fitness for purpose characteristics

Electrofusion joint including socket fitting ^a (A)	Electrofusion joint including saddle fitting ^a (B)	Associated characteristics
Pipe: MRS maximum ^b SDR minimum ^b Joint: conditions 2 and 3 ^c		Decohesive resistance
	Pipe: MRS maximum ^b SDR minimum ^b Joint: conditions 2 and 3 ^c	Cohesive strength
<p>a If accepted by the purchaser, the minimum and maximum energy conditions 2 and 3 may be replaced by a nominal energy at a given ambient temperature T_a defined by the fitting manufacturer (see 3.4 of ISO 11413:2008).</p> <p>b As declared by the fitting manufacturer according to 4.2.3.1.</p> <p>c As specified in Annex C of ISO 11413:2008 with T_{min} and T_{max} as stated in the fitting manufacturer's technical specification.</p>		

The fitting or valve manufacturer shall declare according to Table 4, column(s) A, or B, as applicable, the fitness for purpose under extreme conditions of his fittings or valves with the type of pipe being specified.

4.2.4 Fitness for purpose for mechanical joints

For fitness for purpose of mechanical joints the performances of the joints shall conform to ISO 10838-1, ISO 10838-2 or ISO 10838-3, as applicable.

4.3 Conditioning

The test pieces shall be conditioned at (23 ± 2) °C before testing, unless otherwise specified by the applicable test method as specified in Table 5,

4.4 Requirements

The requirements for characteristics of fitness for purpose are given in Table 5.

MAHCO

Table 5 — Characteristics for fitness for purpose of the system

Characteristic	Requirements	Test parameters		Test method
		Parameter	Value	
Hydrostatic strength (80 °C, 165 h) (C)	No failure during the test period ^a	End caps Orientation Conditioning time Number of test pieces ^b Type of test Circumferential (hoop) stress for: PE 80 PE 100 Test period Test temperature	EN ISO 1167-1:2006, Type A Free Shall conform to EN ISO 1167-1 3 Water-in water 4,5 MPa 5,4 MPa 165 h 80 °C	EN ISO 1167-1 together with EN ISO 1167-2, or EN ISO 1167-4, as applicable
Decohesive resistance (A)	Length of initiation rupture $\leq L/3$ in brittle failure ^c	Test temperature Number of test pieces ^b	23 °C Shall conform to ISO 13954	ISO 13954
		Test temperature Number of test pieces ^b	23 °C Shall conform to ISO 13955	ISO 13955
Evaluation of ductility of fusion joint interface (B)	$L_d \leq 50\%$ and $A_d \leq 25\%$, brittle failure	Test temperature Number of test pieces ^b	23 °C Shall conform to ISO/FDIS 13956	ISO/FDIS 13956
Tensile strength for butt fusion (C)	Test to failure: ductile: pass brittle: fail	Test temperature Number of test pieces ^b	23 °C Shall conform to ISO 13953	ISO 13953
^a Only brittle failures shall be taken into account. If a ductile failure occurs before 165 h, the test is permitted to be repeated at a lower stress. The stress and the associated minimum test period shall be selected from Table 6 or from a line based on the stress/time points given in Table 6. ^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 CEN/TS 1555-7 [2]. ^c L is the nominal length of the fusion zone of the electrofusion socket fitting.				

4.5 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 recommended stress/time points given in Table 6.

MAHCO

Table 6 — Circumferential (hoop) stress at 80 °C and associated minimum test period

PE 80		PE 100	
Stress MPa	Minimum test time h	Stress MPa	Minimum test time h
4,5	165	5,4	165
4,4	233	5,3	256
4,3	331	5,2	399
4,2	474	5,1	629
4,1	685	5,0	1 000
4,0	1 000	—	—

5 Design coefficient

The minimum value of the design coefficient, C , for pipes, fittings and valves for the supply of gaseous fuels shall be 2, or higher values according to national legislation.

To this value other coefficients may be applied taking into account different aspects such as:

- a) operating temperature range;
- b) specific material aspects, for instance Rapid Crack Propagation (RCP);

NOTE 1 For information about RCP resistance at temperature less than 0 °C, see Annex B.

- c) storage and laying conditions.

NOTE 2 For information about derating coefficients for other operating temperatures, see Annex A.

MAHCO

Annex A (informative)

Derating coefficients for operating temperatures

Derating factor (D_F) is a coefficient used in the calculation of the maximum operating pressure (MOP), which takes into account the influence of operating temperature.

Table A.1 gives derating coefficients for various operating temperatures.

Table A.1 — Temperature derating coefficients

Temperature	Derating coefficient (D_F)
20 °C	1,0
30 °C	1,1
40 °C	1,3

For other temperatures between each step, linear interpolation is permitted.

The calculation of MOP for a given operating temperature is based on the following equation:

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

in which the value of the design coefficient, C , shall not be less than 2 in accordance with Clause 5.

MAHCO

Annex B (normative)

Rapid crack propagation (RCP) resistance of pipe at temperature less than 0 °C

Piping system intended for the distribution of gas at temperature less than 0 °C, e.g. liquid petroleum gas (LPG) systems and in use downstream of pressure reduction stations, shall be subjected to additional rapid crack propagation (RCP) evaluation in accordance with EN ISO 13477 or EN ISO 13478, to determine the critical pressure p_c at the minimum expected operating temperature; see EN 1555-1.

NOTE More information may be found in EN 12007-2:2000 [1].



Bibliography

- [1] EN 12007-2:2000, *Gas supply systems — Gas 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] CEN/TS 1555-7, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 7: Guidance for assessment of conformity*



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) Gas supply companies and other entities deemed to be within the scope of the Public Procurement Directives (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 the PPD scope.
- b) CE marking against the Construction Products Directive and the Pressure Equipment Directive does not apply to pipes and fittings within the scope of EN 1555-1, EN 1555-2 and EN 1555-3. However, CE marking may apply to valves within the scope of EN 1555-4.
- c) Attention is drawn to Clause 4.1.1 and the requirements that joints be made by using pipes conforming to EN 1555-2, fittings conforming to EN 1555-3 or valves conforming to EN 1555-4. The tests within these standards confirm the compatibility of components and the efficacy and fitness for purpose of pipes, jointing systems and assemblies of components, in withstanding variations in assembly conditions and the operating pressures and temperatures generated within gas distribution systems.
- d) Attention is drawn to the necessity of following manufacturers 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.

MAHCO



MAHCO

British Standards Institution (BSI)

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

It presents the UK view on standards in Europe and at the international level.

It is incorporated by Royal Charter.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover.

Tel: +44 (0)20 8996 9001 Fax: +44 (0)20 8996 7001

BSI offers Members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Tel: +44 (0)20 8996 7669 Fax: +44 (0)20 8996 7001

Email: plus@bsigroup.com

Buying standards

You may buy PDF and hard copy versions of standards directly using a credit card from the BSI Shop on the website www.bsigroup.com/shop. In addition all orders for BSI, international and foreign standards publications can be addressed to BSI Customer Services.

Tel: +44 (0)20 8996 9001 Fax: +44 (0)20 8996 7001

Email: orders@bsigroup.com

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Knowledge Centre.

Tel: +44 (0)20 8996 7004 Fax: +44 (0)20 8996 7005

Email: knowledgecentre@bsigroup.com

Various BSI electronic information services are also available which give details on all its products and services.

Tel: +44 (0)20 8996 7111 Fax: +44 (0)20 8996 7048

Email: info@bsigroup.com

BSI Subscribing Members are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration.

Tel: +44 (0)20 8996 7002 Fax: +44 (0)20 8996 7001

Email: membership@bsigroup.com

Information regarding online access to British Standards via British Standards Online can be found at www.bsigroup.com/BSOL

Further information about BSI is available on the BSI website at www.bsigroup.com/standards

Copyright

Copyright subsists in all BSI publications. BSI also holds the copyright, in the UK, of the publications of the international standardization bodies. Except as permitted under the Copyright, Designs and Patents Act 1988 no extract may be reproduced, stored in a retrieval system or transmitted in any form or by any means – electronic, photocopying, recording or otherwise – without prior written permission from BSI. This does not preclude the free use, in the course of implementing the standard of necessary details such as symbols, and size, type or grade designations. If these details are to be used for any other purpose than implementation then the prior written permission of BSI must be obtained. Details and advice can be obtained from the Copyright & Licensing Manager.

Tel: +44 (0)20 8996 7070

Email: copyright@bsigroup.com

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

Tel +44 (0)20 8996 9001

Fax +44 (0)20 8996 7001

www.bsigroup.com/standards

raising standards worldwide™

MEHR AB HAYAT SANAAT KERMAN

www.MAHCOpipe.com

