

BS EN ISO 15876-5:2017



BSI Standards Publication

<http://www.china-gauges.com/>

Plastics piping systems for hot and cold water installations — Polybutene (PB)

Part 5: Fitness for purpose of the system
(ISO 15876-5:2017)

bsi.

National foreword

This British Standard is the UK implementation of EN ISO 15876-5:2017. It supersedes BS EN ISO 15876-5:2003 which is withdrawn.

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

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

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

© The British Standards Institution 2017.
Published by BSI Standards Limited 2017

ISBN 978 0 580 90298 7

ICS 23.040.01; 91.140.60

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 28 February 2017.

Amendments/corrigenda issued since publication

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

English Version

Plastics piping systems for hot and cold water installations
- Polybutene (PB) - Part 5: Fitness for purpose of the
system (ISO 15876-5:2017)

Systèmes de canalisations en plastique pour les
installations d'eau chaude et froide - Polybutène (PB) -
Partie 5: Aptitude à l'emploi du système (ISO 15876-
5:2017)

Kunststoff-Rohrleitungssysteme für die Warm- und
Kaltwasserinstallation - Polybuten (PB) - Teil 5:
Gebrauchstauglichkeit des Systems (ISO 15876-
5:2017)

This European Standard was approved by CEN on 24 December 2016.

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, Serbia, 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

European foreword

This document (EN ISO 15876-5:2017) has been prepared by Technical Committee ISO/TC 138 "Plastics pipes, fittings and valves for the transport of fluids" in collaboration with 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 August 2017, and conflicting national standards shall be withdrawn at the latest by August 2017.

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 ISO 15876-5:2003.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 15876-5:2017 has been approved by CEN as EN ISO 15876-5:2017 without any modification.

Contents		Page
Foreword	.....	iv
Introduction	.....	v
1 Scope	.....	1
2 Normative references	.....	1
3 Terms and definitions, symbols and abbreviated terms	.....	2
4 Fitness for purpose of the joints and the piping system	.....	2
4.1 General	.....	2
4.2 Internal pressure test	.....	2
4.3 Bending test	.....	4
4.4 Pull-out test	.....	5
4.5 Thermal cycling test	.....	5
4.6 Pressure cycling test	.....	6
4.7 Leaktightness under vacuum	.....	7
Bibliography	.....	8

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

ISO 15876-5 was prepared by the European Committee Standardization (CEN) Technical Committee CEN/TC 155, *Plastics pipings systems and ducting systems*, in collaboration with ISO Technical Committee ISO/TC 138, *Plastics pipes, fittings and valves for the transport of fluids*, Subcommittee SC 2, *Plastics pipes and fittings for water supplies*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 15876-5:2003), which has been technically revised with the following changes:

- introduction of polybutene random copolymer (PB-R) and renaming existing polybutene (PB) into polybutene homopolymer (PB-H);
- revision of specifications for conditioning of samples.

A list of all parts in the ISO 15876 series can be found on the ISO website.

Introduction

The System Standard ISO 15876, of which this document is Part 5, specifies the requirements for a piping system when made from polybutene (PB). The piping system is intended to be used for hot and cold water installations.

In respect of potential adverse effects on the quality of water intended for human consumption, caused by the product covered by ISO 15876 (all parts):

- ISO 15876 (all parts) provides no information as to whether the product may be used without restriction in any of the Member States of the EU or EFTA,
- it should be noted that, while awaiting the adoption of verifiable European criteria, existing national regulations concerning the use and/or the characteristics of this product remain in force.

Requirements and test methods for material and components of the piping system are specified in ISO 15876-1, ISO 15876-2 and ISO 15876-3. ISO/TS 15876-7 gives guidance for the assessment of conformity.

This document specifies the characteristics of fitness for purpose of the piping systems.

At the date of publication of this standard, System Standards for piping systems of other plastics materials used for the same application include ISO 15874, ISO 15875, ISO 15876, ISO 15877, ISO 21003 and ISO 22391.

<http://www.china-gauges.com/>

Plastics piping systems for hot and cold water installations — Polybutene (PB) —

Part 5: Fitness for purpose of the system

1 Scope

This document specifies the characteristics of the fitness for purpose of polybutene-1 (PB-1) piping systems, intended to be used for hot and cold water installations within buildings for the conveyance of water, whether or not intended for human consumption, (domestic systems) and for heating systems, under design pressures and temperatures according to the class of application (see ISO 15876-1).

The designation polybutene is used together with the abbreviation PB throughout this document.

This document covers a range of service conditions (application classes) and design pressure classes. For values of T_D , T_{max} and T_{mal} in excess of those in ISO 15876-1:2016, Table 1, this document does not apply.

NOTE 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.

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

In conjunction with the other parts of ISO 15876, it is applicable to PB pipes, fittings, their joints and to joints with components of other plastics and non-plastics materials intended to be used for hot and cold water installations.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

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 1167-2, *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 1167-3, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure — Part 3: Preparation of components*

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 3501, *Plastics piping systems — Mechanical joints between fittings and pressure pipes — Test method for resistance to pull-out under constant longitudinal force*

ISO 3503, *Plastics piping systems — Mechanical joints between fittings and pressure pipes — Test method for leaktightness under internal pressure of assemblies subjected to bending*

ISO 13056, *Plastics piping systems — Pressure systems for hot and cold water — Test method for leaktightness under vacuum*

ISO 15876-1, *Plastics piping systems for hot and cold water installations — Polybutene (PB) — Part 1: General*

ISO 19892, *Plastics piping systems — Thermoplastics pipes and fittings for hot and cold water — Test method for the resistance of joints to pressure cycling*

ISO 19893, *Plastics piping systems — Thermoplastics pipes and fittings for hot and cold water — Test method for the resistance of mounted assemblies to temperature cycling*

3 Terms and definitions, symbols and abbreviated terms

For the purposes of this document, the terms and definitions, symbols and abbreviated terms given in ISO 15876-1 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

4 Fitness for purpose of the joints and the piping system

4.1 General

Intended combinations of materials of pipes and fittings, e.g. PB-R pipes and PB-H fittings, shall fulfil the corresponding requirements of the pipe materials.

When tested in accordance with the applicable test methods as specified in [Table 1](#), using the indicated parameters given in [4.2](#) to [4.7](#), as applicable, the combinations of PB types for pipes and fittings shall have characteristics conforming to the requirements of the pipes given in the applicable clauses.

For the tests described, the fittings shall be connected to the pipe with which they are intended to be used.

[Table 1](#) specifies the tests applicable for each different type of jointing system covered by this document.

Table 1 — Joint tests

Test	Jointing system ^a			Test parameters	Test method
	SW	EF	M		
Internal pressure test	Y	Y	Y	Shall conform to 4.2	ISO 1167-1, ISO 1167-2, ISO 1167-3 and ISO 1167-4
Bending test	N	N	Y	Shall conform to 4.3	ISO 3503
Pull-out test	N	N	Y	Shall conform to 4.4	ISO 3501
Thermal cycling test	Y	Y	Y	Shall conform to 4.5	ISO 19893
Pressure cycling test	N	N	Y	Shall conform to 4.6	ISO 19892
Vacuum test	N	N	Y	Shall conform to 4.7	ISO 13056

^a SW — Socket welded joint
EF — Electro-fusion joint
M — Mechanical joint
Y — Denotes test applicable
N — Denotes test not applicable

4.2 Internal pressure test

When tested in accordance with ISO 1167-1, ISO 1167-2, ISO 1167-3 and ISO 1167-4 using the test parameters given in [Table 2](#) or [Table 3](#) for the relevant classes, the joint assemblies shall not leak.

The test pressure, p_J , for a given time to failure and test temperature shall be determined by [Formula \(1\)](#):

$$p_J = p_D \times \frac{\sigma_P}{\sigma_{DP}} \quad (1)$$

where

- p_J is the hydrostatic test pressure, in bars, to be applied to the joint assembly during the test period;
- σ_P is the hydrostatic stress value, in megapascals, for the pipe material corresponding to time to failure/test temperature points given in [Table 2](#) or [Table 3](#);
- σ_{DP} is the design stress value, in megapascals, for the pipe material as determined for each class and listed in ISO 15876-2;
- p_D is the design pressure of 4 bar, 6 bar, 8 bar or 10 bar, as applicable.

NOTE 1 bar = 10^5 N/m² = 0,1 MPa.

Table 2 — Derivation of test pressure, p_J , for PB-H

	Application			
	Class 1	Class 2	Class 4	Class 5
Maximum design temperature, T_{max} , in °C	80	80	70	90
Design stress of pipe material, σ_{DP} , in MPa	5,72	5,04	5,46	4,30
Test temperature ^a , T_{test} , in °C	95	95	80	95
Test duration, t , in h	1 000	1 000	1 000	1 000
Hydrostatic stress of pipe material, σ_P , in MPa	6,0	6,0	8,2	6,0
Test pressure, p_J , in bars, for a design pressure, p_D , of:				
4 bar	5,5 ^b	5,5 ^b	7,7 ^b	5,6
6 bar	6,3	7,2	9,2	8,4
8 bar	8,4	9,6	12,2	11,2
10 bar	10,5	12,0	15,3	14,0
Number of test pieces	3	3	3	3
^a Generally, the highest test temperature is taken to be $(T_{max} + 10)$ °C with an upper limit of 95 °C. However, to match existing test facilities, the highest test temperature for classes 1 and 2 is also set at 95 °C. The hydrostatic stresses given correspond to the given test temperatures.				
^b The 20 °C, 10 bar, 50 years, cold water requirement, being higher, determines this value (see ISO 15876-1).				

Table 3 — Derivation of test pressure, p_j , for PB-R

	Application			
	Class 1	Class 2	Class 4	Class 5
Maximum design temperature, T_{max} , in °C	80	80	70	90
Design stress of pipe material, σ_{DP} , in MPa	5,16	5,12	4,33	4,13
Test temperature ^a , T_{test} , in °C	95	95	80	95
Test duration, t , in h	1 000	1 000	1 000	1 000
Hydrostatic stress of pipe material, σ_p , in MPa	4,9	4,9	7,3	4,9
Test pressure, p_j , in bars, for a design pressure, p_D , of:				
4 bar	4,5 ^b	4,5 ^b	6,8	4,8
6 bar	5,7	5,8	10,2	7,2
8 bar	7,6	7,7	13,5	9,5
10 bar	9,5	9,6	16,9	11,9
Number of test pieces	3	3	3	3
^a Generally, the highest test temperature is taken to be $(T_{max} + 10)$ °C with an upper limit of 95 °C. However to match existing test facilities the highest test temperature for classes 1 and 2 is also set at 95 °C. The hydrostatic stresses given correspond to the given test temperatures.				
^b The 20 °C, 10 bar, 50 years, cold water requirement, being higher, determines this value (see ISO 15876-1).				

In special circumstances if joint tests according to this subclause cause leaks resulting from differential elongation induced deformations, a test pressure may be determined from the stress and creep data (relative to a design period of 50 years) for the different materials used.

4.3 Bending test

When tested in accordance with ISO 3503 to the applicable pressure for the 20 °C, 1 h condition given in [Table 4](#) or [Table 5](#), as applicable, using a bending radius equal to the minimum radius of bending for the pipes as recommended by the system supplier, the joint assembly shall not leak.

This test is only applicable to pipes that are declared as bendable by the system supplier.

Table 4 — Test parameters for bending test of PB-H

	Application class			
	Class 1	Class 2	Class 4	Class 5
Maximum design temperature, T_{max} , in °C	80	80	70	90
Design stress of pipe material, σ_{DP} , in MPa	5,72	5,04	5,46	4,30
Test temperature, T_{test} , in °C	20	20	20	20
Test duration, t , in h	1	1	1	1
Hydrostatic stress of pipe material, σ_p , in MPa	15,5	15,5	15,5	15,5
Test pressure, p_j , in bars, for a design pressure, p_D , of:				
4 bar	14,3 ^a	14,3 ^a	14,3 ^a	14,5
6 bar	16,3	18,5	17,1	21,7
8 bar	21,7	24,7	22,8	28,9
10 bar	27,1	30,8	28,4	36,1
Number of test pieces	3	3	3	3
^a The 20 °C, 10 bar, 50 years, cold water requirement, being higher, determines this value (see ISO 15876-1).				

Table 5 — Test parameters for bending test of PB-R

	Application class			
	Class 1	Class 2	Class 4	Class 5
Maximum design temperature, T_{\max} , in °C	80	80	70	90
Design stress of pipe material, σ_{DP} , in MPa	5,16	5,12	4,33	4,13
Test temperature, T_{test} , in °C	20	20	20	20
Test duration, t , in h	1	1	1	1
Hydrostatic stress of pipe material, σ_p , in MPa	15,3	15,3	15,3	15,3
Test pressure, p_j , in bars, for a design pressure, p_D , of:				
4 bar	14,1 ^a	14,1 ^a	14,2	14,9
6 bar	17,8	18,0	21,3	22,3
8 bar	23,8	24,0	28,3	29,7
10 bar	29,7	29,9	35,4	37,1
Number of test pieces	3	3	3	3
^a The 20 °C, 10 bar, 50 years, cold water requirement, being higher, determines this value (see ISO 15876-1).				

4.4 Pull-out test

When tested in accordance with ISO 3501 using the parameters given in [Table 6](#), the joint assemblies shall withstand the pull-out force, without being separated.

The force, F , shall be calculated from [Formula \(2\)](#):

$$F = \frac{\pi}{4} d_n^2 \times p_D \quad (2)$$

where:

F is the force, expressed in newtons (N);

d_n is the nominal outside diameter of the pipe, expressed in millimetres (mm);

p_D is the design pressure of 4 bar, 6 bar, 8 bar or 10 bar, as applicable, expressed in megapascals [in the case of the classification “All classes”, the design pressure shall be 10 bar, expressed in megapascals (MPa)].

Table 6 — Test parameters for pull-out test

	All application classes	Application class			
		Class 1	Class 2	Class 4	Class 5
Maximum design temperature, T_{\max} , in °C	—	80	80	70	90
Test temperature, in °C	23	90	90	80	95
Test period, in h	1	1	1	1	1
Pull-out force, in N	$1,5 \times F$	F	F	F	F
Number of test pieces	3	3	3	3	3

4.5 Thermal cycling test

When tested in accordance with ISO 19893 using the parameters given in [Table 7](#), the pipes, fittings or joints, as applicable, shall withstand the test without leakage.

The test for flexible pipes shall only be used when the manufacturer declares that the pipe can be bent to the configuration shown. The bending radius shall not be smaller than the minimum declared bending radius. In all other cases, the test for rigid pipes shall apply.

Table 7 — Test parameters for thermal cycling

	Application class			
	Class 1	Class 2	Class 4	Class 5
Maximum design temperature, T_{\max} , in °C	80	80	70	90
Highest test temperature, in °C	90	90	80	95
Lowest test temperature, in °C	20	20	20	20
Test pressure, in bars	p_D	p_D	p_D	p_D
Number of cycles ^a	5 000	5 000	5 000	5 000
Number of test pieces	One set of fittings in accordance with the configuration shown in ISO 19893			
^a Each cycle shall comprise $15 \begin{smallmatrix} +1 \\ 0 \end{smallmatrix}$ min at the highest test temperature and $15 \begin{smallmatrix} +1 \\ 0 \end{smallmatrix}$ min at the lowest (i.e. the duration of one cycle is $30 \begin{smallmatrix} +2 \\ 0 \end{smallmatrix}$ min).				

The tensile stress, σ_t , used to calculate the pre-stress force required in ISO 19893 shall be calculated based on E-modulus values obtained for given grades of PB-H and PB-R. Typical values are as follows:

- PB-H: 450 MPa;
- PB-R: 330 MPa.

NOTE The tensile stress can be calculated using [Formula \(3\)](#):

$$\sigma_t = \alpha \times \Delta T \times E \quad (3)$$

where

- σ_t is the tensile stress, expressed in megapascals (MPa);
- α is the coefficient of thermal expansion expressed in reciprocal kelvins (1/K);
- ΔT is the temperature difference, expressed in kelvins (K);
- E is the modulus of elasticity, expressed in megapascals (MPa).

In this document, the following values apply:

- a) $\alpha = 1,3 \times 10^{-4} \text{ K}^{-1}$;
- b) $\Delta T = 20 \text{ K}$;
- c) $E =$ to be obtained for given grade of PB-H and PB-R.

4.6 Pressure cycling test

When tested for leak tightness under pressure cycling in accordance with ISO 19892 using the parameters given in [Table 8](#), the pipes, fittings or joints, as applicable, shall not leak.

Table 8 — Test parameters for pressure cycling

Characteristics	Requirement	Test parameters		Test method	
Pressure cycling	No leakage	Test temperature	23 °C		ISO 19892
		Number of test pieces	3		
		Frequency of test cycles	(30 ± 5) cycles per min		
		Number of cycles	10 000		
		Test pressure limits for a design pressure of:	Upper limit	Lower limit	
4 bar	6,0 bar	0,5 bar			
6 bar	9,0 bar	0,5 bar			
8 bar	12,0 bar	0,5 bar			
10 bar	15,0 bar	0,5 bar			

4.7 Leaktightness under vacuum

When tested for leaktightness under vacuum in accordance with ISO 13056 using the parameters given in [Table 9](#), the change in vacuum pressure shall not be greater than 0,05 bar.

Table 9 — Test parameters for leaktightness under vacuum

Characteristics	Requirements	Test parameters		Test method
Leaktightness under vacuum	Change in vacuum pressure ≤ 0,05 bar	Test temperature	23 °C	ISO 13056
		Test duration	1 h	
		Test pressure	-0,8 bar	
		Number of test pieces	3	

Bibliography

- [1] ISO 15876-2, *Plastics piping system for hot and cold water installations — Polybutene (PB) — Part 2: Pipes*
- [2] ISO 15876-3, *Plastics piping system for hot and cold water installations — Polybutene (PB) — Part 3: Fittings*
- [3] ISO/TS 15876-7, *Plastics piping systems for hot and cold water installations — Polybutylene (PB) — Part 7: Guidance for the assessment of conformity*
- [4] CEN/TR 12108, *Plastics piping systems — Guidance for the installation inside buildings of pressure piping systems for hot and cold water intended for human consumption*

<http://www.china-gauges.com/>

<http://www.china-gauges.com/>

<http://www.china-gauges.com/>

<http://www.china-gauges.com/>

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.

Copyright in BSI publications

All the content in BSI publications, including British Standards, is the property of and copyrighted by BSI or some person or entity that owns copyright in the information used (such as the international standardization bodies) and has formally licensed such information to BSI for commercial publication and use.

Save for the provisions below, you may not transfer, share or disseminate any portion of the standard to any other person. You may not adapt, distribute, commercially exploit, or publicly display the standard or any portion thereof in any manner whatsoever without BSI's prior written consent.

Storing and using standards

Standards purchased in soft copy format:

- A British Standard purchased in soft copy format is licensed to a sole named user for personal or internal company use only.
- The standard may be stored on more than 1 device provided that it is accessible by the sole named user only and that only 1 copy is accessed at any one time.
- A single paper copy may be printed for personal or internal company use only.

Standards purchased in hard copy format:

- A British Standard purchased in hard copy format is for personal or internal company use only.
- It may not be further reproduced – in any format – to create an additional copy. This includes scanning of the document.

If you need more than 1 copy of the document, or if you wish to share the document on an internal network, you can save money by choosing a subscription product (see 'Subscriptions').

Reproducing extracts

For permission to reproduce content from BSI publications contact the BSI Copyright & Licensing 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 subscriptions@bsigroup.com.

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.

Useful Contacts

Customer Services

Tel: +44 345 086 9001

Email (orders): orders@bsigroup.com

Email (enquiries): cservices@bsigroup.com

Subscriptions

Tel: +44 345 086 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 Group Headquarters

389 Chiswick High Road London W4 4AL UK