BS ISO 11424:2017

BSI Standards Publication

Rubber hoses and tubing for air and vacuum systems for internal-combustion engines — Specification

bsi.

National foreword

This British Standard is the UK implementation of ISO 11424:2017. It supersedes BS ISO 11424:1996 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PRI/66, Rubber and plastics tubing, hoses and hose assemblies.

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.

Published by BSI Standards Limited 2017

ISBN 978 0 580 89077 2

ICS 27.020; 83.140.30; 83.140.40

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 31 March 2017.

Amendments/corrigenda issued since publication

Date	Text affected

BS ISO 11424:2017

INTERNATIONAL STANDARD

ISO 11424

Second edition
2017-02

Rubber hoses and tubing for air and vacuum systems for internal-combustion engines — Specification

Tuyaux et tubes en caoutchouc pour systèmes d'aération et à vide des moteurs à combustion interne — Spécifications

Reference number
ISO 11424:2017(E)

COPYRIGHT PROTECTED DOCUMENT

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

Page

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

This document was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 1, *Hoses (rubber and plastics).*

This second edition cancels and replaces the first edition (ISO 11424:1996), which has been technically revised.

The main changes are the following:

— in 6.2, inside diameter (ID) for each nominal bore has been included;

— requirement on frequency of testing has been added in Clause 8;

— requirement to mark nominal bore of the hose or tubing has been added in Clause 9;

— recommendations for packaging and storage have been added in Clause 10;

— Annex A and Annex B have been added.

INTERNATIONAL STANDARD ISO 11424:2017(E)

Rubber hoses and tubing for air and vacuum systems for internal-combustion engines — Specification

1 Scope

This document specifies requirements for rubber hoses and tubing for use in the various air and vacuum systems found on internal combustion engines. This document does not cover hoses used for direct power-brake actuation in trucks and trailers, nor for air intakes and ducting within the passenger compartment. The highest-temperature hoses are generally used for turbocharger applications. All hoses and tubing remain serviceable down to −40°C.

NOTE Although the term vacuum is generally used, in reality the application is one of reduced air pressure used for the purposes of actuation or monitoring of the various engine-system components. The air carried by the tubing or hoses may be clean and free of contaminants but may also contain oil, fuel and their vapours as contamination, due to the particular installation and application.

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 37:2011, *Rubber, vulcanized or thermoplastic — Determination of tensile stress-strain properties*

ISO 48, *Rubber, vulcanized or thermoplastic — Determination of hardness (hardness between 10 IRHD and 100 IRHD)*

ISO 188, *Rubber, vulcanized or thermoplastic — Accelerated ageing and heat resistance tests*

ISO 815-1:2014, *Rubber, vulcanized or thermoplastic — Determination of compression set — Part 1: At ambient or elevated temperatures*

ISO 1402, *Rubber and plastics hoses and hose assemblies — Hydrostatic testing*

ISO 1629, *Rubber and latices — Nomenclature*

ISO 1817:2015, *Rubber, vulcanized or thermoplastic — Determination of the effect of liquids*

ISO 3302-1, *Rubber — Tolerances for products — Part 1: Dimensional tolerances*

ISO 4671, *Rubber and plastics hoses and hose assemblies — Methods of measurement of the dimensions of hoses and the lengths of hose assemblies*

ISO 7233:2016, *Rubber and plastics hoses and hose assemblies — Determination of resistance to vacuum*

ISO 7326, *Rubber and plastics hoses — Assessment of ozone resistance under static conditions*

ISO 8033, *Rubber and plastics hoses — Determination of adhesion between components*

ISO 8330, *Rubber and plastics hoses and hose assemblies — Vocabulary*

ISO 10619-1:2011, *Rubber and plastics hoses and tubing — Measurement of flexibility and stiffness — Part 1: Bending tests at ambient temperature*

ISO 10619-2:2011, *Rubber and plastics hoses and tubing — Measurement of flexibility and stiffness — Part 2: Bending tests at sub-ambient temperatures*

ISO 19013-1:2005, *Rubber hoses and tubing for fuel circuits for internal combustion engines — Specification — Part 1: Diesel fuels*

3 Terms, definitions and abbreviated terms

For the purposes of this document, the terms and definitions given in ISO 8330 and the abbreviated terms given in ISO 1629 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 Classification

4.1 Types

Type A — internally reinforced hose with a working pressure up to 0,3 MPa (3 bar).

Type B — homogeneous tube with a working pressure up to 0,12 MPa (1,2 bar).

4.2 Classes

Class 1 — Long-term working temperature up to 70 °C; maximum working temperature up to 100 °C. Not recommended for applications where resistance to oils, fuel and their vapours is required.

NOTE 1 Typically, styrene-butadiene rubber (SBR) can be used.

Class 2 — Long-term working temperature up to 100 °C; maximum working temperature up to 125 °C. Resistant to oils and their vapours.

NOTE 2 Typically, chloroprene rubber (CR) can be used.

Class 3 — Long-term working temperature up to 100 °C, maximum working temperature up to 125 °C. Resistant to oils, fuels and their vapours.

NOTE 3 Typically, acrylonitrile-butadiene rubber (NBR) can be used.

Class 4 — Long-term working temperature up to 125 °C, maximum working temperature up to 150 °C. Not recommended for applications where resistance to oils, fuels and their vapours is required.

NOTE 4 Typically, ethylene-propylene rubber (EPM or EPDM) can be used.

Class 5 — Long-term working temperature up to 125 °C, maximum working temperature up to 150 °C. Resistant to oils and their vapours.

NOTE 5 Typically, chlorinated or chlorosulfonated polyethylene (CM or CSM) can be used.

Class 6 — Long-term working temperature up to 125 °C, maximum working temperature up to 150 °C. Resistant to oils, fuels and their vapours.

NOTE 6 Typically, epichlorohydrin or hydrogenated nitrile rubbers (CO, ECO or HNBR) can be used.

Class 7 — Long-term working temperature up to 150 °C, maximum working temperature up to 175 °C. Not recommended for applications where resistance to oils, fuels and their vapours is required.

NOTE 7 Typically, silicone rubber (VMQ) can be used.

Class 8 — Long-term working temperature up to 150 °C, maximum working temperature up to 175 °C. Resistant to oils and their vapours.

NOTE 8 Typically, acrylic rubber (ACM or AEM) can be used.

Class 9 — Long-term working temperature up to 150 °C, maximum working temperature up to 175 °C. Resistant to oils, fuels and their vapours.

NOTE 9 Typically, fluoroelastomer or fluorosilicone rubbers (FKM or FVMQ) can be used.

Class 10 — Long-term working temperature up to 175 °C, maximum working temperature up to 200 °C. Resistant to oils and their vapours.

NOTE 10 Typically, fluoroelastomer or fluorosilicone rubbers (FKM or FVMQ) can be used.

Hoses are thus designated with a two-character descriptor such as type A4 or type B6, etc.

In cases where type A hose cover and lining are manufactured from materials of different classes, a three character descriptor shall be used thus: Type A9/5 where the second character describes the lining material and the third character describes the cover material.

Similarly, where type B tubing is of a composite construction, a three-character descriptor is also used thus: Type B3/2.

5 Hose and tubing bores

The bore of all hoses and tubing shall be clean and free from any contamination when examined visually.

6 Dimensions and tolerances

6.1 Hoses

When determined by the methods described in ISO 4671, the dimensions and tolerances shall comply with the values given in Table 1.

6.2 Tubing

When determined by the methods described in ISO 4671, bore diameters and wall thicknesses shall be as given in Table 2. Tolerances shall be selected from the appropriate categories given in ISO 3302-1.

Table 1 — Hose dimensions and tolerances

Nominal bore	Inside diameter (ID) mm	Tolerance on ID mm	Wall thickness mm	Outside diameter (OD) mm	Tolerance on OD mm
3,5	3,5	±0,3	3,0	9,5	±0,4
4	4,0		3,0	10,0	
5	5,0		3,0	11,0	
6	6,0		3,0	12,0	
7	7,0		3,0	13,0	
7,5	7,5		3,0	13,5	
8	8,0		3,0	14,0	
9	9,0		3,0	15,0	
11	11,0		3,5	18,0	
12	12,0		3,5	19,0	

Table 2 — Nominal bore diameters and wall thickness of tubing

Nominal bore	Nominal wall thickness mm
2	2
2,5	3
4	3,5
5	4
7 to 13	4,5

7 Requirements for physical properties

7.1 Rubber compounds

7.1.1 Selection of test pieces

Tests shall be carried out where possible on test pieces cut from finished products. Where this is not possible, test pieces shall be cut from standard test slabs with a state of cure equivalent to that of the finished product. Compression set determination shall always be carried out on standard test slabs for both cover and lining of hoses and on the compound used for the tubing.

7.1.2 Hardness

Hardness, determined in accordance with the procedure in ISO 48, shall comply with the values given in Table 3.

7.1.3 Tensile strength and elongation at break

Tensile strength and elongation at break, determined in accordance with ISO 37:2011 using a Type 2 dumb-bell test piece, shall comply with the values given in Table 3.

7.1.4 Change in properties after heat-ageing

The change in hardness, tensile strength and elongation at break, after heat-ageing in accordance with ISO 188 in a ventilated drying oven under the conditions given in a) and b) below, using test pieces as described in 7.1.2 and 7.1.3, shall comply with the values given in Table 3.

— Class 1:

  a) (70^{+2}_{0}) h at 100 °C

  b) 1 000 h ± 5 h at 70 °C

— Classes 2 and 3:

  a) (70^{+2}_{0}) h at 125 °C

  b) 1 000 h ± 5 h at 100 °C

— Classes 4, 5 and 6:

  a) (70^{+2}_{0}) h at 150 °C

  b) 1 000 h ± 5 h at 125 °C

— Classes 7, 8 and 9:

a) (70^{+2}_{0}) h at 175 °C

b) 1 000 h ± 5 h at 150 °C

— Class 10:

a) (70^{+2}_{0}) h at 200 °C

b) 1 000 h ± 5 h at 175 °C

7.1.5 Compression set

Compression set, when determined in accordance with ISO 815-1:2014, using the Type A test piece and the following conditions, shall comply with the values given in Table 3.

— Class 1: (70^{+2}_{0}) h at 70 °C

— Classes 2 and 3: (70^{+2}_{0}) h at 100 °C

— Classes 4, 5 and 6: (70^{+2}_{0}) h at 125 °C

— Classes 7, 8 and 9: (70^{+2}_{0}) h at 150 °C

— Class 10: (70^{+2}_{0}) h at 175 °C

7.1.6 Resistance to oxygenated fuels

This requirement applies only to the lining of type A hoses and to type B tubing for classes 3, 6 and 9.

Any changes in properties after a period of (70^{+2}_{0}) h of immersion in a mixture of 85 parts by volume of liquid C (see ISO 1817:2015) and 15 parts by volume of methanol at 23 °C ± 2 °C when determined in accordance with ISO 1817:2015, shall comply with the values given in Table 3.

7.1.7 Resistance to oil No.3

This requirement applies only to the cover and lining of type A hoses and to type B tubing for classes 2, 3, 5, 6, 8, 9 and 10.

Any change in properties after a period of (70^{+2}_{0}) h of immersion in oil No.3 at one of the following temperatures, when determined in accordance with ISO 1817, shall comply with the values given in Table 3.

— Classes 2 and 3: 100 °C ± 2 °C

— Classes 5 and 6: 125 °C ± 2 °C

— Classes 8, 9 and 10: 150 °C ± 2 °C

7.2 Hose and tubing

7.2.1 Proof pressure

When tested in accordance with ISO 1402 at the proof pressure given in Table 3, no leakage or other signs of weakness shall be shown.

7.2.2 Minimum burst pressure

When tested in accordance with ISO 1402, minimum burst pressures shall comply with the values given in Table 3.

7.2.3 Adhesion

This requirement applies to type A hoses of all classes.

The adhesion between hose cover and lining, when determined in accordance with ISO 8033, shall comply with the values given in Table 3.

7.2.4 Ozone resistance

When determined in accordance with ISO 7326, under the following conditions, the ozone resistance shall comply with the requirement given in Table 3.

Ozone concentration: 50 mPa ± 5 mPa

Duration: (70^{+2}_{0}) h

Elongation: 20 %

Temperature: 40 °C ± 2 °C

7.2.5 Low-temperature flexibility after heat-ageing

The low-temperature flexibility after heat-ageing shall be in accordance with the requirement given in Table 3.

The test shall be carried out in accordance with ISO 10619-2:2011, Method B, after 24 h at −40 °C ± 2 °C, with the bend radius 12 times the nominal bore for hoses and 25 times the nominal bore for tubing, on hoses and tubing heat-aged under set of conditions b) specified for their class in 7.1.4.

7.2.6 Amount of extractable products

The amount of extractable products, determined in accordance with ISO 19013-1:2005, Annex A, using a mixture of 85 parts by volume of liquid C (see ISO 1817:2015) and 15 parts by volume of methanol, shall comply with the values given in Table 3.

7.2.7 Tear resistance

This requirement only applies to type B tubing.

The resistance to tearing determined in accordance with ISO 19013-1:2005, Annex B, shall comply with the value given in Table 3.

7.2.8 Suction resistance (only for Type A)

The suction resistance shall be in accordance with the requirements given in Table 3.

The test shall be carried out on straight hoses and tubing only, in accordance with ISO 7233:2016, Method A, under the following conditions:

Test pressure:

— 80 kPa ± 1 kPa below atmospheric pressure for ID ≤ 10 mm

— 35 kPa ± 1 kPa below atmospheric pressure for ID > 10 mm

Duration: 15 s to 60 s

Ball diameter: 0,8 × nominal bore of hose or tube

7.2.9 Resistance to kinking

This requirement applies to straight tubing and hoses of 16 mm bore or less. When tested in accordance with Method A1 of ISO 10619-1:2011, using mandrel diameters of 14 mm for hose and tubing up to and including 11 mm bore; 220 mm for hose and tubing above 11 mm bore.

The coefficient of deformation (T/D) shall comply with the values given in Table 3.

8 Frequency of testing

Type testing and routine testing shall be as specified in Annex A.

Type tests are those tests required to confirm that a particular hose or hose assembly design, manufactured by a particular method from particular materials, meets all the requirements of this document. The tests shall be repeated at a maximum of five-year intervals, or whenever a change in the method of manufacture or materials used occurs. They shall be performed on all sizes, and on all classes and types except those of the same size and construction.

Routine tests are those tests required to be carried out on each length of finished hose prior to dispatch.

Production tests are non-mandatory and the recommended frequencies are given in Annex B for guidance only.

9 Marking

Except where the component is too small to label, the tubing and hose shall be continuously legibly and durably marked, at intervals of no greater than 50 mm, with the following information:

a) the manufacturer's name or mark, e.g. XXXX;

b) the number and year of this document, i.e. ISO 11424:2017;

c) the type and class of the hose or tubing, e.g. A9/5;

d) the nominal bore of the hose or tubing, e.g. 7,5;

e) quarter and year of manufacture, e.g. 1Q17.

EXAMPLE XXXX/ISO 11424:2017/A9/5/7,5/1Q17

10 Recommendations for packaging and storage

Recommendations for storage are detailed in ISO 8331.

Table 3 — Requirements for all classes

Subclause	Property	Unit	Requirement		
			Type A hose		Type B tubing
			Lining	Cover	
7.1.2	Hardness	IRHD	70 ± 10	70 ± 10	70 ± 10
7.1.3	Tensile strength, min.				
	Class 1	MPa	10	10	10
	Class 2	MPa	10	10	10
	Class 3	MPa	10	10	10
	Class 4	MPa	10	10	10
	Class 5	MPa	10	10	10
	Class 6	MPa	10	10	10
	Class 7	MPa	6	6	6
	Class 8	MPa	8	8	8
	Class 9	MPa	6	6	6
	Class 10	MPa	6	6	6
7.1.3	Elongation at break, max.				
	Class 1	%	250	250	250
	Class 2	%	250	250	250
	Class 3	%	250	250	250
	Class 4	%	200	200	200
	Class 5	%	250	250	250
	Class 6	%	250	250	250
	Class 7	%	150	150	150
	Class 8	%	150	150	150
	Class 9	%	150	150	150
	Class 10	%	150	150	150
7.1.4	Accelerated ageing				
	Hardness change, max.	IRHD	±15	±15	±15
			Maximum value 90 IRHD		
	Tensile strength change, max.	%	−30	−30	−30
			Minimum value 5 MPa		
	Elongation at break change, max.	%	−50	−50	−50
			Minimum value 100 %		
7.1.5	Compression set	%	50	50	50
7.1.6	Resistance to oxygenated fuels, classes 3, 6 and 9				
	Hardness change, max.	IRHD	−25	—	−25
			Minimum value 40 IRHD		
	Tensile strength change, max.	%	−50	—	−50
			Minimum value 5 MPa		
	Elongation at break change, max.	%	−50	—	−50
			Minimum value 100 %		
	Change in volume, max.	%	+70	—	+70

Table 3 *(continued)*

Subclause	Property	Unit	Requirement		
			Type A hose		Type B tubing
			Lining	Cover	
7.1.7	Resistance to oil No.3				
	Classes 2, 3, 5, 6, 8, 9 and 10				
	Hardness change, max.	IRHD	−25	−25	−25
			Minimum value 40 IRHD		
	Tensile strength change, max.	%	−50	−50	−50
			Minimum value 5 MPa		
	Elongation at break change, max.	%	−50	−50	−50
			Minimum value 100 %		
	Change in volume, max.	%	+60	+60	+60
7.2.1	Proof pressure	MPa (bar)	0,6 (6)	0,6 (6)	0,25 (2,5)
7.2.2	Minimum burst pressure	MPa (bar)	1,5 (15)	1,5 (15)	0,5 (5)
7.2.3	Adhesion, min.	kN/m	1,5	1,5	—
7.2.4	Ozone resistance		No signs of cracking under × 2 magnification		
7.2.5	Low-temperature flexibility after heat-ageing		No signs of cracking under × 2 magnification		
7.2.6	Extractable products max.	g/m^2	10	10	10
7.2.7	Tear resistance, min.	kN/m	—	—	8
7.2.8	Suction resistance		Ball passes freely		—
7.2.9	Resistance to kinking Coefficient of deformation (T/D), max.		0,7	0,7	0,7

Annex A
(normative)

Type and routine tests

Table A.1 gives the frequency of type tests and routine tests.

Table A.1 — Frequency of type tests and routine tests

Property	Type tests	Routine tests
Rubber compounds		
Hardness	×	N/A
Tensile strength and elongation at break	×	N/A
Change in properties after heat-ageing	×	N/A
Compression set	×	N/A
Resistance to oxygenated fuels	×	N/A
Resistance to oil No.3	×	N/A
Hose and tubing		
Visual examination	×	×
Inside diameter	×	×
Wall thickness	×	×
Outside diameter	×	×
Proof pressure	×	×
Minimum burst pressure	×	N/A
Adhesion	×	N/A
Ozone resistance	×	N/A
Low-temperature flexibility after heat ageing	×	N/A
Amount of extractable products	×	N/A
Tear resistance	×	N/A
Suction resistance	×	N/A
Resistance to kinking	×	N/A
× Test shall be carried out. N/A Test not applicable.		

Annex B
(informative)

Recommended production tests

Table B.1 gives recommended production tests to be carried out per batch and per 10 batches. A batch is defined as either 1 000 m of hose (or tubing) or 2 000 kg of rubber compound.

Table B.1 — Recommended production tests

Property	Production tests	
	Per batch	Per 10 batch
Rubber compounds		
Hardness	×	N/A
Tensile strength and elongation at break	×	N/A
Change in properties after heat-ageing	×	N/A
Compression set	N/A	×
Resistance to oxygenated fuels	N/A	×
Resistance to oil No. 3	N/A	×
Hose and tubing		
Visual examination	N/A	N/A
Inside diameter	N/A	N/A
Wall thickness	N/A	N/A
Outside diameter	N/A	N/A
Proof pressure	×	N/A
Minimum burst pressure	×	N/A
Adhesion	×	N/A
Ozone resistance	N/A	×
Low-temperature flexibility after heat ageing	N/A	×
Amount of extractable products	N/A	×
Tear resistance	×	N/A
Suction resistance	×	N/A
Resistance to kinking	×	N/A
× Test shall be carried out. N/A Test not applicable.		

Bibliography

[1] ISO 8331, *Rubber and plastics hoses and hose assemblies — Guidelines for selection, storage, use and maintenance*

ICS 27.020; 83.140.30; 83.140.40

Price based on 12 pages

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.

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

bsi.