

BS 1088:2018



BSI Standards Publication

Marine plywood – Requirements

Publishing and copyright information

The BSI copyright notice displayed in this document indicates when the document was last issued.

© The British Standards Institution 2018

Published by BSI Standards Limited 2018

ISBN 978 0 580 99631 3

ICS 47.020.05, 79.060.10

The following BSI references relate to the work on this document:

Committee reference B/541

Draft for comment 18/30371881 DC

Amendments/corrigenda issued since publication

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

Contents		Page
	Foreword	ii
1	Scope	1
2	Normative references	1
3	Terms and definitions	2
4	Requirements for manufacture	3
	<i>Table 1 — Durability requirements for standard and lightweight marine plywood</i>	4
	<i>Table 2 — Permissible frequencies of defects and joints in veneer for outer and inner plies</i>	5
	<i>Table 3 — Marine plywood application and use class</i>	6
5	Requirements for finished marine plywood	6
	<i>Table 4 — Permissible tolerances for nominal length, width, thickness and squareness, and edge-straightness of panels</i>	7
6	Marking and documentation	8
Annex A	(informative) Example of marking	9
	Bibliography	10

Summary of pages

This document comprises a front cover, and inside front cover, pages i to iv, pages 1 to 10, an inside back cover and a back cover.

Requirements in this standard are drafted in accordance with *Rules for the structure and drafting of UK standards*, subclause **G.1.1**, which states, “Requirements should be expressed using wording such as: ‘When tested as described in Annex A, the product shall ...’”. This means that only those products that are capable of passing the specified test will be deemed to conform to this standard.

Contractual and legal considerations

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

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

Licensed copy: Imperial College, Imperial College London, Version correct as of 07/08/2018

1 Scope

BS 1088 specifies requirements for two classes of marine plywood:

- standard; and
- lightweight,

intended for use primarily in the manufacture of marine craft and in other marine and waterway applications.

The requirements also take into consideration the use of marine plywood in building construction.

BS 1088 addresses in particular the resistance of plywood to bio-deterioration and loss of bond strength with time. It does not make provision for other properties which might additionally be relevant in a particular end use.

Plywood made in accordance with this standard might also need to meet additional requirements in legislation and/or standards specific to its end use that are not covered by this standard.

With particular reference to building construction, experience has shown that rapid ingress of water at the panel edge during the build process can cause differential swelling in the core, resulting in localized catastrophic rupture of the wood fibres, thus giving the appearance of delamination. If subsequent integrity of the waterproof envelope of the building is not maintained, similar problems can arise. BS 1088 cannot make provision for such events since the choice of veneer species is based only on density and resistance to bio-deterioration.

NOTE 1 Where marine plywood is to be used in building construction, attention is drawn to the Construction Products Regulations 2013 [1]. Conformity with these can be verified through demonstrating conformity with BS EN 13986.

NOTE 2 When used in building construction, good site practice with particular reference to protection of the building elements against wetting is of the highest importance for ensuring the intended results for the building.

2 Normative references

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

[BS 1203](#), *Hot-setting phenolic and aminoplastic wood adhesives — Classification and test methods*

BS EN 314-1, *Plywood — Bonding quality — Part 1: Test methods*

BS EN 314-2:1993, *Plywood — Bonding quality — Part 2: Requirements*

BS EN 322, *Wood-based panels — Determination of moisture content*

BS EN 324-1, *Wood-based panels — Determination of dimensions of boards — Part 1: Determination of thickness, width and length*

BS EN 324-2, *Wood-based panels — Determination of dimensions of boards — Part 2: Determination of squareness and edge straightness*

BS EN 326-1, *Wood-based panels — Sampling, cutting and inspection — Part 1: Sampling and cutting of test pieces and expression of test results*

BS EN 335:2013, *Durability of wood and wood-based products — Use classes: definitions, application to solid wood and wood-based products*

[BS EN 350:2016](#), *Durability of wood and wood-based products — Testing and classification of the durability to biological agents of wood and wood-based materials*

BS EN ISO 3166-1, *Codes for the representation of names of countries and their subdivisions — Part 1: Country codes*

3 Terms and definitions

For the purposes of this British Standard, the following terms and definitions apply.

3.1 amino resin

thermosetting synthetic resin derived from a condensation reaction of the –NH– groups of amines or amides with aldehydes

NOTE “Urea–formaldehyde (UF)” and “melamine–formaldehyde (MF)” resins are mainly of significance in the adhesives field.

[SOURCE: BS EN 923:2015, 2.3.51, modified]

3.2 batch

output, which may comprise boards of more than one thickness, of a single product type within a single shift of maximum 8 h duration

3.3 layer

either one ply or two or more plies glued together with their grain direction parallel, or another material

[SOURCE: BS EN 313-2:2000, 2.11]

3.4 standard marine plywood

veneer plywood comprising heartwood of wood species of superior natural biological durability with an exterior glue bond

[SOURCE: BS EN 314-2:1993]

3.5 lightweight marine plywood

veneer plywood comprising wood species of lower density than those used in standard marine plywood (see 3.4) with an exterior glue bond

NOTE 1 Lower density wood species in most cases have lower natural biological durability than the species used in standard marine plywood.

NOTE 2 Lightweight marine plywood is generally specified only where low weight is of critical importance to the design. An example of a lower density timber species is gaboan.

3.6 pMDI (diphenylmethane diisocyanate, isomers and homologues)

mixture containing 4,4'–methylenediphenyl diisocyanate (MDI), other methylenediphenyl diisocyanate isomers, and low oligomers

NOTE It is produced by the reaction of aniline and formaldehyde, using hydrochloric acid as a catalyst to produce a mixture of diamine precursors, as well as their corresponding polyamines. These diamines are reacted with phosgene to form a mixture of isocyanates. Distillation of the mixture leads to pMDI.

3.7 phenolic resin

thermosetting synthetic resin derived from a condensation reaction of a phenol with an aldehyde

NOTE The main phenols used are:

- phenol, cresol, xylenol, butyl- and octyl-phenol, resorcinol and cashew nut shell liquid (from *Anacardium occidentale*), which consists mainly of substituted phenols. Mixtures of these phenols are used, as well as mixtures of aldehydes like formaldehyde or furfuraldehyde for the manufacture of these resins;
- "lignin", a major constituent of wood obtained as a by-product of chemical pulping, has a phenol-like chemical composition and is usually used in combination with phenol-formaldehyde (PF) resins as a phenol substitute; and
- "condensed tannins" obtained from the bark of several species of trees have a phenol-like composition and are generally used in combination with PF resins.

[SOURCE: BS EN 923:2015, 2.3.52, modified]

3.8 ply

either one single veneer or two or more veneers joined edge to edge or end to end

[SOURCE: BS EN 313-2:2000, 2.17]

3.9 tight side

side of the veneer opposite the loose side

[SOURCE: BS 6100-4.3:1984, 430.2111]

NOTE 1 In accordance with BS 6100-4.3:1984, definition 430.2110, the loose side is the "side of a peeled or sliced veneer that is in contact with the knife as the veneer is being cut and which undergoes an elongation often producing lathe checks".

NOTE 2 This is sometimes referred to as "slack side".

3.10 veneer

thin sheet of wood not more than 7 mm in thickness

[SOURCE: BS EN 313-2:2000, 2.14]

4 Requirements for manufacture

4.1 Selection of timber species

The timber species of the veneers used in the manufacture of marine plywood shall be selected according to [Table 1](#) so that the required durability is obtained.

Where a range of durability classes is given for a species or species mixture, the least durable class shall be used as the basis for conforming to [Table 1](#).

NOTE 1 Where an increase in durability is required it might be necessary to apply preservative treatment, either to the veneers before bonding, to the adhesive (which will diffuse into the veneers during hot pressing), or to the finished plywood, but only if incorporated by the original manufacturer. Guidance on preservative treatment is given in DD CEN/TS 1099.

NOTE 2 Plywood for marine use is employed in many different circumstances and the nature of the hazard (wet rot, insect attack, soft rot, marine borer attack) to which it might be exposed can vary widely. Where resistance to marine borer attack is desirable, e.g. if marine plywood is likely to come into direct contact with water, it is important that species with an adequate resistance to marine borer attack are used. BS EN 350 includes a limited list of species having such resistance, but it is not exhaustive and other species may also be used if adequate resistance to marine borers can be demonstrated from previous experience or by testing.

Table 1 — *Durability requirements for standard and lightweight marine plywood*

Class	Requirements
Standard	<p>The wood species used shall be from those listed in BS EN 350:2016, Annex B, as having natural biological durability Class DC 3 or better and with a nominal density >500 kg/m³ at 12% moisture content</p> <p>The aim shall be to exclude sapwood, but for practical reasons up to 5% sapwood per veneer shall be permitted, assessed on a visual inspection of the surface area of the veneer prior to assembly</p>
Lightweight	<p>The wood species used shall be from those listed in BS EN 350:2016, Annex B, as having natural biological durability Class DC 4 or better and with a nominal density ≤500 kg/m³ at 12% moisture content</p> <p>The aim shall be to exclude sapwood, but for practical reasons up to 5% sapwood per veneer shall be permitted, assessed on a visual inspection of the surface area of the veneer prior to assembly</p>
<p><i>NOTE</i> Ideally, all veneers consist entirely of heartwood but, for practical reasons, a small percentage of sapwood is permitted.</p>	

Where species to be used, and similarly sources of the wood, are not listed in [BS EN 350:2016](#), Annex B, it shall be demonstrated that the required natural durability class in accordance with [BS EN 350](#) has been met and the proposal presented according to [BS EN 350:2016](#), Annex G.

4.2 Materials — Veneers

Veneers shall be either sliced or rotary cut. Veneers prepared by either method shall have smooth surfaces. The outer plies of a panel shall be prepared by the same method, i.e. sliced or rotary cut, except for decorative face veneers (see [4.3.3](#)). The permissible number of natural defects and edge joints shall not exceed the limits given in [Table 2](#).

Table 2 — Permissible frequencies of defects and joints in veneer for outer and inner plies

Defect/joint type	Veneer for outer plies	Veneer for inner plies
Pin knots	Up to 6 per square metre of panel surface	No limit
Closed splits	A maximum of 2 per metre width of panel area with a total length of 200 mm	No limit
Open splits	Not permitted	A maximum of 1 split of up to 0.5 mm wide on any panel edge
Small worm holes, ≤1.5 mm diameter	Up to 2 per square metre. Holes in plane of veneer not permitted	Greater number permitted, including some in plane of veneer, provided they do not produce voids
Variation in colour	Low contrast variation in colour is permitted if free from fungal decay	Permitted, if free from fungal decay
Edge joints	For peeled face veneers the minimum distance between edge joints shall be 300 mm For sliced face veneers the minimum distance between edge joints shall be 100 mm	No limit
End joints	Not permitted	Not permitted
Compression failure	Not permitted	Not permitted
Others: Knots other than pin knots Worm holes >1.5 mm diameter Fungal decay	Not permitted	Not permitted
Repairs	Not permitted	Properly made and tightly fitted glued patches with their grain aligned with the grain of the veneer and having a maximum dimension of 60 mm permitted up to 3 per square metre

4.3 Lay-up and panel structure

NOTE The requirements of 4.3.3 and 4.3.4 aim to ensure that the marine plywood has the balanced construction essential to most applications.

4.3.1 Number of plies

Panels having a thickness of 6.5 mm or less shall have three or more plies. Panels having a thickness greater than 6.5 mm shall have five or more plies.

4.3.2 Edge joints

Glued edge joints shall be made using either a thermosetting phenolic or an aminoplastic adhesive. In the case of the latter, the moisture resistance shall be class H2, or better, in accordance with BS 1203. Thermoplastic adhesives shall not be used.

Metal fastenings, tapes or stitching shall not be used for edge joints in inner plies.

NOTE Veneers for outer plies may be taped or stitched to repair splits.

Where outer plies have been taped or stitched, such material shall be removed after pressing.

4.3.3 Lay-up

Adjacent plies shall be laid up with their grains at right angles to each other.

NOTE 1 Cores (centres) may comprise two veneers of equal thickness with their grains parallel, provided that the panel conforms to 4.3.1.

In order to ensure a balanced construction, the veneers forming any one layer and the corresponding layer on the opposite side of the central plane of the panel shall be of the same thickness and species, or of species known to be similar to one another in physical characteristics. These veneers shall be cut by the same method.

NOTE 2 Decorative outer veneers (face veneers) may be cut by different methods, but the physical characteristics and thickness of the veneers are selected to avoid distortion of the panel in service.

Outer plies shall be laid up with the tight side of the veneer outermost.

4.3.4 Panel structure

4.3.4.1 General

Panels shall conform to 4.3.4.2 or 4.3.4.3 after sanding, when conditioned to a moisture content of between 6% and 14%.

4.3.4.2 Three-ply panels

The combined thickness of the two outer plies after sanding shall be not less than 40% and not more than 65% of the nominal, unsanded thickness of the panel.

4.3.4.3 Multi-ply panels

After sanding, the thickness of each of the two outer plies, combined with those of the core and other inner plies with their grain direction parallel to the outer plies, shall be not less than 40% and not more than 65% of the nominal, unsanded thickness of the panel. In addition, for panels with a nominal thickness of greater than 3.8 mm, each outer ply shall be not less than 1.0 mm thick after sanding and each inner and core ply shall be not more than 4.8 mm thick.

4.4 Durability and classification

COMMENTARY ON 4.4

The durability of marine plywood derives from both the resistance to degradation by moisture of the glue line and the resistance to bio-deterioration of the timber species used for the veneers.

Marine plywood shall be classified according to its durability in accordance with Table 3.

Table 3 — Marine plywood application and use class

Class	Application
Standard	Plywood suitable for use when exposed to regular wetting or frequent or continuous exposure to water (fresh or salt), e.g. use classes 3.2, 4 or 5 in BS EN 335:2013
Lightweight	Plywood suitable for use when wetted occasionally or, if wetting is more prolonged, when the plywood is protected, e.g. use class 3.1 in BS EN 335:2013

NOTE Lightweight plywood is normally only specified where low weight is of critical importance to the design.

5 Requirements for finished marine plywood

NOTE In case of dispute, a consignment may be sampled in accordance with BS EN 326-3. Testing of the sample is limited to those requirements specified in 5.1 to 5.5 that are in dispute.

5.1 Dimensional tolerances, squareness and edge-straightness

When tested in accordance with BS EN 324-1, at a minimum sampling frequency of one panel per batch, the nominal length, width and thickness of the panels shall be within the tolerances given in [Table 4](#).

When tested in accordance with BS EN 324-2, at a minimum sampling frequency of one panel per batch, the squareness and edge-straightness of the panels shall be within the tolerances given in [Table 4](#).

Table 4 — Permissible tolerances for nominal length, width, thickness and squareness, and edge-straightness of panels

Tolerances on nominal thickness t mm	Unsanded panels		Sanded panels	
	Thickness tolerance within one panel mm	Tolerances on nominal thickness mm	Thickness tolerance within one panel mm	Tolerances on nominal thickness mm
$3 \leq t \leq 12$	1.0	$+ (0.8 + 0.03 \ t)$ $- (0.4 + 0.03 \ t)$	0.6	$+ (0.2 + 0.03 \ t)$ $- (0.4 + 0.03 \ t)$
$t > 12$	1.5			
Tolerance on nominal length and width	$\pm 3.5 \text{ mm}$			
Tolerance on squareness and edge-straightness	1 mm/m			

5.2 Moisture content

When determined in accordance with BS EN 322, at a minimum sampling frequency of one panel per batch, at the time of leaving the manufacturer's premises the moisture content of marine plywood shall be between 6% and 14%.

5.3 Quality of surface appearance

On visual inspection the surface of panels after sanding shall not exceed the limits given in [Table 2](#).

5.4 Manufacturing defects

Panels shall not contain any of the following manufacturing defects: open joints (e.g. core gaps, overlaps and pleats, blisters, hollows, bumps and imprints), roughness (other than that due to the irregular structure of the wood), sanding through, foreign particles, or defects in the edges of panels (e.g. due to sanding, sawing, missing wood).

Glue penetration through to the surface shall only be allowed close to areas of permitted defects, up to a maximum of 5% of the area of each outer ply.

5.5 Bonding quality

When tested in accordance with BS EN 314-1, the bonding quality shall meet the requirements of BS EN 314-2:1993, Bonding Class 3. Minimum sampling frequency shall be one pair of glue-lines per every 2 000 pairs of glue-lines produced, whatever the lay-up of the panel, but not more than one panel per batch. Test pieces shall be sampled from the selected panels in accordance with BS EN 326-1.

The adhesive(s) used for bonding the plies shall be selected to ensure that the product meets these bonding requirements.

NOTE 1 Examples of adhesive types that might be suitable include:

- a) a phenolic resin;*
- b) a melamine–formaldehyde (amino) resin containing sufficient resorcinol (or other phenol); and*
- c) pMDI (diphenylmethane diisocyanate, isomers and homologues).*

NOTE 2 Additives may be included only with the adhesive manufacturer's written approval.

6 Marking and documentation

6.1 Marking

Panels shall be indelibly marked on the edge or back with the following information, in upper case, in the order shown:

- a) the number and date of this British Standard, i.e. BS 1088:2018,¹ and the word “MARINE”;
- b) the letters “PT” if there has been any application of preservative treatment;
- c) the nominal panel thickness, in millimetres (mm);
- d) the manufacturer's name or identification mark;
- e) the country of manufacture (alpha-2 code, in accordance with BS EN ISO 3166-1);
- f) identification of panel type, using the words either STANDARD or LIGHTWEIGHT; and
- g) the name(s) of the predominant wood specie(s) according to [BS EN 350](#), expressed as either the four digit code or the common name.

NOTE An example is given in [Annex A](#).

6.2 Documentation

The documentation for each consignment of panels shall include the information in [6.1](#), together with a list of all the species used in their construction and details of any preservative treatment which has been applied.

Test reports for [5.1](#) to [5.5](#) shall be retained by the manufacturer and made available to the purchaser on request.

NOTE Where biocides are added during manufacture to improve resistance to bio-deterioration, the Biocidal Regulation No. 528/2012 [2], Article 58, Clause 3, specifies the provision of the following accompanying information:

- a) a statement that the treated article incorporates biocidal products;*
- b) where substantiated, the biocidal property attributed to the treated article;*
- c) the name of all active substances contained in the biocidal products;*
- d) the name of all nanomaterials contained in the biocidal products, followed by the word “nano” in brackets; and*
- e) any relevant instructions for use, including any precautions to be taken because of the biocidal products with which a treated article was treated or which it incorporates.*

¹ Marking BS 1088:2018 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is solely the claimant's responsibility. Such a declaration is not to be confused with third-party certification of conformity.

Annex A (informative)

Example of marking

An example of marking is:

BS 1088:2018, MARINE/PT/12MM/MFR/GB/LIGHTWEIGHT/GABOON

This marking indicates the plywood conforms to BS 1088:2018 and has the following characteristics:

- a) preservative treatment (PT) applied;
- b) nominal thickness of 12 mm;
- c) manufacturer's name or identification mark: MFR;
- d) country of manufacture: Great Britain;
- e) panel type: lightweight; and
- f) timber species: gaboon.

Bibliography

Standards publications

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

[BS 6100-4.3:1984](#), *Glossary of building and civil engineering terms — Part 4: Forest products — Section 4.3: Wood based panel products*

BS EN 313-2:2000, *Plywood — Classification and terminology — Part 2: Terminology*

BS EN 326-3, *Wood-based panels — Sampling, cutting and inspection — Part 3: Inspection of an isolated lot of panels*

BS EN 636, *Plywood — Specifications*

BS EN 923:2015, *Adhesives — Terms and definitions*

BS EN 13986, *Wood-based panels for use in construction — Characteristics, evaluation of conformity and marking*

BS EN ISO 9000, *Quality management systems — Fundamentals and vocabulary*

BS EN ISO 9000-1, *Quality management and quality assurance standards — Part 1: Guidelines for selection and use*

[BS EN ISO 9001:2015](#), *Quality management systems — Requirements*

BS ISO 9000-2:1997, *Quality management and quality assurance standards — Part 2: Generic guidelines for the application of ISO 9001, ISO 9002 and ISO 9003*

DD CEN/TS 1099, *Plywood — Biological durability — Guidance for the assessment of plywood for use in different use classes*

Other publications

- [1] GREAT BRITAIN. *The Construction Products Regulations* 2013. London: The Stationery Office.
- [2] EUROPEAN PARLIAMENT AND COUNCIL OF THE EUROPEAN UNION. *Regulation (EU) No 528/2012 of the European Parliament and of the Council of 22 May 2012 concerning the making available on the market and use of biocidal products*. Luxembourg: Office for Official Publications of the European Communities, 2012.

Licensed copy: Imperial College, Imperial College London, Version correct as of 07/08/2018

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