

**BS A 275, A 276, A 277, A 278,
A 279, A 280:1981+A2:2011**



BSI Standards Publication

AEROSPACE SERIES

Specification for Hexagon self-locking nuts with non-metallic locking inserts

Metric series

Série aérospatiale: Spécification des écrous hexagonaux auto-blocables avec grains de blocage non métalliques. Série métrique

Luft- und Raumfahrt-Reihe: Spezifikation für Sechskant-Sicherungsmuttern mit nichtmettallischen Sperreinsätzen. Metrische Reihe

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW

raising standards worldwide™



Publishing and copyright information

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

© BSI 2011

ISBN 978 0 580 72746 7

ICS 49.030.30

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

Committee reference ACE/12

Draft for comment 79/70124 DC; 10/30234053 DC

Publication history

First published February 1981

Amendments issued since publication

Date	Text affected
30 September 1982	See Foreword.
31 January 2011	See Foreword.

Contents

Foreword *ii*

- 1 Scope 1
- 2 References 1
- 3 Performance and procurement 2
- 4 General requirements 2
- 5 Designation 6
- 6 Identification and marking 6

Appendices

- Appendix A Coarse thread pitch series for size codes 080, 100 and 120 8
- Appendix B Foreign materials and finishes 9

List of figures

- Figure 1 – Configuration 3

List of tables

- Table 1 – Dimensions 4
- Table 2 – Materials 5
- Table 3 – Strengths 6
- Table 4 – Marking 7
- Table 5 – Dimensions 8
- Table 6 – Materials 8
- Table 7 – Strengths 8

Summary of pages

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

Foreword

Publishing information

This British Standard is published by BSI and came into effect on 27 February 1981. It was prepared by Technical Committee ACE/12, *Aerospace fasteners and fastening systems, details and parts*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

BS A 275, A 276, A 277, A 278, A 279, A 280:1981+A2:2011 supersedes BS A 275, A 276, A 277, A 278, A 279, A 280:1981+A1:1982, which is withdrawn.

Relationship with other publications

These British Standards provide a series of metric, hexagon nuts with non-metallic locking inserts. The dimensional data is based on that already agreed in ISO/TC 20/SC 4, Aircraft and space vehicles – Aerospace fastener systems. However, it should be noted that the across flats dimensions for diameters MJ3, MJ10, MJ12 and MJ14 are different from the dimensions agreed in ISO/TC 2, Fasteners, for non aerospace use.

Information about this document

The start and finish of text introduced or altered by Amendments No. 1 and No. 2 is indicated in the text by tags A1 A1 and A2 A2. Minor editorial changes are not tagged.

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.

1 Scope

These British Standards specify materials, dimensions, protective treatment, identification and marking, together with part numbers for hexagon (thick) self-locking nuts, with non-metallic inserts and having MJ screw threads.

They are primarily intended for use on non-structural aerospace applications and have operational temperature limitations of $-40\text{ }^{\circ}\text{C}$ to $+120\text{ }^{\circ}\text{C}$.

Coarse thread series for size codes 080, 100 and 120 have been included in Appendix A for those users wishing to specify them.

2 References

These standards make reference to the following standards publications and Ministry of Defence publications.

- | | |
|---|--|
| <p>A2 BS EN 10083</p> <p>BS 1134</p> <p>A2 BS EN 12164</p> <p>BS EN 2133</p> <p>BS 3643</p> <p>A2 A 358</p> <p>A1 S 105</p> <p>S 147</p> <p>S 154</p> <p>A1 S 158</p> <p>A2 A 293</p> | <p>Stainless steel</p> <p>Part 3 Technical delivery conditions for semi-finished products, bars, rods, wire, sections and bright products of corrosion resisting steels for general purposes A2</p> <p>Method for the assessment of surface texture</p> <p>Part 1 Method and instrumentation</p> <p>Copper and copper alloys. Rod for free machining purposes</p> <p>Cadmium plating of steels with specified tensile strength $\leq 1\,450\text{ MPa}$, copper, copper alloys and nickel alloys A2</p> <p>ISO metric screw threads</p> <p>MJ Threads</p> <p>Part 1 General requirements</p> <p>Part 2 Limit dimensions for bolts and nuts A2</p> <p>Carbon steel (bar for the manufacture of forged bolts only)</p> <p>0.5 per cent nickel-chromium-molybdenum steel bars for the manufacture of forged bolts and forged nuts A1</p> <p>2½ per cent nickel-chromium-molybdenum steel billets, bars, forgings and parts (880-1080 MPa; limiting ruling section 150 mm)</p> <p>Specification for 1 per cent chromium-molybdenum steel bars for the manufacture of forged bolts and forged nuts A1</p> <p>Procurement of self-locking nuts with non-metallic locking elements. Metric Series Specification A2</p> |
|---|--|

Ministry of Defence publications

- | | |
|--|---|
| <p>A2 DEF STAN 03-19</p> <p>DEF STAN 03-2</p> | <p>Electro-deposition of cadmium A2</p> <p>Cleaning and preparation of metallic surfaces</p> |
|--|---|

The latest issue of these publications shall be used.

3 Performance and procurement

The nut performance and procurement requirements shall comply with the requirements of A_2 BS A 293 A_2 .

4 General requirements

4.1 Dimensions. All nuts shall conform to the dimensions and tolerances given in Table 1 and Figure 1. Unless otherwise specified, the dimensions shall apply after the application of the protective treatment.

4.2 Screw threads. The screw threads shall be as given in A_2 BS A 358 A_2 to the tolerance class specified in Table 1.

4.3 Materials. The materials shall be as given in Table 2 or Appendix B.

4.4 Mechanical properties. The mechanical properties shall conform to those given in Table 3.

4.5 Surface roughness. The surface roughness shall be R_a 6.3 μm except where indicated otherwise in Figure 1 and shall be in accordance with BS 1134. This requirement does not apply to the threads, which shall be as achieved by normal methods of manufacture. Tool marks resulting from the securing of the non-metallic insert shall be permissible.

Figure 1 Configuration

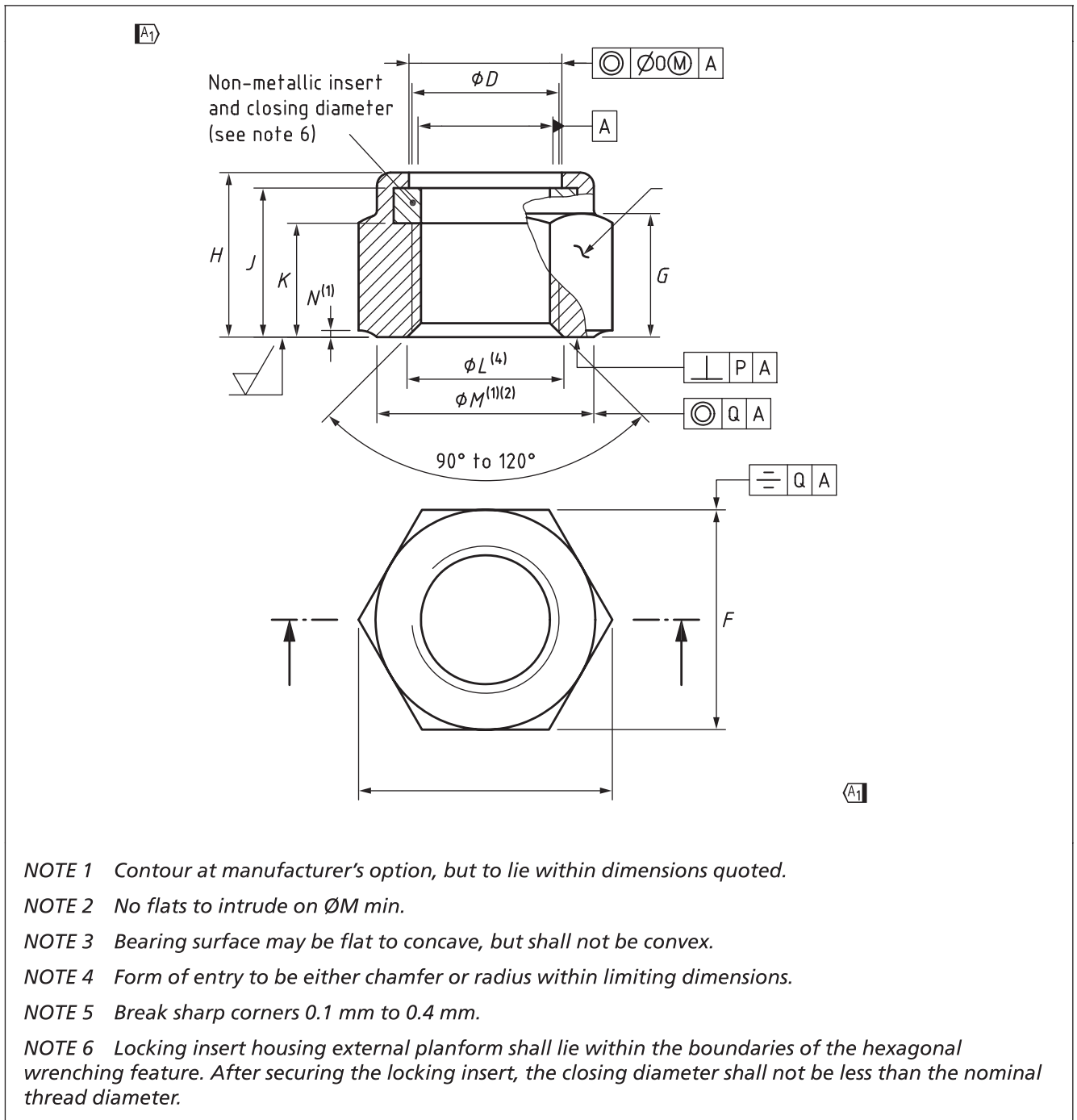


Table 1 Dimensions
All dimensions are in millimetres

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Size code	<i>D</i> Thread	<i>E</i>	<i>F</i>			<i>G</i>	<i>H</i>	<i>J</i>	<i>K</i>	<i>L</i>		<i>M</i>	<i>N</i>		<i>P</i>	<i>Q</i>
	Dia. × pitch – Tol. class	min.	max.	min.		tol.	± 0.3	max.	max.	min.	max.	min.	min.	max.		
016	MJ1.6 × 0.35 – 4H6H	3.3	3.2	3.08	h12	1.3	2.5	2.3	1.1	2.2	1.6	–	–	–	0.08	0.15
020	MJ2 × 0.4 – 4H6H	4.2	4	3.88		1.6	2.9	2.7	1.3	2.6	2.0	–	–	–	0.08	0.15
025	MJ2.5 × 0.45 – 4H6H	5.3	5	4.88		2	3.6	3.3	1.7	3.1	2.5	–	–	–	0.08	0.15
030	MJ3 × 0.5 – 4H6H	6.5	6	5.88		2.4	4.1	3.8	2.0	3.6	3	5.4	0.4	0.2	0.1	0.2
040	MJ4 × 0.7 – 4H6H	7.6	7	6.85		3.2	5.5	5.1	2.6	4.6	4	6.4	0.5	0.2	0.1	0.2
050	MJ5 × 0.8 – 4H6H	8.7	8	7.85		4	6.7	6.2	3.3	5.6	5	7.4	0.5	0.2	0.1	0.2
060	MJ6 × 1 – 4H5H	10.9	10	9.78	h13	5	8.1	7.5	3.9	6.8	6	9.3	0.5	0.2	0.1	0.2
*080	MJ8 × 1 – 4H5H	14.3	13	12.73		6.5	9.8	9.0	5.2	8.8	8	12.2	0.5	0.2	0.1	0.2
*100	MJ10 × 1.25 – 4H5H	18.9	17	16.73		8	12.3	11.3	6.5	10.8	10	16.0	0.6	0.3	0.13	0.25
*120	MJ12 × 1.25 – 4H5H	21.1	19	18.67		10	14.0	12.8	7.8	12.8	12	18.0	0.6	0.3	0.13	0.25
140	MJ14 × 1.5 – 4H5H	24.5	22	21.67		11	16.4	15.0	9.1	14.8	14	21.0	0.6	0.3	0.15	0.25
160	MJ16 × 1.5 – 4H5H	26.8	24	23.67		13	18.1	16.5	10.4	16.8	16	23.0	0.6	0.3	0.18	0.3
180	MJ18 × 1.5 – 4H5H	30.2	27	26.67		15	19.8	18.0	11.7	18.8	18	26.0	0.6	0.3	0.18	0.3
200	MJ20 × 1.5 – 4H5H	33.6	30	29.67		16	21.5	19.5	13.0	20.8	20	29.0	0.6	0.3	0.18	0.3

* For users wishing to specify coarse thread pitches for size codes 080, 100 and 120, see Appendix A.

Table 2 Materials

1 Basic BS number	2 Type of material	3 Hardness*		4 Nut finish	5 Insert material	6 Soak † temperature limits	7 Operational temperature limits
		Rockwell	Vickers				
A 275	Steel S105 ^{A1} § ^{A1} S147 S154 S158	28 to 35 HRC	280 to 335 HV	Cadmium plate and passivate to ^{A2} DEF STAN 03-19 or BS EN 2133 ^{A2}	Nylon type	−60 °C to +200 °C	−40 °C to +120 °C
A 276	Corrosion resisting steel‡ ^{A2} X5CrNi17-7 X5CrNiMo17-12-2 X6CrNiTi18-10 X8CrNiS18-9 X5CrNi18-10 ^{A2}	^{A1} 94 HRB ^{A1} to 26 HRC	^{A1} 200 ^{A1} to 265 HV	Passivate to DEF STAN 03-2 Method M	Nylon type	−60 °C to +200 °C	−40 °C to +120 °C
A 277	Brass ^{A2} BS EN 12164 (CW 614N) ^{A2}	—	—	Cadmium plate and passivate to ^{A2} DEF STAN 03-19 or BS EN 2133 ^{A2}	Nylon type	−60 °C to +200 °C	−40 °C to +120 °C

* In the event of a dispute, the Vickers hardness shall take precedence.

† Items shall not be damaged after these soak temperature limits have been applied in accordance with performance and procurement specification ^{A2} BS A 293 ^{A2}.

‡ According to ^{A2} BS EN 10088 : Part 3 ^{A2}.

^{A1} § S105 is an obsolescent standard and its use is only permitted while existing stocks last. ^{A1}

Table 3 Strengths

1 Size code	2 <i>D</i> Thread size	3 Axial tensile strength* kN min.		
		4 A 275 (Steel)	5 A 276 (C.R.S.)	6 A 277 (Brass)
016	MJ1.6 × 0.35 – 4H6H	0.91	0.66	0.45
020	MJ2 × 0.4 – 4H6H	1.53	1.11	0.76
025	MJ2.5 × 0.45 – 4H6H	2.57	1.86	1.28
030	MJ3 × 0.5 – 4H6H	3.88	2.80	1.94
040	MJ4 × 0.7 – 4H6H	6.76	4.88	3.38
050	MJ5 × 0.8 – 4H6H	11.13	8.04	5.56
060	MJ6 × 1 – 4H5H	15.70	11.34	7.85
080	MJ8 × 1 – 4H5H	31.86	23.00	15.93
100	MJ10 × 1.25 – 4H5H	49.95	36.10	24.97
120	MJ12 × 1.25 – 4H5H	76.40	55.20	38.20
140	MJ14 × 1.5 – 4H5H	103.30	74.60	51.65
160	MJ16 × 1.5 – 4H5H	140.30	101.30	70.15
180	MJ18 × 1.5 – 4H5H	182.90	132.10	91.45
200	MJ20 × 1.5 – 4H5H	231.20	167.00	115.60

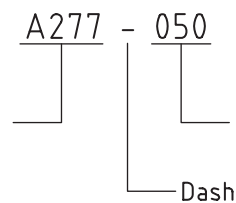
^(A1) * When used with bolts of strength classification (σ_B) 900 MPa for steel, 650 MPa for C.R.S. and 450 MPa for brass the axial tensile strength = $\frac{\pi}{4}d_3^2\sigma_B$

where

d_3 is the core diameter. ^(A1)

5 Designation

5.1 An example of part number is as follows.



5.2 Unassigned part numbers shall not be used.

6 Identification and marking

6.1 **Marking of parts.** Each nut shall be marked at the position indicated in Figure 1 with the following.

- The manufacturer's monogram.
- The minimum data on the flat opposite that bearing the manufacturer's monogram, as shown in Table 4.

Table 4 Marking

Size code	Minimum marking	Example
016 to 040	No marking (bag and label with complete designation)	Not applicable
050 to 080	Last figure of basic British Standard number	7
100 120	Designation as 5.1 without prefix 'A' or size code	277
140 160	Designation as 5.1 without size code	A277
180 200	Complete designation as 5.1.	A277-200

6.2 Method of marking. The marking shall be etched, stamped, or engraved at the manufacturer's option. The impressed characters shall be not greater than 0.25 mm in depth and shall be of rounded root form. The marking shall not have an adverse effect on performance.

Appendix A Coarse thread pitch series for size codes 080, 100 and 120

A.1 This appendix gives the requirements for the manufacture (see **A.2** and Tables 5, 6 and 7) and designation (see **A.3**) of the coarse thread pitch series for size codes 080, 100 and 120.

For all other information see the previous clauses.

Table 5 **Dimensions**

All dimensions are in millimetres.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Size code	<i>D</i> Thread	<i>E</i>	<i>F</i>		<i>G</i>	<i>H</i>	<i>J</i>	<i>K</i>	<i>L</i>		<i>M</i>	<i>N</i>		<i>P</i>	<i>Q</i>	
	Dia. × pitch – Tol. class	min.	max.	min.	tol.	± 0.3	max.	max.	min.	max.	min.	min.	max.	min.		
080	M8 × 1.25 – 4H5H	14.3	13	12.73	h13	6.5	9.8	9.0	5.2	8.8	8	12.0	0.5	0.2	0.1	0.2
100	\square_{A1} M10 × 1.5 – 4H5H \square_{A1}	18.9	17	16.73		8	12.3	11.3	6.5	10.8	10	16.0	0.6	0.3	0.13	0.25
120	M12 × 1.5 – 4H5H	21.1	19	18.67		10	14.0	12.8	7.8	12.8	12	18.0	0.6	0.3	0.13	0.25

A.2 The screw threads shall be as given in BS 3643 to the tolerance class specified in Table 5.

Table 6 **Materials**

Basic BS number	Type of material	Material specification	Protective treatment
A 278	Steel	See Table 2	See Table 2 or Appendix B
A 279	C.R.S. }		
A 280	Brass		

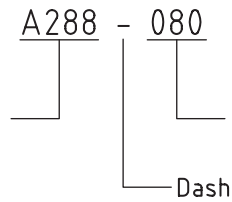
Table 7 **Strengths**

1	2	3	4	5
Size code	<i>D</i> Thread size	Axial tensile strength * kN min.		
		A 278 (Steel)	A 279 (C.R.S.)	A 280 (Brass)
080	M8 × 1.25 – 4H5H	29.0	21.0	14.5
100	M10 × 1.5 – 4H5H	46.3	33.4	23.1
120	M12 × 1.5 – 4H5H	71.9	51.9	35.9

* See footnote to Table 3.

A.3 Designation

A.3.1 An example of part number is as follows.



A.3.2 Unassigned part numbers shall not be used.

Appendix B Foreign materials and finishes

B.1 General. This appendix lists the materials and finishes that may be substituted for those listed in this standard. It is the manufacturer's responsibility to ensure complete traceability of the materials used and to guarantee that the part made from these materials satisfies the requirements of the procurement specification in every detail to the satisfaction of the Quality Assurance Authority.

B.2 Materials

UK material as called for in this standard	French alternative
S154	35NC6f(AIR 9160) or 35CD4S(AIR 9160)
\square_{A2} BS EN 12164 (CW 614N) \square_{A2}	UZ39Pb2(AIR 9070)

B.3 Finishes

UK finish as called for in this standard	French alternative
\square_{A2} Def stan 03-19 \square_{A2} DEF STAN 03-2	} AIR 3376
\square_{A2} BS EN 2133 \square_{A2}	

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