BRITISH STANDARD

BS EN
10131:2006

Cold rolled uncoated and zinc or zinc-nickel electrolytically coated low carbon and high yield strength steel flat products for cold forming — Tolerances on dimensions and shape

The European Standard EN 10131:2006 has the status of a British Standard

ICS 77.140.50

BSI
British Standards

National foreword

This British Standard is the official English language version of EN 10131:2006. It supersedes BS EN 10131:1991 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee ISE/10, Flat rolled steels products, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

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

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled "International Standards Correspondence Index", or by using the "Search" facility of the *BSI Electronic Catalogue* or of British Standards Online.

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 does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 12, an inside back cover and a back cover.

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

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 July 2006

ISBN 0 580 48668 0

Amendments issued since publication

Amd. No.	Date	Comments

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 10131

July 2006

ICS 77.140.50

Supersedes EN 10131:1991

English Version

Cold rolled uncoated and zinc or zinc-nickel electrolytically coated low carbon and high yield strength steel flat products for cold forming - Tolerances on dimensions and shape

Produits plats laminés à froid, non revêtus ou revêtus de zinc ou de zinc-nickel par voie électrolytique, en acier à bas carbone et en acier à haute limite d'élasticité pour formage à froid - Tolérances sur les dimensions et sur la forme

Kaltgewalzte Flacherzeugnisse ohne Überzug und mit elektrolytischem Zink- oder Zink-Nickel-Überzug aus weichen Stählen sowie aus Stählen mit höherer Streckgrenze zum Kaltumformen - Grenzabmaße und Formtoleranzen

This European Standard was approved by CEN on 12 June 2006.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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

Management Centre: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 10131:2006: E

Contents

Foreword

This document (EN 10131:2006) has been prepared by Technical Committee ECISS/TC 13 “Flat products for cold working - Qualities, dimensions, tolerances and specific tests”, the secretariat of which is held by IBN.

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 January 2007, and conflicting national standards shall be withdrawn at the latest by January 2007.

This document supersedes EN 10131:1991.

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

1 Scope

This European Standard applies to cold rolled uncoated and electrolytically zinc or zinc-nickel coated low carbon and high yield strength steel flat products for cold forming with a minimum thickness of 0,35 mm and, unless otherwise agreed at the time of ordering, less than or equal to 3 mm thick, delivered in sheet, wide strip, slit wide strip or cut lengths obtained from slit wide strip or sheet. The concerned standards are EN 10130, EN 10152, EN 10271, EN 10209, EN 10268 prEN 10336 and prEN 10338.

It does not apply to cold rolled strip (rolled width < 600 mm) or to flat cold rolled products for which there is a specific standard, in particular the following:

— cold rolled non-grain oriented magnetic steel sheet and strip (EN 10106);

— cold rolled electrical non-alloy and alloy steel sheet and strip delivered in the semi-processed state (EN 10341);

— tinplate and ECCS (EN 10202);

— blackplate in coils (EN 10205);

— cold rolled uncoated non-alloy mild steel narrow strip for cold forming (EN 10139).

2 Normative references

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

EN 10079:1992, *Definition of steel products*

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 10079:1992 and the following apply.

3.1
nominal thickness
whole specified thickness of the coated or uncoated product

NOTE In the case of coated products, it includes both substrate and coating.

4 Designation

4.1 Products conforming to this European standard shall be designated in the following order (see also clause 5):

a) type of product (sheet, wide strip, slit wide strip or cut length);

b) reference to this European Standard (EN 10131);

c) nominal thickness in millimetres;

d) letter S for products ordered with special tolerances on thickness;

e) nominal width in millimetres;

f) letter S for products ordered with special tolerances on width;

g) nominal length in millimetres;

h) letter S for products ordered with special tolerances on length (sheets and cut lengths only);

i) letter FS for sheets or cut lengths ordered with special tolerances on flatness;

j) letters CS for slit strip ordered with special tolerances on camber.

4.2 The product designation in accordance with 4.1 shall be followed by the complete designation of the steel ordered (e.g. according to EN 10130).

EXAMPLE 1 Wide strip according to this European standard of nominal thickness 1,20 mm, nominal width of 1500 mm in steel DC04-A-m as specified in EN 10130:

Wide strip EN 10131-1,20x1500
Steel EN 10130-DC04-A-m

EXAMPLE 2 Sheet according to this European standard of nominal thickness 0,80 mm ordered with special thickness tolerance (S), nominal width of 1200 mm with special tolerances on width (S), nominal length of 2500 mm and with special tolerances on flatness in steel DC06-B-g as specified in EN 10130:

Sheet EN 10131-0,80Sx1200Sx2500FS
Steel EN 10130-DC06-B-g

5 Condition of delivery

5.1 Flat products according to this European standard may be delivered as follows:

a) with normal or special thickness tolerances (see Tables 1 to 4);

b) with normal or special width tolerances (see Tables 5 and 6);

c) with normal or special length tolerances for sheet or cut lengths (see Table 7);

d) with normal or special flatness tolerances for sheet or cut lengths (see Tables 8 and 9);

e) with normal or special tolerances on camber for slit strip of width less than 600 mm (see clause 11).

5.2 In the absence of information on the order in respect of the condition of delivery given in 5.1 the flat products shall be delivered with normal tolerances on thickness, width, length, flatness and camber.

6 Tolerances on thickness

The thickness may be measured at any point located more than 40 mm from the edges.

In the case of slit coils or cut lengths having a width of 80 mm or below, the position of the measurement shall be at the middle axis.

The tolerances on thickness shall be as given in Tables 1 to 4 and apply over the whole length.

Tolerances more severe than special tolerances may be agreed at the time of the order.

Table 1 — Tolerances on thickness for steel grades with a specified minimum yield strength Re < 260 MPa[1)]

Dimensions in millimetres

Nominal thickness	Normal tolerances [a] for a nominal width w			Special tolerances (S) [a] for a nominal width w		
	≤ 1200	> 1 200 to ≤ 1 500	> 1500	≤ 1 200	> 1 200 to ≤ 1 500	> 1 500
= 0,35 to 0,40	± 0,03	± 0,04	± 0,05	± 0,020	± 0,025	± 0,030
> 0,40 to 0,60	± 0,03	± 0,04	± 0,05	± 0,025	± 0,030	± 0,035
> 0,60 to 0,80	± 0,04	± 0,05	± 0,06	± 0,030	± 0,035	± 0,040
> 0,80 to 1,00	± 0,05	± 0,06	± 0,07	± 0,035	± 0,040	± 0,050
> 1,00 to 1,20	± 0,06	± 0,07	± 0,08	± 0,040	± 0,050	± 0,060
> 1,20 to 1,60	± 0,08	± 0,09	± 0,10	± 0,050	± 0,060	± 0,070
> 1,60 to 2,00	± 0,10	± 0,11	± 0,12	± 0,060	± 0,070	± 0,080
> 2,00 to 2,50	± 0,12	± 0,13	± 0,14	± 0,080	± 0,090	± 0,100
> 2,50 to 3,00	± 0,15	± 0,15	± 0,16	± 0,100	± 0,110	± 0,120

[a] The thickness tolerances in the region of cold rolled welds may be increased by a maximum of 50 % over a length of 10 metres. This increase is applicable to all thicknesses and, unless otherwise agreed at the time of order, to normal and special tolerances over or under.

Table 2 — Tolerances on thickness for steel grades with a specified minimum yield strength 260 MPa ≤ Re < 340 MPa[1)]

Dimensions in millimetres

Nominal thickness	Normal tolerances [a] for a nominal width w			Special tolerances (S) [a] for a nominal width w		
	≤ 1200	> 1200 to ≤ 1500	> 1500	≤ 1 200	> 1 200 to ≤ 1 500	> 1 500
= 0,35 to 0,40	± 0,04	± 0,05	± 0,06	± 0,025	± 0,030	± 0,035
> 0,40 to 0,60	± 0,04	± 0,05	± 0,06	± 0,030	± 0,035	± 0,040
> 0,60 to 0,80	± 0,05	± 0,06	± 0,07	± 0,035	± 0,040	± 0,050
> 0,80 to 1,00	± 0,06	± 0,07	± 0,08	± 0,040	± 0,050	± 0,060
> 1,00 to 1,20	± 0,07	± 0,08	± 0,10	± 0,050	± 0,060	± 0,070
> 1,20 to 1,60	± 0,09	± 0,11	± 0,12	± 0,060	± 0,070	± 0,080
> 1,60 to 2,00	± 0,12	± 0,13	± 0,14	± 0,070	± 0,080	± 0,100
> 2,00 to 2,50	± 0,14	± 0,15	± 0,16	± 0,100	± 0,110	± 0,120
> 2,50 to 3,00	± 0,17	± 0,18	± 0,18	± 0,120	± 0,130	± 0,140

[a] The thickness tolerances in the region of cold rolled welds may be increased by a maximum of 50 % over a length of 10 metres. This increase is applicable to all thicknesses and, unless otherwise agreed at the time of order, to normal and special tolerances over or under.

1) 1 MPa = 1 N/mm^2.

Table 3 — Tolerances on thickness for steel grades with a specified minimum yield strength 340 MPa ≤ Re ≤ 420 MPa[1)]

Dimensions in millimetres

Nominal thickness	Normal tolerances [a] for a nominal width w			Special tolerances (S) [a] for a nominal width w		
	≤ 1200 [b]	> 1 200 to ≤ 1 500	> 1500	≤ 1200 [b]	> 1 200 to ≤ 1 500	> 1 500
= 0,35 to 0,40	± 0,04	± 0,05	± 0,06	± 0,030	± 0,035	± 0,040
> 0,40 to 0,60	± 0,05	± 0,06	± 0,07	± 0,035	± 0,040	± 0,050
> 0,60 to 0,80	± 0,06	± 0,07	± 0,08	± 0,040	± 0,050	± 0,060
> 0,80 to 1,00	± 0,07	± 0,08	± 0,10	± 0,050	± 0,060	± 0,070
> 1,00 to 1,20	± 0,09	± 0,10	± 0,11	± 0,060	± 0,070	± 0,080
> 1,20 to 1,60	± 0,11	± 0,12	± 0,14	± 0,070	± 0,080	± 0,100
> 1,60 to 2,00	± 0,14	± 0,15	± 0,17	± 0,080	± 0,100	± 0,110
> 2,00 to 2,50	± 0,16	± 0,18	± 0,19	± 0,110	± 0,120	± 0,130
> 2,50 to 3,00	± 0,20	± 0,20	± 0,21	± 0,130	± 0,140	± 0,150

[a] The thickness tolerances in the region of cold rolled welds may be increased by a maximum of 50 % over a length of 10 metres. This increase is applicable to all thicknesses and, unless otherwise agreed at the time of order, to normal and special tolerances over or under.

Table 4 — Tolerances on thickness for steel grades with a specified minimum yield strength 420 MPa < Re[1)]

Dimensions in millimetres

Nominal thickness	Normal tolerances [a] for a nominal width w			Special tolerances (S) [a] for a nominal width w		
	≤ 1200	> 1 200 to ≤ 1 500	> 1 500	≤ 1200	> 1 200 to ≤ 1 500	> 1 500
= 0,35 to 0,40	± 0,05	± 0,06	± 0,07	± 0,035	± 0,040	± 0,050
> 0,40 to 0,60	± 0,05	± 0,07	± 0,08	± 0,040	± 0,050	± 0,060
> 0,60 to 0,80	± 0,06	± 0,08	± 0,10	± 0,050	± 0,060	± 0,070
> 0,80 to 1,00	± 0,08	± 0,10	± 0,11	± 0,060	± 0,070	± 0,080
> 1,00 to 1,20	± 0,10	± 0,11	± 0,13	± 0,070	± 0,080	± 0,100
> 1,20 to 1,60	± 0,13	± 0,14	± 0,16	± 0,080	± 0,100	± 0,110
> 1,60 to 2,00	± 0,16	± 0,17	± 0,19	± 0,100	± 0,110	± 0,130
> 2,00 to 2,50	± 0,19	± 0,20	± 0,22	± 0,130	± 0,140	± 0,160
> 2,50 to 3,00	± 0,22	± 0,23	± 0,24	± 0,160	± 0,170	± 0,180

[a] The thickness tolerances in the region of cold rolled welds may be increased by a maximum of 50 % over a length of 10 metres. This increase is applicable to all thicknesses and, unless otherwise agreed at the time of order, to normal and special tolerances over or under.

1) 1 MPa = 1 N/mm^2.

7 Tolerances on width

7.1 General

Width is measured perpendicularly to the longitudinal axis of the product.

The tolerances on width of flat products in low carbon and high yield strength steels are given in 7.2 for sheet and wide strip and in 7.3 for slit wide strip of width less than 600 mm.

7.2 Sheet and wide strip

The tolerances on width of sheet and wide strip shall be as given in Table 5.

Table 5 — Tolerances on width of sheet and wide strip

Dimensions in millimetres

Nominal width	Normal tolerances		Special tolerances (S)	
w	Under	Over	Under	Over
w ≤ 1200	0	+ 4	0	+ 2
1200 < w ≤ 1500	0	+ 5	0	+ 2
w > 1500	0	+ 6	0	+ 3

7.3 Slit wide strip of width less than 600 mm

The tolerances on width of slit wide strip of width less than 600 mm shall be as given in Table 6.

Table 6 — Tolerances on slit wide strip of width less than 600 mm

Dimensions in millimetres

Tolerance class	Nominal thickness	Nominal width							
	t	w< 125		125 ≤ w < 250		250 ≤ w < 400		400 ≤ w < 600	
		Under	Over	Under	Over	Under	Over	Under	Over
Normal	t < 0,6	0	+ 0,4	0	+ 0,5	0	+ 0,7	0	+ 1,0
	0,6 ≤ t < 1,0	0	+ 0,5	0	+ 0,6	0	+ 0,9	0	+ 1,2
	1 ≤ t < 2	0	+ 0,6	0	+ 0,8	0	+ 1,1	0	+ 1,4
	2 ≤ t ≤ 3	0	+ 0,7	0	+ 1,0	0	+ 1,3	0	+ 1,6
Special (S)	t < 0,6	0	+ 0,2	0	+ 0,2	0	+ 0,3	0	+ 0,5
	0,6 ≤ t < 1,0	0	+ 0,2	0	+ 0,3	0	+ 0,4	0	+ 0,6
	1,0 ≤ t < 2,0	0	+ 0,3	0	+ 0,4	0	+ 0,5	0	+ 0,7
	2,0 ≤ t ≤ 3,0	0	+ 0,4	0	+ 0,5	0	+ 0,6	0	+ 0,8

8 Tolerances on length

Length is measured along one of the long sides of the sheet or cut length.

The tolerances on length shall be as given in Table 7 and apply to all products covered by this standard.

Table 7 — Tolerances on length

Dimensions in millimetres

Nominal length	Normal tolerances		Special tolerances (S)	
	Under	Over	Under	Over
< 2000	0	6	0	3
≥ 2000	0	0,3 % of the length	0	0,15 % of the length

9 Tolerances on flatness

9.1 General

The tolerance on flatness is the maximum permitted distance between the sheet and the horizontal surface on which it is placed.

The measurement of waviness is only made on sheet edges.

The flatness tolerances apply only to sheet. If the sheet is ordered non-skin passed only the normal tolerances are applicable.

Flatness tolerances closer than special tolerances may be agreed at the time of the order.

9.2 Steel grades with specified minimum yield strength Re < 260 MPa

Flatness tolerances for these steel grades shall be as given in Table 8.

When these steel grades are ordered with the special tolerances given in Table 8, in case of dispute it is necessary to verify that the wave height of any edge wave of length over 200 mm is always less than:

— 1 % of its length for a nominal sheet width < 1500 mm;

— 1,5 % of its length for a nominal sheet width = 1500 mm.

If the length of an edge wave is less than 200 mm it is necessary to verify that its maximum height does not exceed 2 mm.

Table 8 — Flatness tolerances for steel grades with a specified minimum yield strength Re < 260 MPa

Dimensions in millimetres

Tolerance class	Nominal width	Nominal thickness		
	w	t < 0,7	0,7 ≤ t < 1,2	t ≥ 1,2
Normal	w < 600	7	6	5
	600 ≤ w < 1200	10	8	7
	1200 ≤ w < 1500	12	10	8
	w ≥ 1500	17	15	13
Special (FS)	w < 600	4	3	2
	600 ≤ w < 1200	5	4	3
	1200 ≤ w < 1500	6	5	4
	w ≥ 1500	8	7	6
	w < 1500	Height of edge wave of length over 200 mm must be less than 1 % of its length.		
	w ≥ 1500	Height of edge wave of length over 200 mm must be less than 1,5 % of its length. For edge waves of length less than 200 mm, the maximum height must not exceed 2 mm.		

9.3 Steel grades with specified minimum yield strength 260 MPa ≤ Re < 340 MPa

Flatness tolerances for these steel grades shall be as given in Table 9.

Flatness tolerances for widths less than 600 mm shall to agreed at the time of the order.

Table 9 — Flatness tolerances for high yield strength steel sheet with specified minimum yield strength $260 \leq R_e < 340$ MPa

Dimensions in millimetres

Tolerance class	Nominal width	Nominal thickness		
	w	t < 0,7	0,7 ≤ t < 1,2	t ≥ 1,2
Normal	600 ≤ w < 1 200	13	10	8
	1 200 ≤ w < 1 500	15	13	11
	w ≥ 1 500	20	19	17
Special (FS)	600 ≤ w < 1 200	8	6	5
	1200 ≤ w < 1 500	9	8	6
	w ≥ 1 500	12	10	9

9.4 Steel grades with specified minimum yield strength Re ≥ 340 MPa

For these steel grades, the values for flatness tolerances shall be specified at the time of the order.

10 Tolerances on out of squareness

The out-of-squareness (u) is the orthogonal projection of transverse edge over a longitudinal edge (see Figure 1).

The out-of-squareness shall not exceed 1 % of the actual width of the sheet.

11 Tolerances on edge camber

Edge camber (q) is the maximum distance between a longitudinal edge and a straight edge supported on the latter (see Figure 1).

Edge camber shall be measured on the concave edge. The basis of measurement shall be a distance of 2 m taken at any point on the edge. In the case of sheets and cut lengths with a length less than 2 m, the basis measurement shall be equal to their length.

The edge camber shall not exceed 5 mm over a length of 2 m. For lengths less than 2 metres, the edge camber shall not exceed 0,25 % of the actual length.

For slit wide strip of width less than 600 mm a special edge camber tolerance (CS) of 2 mm maximum on a 2 m length may be specified. This special edge camber tolerance is not applicable to slit wide strip of high yield strength steels.

12 Superimposition of dimensions

By agreement at the time of ordering, the tolerance on out-of-squareness and edge camber may be replaced by a requirement that a perfect rectangle formed by the ordered width and length dimensions can be superimposed onto the sheets delivered.

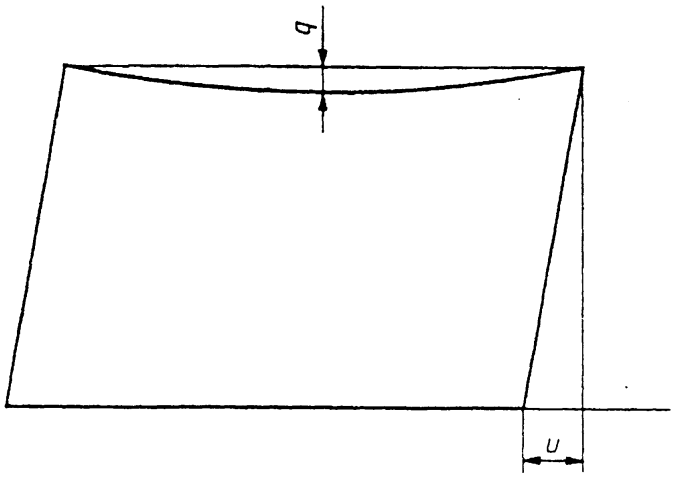

Figure 1 — Out-of-squareness (u) and edge camber (q)

Bibliography

[1] EN 10130, *Cold rolled low carbon steel flat products for cold forming – Technical delivery conditions*

[2] EN 10152, *Electrolytically zinc coated cold rolled steel flat products for cold forming – Technical delivery conditions*

[3] EN 10209, *Cold rolled low carbon steel flat products for vitreous enamelling – Technical delivery conditions*

[4] EN 10268, *Cold rolled steel flat products with higher yield strength for cold forming – Technical delivery conditions*

[5] EN 10271, *Electrolytically zinc-nickel (ZN) coated steel flat products – Technical delivery conditions*

[6] prEN 10338, *Cold rolled flat products of multiphase steels for cold forming – Technical delivery conditions*

[7] prEN 10336, *Continuously hot-dip coated and electrolytically coated strip and sheet of multiphase steels for cold forming – Technical delivery conditions*

[8] EN 10106, *Cold rolled non-oriented electrical steel sheet and strip delivered in the fully processed state*

[9] EN 10341, *Cold rolled electrical non-alloy and alloy steel sheet and strip delivered in the semi-processed state*

[10] EN 10202, *Cold reduced tinmill products – Electrolytic tinplate and electrolytic chromium/chromium oxide coated steel*

[11] EN 10205, *Cold reduced blackplate in coil form for the production of tinplate or electrolytic chromium/chromium oxide coated steel*

[12] EN 10139, *Cold rolled uncoated mild steel narrow strip for cold forming – Technical delivery conditions*

blank

BSI — British Standards Institution

BSI is the independent national body responsible for preparing British Standards. 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 9000. Fax: +44 (0)20 8996 7400.

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

Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: +44 (0)20 8996 9001. Fax: +44 (0)20 8996 7001. Email: orders@bsi-global.com. Standards are also available from the BSI website at http://www.bsi-global.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 Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre. Tel: +44 (0)20 8996 7111. Fax: +44 (0)20 8996 7048. Email: info@bsi-global.com.

Subscribing members of BSI 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@bsi-global.com.

Information regarding online access to British Standards via British Standards Online can be found at http://www.bsi-global.com/bsonline.

Further information about BSI is available on the BSI website at http://www.bsi-global.com.

Copyright

BSI
389 Chiswick High Road
London
W4 4AL