BRITISH STANDARD

BS EN
988 : 1997

Zinc and zinc alloys — Specification for rolled flat products for building

The European Standard EN 988 : 1996 has the status of a British Standard

ICS 77.120.60; 77.140.90

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee NFE/8, Zinc, upon which the following bodies were represented:

British Iron and Steel Producers' Association
Institute of British Foundrymen
London Metal Exchange
Metal Roofing Contractors' Association
Zinc Alloy Die Casters' Association
Zinc Development Association

This British Standard, having been prepared under the direction of the Engineering Sector Board, was published under the authority of the Standards Board and comes into effect on
15 January 1997

© BSI 1997

Amendments issued since publication

Amd. No.	Date	Text affected

The following BSI references relate to the work on this standard:
Committee reference NFE/8
Draft for comment 93/300802 DC

ISBN 0 580 26426 2

标准分享网 www.bzfxw.com 免费下载

Contents

© BSI 1997

National foreword

This British Standard has been prepared by Technical Committee NFE/8, Zinc, and is the English language version of EN 988 : 1996 *Zinc and zinc alloys — Specifications for rolled flat products for building*, published by the European Committee for Standardization (CEN).

This standard supersedes BS 6561 : 1985, which is withdrawn.

Cross-references

Publication referred to	Corresponding British Standard
EN 1179 : 1995	BS EN 1179 : 1996 *Specification for zinc and zinc alloys — Primary zinc*
EN 10002-1 : 1990	BS EN 10002-1 : 1990 *Tensile testing of metallic materials* Part 1 : *Method of test at ambient temperature*
EN 10204	BS EN 10204 : 1991 *Metallic products —Types of inspection documents*

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, pages i and ii, pages 1 to 8, an inside back cover and back cover.

© BSI 1997
标准分享网 www.bzfxw.com 免费下载

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 988

June 1996

ICS 77.120.60; 77.140.90

Descriptors: rolled products, steel strips, zinc products, zinc alloys, buildings, chemical composition, mechanical properties, dimensions, tests, designation, marking, packing

English version

Zinc and zinc alloys — Specifications for rolled flat products for building

Zinc et alliages de zinc — Spécifications pour produits laminés plats pour le bâtiment

Zink und Zinklegierungen — Anforderungen an gewalzte Flacherzeugnisse fur das Bauwesen

This European Standard was approved by CEN on 1996-03-07. 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, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

© 1996 Copyright reserved to CEN members

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 209, Zinc and zinc alloys, the secretariat of which is held by AFNOR.

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 December 1996, and conflicting national standards shall be withdrawn at the latest by December 1996.

This standard defines product requirements, derived from performance requirements established for various applications in building, and is supported by separate standards for specific and common test methods in the framework of CEN/TC 209/SC 3.

Annex A (informative) gives information on the physical properties of rolled zinc–copper–titanium products.

Annex B (informative) gives guidance to the user in calculating masses of the product for a range of thickness.

According to CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Contents

© BSI 1997

标准分享网 www.bzfxw.com 免费下载

1 Scope

This European Standard specifies requirements for rolled flat products for building purposes made from zinc–copper–titanium alloy, in the form of strip, sheet or cut length. It covers products in the range 0,6 mm up to and including 1,0 mm thickness and from 100 mm up to and including 1000 mm width.

This standard does not cover formed or shaped products or products prefabricated by any means other than cutting to size.

NOTE. By agreement between the purchaser and the supplier at the time of ordering, this standard or parts of this standard can be applied on other thicknesses or widths of rolled flat products made from zinc–copper–titanium alloy.

2 Normative references

This European Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

EN 1179	*Zinc and zinc alloys — Primary zinc*
EN 10002-1 : 1990	*Metallic materials — Tensile testing — Part 1: Method of test (at ambient temperature)*
EN 10204	*Metallic products — Types of inspection documents*
prEN 12019	*Zinc and zinc alloys — Optical emission spectrometric analysis*
ISO 7438 : 1985	*Metallic materials — Bend test*

3 Definitions

For the purposes of this standard, the following definitions apply.

3.1 flat product

Product manufactured by rolling, having a rectangular cross-section, the width being much greater than the thickness and the nominal thickness being the same throughout its length.

3.2 strip

Flat product, which after final rolling, and/or treatment if any, is wound to form a coil. No distinction is made between strip rolled to final width or strip slit from a wider strip.

3.3 coil

Delivery form of strip not less than 600 mm in width, wound in regularly superimposed laps.

3.4 slit coil

Delivery form of strip less than 600 mm in width, wound in regularly superimposed laps, obtained by slitting a coil.

3.5 sheet

Rectangular or square flat product not less than 600 mm in width, delivered flat and cut from strip.

3.6 cut length

Rectangular or square flat product less than 600 mm in width, delivered flat and cut from strip or sheet.

4 Requirements

4.1 Manufacturing

Zinc–copper–titanium alloy shall be made from zinc grade Z1 conforming to EN 1179, that is 99,995 % minimum zinc content, with addition of alloying elements.

The flat product shall be made either from casting in slabs or by continuous casting, but either of these shall subsequently be rolled to produce the coil.

4.2 Chemical composition

The alloy composition shall conform to the requirements given in table 1. The chemical composition shall be determined in accordance with **6.1** and **6.2**.

Table 1. Chemical composition

Chemical composition (m/m) %			
Cu	**Ti**	**Al**	**Zn**[1)]
min. 0,08 max. 1,0	min. 0,06 max. 0,2	— max. 0,015	Remainder

[1)] Zinc of grade Z1, see **4.1**.

4.3 Mechanical properties

The product shall conform to the requirements given in table 2. The tests shall be carried out in accordance with **6.1** and **6.3**.

Table 2. Mechanical properties

0,2 % proof strength, non-proportional extension $R_{p0,2}$ N/mm^2 min.	**Tensile strength** R_m N/mm^2 min.	**Percentage total elongation at fracture** $A_{50\ mm}$ % min.	**Percentage elongation after fracture in creep test** % max.	**Bend test**
100	150	35	0,1	No cracks on fold

© BSI 1997

4.4 Other requirements

The surface shall be smooth, free from blisters, cracks, deep striations other than usual rolling marks. Any surface marks shall not affect any kind of normal mechanical processing.

NOTE. Slight discoloration, white rust, grease or oiling spots are acceptable since they fade when weathering patina forms, without affecting mechanical or physical properties of the product.

Special decorative requirements such as preweathered or organic coated surfaces shall be specified at the time of order and agreed between the purchaser and the supplier.

5 Dimensions and tolerances

5.1 Thickness

The maximum deviation from the ordered nominal thickness, when measured at least 30 mm from the edge of the strip or sheet shall not exceed $\pm$ 0,03 mm.

NOTE. Sheet and strip are normally supplied in the following preferred nominal thicknesses: 0,60 mm; 0,65 mm; 0,70 mm; 0,80 mm; 1,00 mm.

5.2 Width

The maximum deviation from the ordered nominal width shall not exceed $^{+2}_{0}$ mm.

NOTE. Minimum nominal width is 100 mm, and maximum 1000 mm.

5.3 Length

The maximum deviation from the ordered nominal length of sheet or cut length shall not exceed $^{+10}_{0}$ mm.

NOTE. Preferred lengths are 2000 mm and 3000 mm.

5.4 Lateral curvature

Deviation from straightness, dimension d in figure 1, shall not exceed 1,5 mm/m when tested in accordance with **6.4.2**.

5.5 Flatness

Deviation from flatness, dimension d in figures 2 to 5, shall not exceed 2 mm when tested in accordance with **6.4.3**.

6 Sampling and test methods

6.1 Sampling

6.1.1 *Test units*

For the determination of the chemical composition, the test unit shall consist of one melt of the alloy in the furnace.

For the determination of the mechanical or shape characteristics, the test unit shall consist of one coil rolled to final thickness per melt.

6.1.2 *Test samples*

For the determination of the chemical composition, one test sample shall be taken during the casting of the melt.

For the determination of the mechanical or shape characteristics of coil or slit coil, one test sample shall be taken at the beginning or end of one of the products, with the sample length not exceeding 2 m. For sheet or cut length, the selection of the sample shall be left to the discretion of the inspector carrying out the tests.

6.1.3 *Test pieces*

For the determination of the chemical composition, the test piece shall be prepared in accordance with prEN 12019.

For the determination of the shape characteristics, the test piece shall be the test sample.

For the determination of the mechanical characteristics, the test piece shall be taken at a distance of at least 50 mm from the edge of the test sample.

6.2 Test method for chemical composition

The test for chemical composition shall be carried out in accordance with prEN 12019.

6.3 Test methods for mechanical properties

6.3.1 *General*

All tests for mechanical properties shall be carried out at (20 $\pm$ 2) °C.

6.3.2 *Tensile testing*

Tensile testing shall be carried out in accordance with EN 10002-1, using a test piece taken parallel to the rolling direction.

The shape of the test piece shall be in accordance with test piece type 1 given in **A.2.1** of EN 10002-1 : 1990.

6.3.3 *Creep test*

Creep test shall be carried out on a device exerting a constant load to the test piece as defined in **6.3.2**.

A constant stress of (50 $\pm$ 1) N/mm^2 shall be applied for (60 $\pm$ 1) min to the test piece. The percentage permanent elongation shall be measured after removal of the load.

6.3.4 *Bend test*

Bend test shall be carried out in accordance with IS0 7438 : 1985 on tensile testing equipment according to EN 10002-1, with the following further requirements:

The length of the test piece shall be (50 $\pm$ 1) mm, taken perpendicular to the rolling direction. Its width shall be (25 $\pm$ 1) mm. The fold shall be parallel to the rolling direction.

Pre-bending of the test piece shall be carried out with a bending device with two supports and a mandrel, according to **4.1** of ISO 7438 : 1985.

Final bending of the test piece shall be carried out in accordance with **6.3** to **6.5** of ISO 7438 : 1985, at a relative speed of the plates of 30 mm/min. The final force on the test piece shall be (7500 $\pm$ 100) N with bend radius of 0.

6.4 Test methods for shape characteristics

6.4.1 *General*

The test piece for the determination of the shape characteristics shall be either a sheet or a cut length, to ordered width and length, or part of a strip, to ordered width, cut to length and laid flat.

Measurement of lateral curvature or deviation from flatness shall be carried out with a suitable measuring device, such as a feeler gauge, dial gauge or scale.

© BSI 1997

标准分享网 www.bzfxw.com 免费下载

6.4.2 *Lateral curvature test*

The determination of lateral curvature (i.e. the deviation of a side edge from a straight line) shall be carried out with the test piece resting on a flat horizontal surface, against a straightedge as shown in figure 1. The measurement shall be taken on the concave side.

6.4.3 *Flatness test*

No flatness test shall be done on coils or silt coils, except with prior agreement between the purchaser and the supplier.

The deviation from flatness due to transverse curvature, longitudinal curvature, buckles and edge waves i.e. dimensions d in figures 2 to 5 shall be measured using a straightedge which does not deform the test piece during the measurement, and gap gauges.

7 Inspection documents

If requested by the purchaser at the time of ordering, the manufacturer shall issue a certificate, according to EN 10204, based on tests of delivered lot or based on statistical quality control measurements, as indicated by the purchaser.

8 Designation

The derivation of a product designation is shown in examples 1 and 2.

Example 1:

Strip conforming to this European Standard, nominal thickness 0,70 mm, nominal width 1000 mm, shall be designated:

zinc–copper–titanium EN 988 − 0,70 − 1000

Denomination

Number of this European Standard

Nominal thickness in millimetres

Nominal width in millimetres

NOTE. The denominations E: Zinc–copper–titanium
F: Zinc–cuivre–titane
D: Titanzink
designate the same product.

Example 2:

Sheet conforming to this European Standard, nominal thickness 0,70 mm, nominal width 1000 mm, nominal length 2000 mm, shall be designated:

Zinc–copper–titanium EN 988 – 0,70 − 1000 − 2000

Denomination

Number of this European Standard

Nominal thickness in millimetres

Nominal width in millimetres

Nominal length in millimetres

9 Marking, labelling, packaging

9.1 Marking and labelling

Unless otherwise agreed at the time of ordering, the following minimum marking requirements shall apply:

- denomination;
- number of this European Standard (EN 988);
- nominal thickness;
- melt and/or coil number;
- name of registered identification of manufacturer;
- name or identification of rolling mill.

Marking shall be durable and continuously printed on at least one row per 600 mm of width directly on the strip after final rolling.

For products with treated surfaces, the marking shall be printed on a label or sticker, attached to the product or attached to each bundle or pack at the discretion of the manufacturer.

9.2 Packaging

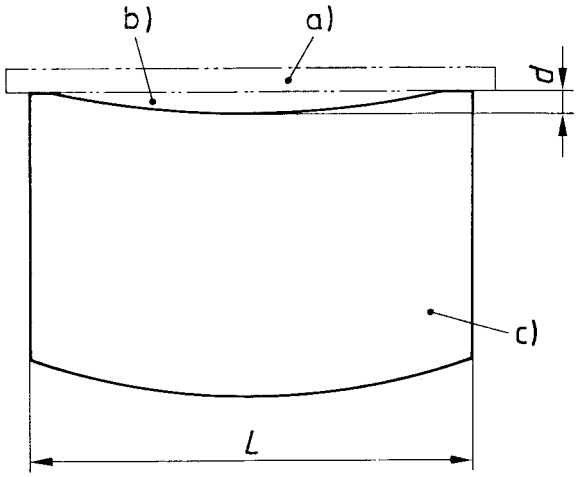
The type and method of packaging shall be at the discretion of the supplier, unless special packaging requirements have been agreed between the supplier and purchaser at the time of ordering. The packaging shall protect the product in normal transport and storage conditions.

10 Ordering information

The following information shall be supplied by the purchaser in the enquiry and/or order, to assist the manufacturer in supplying the correct material:

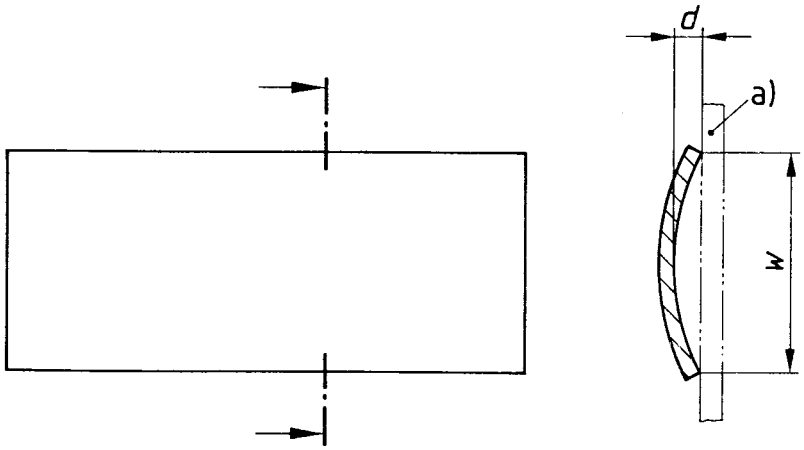
- denomination;
- number of this European Standard (EN 988);
- type of product (sheet, strip, cut length, coil, slit coil);
- dimensions required;
- quantity required;
- in the case of strip, the inner diameter of the coil;
- special decorative requirements, if appropriate;
- special packaging requirements, if appropriate;
- special requirements for inspection documents, if appropriate.

© BSI 1997



a) straightedge
b) side edge (concave side)
c) sheet, cut length or part of a strip
d deviation from straightness
L length

Figure 1. Lateral curvature

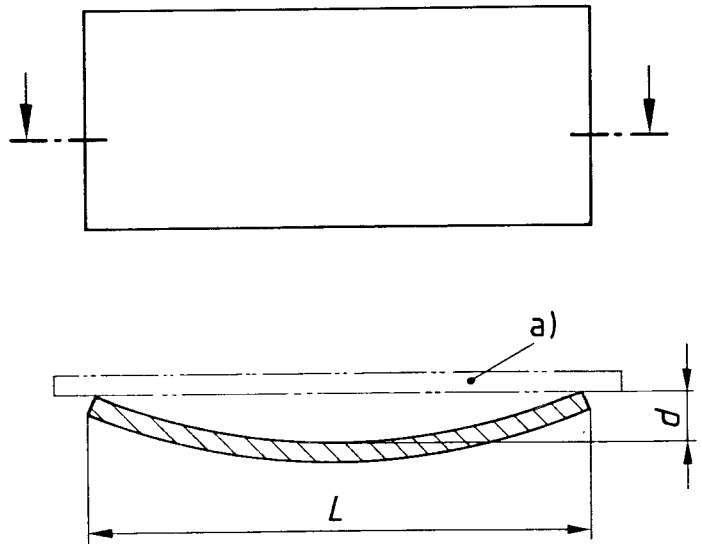


a) straightedge
d deviation from flatness
W width of the sheet or cut length

Figure 2. Transverse curvature

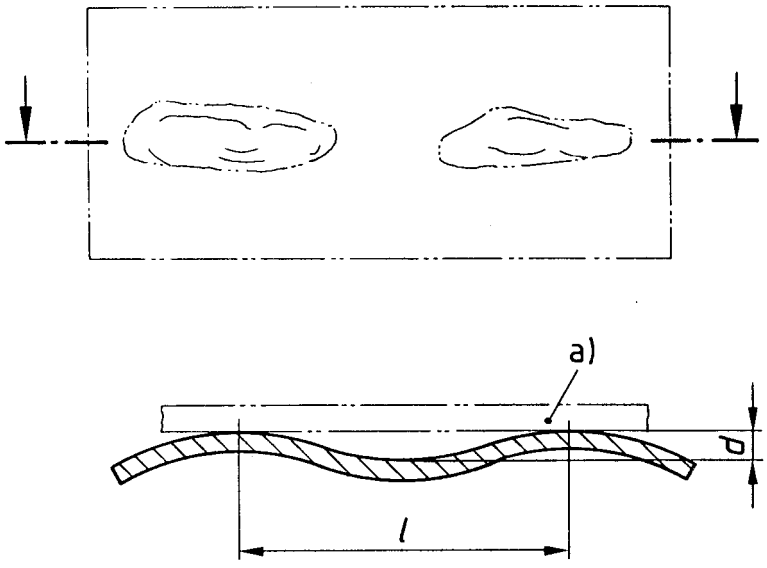
© BSI 1997

标准分享网 www.bzfxw.com 免费下载



a) straightedge
d deviation from flatness
L length of the sheet or cut length

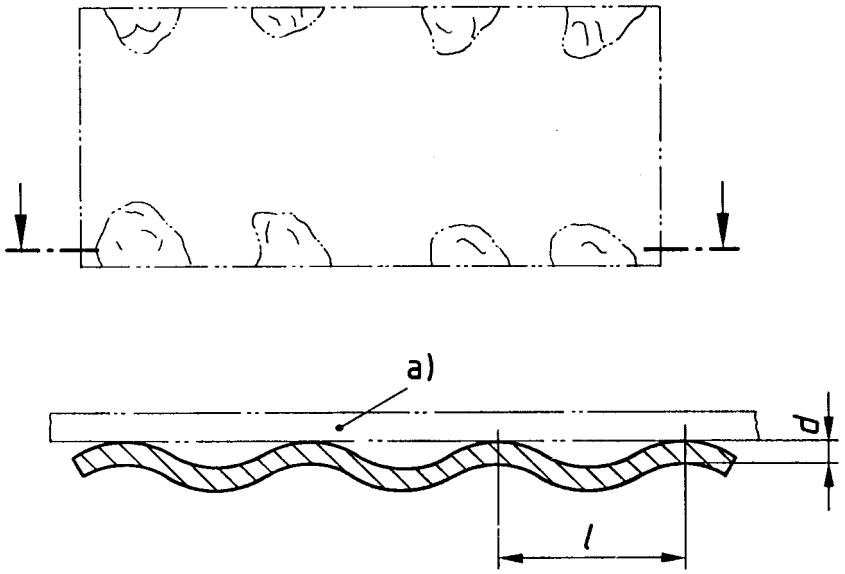
Figure 3. Longitudinal curvature



a) straightedge
d deviation from flatness
l length of buckle

Figure 4. Buckles

© BSI 1997



a) straightedge
d deviation from flatness
l length of edge wave

Figure 5. Edge waves

Annex A (informative)
Physical properties

Table A.1 gives typical physical properties. These properties are for guidance only and are not the subject of acceptance testing.

Table A.1 Physical properties

Property	Unit	Value
Density	kg/dm^3	7,2
Thermal expansion coefficient parallel to the rolling direction	m/(m · K)	22×10^{-6}
Melting point	°C	420
Recrystallization temperature	°C	300
Thermal conductivity	W/(m·K)	110
Electrical conductivity	MS/m	17
Danger of sparking	—	Non-sparking
Magnetic properties	—	Diamagnetic

Annex B (informative)
Calculation of mass

Mass of sheet or strip can be calculated from thickness, width and length and density.

Approximate values for guidance are given in table B.1.

Table B.1 Approximate mass per square metre

Nominal thickness mm	Mass kg/m^2 approximate
0,60	4,3
0,65	4,7
0,70	5,0
0,80	5,8
1,00	7,2

NOTE. All values listed are given for information only and are not subject to any acceptance testing.

© BSI 1997

标准分享网 www.bzfxw.com 免费下载

List of references

See national foreword.

© BSI 1997

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: 020 8996 9000. Fax: 020 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: 020 8996 9001. Fax: 020 8996 7001.

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: 020 8996 7111. Fax: 020 8996 7048.

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: 020 8996 7002. Fax: 020 8996 7001.

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.

If permission is granted, the terms may include royalty payments or a licensing agreement. Details and advice can be obtained from the Copyright Manager. Tel: 020 8996 7070.

BSI
389 Chiswick High Road
London
W4 4AL

标准分享网 www.bzfxw.com 免费下载