BS 7371-3:2009

BSI British Standards

Coatings on metal fasteners –

Part 3: Specifications for electroplated zinc coatings

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Contents

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This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 12, an inside back cover and a back cover.

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Foreword

Publishing information

This part of BS 7371 is published by BSI and came into effect on 31 August 2009. It was prepared by Subcommittee FME/9/1, *Mechanical properties of fasteners*, under the authority of Technical Committee FME/9, *Fasteners*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

This part of BS 7371 supersedes BS 7371-3:1993, which is withdrawn.

Relationship with other publications

Other published Parts of BS 7371 are as follows:

- BS 7371-1, *Coatings on metal fasteners – Specification for general requirements and selection guidelines*
- BS 7371-2, *Coatings on metal fasteners – Part 2: Specification for torque/clamping force relationship*
- BS 7371-4, *Coating on metal fasteners – Part 4: Specification for electroplated nickel, nickel/chromium and copper/nickel/chromium coatings*
- BS 7371-6, *Coatings on metal fasteners – Part 6: Specification for hot dipped galvanized coatings*
- BS 7371-7, *Coatings on metal fasteners – Part 7: Specification for mechanically applied zinc and zinc based coatings*
- BS 7371-8, *Coatings on metal fasteners – Part 8: Specification for sherardized coatings*
- BS 7371-9, *Coatings on metal fasteners – Part 9: Specification for phosphate or phosphate and oil coatings*
- BS 7371-10, *Coatings on metal fastenings – Part 10: Specification for phosphate or phosphate and oil coatings*.
- BS 7371-11, *Coatings on metal fasteners – Part 11: Specification for zinc flake non-electrolytically applied cured coatings* [1)]
- BS 7371-12, *Coatings on metal fasteners – Part 12: Requirements for imperial fasteners*

Information about this document

This is a full revision of the standard, and introduces the following principal changes:

- the option of specifying non-hexavalent chromium containing conversion coatings;
- details concerning cadmium have been deleted from this British Standard due to the restrictions below.

Assessed capability. Users of this British Standard are advised to consider the desirability of quality system assessment and registration against the appropriate standard in the BS EN ISO 9000 series by an accredited third-party certification body.

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1) Obsolete, replaced by BS EN ISO 10683 but remains current.

Hazard warnings

WARNING. This British Standard calls for the use of substances and/or procedures that can be injurious to health if adequate precautions are not taken. It refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is "shall".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

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.

The attention of the user of this Part of BS 7371 is drawn to the restrictions placed on the marketing and use of cadmium and its compounds contained in the Environmental Protection (Controls on Injurious Substances) (No 4) Regulations 1992 [1]. Cadmium is excluded from this Standard.

The attention of the user of this Part of BS 7371 is drawn to the restrictions placed on the use and supply of hexavalent chromium containing substances by ECC Directive 2000/53/EC on End of Life Vehicles [2] and amendment of Annex II by Commission Decision June 2002 [Document No. C(2002) 2238] [3], and non-use on Motor Vehicles marketed after July 2007.

Attention is also drawn to The Waste Electrical and Electronic Equipment (WEEE) Directive (2002/96/EC) [4], which came into force on 31st December 2006.

Introduction

The BS 7371 series deals with the performance and selection of coatings on metal fasteners and accessories. This Part of BS 7371 addresses zinc electroplated coatings.

The coating has a silver appearance which can be modified to yellow, olive green or black by a hexavalent chromium containing conversion (passivation) treatment applied to improve corrosion resistance. Tri-valent chromium containing top coatings can be applied which will give a transparent to bluish iridescence or pale green iridescence.

Additional coatings are available to further modify colour but these may influence coating performance, e.g. lubricity or electrical conductivity.

The shape of certain parts may create difficulties in the application of a coating of uniform thickness and reference to the coater is recommended to enquire if a difficulty exists or if it can be overcome by the use of specialized processing methods.

Typical difficulties as outlined in BS 4479-1 and BS 4479-2 arise when bulk processing:

a) long thin parts;

b) parts with flat surfaces that can stick together during processing, e.g. flat washers;

c) parts with recesses which do not receive the full coating;

d) parts with shapes that induce nesting and interlocking;

e) the internal surfaces of hollow parts.

The coatings are suitable for application to metal components such as the following:

1) parallel threaded fasteners and accessories;

2) screws that cut or form their own threads, e.g. self tapping screws (see for example BS 4174);

3) woodscrews (see for example BS 1210);

4) springs and spring components;

5) pipe nuts and connectors with parallel or tapered threads.

When these coatings are applied to non-ferrous fasteners, the relevant part of the specification that will apply will be the coating thickness requirement. These coatings are not to be specified for application to copper or copper alloys unless an undercoat is also specified, e.g. nickel.

NOTE The coating processes covered by this British Standard might induce hydrogen embrittlement in certain ferrous fasteners. Attention is drawn to the appropriate requirements in BS 7371-1.

Annexes include tables indicating suitable coating grades for standard screw threads and methods of determination of coating thickness.

1 Scope

This Part of BS 7371 specifies requirements for coatings applied by the electrolysis of solutions of zinc.

NOTE The coatings consist principally of zinc and can be lubricated to give controlled torque/clamping force properties when required (see, for example, BS 7371-2).

In addition to the requirements in this Part of BS 7371, the requirements in BS 7371-1 which are applicable to zinc electroplated coatings apply.

This Part of BS 7371 also specifies requirements for:

a) the coating thickness;

b) the type of conversion treatment or topcoat to be applied;

c) quality assessment of the corrosion resistance of unused coated parts when subjected to neutral salt spray testing (for example BS EN ISO 9227); and

d) an adhesion test.

Zinc electroplated coatings covered by this Part of BS 7371 are for use on fasteners and accessories where the following apply:

1) A coating giving galvanic protection is required for ferrous fasteners.

2) A substrate is required to improve the corrosion resistance of subsequent coatings on ferrous fasteners, e.g. organic.

3) The risk of hydrogen embrittlement of high tensile steel fasteners is acceptable.

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.

BS 3643-1, *ISO metric screw threads Part 1: Principles and basic data*

BS 3643-2, *ISO metric screw threads Part 2: Specification for selected limits of size*

BS 7371-1, *Coatings on metal fasteners – Specification for general requirements and selection guidelines*

BS EN ISO 2177, *Metallic coatings – Measurement of coating thickness – Coulometric method by anodic dissolution*

BS EN ISO 2819, *Metallic coatings on metallic substrates – Electrodeposited and chemically deposited coatings – Review of methods available for testing adhesion*

BS EN ISO 3497, *Metallic coatings – Measurement of coating thickness – X-ray spectrometric methods*

BS EN ISO 3882, *Metallic and other non-organic coatings – Review of methods of measurement of thickness.*

BS EN ISO 9227, *Corrosion tests in artificial atmospheres – Salt spray tests*

3 Terms and definitions

For the purposes of this Part of BS 7371, the terms and definitions given in BS 7371-1 apply.

4 Application and type of coating

4.1 Cleaning and pretreatment

Parts, fasteners and accessories shall be cleaned and pretreated in accordance with BS 7371-1.

NOTE Embrittlement of high tensile parts should be avoided.

4.2 Type of coating

The coating shall be either silver in appearance or modified by chromate passivation types C, D or Bk, or tri-valent topcoat types V or W (see Clause **6**).

NOTE 1 The colour may be further modified by the addition of an organic top coat.

The coating shall be electrically conductive and galvanically protective to steel under most climatic conditions.

NOTE 2 The presence of passivates, particularly the coloured ones, decreases electrical conductivity at the surface.

Where specified by the purchaser [see Clause **8**e)] the lubricity of the coating shall be modified by the addition of a lubricant and the torque/clamping force performance of a coated fastener shall conform to BS 7371-2.

NOTE 3 The addition of an organic coating might affect dimensions, lubricity and electrical conductivity.

4.3 Application

The coating of zinc shall be applied by the electrolysis of an aqueous solution of a salt or salts of the appropriate metal.

NOTE Stabilizers and brighteners may be added to the solution as necessary.

5 Coating

5.1 Surface condition

The coating shall be clean, dry and of uniform appearance. All surfaces of a component shall be coated unless otherwise agreed. The coating shall be free from blisters or loosely-adhering material.

5.2 Coating thickness

The specified coating thickness [see Clause **8**b)] shall be applied using the relationships between nominal, local and batch average thicknesses shown in Table 1; if coating thicknesses other than those given in Table 1 are required, this shall be agreed between the purchaser and the supplier.

Coating thicknesses for threaded parts shall confirm to Annex A. The coating thicknesses shall be measured by the methods described in Annex B.

Local thickness shall be measured on a significant surface (see Figure B.1 for measuring areas).

Exceeding the maximum batch average thickness shall not be a cause for rejection if the coated thread is still accepted by an appropriate 'GO' gauge, 4h for external threads and 4H for internal threads.

Table 1 **Nominal coating thicknesses**

Nominal coating thickness [A)] µm	**Effective coating thickness** µm		
	Minimum local thickness	**Batch average thickness**	
		min.	**max.**
3	3	3	5
5	5	4	6
8	8	7	10
10	10	9	12
12	12	11	15
15	15	14	18
20	20	18	23
25	25	23	28
30	30	27	35

NOTE BS 7371-1 covers a range of thicknesses up to and including 12 µm. Greater thicknesses are given here, as these can be ordered by the purchaser on agreement with the supplier.

[A)] See Annex A.

5.3 Corrosion resistance

Unless otherwise agreed, representative samples from a batch shall be selected in accordance with the sampling clause of BS 7371-1 and shall be tested for resistance to neutral salt spray in accordance with BS EN ISO 9227.

Coatings shall be graded by their corrosion resistance as given in Table 2. Surfaces which are not significant shall resist neutral salt spray for 50% of the time given in Table 2.

NOTE For routine quality control purposes, after the ability of the coating to conform to the corrosion test is established, evaluation of coating mass or thickness may be used, but for referee purposes the corrosion resistance requirements still apply.

Table 2 **Coating designation and corrosion resistance**

Designation	**Nominal coating treatment** μm	**Chromate treatment designation** [A]	**First appearance of white corrosion product** h	**First appearance of rust** h
Zn 3A	3 [B]	A	2	12
Zn 3B		B	6	12
Zn 3C		C	24	24
Zn 3D		D	24	24
Zn 5A	5	A	2	24
Zn 5B		B	12	36
Zn 5C		C	48	72
Zn 5D		D	72	96
Zn 5Bk		Bk	12	24
Zn 8A	8	A	6	48
Zn 8B		B	24	72
Zn 8C		C	72	120
Zn 8D		D	96	144
Zn 8Bk		Bk	24	72
Zn 12A	12	A	6	72
Zn 12B		B	24	96
Zn 12C		C	72	144
Zn 12D		D	96	168
Zn 12Bk		Bk	24	96
		Tri-valent topcoats designation [C]		
Zn 3V	3	V	2	12
Zn 3W	3	W	24	24
Zn 5V	5	V	6	24
Zn 5W	5	W	36	72
Zn 8V	8	V	12	48
Zn 8W	8	W	60	120
Zn 12V	12	V	12	72
Zn 12W	12	W	60	144

NOTE 1 The corrosion performance of tri-valent topcoats are only slightly lowered by thermal cycling.

NOTE 2 Specifying a sealant (suffix SL) will extend the above corrosion resistances by up to 96 hours. The degree of improvement will depend on the chemistry of the topcoat / sealant.

[A] See Clause **6**.

[B] Low coating thicknesses impair chromate conversion performance.

[C] See Table 4.

5.4 Adhesion

When tested in accordance with BS EN ISO 2819, the metallic coating shall continue to adhere to basic metal.

6 Chromate treatment or topcoat

The chromate treatment (passivation) or tri-valent topcoat shall be designated by the symbols specified in Table 3 and Table 4.

NOTE A sealant can be applied to improve handling resistance, which for use on fasteners usually incorporates a lubricant. Organic resin type sealants can also be used, see BS EN ISO 2819.

Table 3 **Designation of chromate treatments**

Designation	Type	Typical appearance	Corrosion protection
A	Clear	Transparent clear, sometimes with a bluish tinge	Slight, for example against staining during handling or against high humidity in mildly corrosive conditions
B	Bleached	Transparent with slight iridescence	
Bk	Black	Black with slight iridescence	
C	Iridescent	Yellow iridescent	Considerable, including protection against certain organic vapours
D	Opaque	Olive green, shading to brown or bronze	

NOTE This table is modified from Table 1 of BS 6338:1982.

Table 4 **Designation of tri-valent based treatments**

Designation	Type	Typical appearance	Corrosion protection
V	Clear	Transparent clear, sometimes with a bluish tinge	Slight.
W	Heavy	Transparent with pale coloured iridescence	Good
SL	Sealant with lubrication	Colourless to slight iridescent	Considerable

7 Suitability of coatings for components with parallel threads

NOTE 1 The suitability of the coatings specified in this Part of BS 7371 for parts with screw threads is limited by the clearance between external and internal threads.

Maximum electroplating thickness to be applied to parts incorporating standard thread forms shall be as specified in Annex A, in order to minimize the risk of interference when both threaded elements of an assembly are similarly coated.

NOTE 2 Annex C gives guidance for modifying thread dimensions to accommodate thicker coatings.

NOTE 3 Modification of male thread dimensions from tolerance class 6g can influence the mechanical properties.

8 Information to be documented and supplied to the coater

The following information shall be fully documented and supplied to the coater:

a) the number and date of this British Standard i.e. BS 7371-3:2009;

b) the nominal coating thickness (see Table 1) and the coating designation (see Table 2);

c) the type of chromate conversion treatment or topcoat required (see Clause **6**);

d) the hardness and property class of the component to be plated;

e) if lubrication of the coating is required in accordance with BS 7371-2;

f) the significant surfaces, if not as defined in BS 7371-1;

g) any additional protection required for delivery (see BS 7371-1);

h) the requirements of any subsequent operations (e.g. the application of an adhesive);

i) any special requirements (for example, selective plating: see Annex C).

9 Identification

The coating shall be identified by the number and date of this British Standard, i.e. BS 7371-3:2009 [2)] together with the coating designation in accordance with Table 2.

NOTE The chromate conversion treatment or topcoat is included in the designation.

A lubricated condition shall be designated by the letter L after the designation (see **4.2**).

EXAMPLES
A zinc electroplated coating of 8 µm thickness with yellow chromate conversion coating and added lubricant would be identified as BS 7371-3:2009 Zn8CL.

A zinc electroplated coating of 5 µm thickness with heavy weight tri-valent topcoat with lubricated sealant would be identified as BS 7371-3:2009 Zn5WSL.

2) Marking BS 7371-3:2009 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. See the Foreword for further details.

Annex A (normative) Coating thickness for threaded parts

In order to reduce the risk of interference on assembly of threads with electroplated coatings, the nominal coating thickness shall not exceed one-quarter of the fundamental deviation of the thread as specified in Table A.1. The effective coating thicknesses measured according to one of the methods specified in Annex B shall conform to the values specified in Table 1. If batch average thickness measurement is used for threaded parts having a nominal thread length > 5*d*, then a smaller nominal thickness shall be applied (see Table A.1).

Table A.1 **Upper limits of nominal coating thickness**

Pitch *P*	Nominal thread diameter[A] d mm	Internal thread	External thread													
		Tolerance position G[B]	Tolerance position g[B]					Tolerance position f[B]					Tolerance position e[B]				
				Normal coating thickness max.					Normal coating thickness max.					Normal coating thickness max.			
				[C]	[D]				[C]	[D]				[C]	[D]		
				All nominal lengths	Nominal length *l*				All nominal lengths	Nominal length *l*				All nominal lengths	Nominal length *l*		
		Fundamental deviation µm	Nominal coating thickness max. µm	Fundamental deviation µm	µm	*l* < 5*d* µm	5*d* < *l* < 10*d* µm	10*d* < *l* < 15*d* µm	Fundamental deviation µm	µm	*l* < 5*d* µm	5*d* < *l* < 10*d* µm	10*d* < *l* < 15*d* µm	Fundamental deviation µm	µm	*l* < 5*d* µm	5*d* < *l* < 10*d* µm	10*d* < *l* < 15*d* µm
0.2	—	+17	3	–17	3	3	3	3	—	—	—	—	—	—	—	—	—	—
0.25	1; 1.2	+18	3	–18	3	3	3	3	—	—	—	—	—	—	—	—	—	—
0.3	1.4	+18	3	–18	3	3	3	3	—	—	—	—	—	—	—	—	—	—
0.35	1.6 (1.8)	+19	3	–19	3	3	3	3	–34	8	8	5	5	—	—	—	—	—
0.4	2	+19	3	–19	3	3	3	3	–34	8	8	5	5	—	—	—	—	—
0.45	2.5 (2.2)	+20	5	–20	5	5	3	3	–35	8	8	5	5	—	—	—	—	—
0.5	3	+20	5	–20	5	5	3	3	–36	8	8	5	5	–50	12	12	10	8
0.6	3.5	+21	5	–21	5	5	3	3	–36	8	8	5	5	–53	12	12	10	8
0.7	4	+22	5	–22	5	5	3	3	–38	8	8	5	5	–56	12	12	10	8
0.75	4.5	+22	5	–22	5	5	3	3	–38	8	8	5	5	–56	12	12	10	8
0.8	5	+24	5	–24	5	5	3	3	–38	8	8	5	5	–60	15	15	12	10
1	6 (7)	+26	5	–26	5	5	3	3	–40	10	10	8	5	–60	15	15	12	10
1.25	8	+28	5	–28	5	5	5	3	–12	10	10	8	5	–63	15	15	12	15
1.5	10	+32	8	–32	8	8	5	5	–45	10	10	8	5	–67	15	15	12	15
1.75	12	+34	8	–34	8	8	5	5	–48	12	12	8	8	–71	15	15	12	15
2	16 (14)	+38	8	–38	8	8	5	5	–52	12	12	10	8	–71	15	15	12	10
2.5	20 (18; 22)	+42	10	–42	10	10	8	5	–58	12	12	10	8	–71	20	20	15	12
3	24 (27)	+48	12	–48	12	12	8	8	–53	15	15	12	10	–80	20	20	15	12
3.5	30 (33)	+53	12	–53	12	12	10	8	–70	15	15	12	10	–90	20	20	15	15
4	36 (39)	+60	15	–60	15	15	12	10	–75	15	15	15	12	–95	20	20	15	15
4.5	42 (45)	+63	15	–63	15	15	12	10	–80	20	20	15	12	–100	25	25	20	15
5	48 (52)	+71	15	–71	15	15	12	10	–85	20	20	15	12	–106	25	25	20	15
5.5	56 (60)	+75	15	–75	15	15	15	12	–90	20	20	15	12	–112	25	25	20	15
6	64	+80	20	–80	20	20	15	12	–95	20	20	15	12	–118	25	25	20	15

NOTE *The additional deviations that can be applied to threads specially manufactured to accommodate thick coatings are given in Table C.1.*

A) Information for coarse pitch threads is given for convenience only. The determining characteristic is the thread pitch.
B) Maximum values of nominal coating thickness if local thickness measurement is agreed.
C) Maximum values of nominal coating thickness if batch average thickness measurement is agreed.
D) See BS 3643, Part 1 and Part 2.

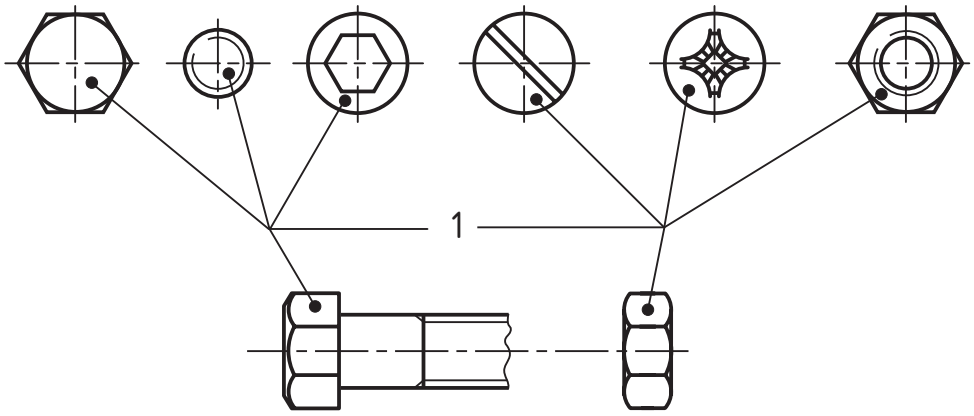
Annex B (normative) Measurement of coating thickness

B.1 Local thickness

The local thickness shall be measured by one of the methods contained in BS EN ISO 2177 or BS EN ISO 3497 or BS EN ISO 3882.

The thickness shall only be measured on the measuring areas (significant surfaces) as shown in Figure B.1.

Figure B.1 **Measuring area for local coating thickness measurement on fasteners**



Key

1 Measuring area

B.2 Determination of group and batch average coating thickness

WARNING. This British Standard calls for the use of substances and/or procedures that can be injurious to health if adequate precautions are not taken. It refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage.

B.2.1 Reagents

B.2.1.1 *Stripping solution, consisting of the following:*

- hydrochloric acid 800 mL (density 1.16 g/mL to 1.18 g/mL);
- distilled water 200 mL;
- antimony trioxide 20 g.

B.2.1.2 *Acetone or an organic solvent*.

B.2.2 Procedure

Degrease the group of components in the acetone or an organic solvent, dry thoroughly and weigh to an accuracy of 0.01% of the total mass of the group of components, then totally immerse the components in the stripping solution and turn them over to allow free access to all surfaces. After the effervescence has ceased, remove the samples, wash immediately in running water, and wipe with a soft cloth to remove any loose deposits. Immerse in clean acetone, remove, dry thoroughly and reweigh.

B.2.3 Calculations

B.2.3.1 Group average thickness

Calculate the group average thickness of coating (in µm) using the formula

$$\text{Thickness} = \frac{K\left(m_0 - m_1\right)}{A}$$

where:

K is a factor dependent on the density of the coating (see **B.2.3.2**);

m_0 is the original mass of the group of components (in g);

m_1 is the final mass of the group of components (in g);

A is the total surface area of the group of components (in cm^2)[3)].

B.2.3.2 Values of K

For zinc, K = 1410, assuming a density of 7.1 g/cm^3 for zinc.

B.2.3.3 Batch average coating thickness

Calculate the batch average coating thickness from the following formula:

$$\text{Batch average coating thickness} = \frac{\text{Sum of all group average coating thicknesses}}{\text{Number of groups}}$$

[3)] The surface areas of common metric components are given in BS 7371-1.

Annex C (informative) Guidance on procedures that may be adopted to accommodate thick coatings

C.1 Modification of thread dimensions

When, in order to provide improved corrosion resistance, it is required to deposit coatings thicker than those that appear in Table A.1 (or alternatively, when it is required to apply coatings to components of pitches smaller than appear in Table A.1), threads would need to be manufactured to special limits and tolerances.

The minimum pitch limits of applicability in Table A.1 may be lowered if (for any particular thread) the normal tolerance is restricted at the maximum metal limits. This provides a greater fundamental deviation or, in the case of tolerance position H, it provides a deviation which does not otherwise exist. Alternatively, the whole tolerance zone may be displaced to provide a greater fundamental deviation.

The minimum fundamental deviation for particular pitches and deposit thicknesses are given in Table C.1.

C.2 Selective electroplating

Where a thick deposit is required on a portion of the fastener (for example the heads of bolts or blind nuts) it is often possible to use the procedure of selective electroplating. In such cases the thickness of the deposits applied to the different areas of the fastener should be specified by the purchaser.

Table C.1 **Minimum fundamental deviation required to accommodate coatings too thick to be applied to standard threads, metric threads**

Nominal coating thickness µm	**Minimum fundamental deviation**			
	If local thickness measurement is agreed	**If batch average thickness measurement is agreed**		
	All nominal lengths	$l < 5d$	$5d < l < 10d$	$10d < l < 15d$
	µm	µm	µm	µm
3	12	12	15	18
5	20	20	25	30
8	32	32	40	48
10	40	40	50	60
12	48	48	60	72
15	60	60	75	90
20	80	80	100	120
25	100	100	125	150
30	120	120	150	180

NOTE 1 If the tolerance class already has a basic deviation (for example, G, g, f or e), the deviation is deducted from the relevant deviation in Table C.1 to give the minimum additional basic deviation.

NOTE 2 Since the modifications for the thicker deposits might significantly reduce the thread engagement, their application should be agreed between manufacturer and purchaser.

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 1210, *Specification for wood screws* [4)]

BS 4174, *Specification for self–tapping screws and metallic drive screws* [4)]

BS 4479-1, *Design of articles that are to be coated – Part 1: General recommendations* [4)]

BS 4479-2, *Design of articles that are to be coated – Part 2: Recommendations for electroplated and autocatalytic coatings* [4)]

BS 6338:1982, *Specification for chromate conversion coatings on electroplated zinc and cadmium coatings*

BS 7371-2, *Coatings on metal fasteners – Part 2: Specification for torque/clamping force relationship*

BS EN ISO 9227, *Corrosion tests in artificial atmospheres – Salt spray tests*

BS EN ISO 10683, *Fasteners – Non-electrolytically applied zinc flake coatings*

Other references

[1] GREAT BRITAIN. Environmental Protection (Controls on Injurious Substances) (No. 4) Regulations 1992. London: HMSO [5)]

[2] EUROPEAN COMMUNITIES. 2000/53/EC. Directive on End of Life Vehicles Vehicles and amendment of Annex II by Commission Decision June 2002 (Document No. C(2002) 2238). Luxembourg: Office for Official Publications of the European Communities, 2000/2002. [5)]

[3] EUROPEAN COMMUNITIES. 2002/525/EC. Amendment of Annex II by Commission Decision June 2002 (Document No. EC(2002) 2238). Luxembourg: Office for Official Publications of the European Communities, 2002. [5)]

[4] EUROPEAN COMMUNITIES. 2002/96/EC. The Waste Electrical and Electronic Equipment (WEEE) Directive. Luxembourg: Office for Official Publications of the European Communities, 2002. [5)]

[4)] Referred to in the Introduction only.

[5)] Referred to in the Foreword only.

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