



BSI Standards Publication

**Aerospace series — Washers,
lock, with radial serrations
in corrosion resisting steel,
cadmium plated for flight
control rods — Dimensions**

National foreword

This British Standard is the UK implementation of EN 2596:2006. It supersedes BS EN 2596:1990 which is withdrawn.

The UK Technical Committee draws the attention of the user, to the fact that under normative references, the quality management systems Standard applicable to BS EN 2596, is EN 9133 and not EN 9100, as is the case for all other EN standards for radial serrated lock washers. This error has been identified to CEN but no corrigenda has been issued to date. It is expected to be corrected at the next amendment or revision of the European Standard.

The UK participation in its preparation was entrusted to Technical Committee ACE/12, Aerospace fasteners and fastening systems.

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

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

© BSI 2011

ISBN 978 0 580 55899 3

ICS 49.030.50

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

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 28 February 2011.

Amendments issued since publication

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

EUROPEAN STANDARD

EN 2596

NORME EUROPÉENNE

EUROPÄISCHE NORM

May 2006

ICS 49.060

Supersedes EN 2596:1988

English Version

Aerospace series - Washers, lock, with radial serrations in corrosion resisting steel, cadmium plated for flight control rods - Dimensions

Série aéronautique - Freins à stries radiales en acier résistant à la corrosion, cadmiés pour bielles de commandes de vol - Dimensions

Luft- und Raumfahrt - Sicherungen, radialverzahnt aus korrosionsbeständigem Stahl, verkadmet für Bediengestänge von Flugsteuerungen - Maße

This European Standard was approved by CEN on 6 January 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

Contents		Page
Foreword		3
1	Scope	4
2	Normative references	4
3	Required characteristics	4
4	Designation	6
5	Marking	7
6	Qualification	7

Foreword

This European Standard (EN 2596:2006) has been prepared by the European Association of Aerospace Manufacturers - Standardization (AECMA-STAN).

After enquiries and votes carried out in accordance with the rules of this Association, this Standard has received the approval of the National Associations and the Official Services of the member countries of AECMA, prior to its presentation to CEN.

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 November 2006, and conflicting national standards shall be withdrawn at the latest by November 2006.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This European Standard supersedes EN 2596:1988.

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 the United Kingdom.

1 Scope

This standard specifies the characteristics of lock washers in corrosion resisting steel, cadmium plated, with radial serrations primarily intended for flight control rods.

These lock washers are intended to immobilise the rod end in relation to the rod body, whilst allowing a precise positional adjustment.

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 2133, *Aerospace series — Cadmium plating of steels with specified tensile strength $\leq 1\ 450$ MPa, copper, copper alloys and nickel alloys.*

EN 2538, *Aerospace series — Steel FE-PM3801 (X5CrNiCu17-4) — Air melted — Solution treated and precipitation treated — Sheet and strip — $a \leq 6$ mm — $R_m \geq 1\ 310$ MPa.*¹⁾

EN 2540, *Aerospace series — Steel FE-PM3902 (X7CrNiAl17-7) — Air Melted — Solution treated and precipitation hardened — Sheet and strip — $a \leq 6$ mm — $1\ 240$ MPa $\leq R_m \leq 1\ 450$ MPa.*¹⁾

EN 9100, *Aerospace series — Quality management systems — Requirements (based on ISO 9001:2000) and Quality systems — Model for quality assurance in design, development, production, installation and servicing (based on ISO 9001:1994).*

3 Required characteristics

3.1 Dimensions – Mass

Configuration shall correspond with Figures 1, 2 and 3.

The dimensions and masses shall conform with values quoted in Tables 1 and 2.

Dimensions apply after cadmium plating.

3.2 Surface roughness

$R_a = 3,2$ μm . This value applies prior to cadmium plating.

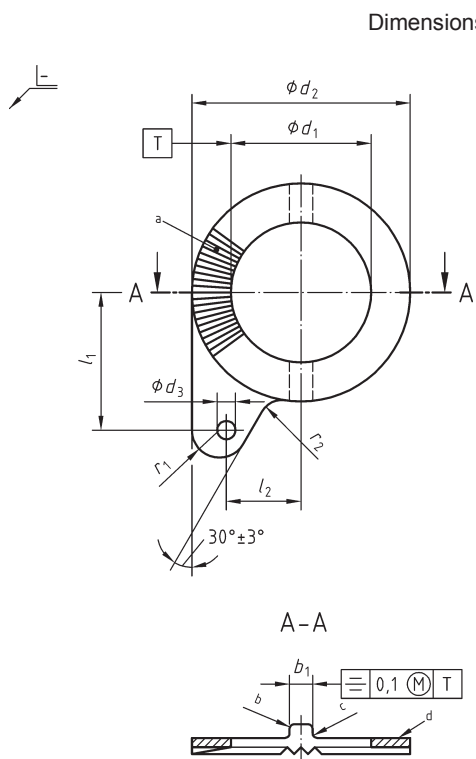
3.3 Material

Steel according to EN 2540 or EN 2538 (inactive for new design).

3.4 Surface treatment

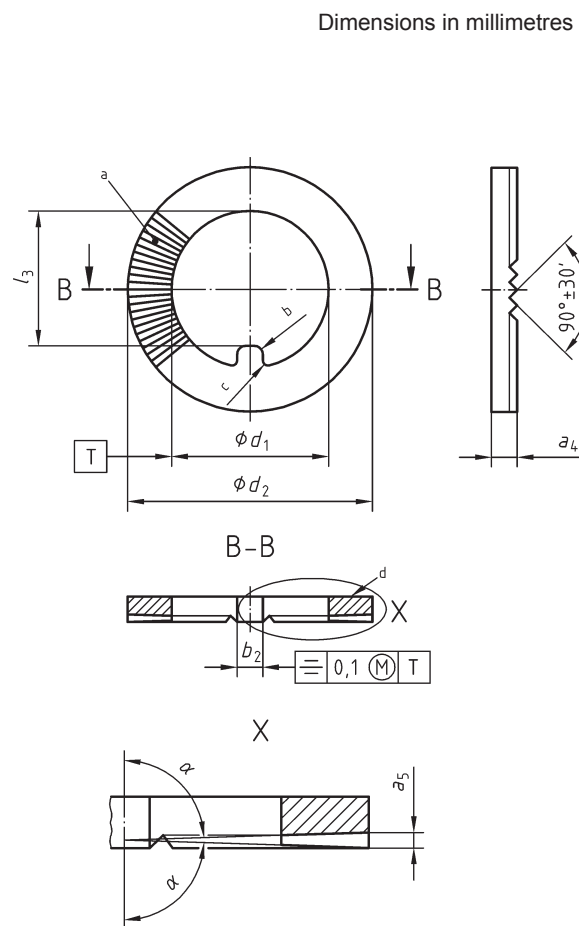
Cadmium plated according to EN 2133, 10 μm to 20 μm , without chromatation.

1) Published as AECMA Prestandard at the date of publication of this standard.



- a N equidistant serrations
- b R 0,5 to 0,8
- c R 0,3 to 0,5
- d Identification mark

Figure 1 — Element for rod body side – Code A



- a N equidistant serrations
- b R 0,5 to 0,8
- c R 0,3 to 0,4
- d Identification mark

Figure 2 — Element for rod end side – Code B

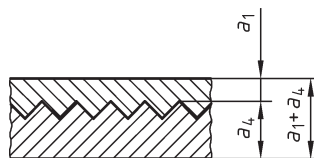


Figure 3 — Thickness of lock washer assembly

Table 1

Dimensions in millimetres

Diameter code	d_1	d_2	d_3	a_1	a_2	a_3	a_4	(a_5)	b_1	b_2	l_1	l_2	l_3	r_1	r_2
	$\pm 0,1$	$\begin{matrix} +0,5 \\ 0 \end{matrix}$	$\pm 0,25$	$\pm 0,15$	$\begin{matrix} +0,15 \\ -0,25 \end{matrix}$	$\pm 0,15$	$\pm 0,15$		$\pm 0,15$	$\pm 0,15$	$\pm 0,25$	$\pm 0,25$	$\begin{matrix} 0 \\ -0,15 \end{matrix}$	$\pm 0,15$	$\pm 0,15$
08	8,2	12,7	1,6	0,58	1,0	1,1	1,8	0,5	1,3	1,3	8,4	4,0	6,8	2,4	0,70
10	10,2	19,0		0,80		1,2	1,4	2,0	0,6	2,0	2,0	12,0	6,5		8,3
12	12,2		22,0		1,5									1,6	
14	14,2	25,4		0,86		1,5	1,6	2,3	0,7	3,0	3,0	14,7	10,0		14,0
16	16,3		25,4		0,86									1,5	

Table 2

Diameter code	N Number of serrations	α		$a_1 + a_4$	Mass lock washer assembly
		min.	max.	mm	g
				$\pm 0,3$	\approx
08	42	87°21'	88°21'	2,38	1,8
10	50	87°42'	88°42'	2,80	6,0
12					4,5
14	56	89°20'	90°	3,10	5,8
16					9,6

4 Designation

EXAMPLE

Description block	Identity block
WASHER LOCK	EN2596A08

Number of this standard _____

Code for the lock washer (see Table 3) _____

Diameter code (see Table 1) _____

NOTE If necessary, the code I9005 shall be placed between the description block and the identity block.

Table 3

Lock washer	Code
Element, rod body side, according to Figure 1	A
Element, rod end side, according to Figure 2	B
Lock washer assembly	C

5 Marking

In addition to the manufacturer's own marking, each lock washer and its packaging shall be marked, using the identity block as defined in Clause 4 of this standard.

The marking position and method are at the manufacturer's option. The marking, when it is possible, shall be indelible and shall not impair the characteristics of the lock washer.

6 Qualification

According to EN 9100.

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.

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 bsmusales@bsigroup.com.

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

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.

Copyright

All the data, software and documentation set out in all British Standards and other BSI publications are 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. 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. Details and advice can be obtained from the Copyright & Licensing Department.

Useful Contacts:

Customer Services

Tel: +44 845 086 9001

Email (orders): orders@bsigroup.com

Email (enquiries): cservices@bsigroup.com

Subscriptions

Tel: +44 845 086 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



...making excellence a habit.™