

Specification for

Corrosion-resisting steel crinkle washers

ICS 49.030.50

Foreword

This British Standard is published by BSI Standards Limited, under licence from The British Standards Institution.

BS SP 139 and SP 140:1969+A2:2012 supersedes BS SP 139 and SP 140:1969 (incorporating Amendment No 1:1988), which is withdrawn.

Text introduced or altered by Amendment No. 2 is indicated in the text by tags **A₂** ~~A₂~~. Minor editorial changes are not tagged. Previous amendments are not indicated.

This British Standard has been prepared at the request of the Aerospace Industry to provide a series of corrosion-resisting steel crinkle washers, suitable for aerospace applications. It lists a range in current use together with part or code numbers which is complementary to the range given in BS SP 134 to BS SP 138 — “Copper-beryllium crinkle washers”.

This Standard makes reference to the following publications:

British Standards

BS EN 2133, *Cadmium plating of steels with specified tensile strength ≤ 1450 MPa, copper, copper alloys and nickel alloys*

BS EN 10088-2:2005, *Stainless steels – Part 2: Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes*

BS EN ISO 6507-1, *Metallic materials – Vickers hardness test – Part 1: Test method*

BS EN ISO 9445-1, *Continuously cold-rolled stainless steel – Tolerances on dimensions and form – Part 1: Narrow strip and cut lengths*

BS EN ISO 9445-2, *Continuously cold-rolled stainless steel – Tolerances on dimensions and form – Part 2: Wide strip and plate/sheet*

Ministry of Defence Standard

Def Stan 03-19, *Electro-disposition of cadmium.*

CAUTION. BS SP 140 crinkle washers have cadmium as a plating material, which has been restricted and/or banned for use in many countries owing to environmental and health concerns; they should not be used in new product designs. Local officials should be consulted about any concerns on using cadmium plated parts.

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.

This British Standard, having been approved by the Aerospace Industry Standards Committee was published under the authority of the Executive Board of the Institution on 31 December 1969

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 and 2 and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

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The following BSI reference relates to the work on this standard:

Committee reference ACE/14
Drafts for comment 68/29666, 12/30266655

Amendments issued since publication

Amd. No.	Date	Comments
5766	October 1988	
A2	December 2012	See Foreword.

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1 Scope

This standard specifies dimensions, tolerances and general requirements for a series of corrosion-resisting steel crinkle washers suitable for use with screwed fasteners ranging from 0.060 in (Unified No. 0) to 0.750 in nominal diameter. It provides for natural finish, BS SP 139 and cadmium coating BS SP 140.

NOTE The values stated in imperial units are to be regarded as the standard and the metric equivalents are approximate. More accurate conversions should be based upon the data in BS 350 "Conversion factors and tables".

2 Nomenclature

For the purposes of this British Standard the washers shall be known as "corrosion-resisting steel crinkle washers".

3 Material

A₂ Washers conforming to this specification shall be manufactured from material conforming to BS EN 10088-2 X5CrNi18-10(1.4301) except that the material is to be supplied cold to a hardness of 330 HV minimum, when tested in accordance with the provisions of BS EN ISO 6507-1. **A₂**

A₂ 4 Protective finish

4.1 Uncoated washers shall have a surface finish in accordance with BS EN 10088-2:2005, Table 6, 2B.

4.2 Cadmium coated washers shall be as specified in **4.1** plus coating in accordance with the requirements of specification Def Stan 03-19 or BS EN 2133. **A₂**

4.3 Identification by the relevant British Standard number in accordance with **7.1** shall specify the finish.

5 Freedom from defects

The surfaces of the washers shall be clean, smooth and free from harmful defects.

6 Dimensions

The dimensions of the finished washers in the uncoated condition shall be in accordance with Table 3.

7 Identification

7.1 The washers shall be identified by the relevant British Standard number (see Table 1) and the appropriate part number or code letter (see Table 3), for example, an uncoated washer for a 0.25 in diameter fastener would be identified as

A₂ SP139E **A₂**.

7.2 The British Standard number and code letter shall not be applied direct onto the washers, but they shall be marked on the labels or parcels containing washers complying with this British Standard.

8 Closing test for permanent set

Sample washers shall be selected from batches in accordance with Clause 9. The samples shall be completely closed; on release of the pressure the overall height of each washer shall not be less than twice its sectional thickness. This application and removal of pressure shall then be repeated twenty times in quick succession, after which the overall height of the washer shall not have been reduced to less than 1.7 times its sectional thickness.

9 Sampling procedure

9.1 Definition of a batch. For the purposes of this standard a batch shall consist of a number of washers of the same size made from material of the same strip (or cast).

9.2 Sampling size. For the test specified in Clause 8, a sample shall be selected in accordance with Table 2.

9.3 Testing samples. The samples selected shall be subjected to the test specified in Clause 8 and if there are no failures the batch shall be deemed to be in accordance with this specification.

9.4 Repeat tests. Should not more than 20 % of the first sample fail to pass the test in Clause 8 a repeat test may be carried out on a new sample of the same size. If all the washers in this second sample pass the test then the batch shall be deemed to be in accordance with this specification.

9.5 Rejections. If more than 20 % of the first sample or any of the second sample fail to pass the test, then the batch shall be deemed not to be in accordance with this specification.

Table 1 — **A₂ Protective finishes **A₂****

BS SP 139	Uncoated
BS SP 140	Cadmium coated

Table 2 — Batch sampling sizes

Batch size	Sample
1 – 500	5
501 – 5 000	10
5 001 – 20 000	20
20 001 – and over	50

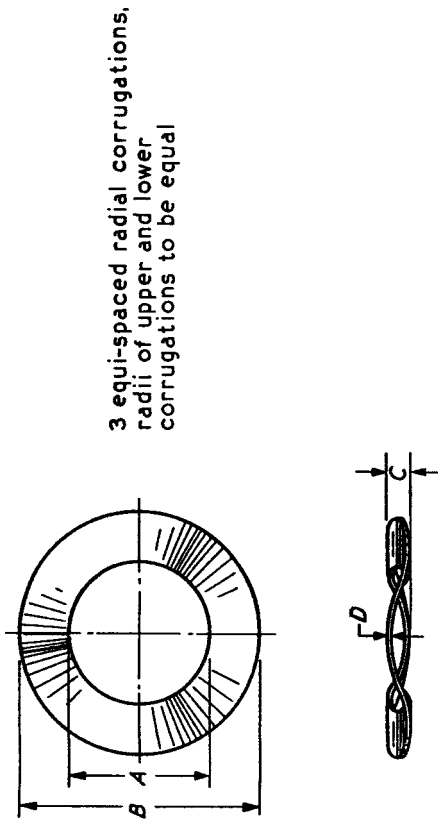


Table 3 — Dimensions of corrosion resisting steel crinkle washers

1 Code letter	2 Nominal size		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17			
	Unified No.	BA ^b No.	max. in	min. in	max. mm	min. mm	max. in	min. in	max. mm	min. mm	max. in	min. in	max. mm	min. mm	max. in	min. in	max. mm	min. mm	max. in	min. in	max. mm	min. mm	max. in	min. in	max. mm	min. mm	nominal in	nominal mm	Thickness D ^a					
Y	0	10	0.080	0.075	2.03	1.90	0.155	0.145	3.94	3.68	0.020	0.014	0.51	0.36	0.0060	0.152																		
Z	2	8	0.100	0.095	2.54	2.41	0.211	0.201	5.36	5.11	0.021	0.013	0.53	0.38	0.0060	0.152																		
A	4	6	0.130	0.125	3.30	3.18	0.255	0.245	6.48	6.22	0.024	0.018	0.61	0.46	0.0060	0.152																		
B	6	4	0.157	0.152	3.99	3.86	0.305	0.295	7.75	7.49	0.031	0.025	0.79	0.64	0.0084	0.213																		
C	8	—	0.181	0.176	4.60	4.47	0.345	0.335	8.76	8.51	0.033	0.027	0.84	0.69	0.0108	0.274																		
D	10	2	0.208	0.203	5.28	5.16	0.380	0.370	9.65	9.40	0.035	0.029	0.89	0.74	0.0124	0.315																		
E	0.250 in		0.271	0.266	6.88	6.76	0.505	0.495	12.83	12.57	0.045	0.039	1.14	0.99	0.0148	0.376																		
G	0.312 in		0.337	0.332	8.56	8.43	0.605	0.595	15.37	15.11	0.055	0.049	1.40	1.24	0.0148	0.376																		
J	0.375 in		0.411	0.406	10.43	10.31	0.705	0.695	17.91	17.65	0.067	0.061	1.70	1.55	0.0220	0.559																		
L	0.437 in		0.474	0.469	12.04	11.91	0.825	0.815	20.96	20.70	0.075	0.065	1.90	1.65	0.0220	0.559																		
N	0.500 in		0.536	0.531	13.61	13.49	0.955	0.945	24.26	24.00	0.081	0.071	2.06	1.80	0.0220	0.559																		
Q	0.625 in		0.661	0.656	16.79	16.66	1.175	1.165	29.84	29.59	0.095	0.085	2.41	2.16	0.0280	0.711																		
S	0.750 in		0.786	0.781	19.96	19.84	1.395	1.385	35.43	35.18	0.105	0.085	2.67	2.16	0.0280	0.711																		

^a The tolerances on the thickness shall be in accordance with the normal tolerance specified for the material in BS EN ISO 9445-1 and BS EN ISO 9445-2.

^b BA threads to BS 93. This specification has been rendered obsolete by Amendment No. 3 (PD 5903).

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