

BS 4A 112:1992+A1:2018



BSI Standards Publication

Aerospace series – Specification for shear bolts, hexagonal heads (Unified threads) in cadmium-plated steel

(Classification Rm = 880-1080 MPa)

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Contents

	Page
Foreword	ii
1 Scope	1
2 Normative references	1
3 Designation and procurement	1
4 Materials and manufacture	1
5 Mechanical properties for forged bolts in the finally heat-treated condition	2
6 Protective finish	2
7 Dimensions	2
8 Screw threads	2
<i>Figure 1 — Bolt outline</i>	3
<i>Table 1 — Dimensions</i>	4
<i>Figure 2 — Bearing length L, clamping length M and overall length E</i>	5
<i>Table 2 — Bearing length L, clamping length M and overall length E</i>	5
<i>Table 2 — Bearing length L, clamping length M and overall length E (continued)</i>	6
<i>Table 2 — Bearing length L, clamping length M and overall length E (continued)</i>	7
<i>Table 2 — Bearing length L, clamping length M and overall length E (continued)</i>	8
<i>Table 2 — Bearing length L, clamping length M and overall length E (continued)</i>	9
<i>Table 2 — Bearing length L, clamping length M and overall length E (continued)</i>	11
<i>Table 2 — Bearing length L, clamping length M and overall length E (continued)</i>	12
<i>Table 2 — Bearing length L, clamping length M and overall length E (continued)</i>	14
Bibliography	16

Summary of pages

This document comprises a front cover, and inside front cover, pages i to ii, pages 1 to 16, an inside back cover and a back cover.

Foreword

Publishing information

This British Standard is published by BSI and came into effect on 15 December 1992. It was prepared by 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.

Supersession

BS 4A 112:1992+A1:2018 supersedes BS 4A 112:1992, which is withdrawn.

Information about this document

This edition clarifies the maximum diameter of bolts after plating, but it does not reflect a full review or revision of the standard, which will be undertaken in due course. The 0.0003 in plating allowance on the maximum diameter quoted in BS 3A 112 (and preceding editions) is now embodied in the maximum diameter after plating in Table 1, and separate reference to a plating allowance has been deleted. The maximum diameter of bolts before plating has been deleted and the thickness of plating is now controlled.

An equivalent range of bolts with unplated shanks is specified in BS 3A 109. Nuts suitable for use with either range of shear bolts are specified in BS 2A 110.

CAUTION. BS 4A 112 bolts 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 the use of cadmium-plated parts.

The start and finish of text introduced or altered by Amendment No.1 is indicated in the text by tags **1** and **1**. Minor editorial changes are not tagged.

Use of this document

It has been assumed in the preparation of this British Standard that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

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.

1 Scope

This British Standard specifies materials, dimensions, finish and inspection requirements for steel shear bolts with Unified hexagons and Unified threads and with close tolerance shanks, cadmium plated, to be suitable for insertion in aluminium alloy materials for aerospace use.

NOTE The latest revision of an Aerospace Series standard is indicated by a prefix number.

2 Normative references

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

BS 2S 147, *Specification for 0.5 % nickel-chromium-molybdenum steel bars for the manufacture of forged bolts and forged nuts*

BS 2S 149, *Specification for 1.75 % nickel-chromium-molybdenum steel bars for the manufacture of forged bolts and forged nuts*

BS 4A 100, *Aerospace series – Specification for general requirements for bolts and free running nuts of tensile strength not exceeding 1 249 MPa*

BS S 154, *Specification for 2/2% nickel-chromium-molybdenum steel billets, bars, forgings and parts (880–1080 MPa: limiting ruling section 150 mm)*

BS S 158, *Specification for 1 % chromium-molybdenum steel bars for the manufacture of forged bolts and forged nuts*

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

SAE AMS03-19, *Electro-Deposition of Cadmium*. SAE International.

3 Designation and procurement

The bolts shall conform to the latest edition of BS 4A 100.

A1 For ordering and designation purposes, the BS Part No. shall consist of the number of this specification (without revision prefix or separation space), i.e. A112 followed by the suffix code chosen from Table 2, separated by a hyphen ‘-’.

NOTE 1 Example: the BS part No. for a 1·000in. long $\times$ ¼-28 UNF bolt is A112-6E.

NOTE 2 For length definition, see 7.3. **A1**

4 Materials and manufacture

The bolts shall be manufactured by one of the following methods:

- a) machined from bright drawn bars which conform to BS S 154:1976;

NOTE **A1** Text deleted **A1**.

- b) forged from material which conforms to one of the following British Standards:

- 1) BS 2S 147
- 2) BS 2S 149
- 3) BS S 158

5 Mechanical properties for forged bolts in the finally heat-treated condition

Forged bolts in the finally heat-treated condition shall have the following mechanical properties:

- a) 0.2 per cent proof stress: not less than 690 MPa;
 - b) tensile strength: 880 MPa to 1 080 MPa;
 - c) elongation on $5.65 \sqrt{S_0}$ (area): not less than 12%;
 - d) impact value: not less than 55 J.
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6 Protective finish

All finished bolts shall be coated with cadmium in accordance with $\boxed{A_1}$ SAE AMS03-19 or BS EN 2133 $\boxed{A_1}$.

7 Dimensions

- 7.1 $\boxed{A_1}$ Dimensions shall be in inches.
 - 7.2 All bolts, after the application of protective finish, shall be in accordance with the dimensions and tolerances given in Table 1 and Table 2. $\boxed{A_1}$
 - 7.3 The clamping length M of the bolts shall be in accordance with the dimensions and tolerances in Table 2 and shall be such that, when a standard nut without countersink or a ring gauge without countersink has been screwed on as far as possible by hand, its leading face is within the distance M from the underside of the bolt head. The runout of the thread shall not exceed twice the pitch.
 - 7.4 The defined nominal length of shear bolts shall be the minimum bearing length L (not the overall length E). L is determined by the minimum clamping length M, less two thread pitches.
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8 Screw threads

The bolts shall have Unified threads of the form and class of fit specified in the latest edition of BS 4A 100.

Figure 1 — Bolt outline