
British Standard Aerospace Series : Specification for

Clinch nuts (Unified threads) for aircraft

Série aérospatiale : Spécification pour les écrous à téton rivé
(filetages unifiés) pour l'aéronautique

Luft- und Raumfahrtreihe : Spezifikation für verniete Muttern
(vereinheitlichtes Gewinde) für Flugzeuge

Index title: Clinch nuts, Unified threads

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The following BSI references relate to the work on this standard: Committee reference ACE/12 Draft for comment 79/80586 DC

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Clinch nuts (Unified threads) for aircraft

2A122, 2A123,
2A124: 1981

Foreword

These British Standards deal with self-locking nuts (stiffnuts) that have a device which imposes friction between the nut and the screw thread on which it is mounted. They have a thread strength similar to the corresponding standard thin nuts. Clinch nuts differ from the types of stiffnut covered by British Standards A 125 to A 168, etc.* in the method of their attachment to the supporting structure, being provided for this purpose with a spigot at the bearing face which is spread as if it were a rivet. Different lengths of spigot are provided for each size of nut to make available to the user a wide choice, at the same time providing the best combination of spigot length and plate thickness that ensures secure riveting so that the nut will not turn once it is in position. The standards contain details of a recommended method of fitting the nuts to obtain the specified minimum torque resistance to turning.

Throughout the preparation of these British Standards the aim has been to define and dimension the product completely, except for the friction element which is defined by the space it may occupy and the performance which it has to attain. Nuts supplied in accordance with these British Standards will therefore be interchangeable within the specified limiting conditions (e.g. of temperature).

This revision brings these British Standards up to date, notably with regard to the qualification approval requirements and the references to other standards. It supersedes the previous edition published in 1959, which is therefore withdrawn.

These standards make reference to the latest issues of the following.

(a) *British Standards*

- | | |
|---------|--|
| BS 919 | Screw gauge limits and tolerances
Part 1 Gauges for screw threads of Unified form |
| BS 1580 | Unified screw threads
Parts 1 & 2 Diameters $\frac{1}{4}$ in and larger
Part 3 Diameters below $\frac{1}{4}$ in |
| BS 2874 | Copper and copper alloys. Rods and sections (other than forging stock) |
| BS 3488 | Technical anhydrous lanolin |
| A 102 | Steel bolts (Unified hexagons and Unified threads) for aircraft |
| A 169 | Aluminium alloy bolts (Unified hexagons and Unified threads) for aircraft |
| B 11 | Brass bars suitable to be brazed or silver soldered |
| L 102 | Bars and extruded sections of aluminium-copper-magnesium-silicon-manganese alloy (solution treated and aged at room temperature) (not exceeding 200 mm diameter or minor sectional dimension) (Cu 4.4, Mg 0.5, Si 0.7, Mn 0.8) |
| L 168 | Specification for bars and extruded sections of aluminium-copper-magnesium-silicon-manganese alloy (solution treated and artificially aged) (not exceeding 200 mm diameter or minor sectional dimension) |
| S 95 | 1½ per cent nickel-chromium-molybdenum steel |
| S 112 | Semi-free cutting carbon steel, bright bars for machining (primarily intended for the manufacture of nuts) |
| S 113 | '40' carbon steel, bright bars for machining (primarily intended for the manufacture of nuts) |
| S 154 | 2½ per cent nickel-chromium-molybdenum steel billets, bars, forgings and parts (880 MPa — 1080 MPa: limiting ruling section 150 mm) |

(b) *Ministry of Defence specifications*

- | | |
|---------------|---|
| DEF 151 | Anodizing of aluminium and aluminium alloys |
| DEF 2331 | Protective PX-1, dyed and undyed |
| DEF STAN 03-8 | Electrodeposition of tin |
| DTD 417 | Lubricating oil, aircraft controls: anti-freezing |
| DTD 904 | Cadmium plating |

(c) *Society of British Aerospace companies (SBAC) publication†*

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|--------|--|
| RS 732 | Manufacturers identification monograms for aerospace fasteners |
|--------|--|

*British Standards A 125 to A 168, A 180, A 181, A 186, A 187, A 192, A 193, A 200, A 201 and A 213, to A 216
'Stiffnuts (Unified threads) for aircraft'.

†Obtainable from the Society of British Aerospace Companies, 29 King Street, St James's, London, SW1.

Clinch nuts (Unified threads) for aircraft

2A122, 2A123,
2A124: 1981

Section one. General requirements

1. Scope

These British Standards cover the dimensions, material, finish, testing and identification of aircraft clinch nuts with Unified threads. According to the materials used in their construction the clinch nuts are classified as satisfactory for use at sustained temperatures within the following ranges:

- (a) -75°C to $+200^{\circ}\text{C}$ — Cadmium plated steel nuts;
- (b) -75°C to $+125^{\circ}\text{C}$ — Aluminium alloy, brass or bronze nuts.

NOTE. All nuts are capable of remaining effective for servicing operations at -40°C .

2. Definitions

For the purposes of these British Standards the following definitions apply.

2.1 clinch nut. A stiffnut, the body of which has a spigot co-axial with the screw thread at the bearing face of the nut capable of being spread by riveting technique to secure the nut in position, and to prevent turning.

2.2 stiffnut. A nut body surmounted by a device that imposes friction independent of the loading on the face of the nut between the nut and the screw thread on which it is mounted. The friction is of such a value that the nut may be considered self-retaining.

2.3 nut body. The portion of a clinch nut containing the screw thread and having wall thickness and height sufficient to provide the required strength.

2.4 friction element. The portion of a clinch nut, above the nut body, designed to impose friction between the clinch nut and the screw thread on which it is mounted. The friction element is contained between the minimum thread length and the maximum overall height of the clinch nut, and within the maximum plan form of the standard nut body. (See table 4.)

2.5 batch. The output of an effectively continuous production run of each size of nut, free from any changes that might be expected to result in an appreciable variation in the quality of the finished product. (See section two.)

2.6 bolt. Unless otherwise stated, the term 'bolt' includes any screwed bolt or stud of the same material, screw thread and finish as the standard bolt specified in clause 13.

2.7 random sample. A sample taken in such a manner that every nut in the batch has a substantially equal chance of selection.

2.8 bolt tolerance test. A test to measure the torque required to remove a clinch nut from a bolt of minimum diameter after the friction element has been strained by assembly on a bolt of maximum diameter.

2.9 endurance test. A test to measure the torque required to remove a clinch nut from a standard bolt after a specified number of applications.

2.10 torque test. A test to measure the torque required to remove a clinch nut from a standard bolt.

2.11 clinching test. A test to confirm that the clinched nut will withstand any reasonable torsion likely to be applied through the bolt under adverse conditions of assembly.

3. Design and dimensions

3.1 All nuts shall, after coating, where applicable, conform to the dimensions and tolerances specified in table 4.

3.2 The design of the friction element of the nut shall be at the option of the manufacturer, but shall be within the dimensions specified in table 4. The spigot shall be concentric with the thread of the nut.

3.3 The friction elements of the nuts are defined in table 4 by maximum envelope dimensions, and in section two by functional test requirements. For inspection purposes the manufacturer shall provide approved drawings (see clause 9) of all such features, with adequate dimensions and limits and including specifications for jointing processes and non-metallic locking elements. Any changes in these features shall be notified to the quality assurance authority (see clause 9) who may require re-qualification testing before approving the drawing changes.

4. Material and manufacture

4.1 Nuts shall be manufactured from the appropriate materials specified in table 3. Materials used in friction elements shall be in accordance with the approved drawings; they shall not be adversely affected by contact with or immersion in fuels, lubricants or other fluids used in aircraft (e.g. water, petroleum oils, synthetic oils (sebacic and adipic esters), silicone greases, castor oil, isopropyl alcohol mixtures, ethanol, methanol, ethanediol, glycerol).

4.2 The friction device shall cause no undue damage or excessive wear on the thread of the bolt. The endurance test (see clause 16) shall serve to indicate the satisfactory nature of the design in this respect.

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2A 122, 2A 123,
2A 124:1981

5. Freedom from defects

The nuts shall be free from harmful defects.

NOTE. Nuts containing defects may be deemed not to comply with the requirements of these standards at any time, although they have been made from material passed and released to the material specification.

6. Protective coating

6.1 Metallic or anodic coatings shall be applied as specified in **6.2** to **6.4** before assembly of any non-metallic friction element, but organic coatings (see **6.4**) shall be applied after such assembly.

6.2 Steel nuts shall be cadmium coated uniformly in accordance with DTD 904.

6.3 Brass and bronze nuts shall be tin coated uniformly in accordance with DEF STAN 03-8.

6.4 Aluminium alloy nuts shall be anodically treated in accordance with DEF 151, and after identification colouring, shall be dipped in a lubricant complying with the requirements of DEF 2331 or BS 3488.

NOTE. Slightly different colours will result from the different processes.

7. Screw threads

7.1 All nuts. The screw threads shall have the thread form and pitches specified in BS 1580 : Parts 1 & 2 and Part 3, as applicable.

7.2 Steel, brass and bronze nuts. After coating, the minimum major, effective and minor diameters of screw threads shall be not less than the minimum dimensions for class 2B nuts specified in table 12 of BS 1580 : Parts 1 & 2 : 1962, and tables 42 and 46 of BS 1580 : Part 3 : 1965 as applicable.

Before coating, the maximum effective and minor diameters shall not exceed the maximum dimensions for class 2B nuts specified in table 12 of BS 1580 : Parts 1 & 2 : 1962, and tables 42 and 46 of BS 1580 : Part 3 : 1965, as applicable.

7.3 Aluminium alloy nuts. After anodizing, the screw threads shall conform to the class 2B limits and tolerances specified in table 12 of BS 1580 : Parts 1 & 2 : 1962 and tables 42 and 46 of BS 1580 : Part 3 : 1965, as applicable.

7.4 Gauges. The screw threads shall be gauged by the methods described in BS 919 : Part 1.

8. Identification and marking

8.1 Identification of Unified threads. All clinch nuts of No. 8-32 UNC nominal size and above shall be identified as 'Unified' by means of a line of contiguous circles indented on one or more of the flats of the hexagon and parallel to the axis of the nut. The circles shall have a diameter of $\frac{5}{64}$ in for No. 8-32 UNC and No. 10-32 UNF, and a diameter of $\frac{3}{32}$ in for sizes $\frac{1}{4}$ in UNF and above. They will normally be applied on the hexagon bar and will appear at random on the nuts.

8.2 Identification of materials

8.2.1 Steel nuts shall have no identification marking for material.

8.2.2 Aluminium alloy nuts shall be dyed blue after anodizing.

8.3 Reference identification

8.3.1 The British Standard number shall not be applied to the nuts, but shall be used with the relevant part reference and the number of the group (see table 4) providing the required spigot length, for the purpose of specifying nuts on drawings or for ordering.

NOTE. Marking the appropriate BS number (e.g. A 122) on or in relation to a product is a claim by the manufacturer that the product has been manufactured in accordance with the requirements of the standard. The accuracy of such a claim is therefore solely the manufacturer's responsibility. Enquiries as to the availability of third party certification to support such claims should be addressed to the Director, British Standards Institution, Maylands Avenue, Hemel Hempstead, Herts HP2 4SQ in the case of certification marks administered by BSI or to the appropriate authority for other certification marks.

8.3.2 Clinch nuts of size No. 8-32 UNC and larger shall be suitably marked with the manufacturers symbol or letter(s), such that there is no ambiguity with any other markings.

NOTE. Manufacturers' identification markings are shown on SBAC standard RS 732.

8.3.3 When it is necessary to differentiate on the drawing or order between a clinch nut with a metallic friction element and one with a non-metallic friction element, the suffixes '/66' or '/77' respectively shall be added to the standard reference. For example, the complete part reference of a $\frac{1}{4}$ in UNF steel clinch nut with a metallic friction element to suit plate range 0.080 in (2 mm) to 0.104 in (2.5 mm) is 'A 122 E2/66' and for clinch nut of the same size but with a non-metallic friction element 'A 122 E2/77'. A part reference without such a suffix indicates that either type of nut may be used or supplied.