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AGS2000 Series Stiffnuts (including Clinch Nuts) BA and BSF Threads for Aircraft		

NOTE: The issue status of this document remains unchanged as there have been no changes to the technical content.

SAE INDUSTRY TECHNOLOGIES CONSORTIA AEROSPACE STANDARDS AND PART QUALIFICATION PROGRAM

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TECHNICAL SPECIFICATION

No. TS120

AGS2000 SERIES STIFFNUTS (INCLUDING CLINCH NUTS) BA & BSF THREADS FOR AIRCRAFT

RATIONALE

Sixth issue of Technical Spec.

General up-date to include replacement of obsolete tin plating & lanolin specs.

Removal of chromic acid anodise option, but adding EN2133 as a cadmium plating option.

Addition of 6BA & 4BA limits in Table 7.

For full details of changes, refer to supplementary ADS Amendment Record document TS120-AR.

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AGS2000 SERIES STIFFNUTS (INCLUDING CLINCH NUTS) BA & BSF THREADS FOR AIRCRAFT

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1. BACKGROUND

Self-locking nuts were introduced to the British aircraft industry in the 1930's. They were widely adopted & soon constituted a large proportion of the nuts used in aircraft construction.

Being proprietary articles, the nuts were subject to test and approval requirements. These were supervised by the Royal Aircraft Establishment (RAE), Farnborough. In 1942, the first issue of AD114, setting out design and test requirements, was published by the RAE and referenced ME9/7005/13/EB/55. The term 'stiffnut' was chosen as the most suitable descriptive name for generic use; 'self-locking nut' is now generally used.

The first issue of AD114 was the initial step towards standardisation of stiffnuts & specified certain general requirements & the minimum performance acceptable in respect of retaining properties. Manufacturers used proprietary drawings approved by the RAE and nuts were known to users by proprietary names & part numbers. In 1947, drawings were issued in the Society of British Aerospace Companies (SBAC)** AGS series, providing common part numbers to which nuts of any make could be supplied. Maximum envelope dimensions were specified & other features affecting interchangeability for user's information. Later, performance testing of production quantities was introduced to ensure that functional properties were maintained at or above the type testing of prototype nuts when submitted for approval.

Eventually, the Ministry of Defence (& its predecessors) became the custodian of AD114, responsibility being vested with AD/Stan (Air)* who also became SBAC** authorised Design Authority, with AQD as the Quality Assurance Authority, for the AGS2000 series of stiffnuts. However, in 1982 a policy decision effectively reduced the viability of AD/Stan (Air)* continuing as the Design Authority. As a direct result of consultation with SBAC it was decided to convert AD114 to an SBAC Technical Specification (TS120), the authorised Design Authority is now the ADS Technical Standards Committee (TSC).

In the 1970's, emphasis was placed on the need for a revision of BS 2A 125 through 2A 216: 1958 – 'Stiffnuts (unified threads) for aircraft'. The appropriate BSI and SBAC committees considered it advisable to update AD114 on the lines to be adopted in the revision of the BS, so that uniformity of requirements & the use of common test equipment could be achieved with respect to the technical requirements & quality assurance aspects of the Unified & AGS series of stiffnuts.

The revised edition of BS 3A 125 through 3A 216 was published in 1981; AD114 was revised & published as Issue 6 in January 1982.

Issue 6 of AD114 (see Note below) superseded the partially modified Issue 5, issued as an interim measure in July 1979. It is recognised, however, that stocks of stiffnuts manufactured to the requirements of Issue 5 & 6 are still available from manufacturers and stockists. Such stocks are acceptable for use until they are exhausted. It is essential, however that all stiffnuts manufactured to TS120 with effect from its publication must conform to the requirements stated therein.

Note: The title of AD114 was previously 'Design requirements, qualification approval tests & acceptance tests for AGS2000 series stiffnuts (BA & BSF threads)'.

* Previously AD/SAE, AD/RS(PE) & later SAE1-4 & ADR(S).

** SBAC is now known as ADS (see this document's Foreword).

2. SCOPE

- 2.1 This specification covers the dimensions, material, finish, testing & identification of aircraft stiffnuts to AGS sheet range 2001 to 2023 with BA & BSF threads.

According to the materials used in their construction, the stiffnuts are classified as satisfactory for use at sustained temperatures within the following ranges :

- (a) -75°C to +200°C : alloy steel & corrosion resisting steel nuts, cadmium plated.
- (b) -75°C to +125°C : aluminium alloy, brass or bronze nuts.

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

- 2.2 Stiffnuts of the following types are covered by this specification :

- (a) Hexagon nuts : thick, thin & cap.
- (b) Anchor nuts.
- (c) Double-lug fixed : thick, thin & cap.
- (d) Double-lug floating : thick & thin.
- (e) Single-lug fixed : thick & thin.
- (f) Stripnuts floating : thick & thin.
- (g) Clinch nuts.

- 2.3 In this specification, the nut bodies, whether of normal hexagon form or not, have a thread strength at least as great as the corresponding standard nuts.

3. NORMATIVE REFERENCES

The following documents, in whole or in part, are normatively referenced in this specification. For dated / revision listed references, only the issue stated applies. For undated / revision listed references, the latest issue of the referenced document (including any amendments) applies :-

(a) ADS Group Ltd (ADS)

TS200	Qualified Manufacturers for ADS Aerospace Industry Standard Parts.
TS202	Qualification Test Requirements & Procedures for Aerospace Industry Standard Parts.
RS732	Manufacturer's Identification Monograms for Aerospace Fasteners.

(b) British Standards Institution (BSi)

BS A 25	Steel Hexagonal Headed Bolts (BA & BSF Threads) for Aircraft.
BS A 61	Aluminium Alloy Hexagonal Headed Bolts (BA & BSF Threads) for Aircraft.
BS 84 : 2007	Parallel Screw Threads of Whitworth Form – Requirements.
BS 93 : 2008	British Association (BA) Screw Threads – Requirements.
BS 919-2 : 2007	Screw Gauge Limits & Tolerances. Pt.2 : Gauges for Screw Threads of Whitworth & BA forms.
BS 1872	Electroplated Coatings of Tin.
BS 3488	Technical Anhydrous Lanolin.
(BS) EN 2133	Cadmium plating of steels with specified tensile strength ≤ 1450 MPa, copper, copper alloys and nickel alloys.

(c) UK Defence Standardisation (DSTAN)

Def Stan 03-19	Electro-Deposition of Cadmium (obsolescent).
Def Stan 03-25	Sulphuric Acid Anodising of Aluminium & Aluminium Alloys (obsolescent).
Def Stan 80-217	Corrosion Preventative Compound : Soft Film, Cold Application, NATO Code C-614 Joint Services Designation : PX-1.
Def Stan 91-114	Lubricating Oil, Aircraft Controls: Anti Freezing. Joint Service Designation OM-150.

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SECTION ONE - GENERAL REQUIREMENTS

6. DEFINITIONS

For the purpose of this specification the following definitions apply.

6.1 ATTACHMENT PLATE

The formed sheet-metal plate of a floating anchor nut that carries the rivet lugs & retains the nut body, allowing a specified float in relation to the structure.

6.2 BASEPLATE

The plate, normal to the axis of the nut, that forms the rivet lugs of a fixed anchor nut or the flange of a floating anchor nut or stripnut & retains the nut body in the attachment plate.

6.3 BATCH

The output of an effectively continuous production run of each size of nut, free from any changes such as might be expected to result in an appreciable variation in the quality of the finished product. (See Section Two).

6.4 BOLT

Unless otherwise stated, the term 'bolt' includes any screwed bolt or stud of the same material, screw thread & finish as the standard bolt specified in clause 18.

6.5 BOLT TOLERANCE TEST

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

6.6 CAP NUT

A stiffnut whose threaded bore is closed by a translucent cap above the friction element.

NOTE: The cap is not intended to be subject to fluid pressures.

6.7 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 a riveting technique, so to secure the nut in position & to prevent turning.

6.8 ENDURANCE TEST

A test to measure the torque required to remove a stiffnut from a standard bolt after a specified number of applications.

6.9 FIXED ANCHOR NUT

A stiffnut, having at the bearing face & integral with the nut body, a lug or lugs by which it may be riveted in position, the nut becoming rigidly located in relation to the supporting structure.

6.10 FLOATING ANCHOR NUT

A stiffnut in which the nut body, integral with a baseplate, is retained in an attachment plate that has lugs by which it may be riveted in position. Provision is made for a limited amount of movement (float) of the nut within the attachment plate to allow for alignment on assembly.

6.11 FRICTION ELEMENT

The portion of a stiffnut, above the nut body, designed to impose friction between the stiffnut & the screw thread on which it is mounted. The friction element is contained between the minimum thread length & the maximum overall height of the stiffnut & within the maximum plan form of the standard nut body.

6.12 INTEGRAL

The baseplate is said to be integral with the nut body when the two are manufactured in one piece or when they are joined by welding, brazing or similar fusion process.

6.13 NUT BODY

The portion of a stiffnut containing the screw thread & having wall thickness & height sufficient to provide the required strength.

6.14 RANDOM SAMPLE

A sample taken in such a manner that every nut in the batch has a substantially equal chance of selection, so that the sample is thus a representative cross section of the whole batch.

6.15 STIFFNUT

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

6.16 STRIPNUTS

A number of the nut bodies integral with baseplates in a continuous strip of formed section for riveting to the supporting structure. Provision is made for a limited amount of movement (float) of the nuts within the attachment strip to allow for alignment on assembly.

6.17 THRUST TEST (for anchor nuts)

A test to confirm that the anchorage will withstand the thrust likely to be applied by a bolt under adverse conditions of assembly.

6.18 TORQUE TEST

A test to measure the torque required to remove a stiffnut from a standard bolt with stiffnut turning at the specified uniform speed.

6.19 TORSIONAL STRENGTH TEST (for anchor nuts & stripnuts)

A test to confirm that the anchorage will withstand any torsion likely to be applied through the bolt under adverse conditions of assembly.

6.20 DESIGN AUTHORITY

ADS Technical Standards Committee (TSC).

6.21 QUALITY ASSURANCE AUTHORITY

As agreed by the Design Authority.