

Procurement of self-locking nuts with non-metallic locking elements — Metric series — Specification

ICS 49.030.30

Confirmed January 2011

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee, ACE/12, Aerospace fasteners and fastening, upon which the following bodies were represented:

- British Coatings Federation Ltd.
- Civil Aviation Authority, Airworthiness
- Energy Institute
- Ministry of Defence, UK Defence Standardization
- Society of British Aerospace Companies

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 22 February 2005

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Amendments issued since publication

Amd. No.	Date	Comments

The following BSI references relate to the work on this British Standard:
Committee reference ACE/12
Draft for comment 03/317781 DC

ISBN 0 580 45229 8

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Foreword

This British Standard was prepared by Technical Committee ACE/12. It supersedes BS A 293:1983, which is withdrawn.

BS 2A 293 is intended primarily for use in conjunction with those “A” series British Standard aerospace specifications in which conformity to this standard is a specific requirement.

This edition introduces technical changes in line with test methods BS 2A 295:2000 and harmonizes the procurement and testing of the metric series non-metallic self-locking nuts with the equivalent Unified series nuts contained in BS 3A 125 to 3A [...].

It may also be applied to other aerospace metric threaded fasteners if required by the relevant specification, drawing, contract or order.

This standard invokes:

- a) quality assurance approval of the manufacturer; and
- b) product qualification testing approval.

Annex A is included in this standard to provide information on the axial loads and torque values for thread sizes $M8 \times 1.25$, $M10 \times 1.5$ and $M12 \times 1.5$. When there is no further requirement for these sizes, Annex A will be deleted by amendment.

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

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 19 and a back cover.

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1 Scope

This British Standard specifies the requirements for the procurement of self-locking nuts with non-metallic locking elements.

This standard invokes product qualification testing requirements and quality assurance approval procedures for manufacture of aerospace standard parts.

This standard is intended primarily for use with “A” series British Standard aerospace standards for metric self-locking nuts with non-metallic locking elements. It is also applicable to other aerospace self-locking nuts if required by the relevant drawing, contract or order.

NOTE Where the requirements of the nut standard or drawing differ from this standard, they take precedence over the requirements of this standard.

2 Normative references

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

BS 1134, *Method for the assessment of surface texture*.

BS 1595-1, *Propan-2-ol (isopropyl alcohol) for industrial use — Part 1: Specification for propan-2-ol (isopropyl alcohol)*.

BS A 352-2/ISO 5855-2, *MJ threads — Part 2: Limit dimensions for bolts and nuts*.

BS 2A 295/ISO 7481, *Methods of test for self-locking nuts with maximum operating temperature less than or equal to 425 °C*.

BS 3A 125 to 3A [...], *Specification for stiffnuts (Unified threads) for aircraft*.

BS 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 Terms and definitions

For the purposes of this British Standard the following terms and definitions apply.

3.1

self-locking nut with non-metallic locking element

self-contained unit which consists of a nut body surmounted by a non-metallic locking element which imposes friction between itself and the male screw thread upon which it is mounted

3.2

nut body

portion of the self-locking nut containing the screw thread

3.3

locking element

non-metallic portion of the self-locking nut designed to impose friction between itself and the male screw thread with which it is engaged

NOTE The locking element does not operate by means of a separate movement as a result of installation and does not depend upon pressure on the bearing surface for the locking action.

3.4

maximum locking torque

highest torque to overcome the friction encountered in any assembly or removal cycle with no axial load on the nut

3.5

minimum breakaway torque

torque required to start nut or bolt rotation from a fixed position during any removal cycle with no axial load on the nut

3.6

wrench torque

minimum torque which the driving configuration of the nut has to withstand without any permanent deformation which would interfere with the appropriate wrench and preclude the reuse of the nut

3.7

permanent set test

measure of the performance of a nut on a minimum mandrel after having been subjected to a single assembly and removal cycle on a maximum stud

3.8

reusability test

test to measure the torque required to remove a self-locking nut from a standard test bolt after a specified number of assembly and removal cycles

3.9

production lot

lot of finished nuts which have the basic part number and diameter, the individual elements of which have been fabricated by the same process from a single material batch, and which have been heat treated together to the same specified condition and produced as one continuous run

3.10

inspection lot

lot of nuts from a single production lot, of the same part number, which completely defines the nut

3.11

Discontinuities

3.11.1

crack

rupture in the material which may extend in any direction and which may be intercrystalline or transcrystalline in character

3.11.2

seam

longitudinal surface defect in the form of an unwelded open fold in the material

3.11.3

lap

surface defect caused by folding over metal fins or sharp corners and then rolling or forging them into the surface

3.12

random sample

sample taken in such a manner that each unit in the inspection lot has the same chance of being the first unit in the random sample; and, after the first unit in the sample is taken, each of the remaining units in the inspection lot has the same chance of being the second unit in the sample; and so on

3.13

acceptable quality level

AQL

maximum percentage defective (or maximum number of defects per hundred units) that, for purposes of sampling inspection, can be considered acceptable as a process average

3.14

limiting quality

LQ

magnitude of percentage defective, greater than the AQL, which, in accordance with the operating characteristic of the sampling/inspection plan, the purchaser runs a specified risk of accepting

NOTE In this standard the LQ corresponds to a purchaser's risk of 10 %.

4 Requirements and test methods

4.1 Introduction

The technical requirements and test methods given in 4.2, 4.3, 4.4, 4.5 and 4.6 complement the requirements of the self-locking nut standard or drawing, but can supplement the requirements of the material specification.

Table 1 gives the testing for each characteristic of the self-locking nut sample necessary for qualification approval. Table 2 summarizes the testing required for both qualification and production acceptance testing.

All tests shall be carried out at ambient temperature unless otherwise specified in a particular test method.

NOTE 1 A nut is considered to be assembled when a minimum of two full male threads plus the chamfer extend beyond the friction element of the nut.

NOTE 2 The removal cycle is considered complete when the friction element is disengaged.

Subclause	Characteristic	Technical requirement	Inspection and test method	Q/A ^a	Sample size
4.2	Materials	The nut shall be made from the material specified by the nut standard or drawing.	As stated in the material specification.		
4.3	Dimensions				
4.3.1	General	The dimensions of the finished nut shall comply with the nut standard or drawing.	All dimensions shall be controlled by the manufacturer's quality system.	Q A	60 (100 %) Table 7 and Table 8
4.3.2	Threads	The threads shall comply with the requirements specified by the nut standard or drawing.		Q A	60 (100 %) Table 7 and Table 8
4.3.3	Squareness	The bearing surface of the nut shall be square to the axis of the thread within the tolerance specified by the nut standard or drawing.	Bearing surface squareness test, 3.2 of BS 2A 295:2000.	Q A	60 (100 %) Table 7 and Table 8
4.4	Manufacture				
4.4.1	Nut bodies	Nut bodies shall be produced by machining from bar or by a hot or cold forging process.	The method of manufacture shall be defined by control documentation to the satisfaction of the appropriate airworthiness authority.		
4.4.2	Heat treatment	The parts shall be heat treated as necessary, to satisfy the requirements of this specification.			
4.4.3	Surface texture	The surface texture shall be as specified by the nut standard or drawing prior to protective treatment.	BS 1134	Q A	3 Table 7 and Table 8
4.4.4	Surface protection	Surfaces shall be coated as specified by the nut standard or drawing.	Relevant coating specification.	Q A	3 Table 7 and Table 8
4.4.5	Lubrication	Surfaces shall be coated as specified by the nut standard or drawing.	Relevant coating specification.	Q A	3 Table 7 and Table 8
^a Q is the qualification approval test requirement and A is the production acceptance test requirement.					