

Methods of test for

Self-locking nuts with maximum operating temperature greater than 425 °C

[ISO title: Aerospace — Self-locking nuts with maximum
operating temperature greater than 425 °C — Test methods]

UDC 629.7.02:621.882.3:[621.882.54]:62 – 97:620.1

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW



Document Sharing Hub

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Aerospace Standards Committee (ACE/-) to Technical Committee ACE/12 upon which the following bodies were represented:

- Civil Aviation Authority (Airworthiness Division)
- Electronic Engineering Association
- Ministry of Defence
- Society of British Aerospace Companies Limited

This British Standard, having been prepared under the direction of the Aerospace Standards Committee, was published under the authority of the Board of BSI and comes into effect on 29 January 1988

© BSI 01-2000

The following BSI references relate to the work on this standard:
Committee reference ACE/12
Draft for comment 85/72371 DC

ISBN 0 580 16382 2

Amendments issued since publication

Amd. No.	Date of issue	Comments

Contents

	Page
Committees responsible	Inside front cover
National foreword	ii
1 Scope and field of application	1
2 References	1
3 Inspections and tests	1
Figure 1	2
Figure 2	2
Figure 3	3
Figure 4	4
Figure 5	5
Figure 6	5
Figure 7	5
Figure 8	6
Figure 9	8
Figure 10	9
Figure 11	11
Figure 12	12
Table 1 — Bolt dimensions for self-locking torque test at ambient temperature (single cycle test)	7
Table 2 — Test bolt coating in relation to the coating of the nut to be tested	7
Table 3 — Dimensions of the mandrels for permanent set test	10
Publications referred to	Inside back cover

National foreword

This British Standard, which has been prepared under the direction of the Aerospace Standards Committee, is identical with ISO 8642:1986 “*Aerospace — Self-locking nuts with maximum operating temperature greater than 425 °C — Test methods*” published by the International Organization for Standardization (ISO).

Terminology and conventions. The text of the International Standard has been approved as suitable for publication as a British Standard without deviation. Some terminology and certain conventions are not identical with those used in British Standards; attention is drawn especially to the following.

The comma has been used as a decimal marker. In British Standards it is current practice to use a full point on the baseline as the decimal marker.

Wherever the words “International Standard” appear referring to this standard, they should be read as “British Standard”.

Cross-references

International Standard	Corresponding British Standard
	BS 6293 <i>MJ threads for aerospace construction</i>
ISO 5855-1:1981	Part 1:1982 <i>Specification for dimensions of basic profile</i> (Identical)
ISO 5855-2:1981	Part 2:1982 <i>Specification for dimensions for bolts and nuts</i> (Identical)
ISO 7403:1983	BS A 294:1984 <i>Specification for spline drive wrenching configuration</i> Metric series (Identical)

The Technical Committee has reviewed the provisions of ISO 691, ISO/R 1024, ISO 6507-1, ISO 6508 and ISO 8641¹⁾ to which reference is made in the text, and has decided that they are acceptable for use in conjunction with this standard. Related British Standards to some of the aforementioned International Standards are as follows:

International Standard	Related British Standard
ISO 691:1983	BS 192:1982 <i>Specification for open-ended wrenches</i>
ISO/R 1024:1969	BS 4175 <i>Method for Rockwell superficial hardness test (N and T scales)</i> Part 1:1967 <i>Testing of metals</i> Part 2:1970 <i>Verification of the testing machine</i>
ISO 6507-1:1982	BS 427 <i>Method for Vickers hardness test</i> Part 1:1961 <i>Testing of metals</i>
ISO 6508:1986	BS 891 <i>Method for Rockwell hardness test</i> Part 1:1962 <i>Testing of metals</i>

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 12, an inside back cover 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.

¹⁾ At present at stage of draft.

1 Scope and field of application

This International Standard specifies test methods for metric self-locking nuts with MJ threads the maximum operating temperature of which is greater than 425 °C, intended for use in aerospace construction. It describes the test device and the method for each test.

Other test devices or test methods than those specified in this International Standard may be used, but, in the event of a dispute, the requirements laid down in this International Standard shall take precedence.

This International Standard shall be used in conjunction with the procurement specification laid down in ISO 8641.

It applies to self-locking nuts as defined above, provided that the relevant documents (drawing, procurement specification, etc.) refer to this International Standard.

2 References

ISO 691, *Wrench and socket openings — Metric series — Tolerances for general use.*

ISO/R 1024, *Rockwell superficial hardness test (N and T scales) for steel.*

ISO 5855-1, *Aerospace construction — MJ threads — Part 1: Basic profile.*

ISO 5855-2, *Aerospace — MJ threads — Part 2: Dimensions of bolts and nuts.*

ISO 6507-1, *Metallic materials — Hardness test — Vickers test — Part 1: HV 5 to HV 100.*

ISO 6508, *Metallic materials — Hardness test — Rockwell test (scales A — B — C — D — E — F — G — H — K).*

ISO 7403, *Fasteners for aerospace construction — Spline drive wrenching configuration — Metric series.*

ISO 8641, *Aerospace — Self-locking nuts with maximum operating temperature greater than 425 °C — Procurement specification²⁾.*

3 Inspections and tests

3.1 Hardness test

3.1.1 Procedure

The authorized procedures are as follows:

- Rockwell hardness, in accordance with ISO 6508;
- Vickers hardness, in accordance with ISO 6507-1;

— Rockwell superficial hardness, in accordance with ISO/R 1024;

— microhardness³⁾.

It is strongly recommended to use the method corresponding to the hardness unit indicated. Should this not be possible, the use of conversion charts is allowed, but, given their inaccuracy, the results obtained shall be used warily. In the event of a dispute, the results obtained using the method corresponding to the hardness unit indicated shall take precedence.

3.1.2 Method

This test shall be carried out at ambient temperature.

The measurement zone (bearing surface, across flats, underside of anchor nut lugs, etc.) shall correspond to the following conditions:

- a) thickness at least equal to 10 times the penetration depth;
- b) deviation in parallelism with respect to bearing surface not greater than 3°.

Should this not be possible, carry out this test on a cut section after moulding the nut into a resin capable of maintaining it in the correct position.

Remove all possible coating (protection, lubrication, paint, etc.) in the measurement zone. True up the bearing surface to obtain the required relationship. These two operations shall not generate any heat liable to modify the characteristics of the material constituting the nut to be tested.

Carry out the test and then check conformity with the requirements of the drawing.

NOTE Nuts subjected to this test shall not be used again.

3.2 Bearing surface squareness test

3.2.1 Test device

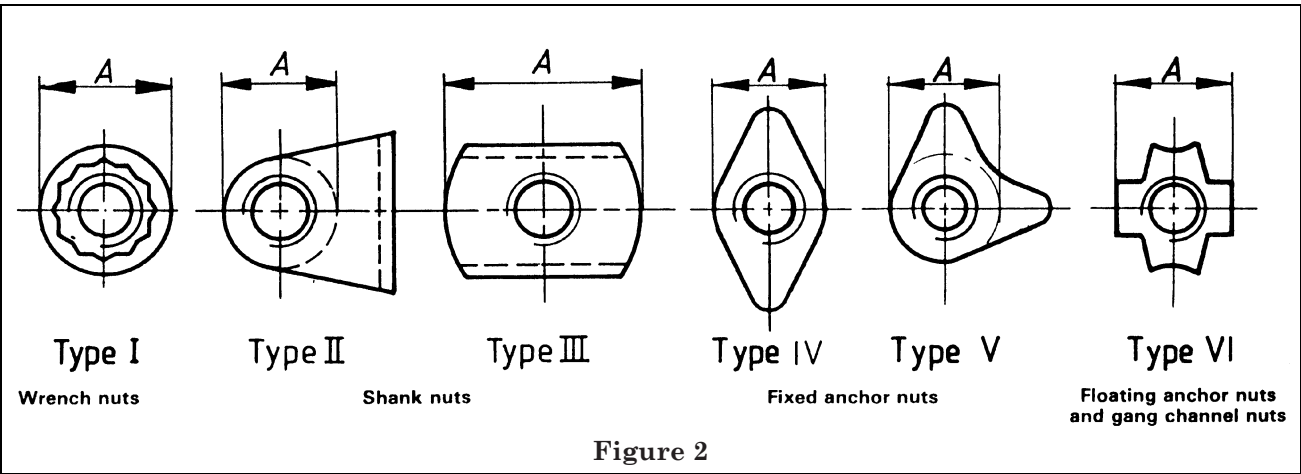
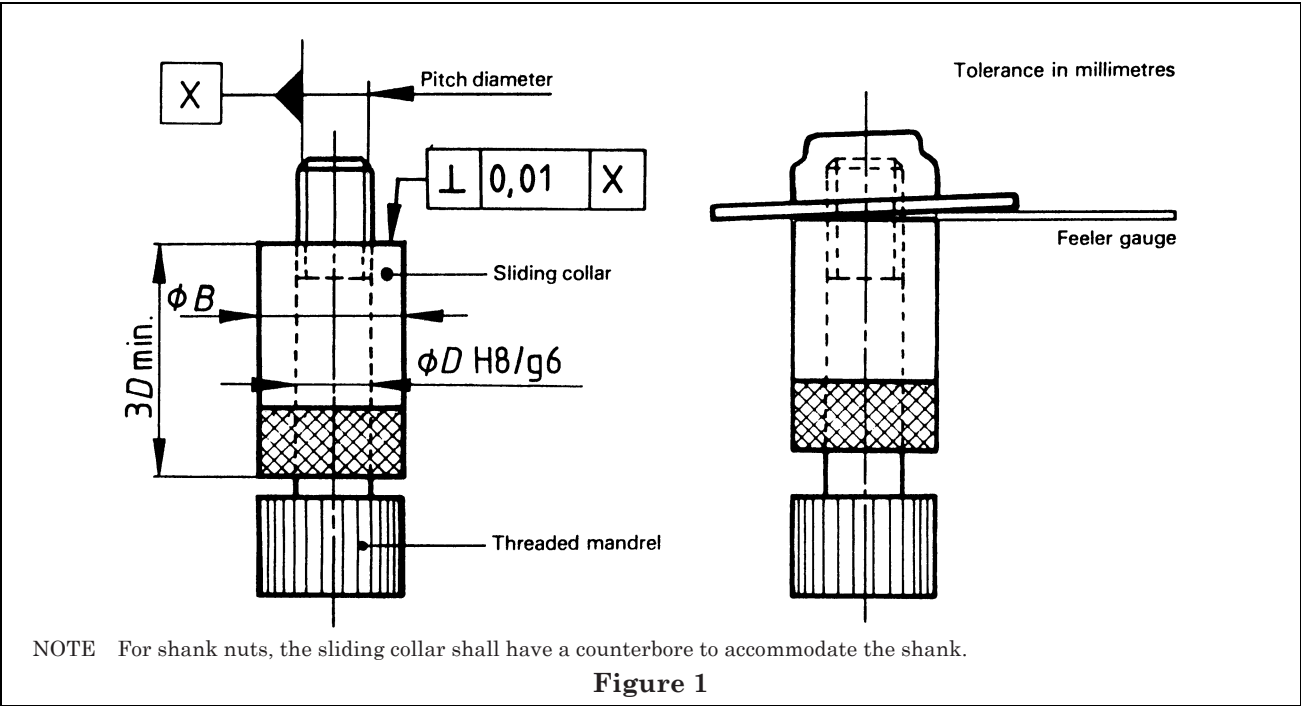
The test device is illustrated in Figure 1.

The test device includes the following elements:

- a) a threaded mandrel with end in accordance with ISO 5855-1 and ISO 5855-2, except for the pitch diameter which shall be in accordance with the values specified in Table 3 for the maximum mandrel;
- b) a collar sliding on the plain portion of the threaded mandrel the external diameter *B* of which shall be at least equal to reference dimension *A* for types I, III and VI nuts in Figure 2 and equal to reference dimension *A* for types II, IV and V nuts in Figure 2;
- c) an appropriate feeler gauge.

²⁾ At present at the stage of draft.

³⁾ Will be dealt with in a future International Standard.



3.2.2 Method

The test shall be carried out at ambient temperature.

For floating nuts, extract the nut from the cage or channel.

Screw the threaded mandrel into the nut or threaded part until it engages with the self-locking zone.

Move the collar into contact with the bearing surface.

Evaluate the out-of-squareness by means of a feeler gauge the thickness of which shall correspond to the permissible squareness error as laid down in the drawing or the procurement specification.

3.3 Axial load test

3.3.1 Test device

The test device is illustrated in Figure 3.

The test device includes the following elements:

- a) a bearing plate in steel, heat-treated to $HRC \geq 40$;
- b) a bolt with a rolled thread and characteristics as follows:
 - 1) threads: in accordance with ISO 5855-1 and ISO 5855-2,
 - 2) tensile strength classification: greater than that of the nut to be tested,
 - 3) material: alloy steel, non-coated;
- c) a torque wrench.