

## Aerospace — Nuts, self-locking, with maximum operating temperature less than or equal to 425 °C — Test methods

*Aéronautique et espace — Écrous à freinage interne dont la température maximale d'utilisation est inférieure ou égale à 425 °C — Méthodes de contrôle et d'essai*

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ISO 7481

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*A model manuscript of a draft International Standard (known as "The Rice Model") is available at*

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**Contents**

Foreword ..... v

1 Scope ..... 1

2 Normative references..... 1

3 Terms and definitions ..... 1

4 Inspections and tests ..... 1

4.1 Hardness test..... 1

4.1.1 Procedure ..... 1

4.1.2 Method..... 2

4.2 Bearing surface squareness test..... 2

4.2.1 Test device ..... 2

4.2.2 Method..... 4

4.3 Axial load test ..... 4

4.3.1 Test device ..... 4

4.3.2 Method..... 5

4.4 Wrenching feature test..... 6

4.4.1 General..... 6

4.4.2 Test device ..... 6

4.4.3 Method..... 7

4.5 Stress embrittlement test..... 8

4.5.1 General..... 8

4.5.2 Test device ..... 8

4.5.3 Method..... 8

4.6 Torque-out test..... 10

4.6.1 General..... 10

4.6.2 Test device ..... 10

4.6.3 Method..... 10

4.7 Test of no rotation of the captive washer ..... 11

4.7.1 General..... 11

4.7.2 Test device ..... 11

4.7.3 Method..... 12

4.8 Push-out test..... 12

4.8.1 General..... 12

4.8.2 Test device ..... 12

4.8.3 Method..... 13

4.9 Self-locking torque at ambient temperature ..... 14

4.9.1 Test device ..... 14

4.9.2 Method..... 14

## ISO/FDIS 7481:2023(E)

4.10	Self-locking torque at ambient temperature after heat soak at maximum operating temperature	16
4.10.1	Test device .....	16
4.10.2	Method.....	16
4.11	Permanent set test.....	17
4.11.1	General.....	17
4.11.2	Test device .....	17
4.11.3	Method.....	18
4.12	Vibration test.....	19
4.12.1	General.....	19
4.12.2	Test device .....	19
4.12.3	Method.....	22

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## Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO ~~documents~~document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

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This document was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 4, *Aerospace fastener systems*.

This third edition cancels and replaces the second edition (ISO 7481:2000), which has been technically revised.

The main changes are as follows:

- ~~Normative~~normative references have been updated and changed to undated;
- ~~Table 4~~— ~~Table 4~~ title error corrected;
- ~~Table 5~~— ~~Table 5~~ has been corrected;
- ~~The~~the footnote in ~~Table 5~~Table 5 has been added;
- ~~The~~the document has been editorially updated.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).



# Aerospace — Nuts, self-locking, with maximum operating temperature less than or equal to 425 °C — Test methods

## 1 Scope

This document specifies test methods for metric self-locking nuts with MJ threads intended for use in aerospace construction at maximum operating temperatures less than or equal to 425 °C. It describes the test device and the method for each test.

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

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 691, *Assembly tools for screws and nuts — Wrench and socket openings — Tolerances for general use*

ISO 5855-2, *Aerospace — MJ threads — Part 2: Limit dimensions for bolts and nuts*

ISO 6507-1, *Metallic materials — Vickers hardness test — Part 1: Test method*

ISO 6508-1, *Metallic materials — Rockwell hardness test — Part 1: Test method (scales A, B, C, D, E, F, G, H, K, N, T)*

ISO 7403, *Aerospace — Spline drives — Wrenching configuration — Metric series*

## 3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

## 4 Inspections and tests

### 4.1 Hardness test

#### 4.1.1 Procedure

The choice depends on the configuration of the nut and available equipment. The authorized procedures shall meet the following requirements:

- Rockwell hardness in accordance with ISO 6508-1;
- Vickers hardness HV 5 to HV 100 in accordance with ISO 6507-1;
- Rockwell superficial hardness in accordance with ISO 6508-1;
- [Microhardness](#).

#### 4.1.2 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) [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 thermosetting resin.

Remove all possible coating (protection, lubrication, paint, etc.) in the measurement zone. Align 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 being tested.

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

Nuts subjected to this test shall not be used again.

### 4.2 Bearing surface squareness test

#### 4.2.1 Test device

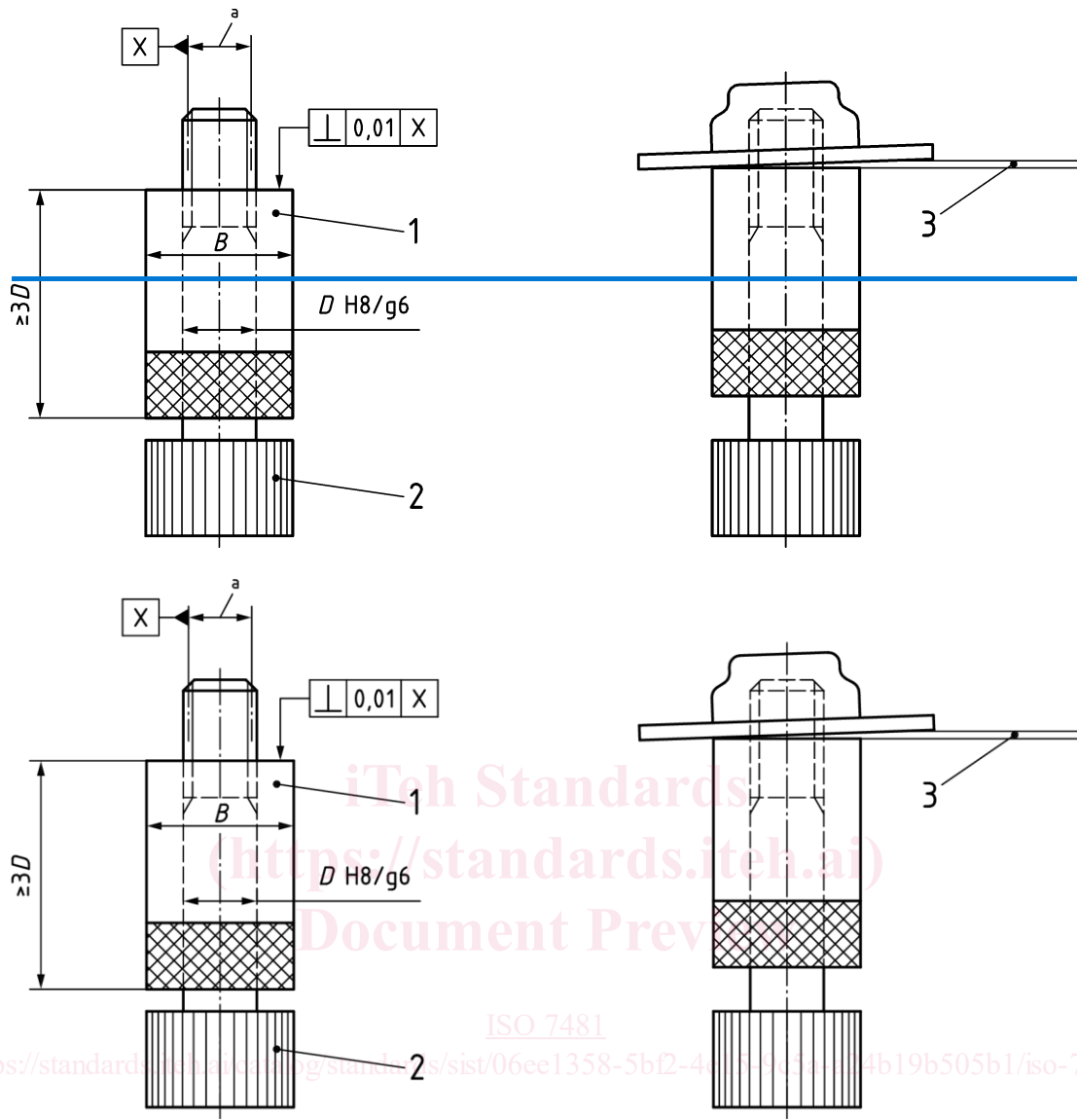
The test device is illustrated in [Figure 1](#).

The test device shall include the following elements:

- a) [A<sub>a</sub>](#) threaded mandrel with end in accordance with ISO 5855-2, with the exception of the pitch diameter, which shall be in accordance with the values specified in [Table 5](#) for the maximum mandrel;
- b) [A<sub>a</sub>](#) collar sliding on the plain portion of the threaded mandrel whose external diameter B is at least equal to reference dimension A for type I, II and V nuts in [Figure 2](#) and equal to reference dimension A for type III and IV nuts in [Figure 2](#);
- c) [A<sub>an</sub>](#) appropriate feeler gauge.

For clinch nuts, the sliding collar shall have a counterbore to accommodate the shank.

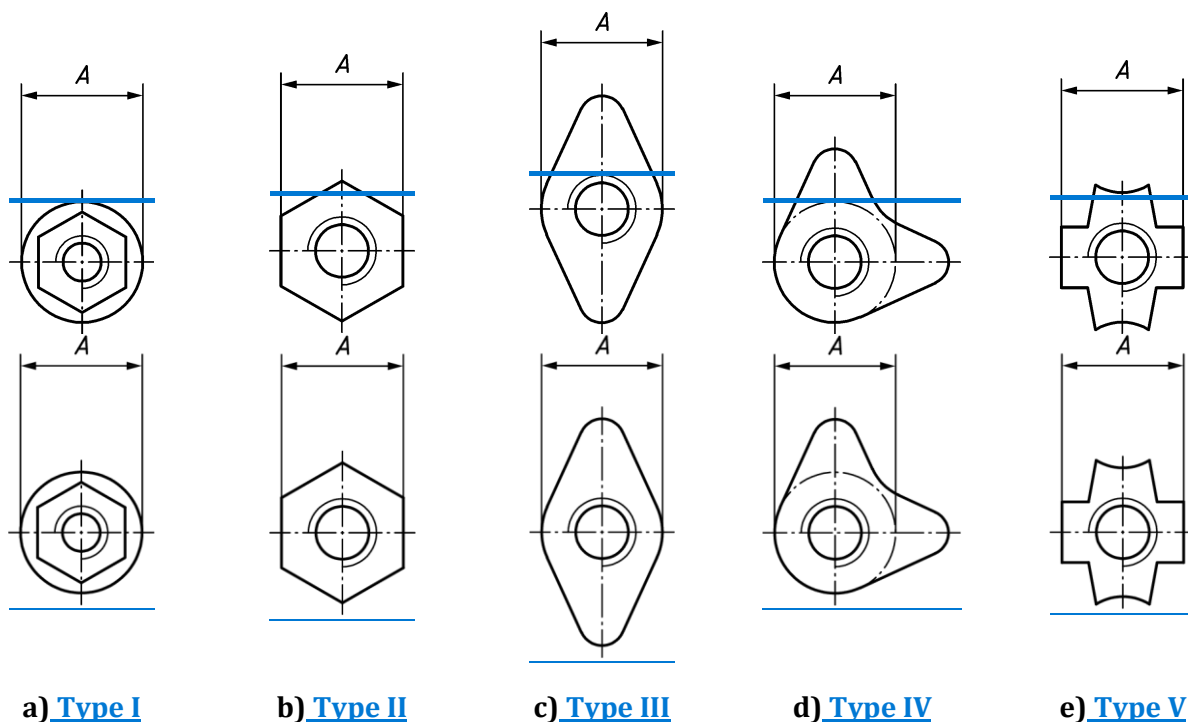




**Key**

- 1 sliding collar
- 2 threaded mandrel
- 3 feeler gauge
- a Pitch diameter.

**Figure 1 — Test device bearing surface squareness**



NOTE Types I and II are wrench nuts and clinch nuts. Types III and IV are fixed anchor nuts. Type V are floating anchor nuts and gang channel nuts.

**Figure 2 — Types of internally threaded fasteners**

#### 4.2.2 Method

The test shall be carried out at ambient temperature.

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

Lubricate the mandrel and nut (or threaded part) threads as stated in [Table 1](#) (if necessary). Screw, with or without a wrench, the threaded mandrel into the nut or threaded part up to a minimum engagement of three turns.

Move the collar into contact with the bearing surface.

Evaluate the out-of-squareness by means of a feeler gauge whose thickness corresponds to the permissible squareness error permitted by the dimensional standard, the drawing or the procurement specification.

#### 4.3 Axial load test

##### 4.3.1 Test device

The test device is illustrated in [Figure 3](#).

The test device includes the following elements:

- a) [A<sub>a</sub>](#) bearing plate in steel, heat-treated to a hardness  $\geq 40$  HRC;
- b) [A<sub>a</sub>](#) conical washer (for testing countersunk nuts);
- c) [A<sub>a</sub>](#) bolt with characteristics as follows:
  - 1) [Thread](#): in accordance with ISO 5855--2;