
Aerospace series - Nuts, self-locking, MJ threads, in heat resisting nickel base alloy NI-PH2601 (Inconel 718), silver plated - Classification: 1 550 MPa (at ambient temperature)/600 °C - Technical specification

Aerospace series - Nuts, self-locking, MJ threads, in heat resisting nickel base alloy NI-PH2601 (Inconel 718), silver plated - Classification: 1 550 MPa (at ambient temperature)/600 °C - Technical specification

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Série aérospatiale - Ecrous, a freinage interne, a filetage MJ, en alliage résistant a chaud a base de nickel - NI-PH2601 (Inconel 718), argentés - Classification: 1 550 MPa (a température ambiante)/600°C - Spécification technique

Ta slovenski standard je istoveten z: EN 4047:2003

ICS:

49.030.30 Matice Nuts

SIST EN 4047:2004 en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 4047:2004](#)

<https://standards.iteh.ai/catalog/standards/sist/70bc667f-28bd-40e2-81d8-bc1ea48d6933/sist-en-4047-2004>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 4047

February 2003

ICS 49.030.30

English version

Aerospace series - Nuts, self-locking, MJ threads, in heat
resisting nickel base alloy NI-PH2601 (Inconel 718), silver plated
- Classification: 1 550 MPa (at ambient temperature)/600 °C -
Technical specification

This European Standard was approved by CEN on 1 November 2002.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovak Republic, Spain, Sweden, Switzerland and United Kingdom.

<https://standards.iteh.ai/catalog/standards/sist/70bc667f-28bd-40e2-81d8-bc1ea48d6933/sist-en-4047-2004>



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

Contents

Foreword.....	3
1 Scope	3
2 Normative references	3
3 Terms and definitions.....	4
4 Quality assurance	6
4.1 Qualification	6
4.2 Acceptance	6
4.2.1 Purpose.....	6
4.2.2 Conditions	6
4.2.3 Responsibility.....	6
4.2.4 Inspection and test report.....	6
5 Requirements	6

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN 4047:2004](https://standards.iteh.ai/catalog/standards/sist/70bc667f-28bd-40e2-81d8-bc1ea48d6933/sist-en-4047-2004)

<https://standards.iteh.ai/catalog/standards/sist/70bc667f-28bd-40e2-81d8-bc1ea48d6933/sist-en-4047-2004>

Foreword

This document EN 4047:2003 has been prepared by the European Association of Aerospace Manufacturers (AECMA).

After enquiries and votes carried out in accordance with the rules of this Association, this Standard has received the approval of the National Associations and the Official Services of the member countries of AECMA, prior to its presentation to CEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 2003, and conflicting national standards shall be withdrawn at the latest by August 2003.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard : Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

iTeh STANDARD PREVIEW (standards.iteh.ai)

1 Scope

This standard specifies the characteristics, qualification and acceptance requirements for self-locking nuts with MJ threads in NI-PH2601, silver plated.

[SIST EN 4047:2004](https://standards.iteh.ai/catalog/standards/sist/70bc667f-28bd-40e2-81d8-bc1ea48d6933/sist-en-4047-2004)

[https://standards.iteh.ai/catalog/standards/sist/70bc667f-28bd-40e2-81d8-](https://standards.iteh.ai/catalog/standards/sist/70bc667f-28bd-40e2-81d8-bc1ea48d6933/sist-en-4047-2004)

Classification: 1 550 MPa ¹⁾ / 600 °C ²⁾. [bc1ea48d6933/sist-en-4047-2004](https://standards.iteh.ai/catalog/standards/sist/70bc667f-28bd-40e2-81d8-bc1ea48d6933/sist-en-4047-2004)

It is applicable whenever referenced.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

- | | |
|------------|---|
| ISO 2859-1 | <i>Sampling procedures for inspection by attributes - Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection.</i> |
| ISO 3452 | <i>Non-destructive testing - Penetrant inspection - General principles.</i> |
| ISO 3534 | <i>Statistics - Vocabulary and symbols.</i> |
| ISO 4288 | <i>Geometrical product specifications (GPS) - Surface texture: Profile method - Rules and procedures for the assessment of surface texture.</i> |

1) Corresponds to the minimum tensile stress which the nut is able to withstand at ambient temperature without breaking or cracking when tested with a bolt of a higher strength class.

2) Maximum test temperature of the parts

EN 4047:2003 (E)

ISO 8642:1986 *Aerospace - Self-locking nuts with maximum operating temperature greater than 425 °C - Test methods.*

EN 2786 *Aerospace series - Electrolytic silver plating of fasteners* ³⁾.

EN 3042 *Aerospace series - Quality assurance - EN aerospace products - Qualification procedure.*

ASTM E112-96 *Standard Test Methods for Determining Average Grain Size* ⁴⁾.

3 Terms and definitions

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

3.1**batch**

quantity of finished nuts, of the same type and same diameter, produced from a material obtained from the same melt, manufactured in the course of the same production cycle, following the same manufacturing route and having undergone all the relevant heat treatments and surface treatments

3.2 Surface discontinuities**3.2.1****crack**

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

3.2.2**seam**

open surface defect

SIST EN 4047:2004
<https://standards.iteh.ai/catalog/standards/sist/70bc667f-28bd-40e2-81d8-bc1ea48d6933/sist-en-4047-2004>

3.2.3**lap**

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

3.2.4**inclusions**

non-metallic particles originating from the material manufacturing process. These particles may be isolated or arranged in strings.

3.3**test temperature**

ambient temperature, unless otherwise specified

3.4**simple random sampling**

taking of n items from a population of N items in such a way that all possible combinations of n items have the same probability of being chosen ⁵⁾

3) Published as AECMA Prestandard at the date of publication of this standard

4) Published by: American Society for Testing and Materials (ASTM), 100 Barr Harbor Dr, West Conshohocken, PA 19428-2959- USA

5) Definition taken from ISO 3534

3.5

critical defect

defect that, according to judgement and experience, is likely to result in hazardous or unsafe conditions for individuals using, maintaining, or depending upon the considered product, or that is likely to prevent performance of the function of a major end item ⁵⁾

3.6

major defect

defect other than critical, that is likely to result in a failure or to reduce materially the usability of the considered product for its intended purpose ⁵⁾

3.7

minor defect

defect that is not likely to reduce materially the usability of the considered product for its intended purpose, or that is a departure from established specification having little bearing on the effective use or operation of this product ⁵⁾

3.8

sampling plan

plan according to which one or more samples are taken in order to obtain information and possibly to reach a decision ⁵⁾

3.9

limiting quality

in a sampling plan, the quality level which corresponds to the specified 10% probability of acceptance

3.10

acceptable quality level (AQL)

quality level which in a sampling plan corresponds to a specified but relatively high probability of acceptance. It is the maximum per cent defective (or the maximum number of defects per hundred units) that, for purposes of sampling inspection can be considered satisfactory as a process average ⁵⁾

3.11

finished nut

nut ready for use, inclusive of any possible treatments and/or surface coatings, as specified in the product standard or definition document

3.12

definition document

document specifying all the requirements for finished nuts

3.13

self-locking torque

torque to be applied to the nut or bolt to maintain its movement of rotation in relation to the associated part, the assembly being under no axial load and the nut locking zone being completely engaged with the bolt (minimum protrusion of two pitches, including the end chamfer)

3.14

seating torque

tightening torque to be applied to the nut or bolt to introduce or to increase the axial load in the assembly

3.15

unseating torque

untightening torque to be applied to the nut or bolt to reduce or remove the axial load in the assembly

EN 4047:2003 (E)

3.16

breakaway torque

torque required to start unscrewing the nut or bolt with respect to the associated part, with the nut locking zone still fully engaged on the bolt, but after the axial load in the assembly has been removed by unscrewing half a turn followed by a halt in rotational movement

3.17

torque for testing the wrench feature

torque to be applied to the wrenching feature of the nut

4 Quality assurance

4.1 Qualification

EN 3042

Qualification inspections and tests (requirements, methods, numbers of nuts) are specified in Table 1. They shall be carried out on:

- each type and diameter of nut;
- 46 nuts selected from a single batch by simple random sampling.

The test programme may possibly be reduced, or the qualification be granted without inspection or testing : any such decision shall be based on the results obtained on similar types and diameters of nuts provided that the design and manufacturing conditions are identical.

Table 2 indicates the allocation of nut samples for the inspections and tests.

4.2 Acceptance

[SIST EN 4047:2004
https://standards.iteh.ai/catalog/standards/sist/70bc667f-28bd-40e2-81d8-bc1ea48d6933/sist-en-4047-2004](https://standards.iteh.ai/catalog/standards/sist/70bc667f-28bd-40e2-81d8-bc1ea48d6933/sist-en-4047-2004)

4.2.1 Purpose

The purpose of acceptance inspections and tests is to check, as simply as possible, by a method representative of actual use conditions, with the uncertainty inherent to statistical sampling, that the nuts constituting the batch satisfy the requirements of this standard.

4.2.2 Conditions

Acceptance inspections and tests (requirements, methods, numbers of nuts) are specified in Table 1. They shall be carried out on each batch. Nuts from the batch to be tested shall be selected by simple random sampling.

Each nut may be submitted to several inspections or tests.

If a more stringent inspection is deemed necessary, all or part of the qualification inspections and tests may be performed during the acceptance inspection and testing. In this case, the number of nuts submitted to these inspections and tests is the same as that submitted for qualification inspection and tests.

4.2.3 Responsibility

Acceptance inspections and tests shall be carried out by the manufacturer, or under his responsibility

4.2.4 Inspection and test report

A test report showing actual numerical values shall be provided if specified in the purchase order.

5 Requirements

See Table 1.

Table 1 – Technical requirements and test methods

Clause	Characteristic	Requirement	Inspection and test method	Q/A ^a	Sample size
5.1	Material	In accordance with the product standard or definition document	Chemical analysis or certificate of compliance issued by the manufacturer of the semi-finished product	Q	
				A	
5.2	Dimensions, tolerances and tolerances of form and position	In accordance with the product standard or definition document	Standard gauging	Q	43
				A	Tables 3 and 4
5.3	Manufacturing				
5.3.1	Forming	Nuts shall be formed by a hot or cold forming process. If hot formed, the forming temperature shall not exceed 1150 °C and they shall be air cooled or faster. The equipment shall ensure a uniform temperature throughout the batch.	The method of forming shall be indicated	Q	
5.3.2	Heat treatment	<p>The heat treatment medium or atmosphere shall not cause any surface contamination except as permitted by 5.5.4.</p> <p>Any scale which will not be removed by subsequent machining shall be removed by abrasive blasting with an appropriate equipment.</p> <p>Solution treat (if applicable) at a temperature of 950 °C to 980 °C, held at the selected temperature within ± 15 °C for between 1 h min. and 2 h max., quench in oil, or alternative medium or faster.</p> <p>Precipitation treat at (720 ± 5) °C holding at heat for $8 \text{ h} \pm 15$ min furnace cooling at (55 ± 5) °C per h to (620 ± 5) °C holding at 620 °C for $8 \text{ h} \pm 5$ min followed by air cooling or faster. Instead of the 55 °C per h cooling rate to 620 °C, parts may be furnace cooled at any rate provided the time at 620 °C is adjusted to give a total precipitation time of 18 h min.</p>	<p>Calibration of the heat treatment equipment shall be confirmed.</p> <p>Visual examination</p> <p>Examination of the heat treatment specification</p>	Q	
continued					

EN 4047:2003 (E)

Table 1 (continued)

Clause	Characteristic	Requirement	Inspection and test method	Q/A ^a	Sample size
5.3.3	Bearing surface perpendicularity	In accordance with the product standard or definition document. For non-floating plate nuts having a bearing surface exceeding 1,5 times the thread nominal diameter, the perpendicularity requirement shall, unless otherwise specified by the product standard or definition document, apply only to that portion of the bearing surface of the part contained within a diameter equal to 1,5 times the thread nominal diameter.	ISO 8642	Q	43
				A	Tables 3 and 4
5.3.4	Thread and thread deformation (form out-of-round)	Threads in the locking zone may be deformed in any manner provided that the nut meets the requirements of this standard. Any tool marks shall blend smoothly without any abrupt changes. The finished nuts shall allow the "GO" thread plug gauge to enter a minimum of three turns before engagement of the locking element for nuts having overall length of thread portion not less than 1,2 times the nominal thread diameter. Finished nuts having shorter threaded portion shall allow the "GO" thread plug gauge to enter a minimum of three quarters of a turn.	Standard gauging.	Q	43
				A	Tables 3 and 4
5.3.5	Surface roughness	In accordance with the product standard or definition document	ISO 4288 Visual examination	Q	3
				A	Tables 3 and 4
5.3.6	Surface coating				
5.3.6.1	Appearance	See EN 2786.	See EN 2786.	Q	43
				A	Tables 3 and 4
5.3.6.2	Thickness	In accordance with the product standard or definition document	See 5.3.6.1. Inspection can be carried out at the same time as inspection per 5.5.1.	Q	2
				A	Table 6, column B
5.3.6.3	Adhesion	EN 2786	See 5.3.6.1. Inspection can be carried out at the same time as inspection per 5.4.3.2.	Q	5
				A	Table 6, column B

continued

Table 1 (continued)

Clause	Characteristic	Requirement	Inspection and test method	Q/A ^a	Sample size
5.4	Mechanical properties	A test sample shall be selected from each size of bar, wire, sheet or strip taken from each cast, and shall be heat treated together with a batch of nuts. The sample selected shall be sufficient to provide tensile test pieces. The test pieces shall meet the mechanical properties required by the material standard.			
5.4.1	Axial load				
5.4.1.1	at ambient temperature	Finished nuts shall withstand the minimum loads specified in Table 5. After the load has been applied the nut shall not display : - any cracks; - any permanent set; - any significant reduction in self-locking torque.	ISO 8642 100 % test	Q	4
				A	Table 6, column B
5.4.1.2	After 600 °C baking	Finished nuts shall withstand the minimum loads specified in Table 5. After testing, the nuts shall not display : - any cracks; - any fracture. Permanent set and resultant effects (reduction of the self-locking torque) are permissible.	ISO 8642, 100 % test Prior to testing, the nut shall be assembled on a bolt of the same material, at least two thread pitches protruding. The assembly shall be heated to (600 ± 8) °C and held at this temperature for 6 h ± 15 min and cooled to ambient temperature. Remove the nut from the bolt and proceed in accordance with ISO 8642. A new test bolt shall be used for each nut to be tested.	Q	4
5.4.2	Wrench feature test	All wrenchable nuts shall withstand 15 successive applications of the torque specified in Table 5 without any permanent damage to the wrench feature.	ISO 8642	Q	3
5.4.3	Vibration test	After the test, rotation of the nut relative to the bolt less than or equal to 360° is permissible. The nut shall not be cracked and shall not be capable of turning by hand.	ISO 8642 Cycles : 30000 Total displacement : 11,25 mm Seating torque to be applied, see Table 5		
5.4.3.1	at ambient temperature	See 5.4.3	See 5.4.3	Q	5

continued