



SLOVENSKI STANDARD

SIST EN 4047:2005

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SIST EN 4047:2004

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

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Luft- und Raumfahrt - Muttern, selbstsichernd, MJ-Gewinde, aus hochwarmfester Nickelbasislegierung NI-PH2601 (Inconel 718), versilbert - Klasse: 1 550 MPa (bei Raumtemperatur) / 600 °C - Technische Lieferbedingungen

Série aérospatiale - Écrous, 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 4047:2004

ICS:

49.030.30 Matice

Nuts

SIST EN 4047:2005

en

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 4047

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ICS 49.030.30

Supersedes EN 4047:2003

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**

Série aérospatiale - Écrous, à freinage interne, à filetage
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This European Standard was approved by CEN on 11 September 2003.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

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Foreword

This document (EN 4047:2004) has been prepared by the European Association of Aerospace Manufacturers - Standardization (AECMA-STAN).

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 May 2005, and conflicting national standards shall be withdrawn at the latest by May 2005.

This document supersedes EN 4047:2003.

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

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EN 4047:2004 (E)

1 Scope

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

Classification: 1 550 MPa ¹⁾ / 600 °C ²⁾

It is applicable whenever referenced.

2 Normative references

The following referenced documents are indispensable for the application 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 2859-1, *Sampling procedures for inspection by attributes – Part 1: Sampling schemes indexed by acceptable quality limit (AQL) for lot-by-lot inspection*
- ISO 3452, *Non destructive testing – Penetrant inspection – General principles*
- ISO 4288, *Geometrical Product Specifications (GPS) – Surface texture: Profile method – Rules and procedures for the assessment of surface texture*
- ISO 8642, *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 9133, *Aerospace series – Quality management systems – Qualification procedure for aerospace standard parts* ³⁾
- ASTM E 112-96, *Standard Test Methods for Determining Average Grain Size* ⁴⁾

3 Terms and definitions

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

3.1

batch

quantity of finished parts, of the same type and same diameter, produced from the same 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

inspection lot

quantity of parts from a single production batch with the same part number which completely defines the part

1) Correspond 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

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

4) Published by: American Society for Testing and Materials (ASTM), 1916, Race Street, Philadelphia, PA 19103, USA

3.3 Surface discontinuities

3.3.1

crack

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

3.3.2

seam

open surface defect

3.3.3

lap

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

3.3.4

inclusions

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

3.4

test temperature

ambient temperature unless otherwise specified

3.5

simple random sampling

the 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

3.6

critical defect

a 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

3.7

major defect

a 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

3.8

minor defect

a 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

3.9

sampling plan

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

3.10

limiting quality (LQ₁₀)

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

EN 4047:2004 (E)**3.11****acceptance quality limit (AQL)**

a quality limit 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.

3.12**finished nut**

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

3.13**definition document**

document specifying all the requirements for finished nuts

3.14**self-locking torque**

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

3.15**seating torque**

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

3.16**unseating torque**

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

3.17**breakaway torque**

the torque required to start unscrewing the nut or bolt with respect to the associated part, with the nut locking device 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

3.18**wrench feature torque**

the torque to be applied to the wrenching feature of the nut

4 Quality assurance**4.1 Qualification**

EN 9133

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 inspection lot by simple random sampling.

The test programme may possibly be reduced, or the qualification of a nut 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

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 production batch or inspection lot. Nuts from the batch or lot 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.

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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 conformity 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 1 150 °C and they shall be air cooled or faster. The equipment shall ensure a uniform temperature throughout the production batch.	The method of forming shall be indicated.	Q	
5.3.2	Heat treatment	The heat treatment medium or atmosphere shall not cause any surface contamination except as permitted by 5.5.4. Any scale which will not be removed by subsequent machining shall be removed by abrasive blasting with an appropriate equipment. Solution treat (if applicable) at a temperature of 950 °C to 980 °C, hold at the selected temperature within ± 15 °C for between 1 h min. and 2 h max., quench in oil, or alternative medium or faster. Precipitation treatment at (720 ± 5) °C, held at temperature for 8 h ± 15 min, furnace cooled at (55 ± 5) °C per hour to (620 ± 5) °C, held at 620 °C for 8 h ± 5 min, followed by air cooling or faster. Instead of the 55 °C per hour 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.	Calibration of the heat treatment equipment shall be confirmed. Visual examination Examination of the heat treatment specification	Q	

continued

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 $\times 1,5$ 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 $\times 1,5$ the thread nominal diameter.	ISO 8642	Q	46
				A	Tables 3 and 4
5.3.4	Thread and thread deformation (form-out-of round)	Threads in the locking region 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 one turn before engagement of the locking element for nuts having overall length of thread portion not less than $\times 1,2$ 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	46
				A	Tables 3 and 4
5.3.5	Surface roughness	In accordance with the product standard or definition document	ISO 4288	Q	3
			Visual examination	A	Tables 3 and 4
5.3.6	Surface coating	Silver plating in the product standard or definition document			
5.3.6.1	Appearance	See EN 2786.	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
5.3.6.3	Adhesion	See 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

continued