

SLOVENSKI STANDARD

SIST EN 2583:2001

01-januar-2001

Aerospace series - Bolts, MJ threads, in heat resisting nickel base alloy NI-PH2601 (Inconel 718) - Classification: 1 275 MPa (at ambient temperature)/650oC - Technical specification

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Luft- und Raumfahrt - Schrauben, MJ-Gewinde, aus hochwarmfester Nickelbasislegierung NI-PH2601 (Inconel 718). Klasse: 1 275 MPa (bei Raumtemperatur)/650°C - Technische Lieferbedingungen

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Série aérospatiale - Vis a filetage MJ, en alliage résistant a chaud a base de nickel NI-PH2601 (Inconel 718) - Classification: 1 275 MPa (a température ambiante)/350°C - Spécification technique

Ta slovenski standard je istoveten z: EN 2583:1997

ICS:

49.030.20 Sorniki, vijaki, stebelni vijaki Bolts, screws, studs

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EUROPEAN STANDARD

EN 2583

NORME EUROPÉENNE

EUROPÄISCHE NORM

January 1997

ICS 49.040.20

Descriptors: aircraft industry, screw, nickel alloy, heat resistant material, classification, quality assurance, specification, characteristic, inspection, test

English version

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Série aéronautique - Vis à filetage MJ, en alliage résistant à chaud à base de nickel NI-PH2601 (Inconel 718) - Classification: 1 275 MPa (à température ambiante) / 650°C - Spécification technique

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CEN

European Committee for Standardization
 Comité Européen de Normalisation
 Europäisches Komitee für Normung

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Foreword

This European Standard has been prepared by the European Association of Aerospace Manufacturers (AECMA).

After inquiries 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of an identical text or by endorsement, at the latest by July 1997, and conflicting national standards shall be withdrawn at the latest by July 1997.

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

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1 Scope

This standard specifies the characteristics, qualification and acceptance requirements for bolts with MJ threads in NI-PH2601.

Classification : 1 275 MPa ¹⁾ / 650 °C ²⁾

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.

ISO 2859-1	Sampling procedures for inspection by attributes - Part 1 : Sampling plans indexed by acceptable quality level (AQL) for lot-by-lot inspection
ISO 3452	Non-destructive testing - Penetrant inspection - General principles
ISO 3534 : 1977	Statistics - Vocabulary and symbols
ISO 4288	Rules and procedures for the measurement of surface roughness using stylus instruments
ISO 5855-2	Aerospace MJ threads - Part 2 : Limit dimensions for bolts and nuts
ISO 6508	Metallic materials - Hardness test - Rockwell test (scales A - B - C - D - E - F - G - H - K)
ISO 6892	Metallic materials - Tensile testing
ISO 7961	Aerospace - Bolts - Test methods
ISO 9227	Corrosion tests in artificial atmospheres - Salt spray tests
EN 3042	Aerospace series - Quality assurance - EN aerospace products - Qualification procedure
ASTM E 112-88	Standard Test Methods for Determining Average Grain Size ³⁾

1) Minimum tensile strength of the material at ambient temperature

2) Maximum test temperature of the parts

3) Published by : American Society for Testing and Materials (ASTM), 1916 Race Street, Philadelphia, PA 19103-1187, USA

3 Definitions

For the purposes of this standard, the following definitions apply :

3.1 Batch

Quantity of finished bolts, 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

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
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3.4 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 ⁴⁾

3.5 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 ⁴⁾

3.6 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 ⁴⁾

3.7 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 ⁴⁾

3.8 Sampling plan

A plan according to which one or more samples are taken in order to obtain information and possibly to reach a decision ⁴⁾

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)

A 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 ⁴⁾.

3.11 Finished bolt

A bolt 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 bolts

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4 Quality assurance

4.1 Qualification

EN 3042

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

- each type and diameter of bolt ;
- 25 bolts 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 bolts provided that the design and manufacturing conditions are identical.

Table 2 indicates the allocation of bolt 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 bolts constituting the batch satisfy the requirements of this standard.

4) Definition taken from ISO 3534

4.2.2 Conditions

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

Each bolt 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 bolts 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 1)	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 A	25 Tables 3 and 4
5.3	Manufacturing				
5.3.1	Forging	The head of the bolts shall be formed by hot or cold forging. If hot forged, the forging temperature shall not exceed 1 150 °C and they shall be air cooled. The equipment shall ensure a uniform temperature throughout the batch.	The method of forging 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 5.5.6. Any scale which will not be removed by subsequent machining shall be removed by abrasive blasting with an appropriate equipment. The headed blanks shall be solution treated at a temperature of 930 °C to 1 010 °C, held at the selected temperature within ± 15 °C for not less than 1 h and air cooled or faster. The headed and solution treated blanks shall be precipitation heat treated 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 ± 15 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 ¹⁾	Sample size
5.3.3	Removal of surface contamination by machining	After solution and precipitation treatment the headed blanks shall have the shank and bearing surface of the head machined : a) for the removal of all surface contamination and oxide penetration ; b) to obtain a clean smooth surface. The amount of material removed (see figure 1) shall be as little as practicable but shall not exceed the limits of table 5.	See 5.5.6. See 5.5.1.		
5.3.4	Head to shank fillet	After completion of solution, precipitation treatment and machining, the underhead radius shall be cold rolled to remove all visual signs of machining and to create cold working. This may cause distortion which shall not exceed the values in figure 2, unless otherwise specified on the product standard or definition document. For parts with compound radii between head and shank (e.g. T head bolts), cold work only the radius that blends with the head, however it is acceptable for cold work to extend over the compound radius. The fillet shall not show seams or inclusions (see table 6).	Dimensional check (see 5.2) and visual examination	Q A	25 Tables 3 and 4
5.3.5	Threads	Shall be formed by a single rolling process after full heat treatment (see figure 3).		Q	
5.3.6	Surface roughness	In accordance with the product standard or definition document	ISO 4288 Visual examination	Q A	3 Tables 3 and 4
5.3.7	Passivation treatment	Uncoated finished bolts shall be passivated in accordance with annex A. After 2 h of salt spray, bolts shall show no evidence of corrosion or staining.	ISO 9227 Visual examination	Q A	5 100 %
5.3.8	Surface coating	In accordance with the product standard or definition document	See applicable coating standard.	Q A	3 Tables 3 and 4

continued

Table 1 (continued)

Clause	Characteristic	Requirement	Inspection and test method	Q/A ¹⁾	Sample size
5.4	Mechanical properties	A test sample shall be selected from each diameter of bar/wire taken from each cast, and shall be heat treated together with a production batch of bolts. The sample selected shall be sufficient to provide tensile and stress rupture test pieces. The test pieces shall meet the mechanical properties required by the material standard.			
5.4.1	Tensile strength	The finished bolts shall withstand the minimum tensile loads specified in table 7. Externally wrenched bolts shall not fail in the head to shank area when subjected to the tensile test. Tensile tests are not applicable to the following: a) protruding head bolts of nominal length < 3 D; b) countersunk head bolts of nominal length < 3 D or bolts having a nominal length < 18 mm. In such cases acceptability shall be based on the results from test bars of the same material heat treated within the same process cycle.			
5.4.1.1	- at ambient temperature		ISO 7961 for parts ISO 6892 for test pieces	Q A	4 Table 8, column B or table 9
5.4.1.2	- at elevated temperature	650 °C ± 5 °C	ISO 7961 for parts ISO 6892 for test pieces	Q	4
5.4.2	Stress rupture	The finished bolts shall be maintained at (650 ± 2) °C while the load specified in table 7 is applied continuously. There shall be no rupture in less than 23 h.	ISO 7961	Q	3

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