SLOVENSKI STANDARD
SIST EN 3818:2004

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Aerospace series - Bolts with MJ threads, in titanium alloy TI-P64001 - Classification: 1100 MPa (at ambient temperature) - Technical specification

Aerospace series - Bolts with MJ threads, in titanium alloy TI-P64001 - Classification: 1100 MPa (at ambient temperature) - Technical specification

Série aérospatiale - Vis a filetage MJ, en alliage de titane TI-P63 - Classification:1 100 MPa (a température ambiante) - Spécification technique

Ta slovenski standard je istoveten z: **EN 3818:2003**

ICS:

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

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Aerospace series - Bolts with MJ threads, in titanium alloy TI-P64001 - Classification: 1100 MPa (at ambient temperature) - Technical specification

This European Standard was approved by CEN on 19 August 2002.

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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.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

page

Foreword

This document EN 3818:2003 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of an identical text or by endorsement, at the latest by August 2003, and conflicting national standards shall be withdrawn at the latest by August 2003.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, Slovak Republic, Spain, Sweden, Switzerland and United Kingdom.

1 Scope

This standard specifies the characteristics, qualification and acceptance requirements for bolts with MJ threads in TI-P64001.

Classification : 1 100 MPa [1)]

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, *Sampling procedures for inspection by attributes - Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*.

ISO 3452, *Non-destructive testing - Penetrant inspection - General principles.*

ISO 3534, *Statistics -Vocabulary and symbols.*

ISO 4288, *Geometrical Product Specifications (GPS) - Surface texture: Profile method - Rules and procedures for the assessment of surface texture.*

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

ISO 6892, *Metallic materials - Tensile testing at ambient temperature.*

ISO 7961, *Aerospace - Bolts - Test methods.*

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

1) Minimum tensile strength of the material at ambient temperature

3 Terms and definitions

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

3.1
production batch
quantity of finished bolts Manufactured, using the same process, from a single material cast (single heat of alloy), having the same basic part number and diameter, heat treated together to the same specified condition and produced as one continuous run

3.2
inspection lot
quantity of bolts from a single production batch with the same part number which completely defines the bolt.

3.3 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 which is the result of the extension of the material

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 [2)]
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 [2)]
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

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[2)] Definitions taken in ISO 3534

3.7
major defect [2)]
defect other than critical, that is likely to result in a failure or to reduce materially the useability of the considered product for its intended purpose

3.8
minor defect [3)]
defect that is not likely to reduce materially the useability of the considered product for its intended purpose, or that is a departure from established specification having a little bearing on the effective use or operation of this product

3.9
sampling plan[2)]
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 (LQ $_{10}$)
in a sampling plan, a quality level which corresponds to a specified and relatively low probability of acceptance, in this case 10 % probability of acceptance

3.11
acceptable quality level (AQL) [2)]
quality level which is 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
microstructural shearing (shear bending)
V or U shaped rippled grain structure immediately below the thread root, or chevron shaped rippled grain structure within the thread crest

3.13
finished bolt
bolt ready for use, inclusive of any possible treatments and/or surface coatings, as specified in the product standard or definition document

3.14
definition document
document specifying all the requirements for finished bolts

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3 Definitions taken in ISO 3534

4 Quality assurance

4.1 Qualification

EN 3042

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

-each type diameter of bolt;

-25 bolts selected from a single inspection lot by simple random sampling.

The test programme may possibly be reduced, or the qualification of a bolt 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 specimens for the inspections and tests.

4.2 Acceptance

4.2.1 Purpose

The purpose of acceptance inspection 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 to this standard.

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 production batch. Bolts from the batch or lot 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 test 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 at the puchaser's option as part of the terms of 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 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	20
				A	See Tables 5and6
5.3	Manufacturing				
5.3.1	Forging	The head of the bolts shall be forged by a hot forging process before heat treatment The equipment shall ensure an adequate and uniform temperature throughout the production batch.	According to the route of manufacture The equipment used shall be approved.	Q	
5.3.2	Heat treatment	The forged blanks shall be heat treated to produce the properties required by the definition document. Blanks shall not be heat treated more than twice.	According to process control The equipment shall be approved	Q	
5.3.3	Removal of surface contamination (bearing face and shank}	If machining is required the requirements of 5.5.1 shall be respected.			
5.3.4	Filet between head and shank [b)]	The fillet radius shall be cold rolled after heat treatment and machining so as to remove all visual signs of machining and to create superficial cold working. The deformation shall not exceed the values in Figure 2.	Visual examination under appropriate magnification and dimensional check	Q	Five
				A	See Table 5 and 6
5.3.5	Threads	Formed by a single rolling process after full heat treatment	According to the manufacturing route		
5.3.6	Surface roughness	The surface roughness shall be as specified by the product standard or the definition document prior to surface coating.	ISO 4288 – Visual comparison method	Q	Five
				A	See Tables 5 and6
5.3.7	Surface coating	In accordance with the product standard or definition document	See applicable coating specification	Q	Five
				A	See Tables 5 and 6

(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 diameter of bar, wire, sheet or strip drawn from each cast, and shall be heat treated together with a production batch of bolts 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	Tensile strength [c]	See Table 3 The requirements generally apply on bolts however the requirements apply to test specimens in the following cases : a) protruding head bolts of grip length less than twice the nominal shank diameter ; b) countersunk head bolts of grip length less than 2,5 times the nominal shank diameter ; c) threaded to head bolts of overall length less than 3 times the nominal shank diameter or bolts having an overall length less than 18 mm ; d) bolts with a thread length less than 1,5 times the thread diameter	On bolts: see ISO 7961 On test specimens : see ISO 6892. The test specimens to be produced from the same material batch as the bolts and treated with them.	Q	Five
				A	See Tables 7 or 8.
5.4.2	Tension fatigue strength [d]	Life: - mean value: min. 65 000 cycles - individual value: min. 45 000 cycles max.130 000 cycles Frequency: 140 Hz max. Loads : see Table 4.	ISO 7961	Q	Five
				A	See Table 7.
5.4.3	Recess torque	Removal torque as specified by the product standard or definition document, using the appropriate driver with an end load of (45 ± 2,5) N, without camout or excessive distortion.	The equipment used shall be approved.	Q	Five
				A	See Tables 5 and 6