SLOVENSKI STANDARD
SIST EN 3818:2019

01-julij-2019

Nadomešča:

SIST EN 3818:2005

Aeronavtika - Sorniki, navoj MJ, iz titanove zlitine TI-P64001 - Trdnostni razredi: 1100 MPa (pri okoljski temperaturi) - Tehnična specifikacija

Aerospace series - Bolts, MJ threads, in titanium alloy TI-P64001 - Strength class: 1 100 MPa (at ambient temperature) - Technical specification

Luft- und Raumfahrt - Schrauben, MJ-Gewinde, aus Titanlegierung TI-P64001 - Festigkeitsklasse: 1 100 MPa (bei Raumtemperatur) - Technische Lieferbedingungen

Série aérospatiale - Vis à filetage MJ, en alliage de titane TI-P64001 - Classe de résistance : 1 100 MPa (à température ambiante) - Spécification technique

Ta slovenski standard je istoveten z: EN 3818:2019

ICS:

21.060.10	Sorniki, vijaki, stebelni vijaki	Bolts, screws, studs
49.025.30	Titan	Titanium
49.030.20	Sorniki, vijaki, stebelni vijaki	Bolts, screws, studs

SIST EN 3818:2019 en,fr,de

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 3818

May 2019

ICS 49.030.20

Supersedes EN 3818:2004

English Version

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This European Standard was approved by CEN on 2 December 2018.

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

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European foreword

This document (EN 3818:2019) has been prepared by the Aerospace and Defence Industries Association of Europe - Standardization (ASD-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 ASD, 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of an identical text or by endorsement, at the latest by November 2019, and conflicting national standards shall be withdrawn at the latest by November 2019.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 3818:2004.

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

1 Scope

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

Strength class: 1 100 MPa[1].

It is applicable whenever referenced.

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 2859-1, *Sampling procedures for inspection by attributes — Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

ISO 3452-1, *Non-destructive testing — Penetrant testing — Part 1: General principles*

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 6892-1, *Metallic materials — Tensile testing — Part 1: Method of test at room temperature*

ISO 7961, *Aerospace — Bolts — Test methods*

3 Terms and definitions

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

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

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

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

1 Minimum tensile strength of the material at ambient temperature

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 compressing 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
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

3.5
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

3.6
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

3.7
sampling plan
plan according to which one or more samples are taken in order to obtain information and possibly to reach a decision

3.8
limiting quality
LQ_{10}
in a sampling plan, the quality level which corresponds to the specified 10 % probability of acceptance

3.9
Acceptance Quality Limit
AQL
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.

3.10
finished bolt
bolt ready for use, inclusive of any possible treatments and/or surface coatings, as specified in the product standard or definition document

3.11
definition document
document specifying all the requirements for finished bolts

4 Quality assurance

4.1 Qualification

The qualification procedure for aerospace standard products (e. g. according to EN 9133 or an equivalent aerospace accepted and established qualification procedure) shall be used and documented according to the specified tests if not otherwise agreed between customer and supplier.

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;

— 20 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.

4.2.2 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 Responsability

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 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	15
				A	Table 3 and Table 4
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 a uniform temperature throughout the batch.	According to the route of manufacture The equipment 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)	No sign of surface contamination or oxidation. If machining is required the requirements of 5.5.1 shall be respected.	Visual examination		

Clause	Characteristic	Requirement	Inspection and test method	Q/A[a]	Sample size
5.3.4	Head to shank fillet	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 1. The requirements apply on bolts except on the following: a) threaded to head bolts; b) bolts with a nominal diameter < 5 mm.	Visual examination at a suitable magnification of × 10 to × 20 and dimensional check	Q	5
				A	Table 3 and Table 4
5.3.5	Threads	Formed by a single rolling process after full heat treatment.	According to the route of manufacture.	Q	
5.3.6	Surface roughness	In accordance with the product standard or definition document.	ISO 4288 Visual examination	Q	5
				A	Table 3 and Table 4
5.3.7	Surface coating	In accordance with the product standard or definition document.	See applicable coating standard.	Q	5
				A	Table 3 and Table 4
5.4	Mechanical properties	A test sample selected from each diameter of bar or wire from each cast shall be heat treated together with a production batch of bolts. The sample selected shall be sufficient to provide tensile test pieces. The test specimens shall meet the mechanical properties required by the material standard.			
5.4.1	Tensile strength	If stress durability is necessary, see 5.5.6, then tensile test is not carried out. The applicable tensile loads are specified in Table 5. This test applies on bolt, except on the following cases, but failure in the bearing face and shank zone is not permissible: a) protruding head bolts of grip length < twice the nominal shank diameter; b) countersunk head bolts of grip length < × 2,5 the nominal shank diameter; c) threaded to head bolts of overall length < × 3 the nominal shank diameter or bolts having an overall length < 18 mm; d) bolts with a thread length < 1,5 times the thread nominal diameter; e) bolts of diameters of < 4 mm.	ISO 7961 for bolts ISO 6892-1 for test specimens	Q	5
				A	Table 6 or Table 7

Clause	Characteristic	Requirement	Inspection and test method	Q/A[a]	Sample size
5.4.2	Tension fatigue strength	Life: — mean value: min. 65 000 cycles. — individual value: min. 45 000 cycles; max. 130 000 cycles. Frequency: 140 Hz max. Loads: see Table 5. This test applies on bolts except on the following: a) protruding head bolts of grip length < twice the nominal shank diameter; b) countersunk head bolts of grip length < × 2,5 the nominal shank diameter; c) bolts with a nominal diameter < 5 mm; d) threaded to head bolts. For individual fatigue life values exceeding 65 000 cycles, breaking may occur in any place. For individual fatigue life values less than 65 000 cycles, the breaking a) shall occur in the thread in the case of parts with full or pitch diameter shanks; b) is acceptable in the groove or relieved diameter for such parts and c) is not allowed in the underhead fillet radius.	ISO 7961	Q	5
5.4.3	Recess removal torque	The internal wrenching recess of the finished screw shall withstand the removal torque specified in the product standard or definition document. During the test, the driving feature shall show no camout and the recess no excessive distortion.	With the screw fixed in rotation, submit the driving feature to an end load of (45 ± 2,5) N with the application of the required removal torque at the same time.	Q A	5 Table 3 and Table 4
5.5	Metallurgical properties		NOTE The same test sample may be used for more than one test provided that none of the characteristics of the samples are altered during the examination procedure (see Table 2).		
5.5.1	Head to shank grain flow	Flow lines in the fillet area immediately below the surface shall closely conform to the fillet contour. Slight cutting in the flow lines shall not extend beyond the *A* dimension as shown in Figure 2 and tabulated in Table 8.	Samples shall be taken from the finished bolts (see Figure 3). The section to be examined shall be subjected to an appropriate etchant. Macroscopic examination of a longitudinal section at a suitable magnification of × 10 to × 20	Q A	5 Table 6