SLOVENSKI STANDARD

SIST EN 4458:2006

01-september-2006

Aeronavtika ï Stebelni vijaki, navoj MJ, iz titanove zlitine TI-P64001, prevleļ eni z MoS2, z nagubanim pritrdilnim obroļ em iz korozijsko odpornega jekla ï Trdnostni razred: 1 100 MPa (pri temperaturi okolice) ï Tehniļ na specifikacija

Aerospace series - Studs, MJ threads, in titanium alloy TI-P64001, MoS2 coated, with serrated locking ring in corrosion resisting steel - Strength class: 1 100 MPa (at ambient temperature) - Technical specification

Luft- und Raumfahrt - Stiftschrauben, MJ-Gewinde aus Titanlegierung TI-P64001, MoS2 beschichtet, mit Ringsicherung aus korrosionsbeständigem Stahl - Festigkeitsklasse: 1 100 MPa (bei Raumtemperatur) - Technische Lieferbedingungen

Série aérospatiale - Goujons, filetage MJ, en alliage de titane TI-P64001, revetus MoS2, avec bague de verrouillage dentelée en acier résistant a la corrosion - Classe de résistance : 1 100 MPa (a température ambiante) - Spécification technique

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English Version

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This European Standard was approved by CEN on 26 September 2005.

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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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of 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.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This European Standard (EN 4458:2005) 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 2006, and conflicting national standards shall be withdrawn at the latest by May 2006.

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

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 the United Kingdom.

1 Scope

This standard specifies the characteristics, qualification and acceptance requirements for studs with MJ threads in TI-P64001, MoS_2 coated, with serrated locking ring in corrosion resisting steel.

Strength class: 1 100 MPa [1)]

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 acceptance quality limit (AQL) for lot-by-lot inspection.*

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

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

EN ISO 4288, *Geometrical Product Specifications (GPS) – Surface texture: Profile method – Rules and procedures for the assessment of surface texture (ISO 4288:1996)*

EN 2638, *Aerospace series – Aluminium alloy 2024-T3 extruded bar and section – 1,2 ≤ (a or D) ≤ 150 mm with coarse peripheral grain control.* [2)]

EN 4460, *Aerospace series – Studs, in titanium alloy TI-P64001, with serrated locking ring in corrosion resisting steel – Installation and removal procedure.* [2)]

EN 9133, *Aerospace series – Quality management systems – Qualification Procedure for aerospace standard parts.*

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 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

1) Minimum tensile strength of the material at ambient temperature.

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

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

3.3
test temperature
ambient temperature, unless otherwise specified

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

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

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

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

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

3.9
limiting quality
in a sampling plan, the quality limit which corresponds to the specified 10 % probability of acceptance

3.10
acceptable 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.

3.11
finished stud
a stud 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 studs

3.13
seating torque
the tightening torque to be applied to the thin wall insert and bolt assembly to introduce or to increase the axial load in the assembly

3.14
unseating torque
the untightening torque to be applied to the thin wall insert and bolt assembly to reduce or remove the axial load in the assembly

4 Quality assurance

4.1 Qualification

EN 9133

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

— each diameter of studs;

— 25 studs 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 studs provided that the design and manufacturing conditions are identical.

Table 2 indicates the allocation of stud 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 studs constituting the batch satisfy the requirements of this standard.

4.2.2 Conditions

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

Each stud 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 studs 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	20
				A	Tables 3 and 4
5.3	**Manufacturing**				
5.3.1	**Forging**	The equipment shall ensure a uniform temperature throughout the batch.	According to the route of manufacture	Q	
				A	
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	
				A	
5.3.3	**Threads**	Formed by a single rolling process after full heat treatment. Threads dimensions and geometry requirements are specified in 5.2.	According to the route of manufacture	Q	5

continued

Table 1 *(continued)*

Clause	Characteristic	Requirement	Inspection and test method	Q/A [a]	Sample size
5.3.4	**Surface roughness**	In accordance with the product standard or definition document	EN ISO 4288 Visual examination	Q A	5 Tables 3 and 4
5.3.5	**Surface coating**	In accordance with the product standard or definition document	See applicable coating standard.	Q A	5 Tables 3 and 4
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 studs. The test pieces are used for tensile, creep and tension fatigue strength tests when the stud have a total length smaller than three times its diameter or smaller than 20 mm. The test pieces and studs shall meet the mechanical properties required by the material standard.			
5.4.1	**Tensile strength**	The test shall be carried out on finished studs or on test pieces. The test assembly must allow a tensile load parallel to the stud axis.	Annex B Before failure, yield strength and elongation are measured.	Q A	5 Table 5
5.4.2	**Tension fatigue strength**	Requirements in accordance with 5.4.1. Life: – mean value: min. 65 000 cycles – individual value: min. 45 000 cycles max. 130 000 cycles Frequency: 140 Hz max. Loads: see Table B.2. If the fatigue strength life is less than 65 000 cycles, the failure shall be situated in threads. If failure occurs starting at 65 000 cycles, it shall be situated either in threads or in the fillet groove.	Annex B ISO 7961	Q A	5 Table 5
5.4.3	**Rotational resistance**	The studs installed into test blocks shall withstand the minimum torque specified in Table B.1.	Annex B	Q	5

continued

Table 1 *(continued)*

Clause	Characteristic	Requirement	Inspection and test method	Q/A [a]	Sample size
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	**Thread grain flow**	Shall be continuous and shall follow the general thread contour with the maximum density at the bottom of the root radius (see Figure 1).	Macroscopic examination at a magnification of × 10 to × 20 (see Figure 2)	Q	5
				A	Table 5
5.5.2	**Microstructure, overheating and surface contamination**	Shall not have: – microporosity or major segregation – indication that the stud has been heated to a temperature > the transition temperature of the beta range without subsequently receiving adequate working within the alpha / beta temperature range. A WIDMANSTATTEN or equi-axed grain structure of beta origin without primary alpha is regarded as overheating. Surface contamination shall not exceed 0,08 mm for all diameters. It is not permitted on other surfaces.	Microscopic examination at a magnification of × 100 (see Figure 2), after appropriate etching	Q	5
				A	Table 5
5.5.3	**Hydrogen content**	≤ 0,0125 % on material removed from the head	The equipment shall be approved.	Q	3
				A	1 per inspection lot
5.5.4	**Surface discontinuities** (before coating)	See Table 6. Care shall be exercised to avoid confusing cracks with other discontinuities. Cracked studs and those having discontinuities transverse to axis (i.e. at an angle more than 10° to the longitudinal axis) shall be rejected and destroyed.	Fluorescent penetrant inspection according to ISO 3452 Suspect studs to be submitted to microscopic examination at a magnification of × 100 (see Figure 2).	Q	5
				A	Penetrant Tables 3 and 4
5.5.5	**Material identification**	Finished studs shall be subjected to a non-destructive test to verify the type of material.	The test equipment shall be calibrated by samples of known chemical composition of the same type and form and in the same heat treatment condition as the parts to be tested.	Q	20
				A	100 %

continued