SLOVENSKI STANDARD
SIST EN 3299:2009

01-junij-2009

Aeronavtika - Gredne matice in navojni obroļ i, samozapiralni, levi ali desni navoj MJ, iz toplotnoodpornega jekla FE-PA2601 (A286), posrebreni - Tehniļ na specifikacija

Aerospace series - Shaft-nuts and threaded rings, self-locking, right- or left-hand MJ threads, in heat resisting steel FE-PA2601 (A286), silver plated - Technical specification

Luft- und Raumfahrt - Wellenmuttern und Gewinderinge, selbstsichernd, Rechts- oder Links-MJ-Gewinde, aus hochwarmfestem Stahl FE-PA2601 (A286), versilbert - Technische Lieferbedingungen

Série aérospatiale - Écrous d'arbres et bagues filetées, à freinage interne, filetage MJ à droite ou à gauche, en acier résistant à chaud FE-PA2601 (A286), argentés - Spécification technique

Ta slovenski standard je istoveten z: EN 3299:2007

ICS:

49.030.30	Matice	Nuts
49.030.50	Podložke in drugi blokirni elementi	Washers and other locking elements

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Foreword

This document (EN 3299:2007) 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of an identical text or by endorsement, at the latest by January 2008, and conflicting national standards shall be withdrawn at the latest by January 2008.

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.

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1 Scope

This standard specifies the characteristics, qualification and acceptance requirements for self-locking shaft-nuts and threaded rings, with right- or left-hand MJ threads, in FE-PA2601, silver-plated, for aerospace applications.

Temperature class: 450 °C [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 3452, *Non-destructive testing — Penetrant inspection — General principles.*

ISO 3534:1977, *Statistics — Vocabulary and symbols.*

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

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

EN ISO 6507-1, *Metallic materials — Vickers hardness test — Part 1: Test method (ISO 6507-1:2005).*

EN ISO 6508-1, *Metallic materials — Rockwell hardness test — Part 1: Test method (scales A, B, C, D, E, F, G, H, K, N, T) (ISO 6508-1:2005).*

EN 2786, *Aerospace series — Electrolytic silver plating of fasteners.* [2)]

EN 9133, *Aerospace series — Quality management systems — Qualification procedure for aerospace standard parts.*

ASTM E 112-88, *Standard Test Methods for Determining Average Grain Size*. [3)]

3 Terms and definitions

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

3.1
finished nut or ring
a nut or ring ready for use, inclusive of any possible treatments and/or surface coatings, as specified in the product standard or definition document

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1) Maximum test temperature of the parts.

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

3) Published by: American Society for Testing and Materials (ASTM), 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, USA.

3.2
definition document
document specifying all the requirements for finished nuts or rings

3.3
batch
quantity of finished nuts or rings, 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

3.4
production cycle
period during which production proceeds without any voluntary or unforeseen change in manufacturing parameters

3.5
heat treatment cycle
period during which the oven continuously remains at nominal treatment temperature

3.6
surface treatment cycle
period during which the surface treatment proceeds without any voluntary or unforeseen change in surface treatment parameters

3.7 Surface discontinuities

3.7.1
crack
rupture in the material which may extend in any direction and which may be intercrystalline or transcrystalline in character

3.7.2
seam
open surface defect

3.7.3
lap
surface defect caused by folding over metal fins or sharp corners

3.7.4
inclusions
non-metallic particles originating from the material manufacturing process

These particles may be isolated or arranged in strings.

3.8
sampling plan
a plan according to which one or more samples are taken in order to obtain information and possibly reach a decision

[ISO 3534, see definition]

3.9
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

[ISO 3534, see definition]

3.10
self-locking torque
the torque to be applied to the nut or ring to maintain its movement of rotation in relation to the associated part, the assembly being under no axial load and the locking zone being completely engaged on the associated part (minimum protrusion of two pitches, including the end chamfer)

3.11
breakaway torque
the torque required to start unscrewing the nut or ring with respect to the associated part, with the locking zone still fully engaged, but after the axial load in the assembly has been removed by unscrewing half a turn followed by a halt in rotational movement

3.12
effective seating torque
part of the apparent seating torque which introduces or increases the axial load in the assembly. The effective seating torque is equal to the difference between the apparent seating torque and the self-locking torque.

3.13
apparent seating torque
the torque indicated by the dynamometric wrench when tightening

4 Quality assurance

4.1 Qualification

EN 9133.

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

— each type and diameter of nut or ring;

— 12 nuts or rings 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 diameters of nuts or rings, provided that the design and manufacturing conditions are identical.

Table 2 indicates the allocation of nut or ring 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 or rings constituting the batch satisfy the requirements of this standard.

4.2.2 Conditions

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

Each nut or ring 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 sample 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 of form and position**	In accordance with the product standard or definition document	Standard gauging	Q A	9 Table 3
5.3	**Manufacturing**	The nuts or rings shall be manufactured by machining.	Examination of the manufacturing process	Q	
5.3.1	**Heat treatment**	The heat treatment medium or atmosphere shall not cause any surface contamination except as permitted by 5.5.4.	Examination of the heat treatment equipment	Q	
		Solution treat (if applicable) at a temperature of 900 °C to 980 °C held at the selected temperature within ± 15 °C for between 1 h min. and 2 h max. quench in oil, or alternative medium or faster.	Examination of the heat treatment process	Q	
		Precipitation treat at (720 ± 10) °C held at temperature for 16 h ± 15 min cooled in air or faster process.			
		Any scale not removed by subsequent machining shall be removed by abrasive blasting.	Visual examination		
5.3.2	**Bearing surface perpendicularity**	In accordance with the product standard or definition document.	See Annex A.	Q A	3 Table 3

continued

Table 1 *(continued)*

Clause	Characteristic	Requirement	Inspection and test method	Q/A [a]	Sample size
5.3.3	**Threads and thread deformation**	Threads in the locking region may be deformed in any manner provided that the nut or ring meets the requirements of this standard. The method of forming shall be indicated. Any tool marks shall blend smoothly without any abrupt changes. The finished nuts or rings shall allow the "GO" thread plug or ring gauge to enter a minimum of 1,5 turns before engagement of the locking element.	Visual examination Standard gauging	Q A	9 Table 3
5.3.4	**Surface roughness**	In accordance with the product standard or definition document	EN ISO 4288 Visual examination	Q A	3 Table 3
5.3.5	**Surface coating**	In accordance with the product standard or definition document	EN 2786		
5.3.5.1	**Appearance**	See 5.3.5.	See 5.3.5.	Q A	9 Table 3
5.3.5.2	**Thickness**	See 5.3.5.	See 5.3.5. Inspection can be carried out at the same time as inspection per 5.5.1.	Q A	3 Table 3
5.3.5.3	**Adhesion**	See 5.3.5.	See 5.3.5. Inspection can be carried out at the same time as inspection per 5.4.1.3.	Q A	3 Table 3
5.4	**Mechanical properties**				
5.4.1	**Reusability test**	After testing, nut or ring threads shall not show any indications of distortion, galling or seizing as to prevent reassembly of the nut or ring freely, up to the self-locking zone. Threads of the inspection device shall remain serviceable and permit assembly of a new nut freely with the fingers up to the self-locking zone. The self-locking torque and the seating and unseating torque shall be measured for each cycle upon tightening and un-tightening.			
5.4.1.1	**Self-locking torque at ambient temperature** (12 cycles)	They shall be within the min./max. values given in Table B.1, columns 2 and 3 or 4, for each cycle.	See Annex B.	Q	3

continued

Table 1 *(continued)*

Clause	Characteristic	Requirement	Inspection and test method	Q/A [a]	Sample size
5.4.1.2	**Self-locking torque at ambient temperature** (one cycle)	They shall be within the min./max. values given in Table B.1, columns 2 and 3.	See Annex B.	A	Table 3
5.4.1.3	**Self-locking torque at ambient temperature after 450 °C baking** (five cycles)	They shall be within the min./max. values given in Table B.1, columns 2 and 3 or 4, for each cycle.	See Annex B.	Q	3
5.4.2	**Hardness**	27 HRC to 37 HRC 280 HV 5 to 365 HV 5	See Annex C.	Q A	3 Table 3
5.5	**Metallurgical properties**		NOTE The same test sample may be utilized 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	**Microstructure**	Nuts or rings shall have a predominantly recrystallized microstructure. The inclusions shall not exceed the values permitted in the material's technical specification.	Samples shall be etched in a suitable solution. Microscopic examination at a magnification of × 100	Q A	3 Table 3
5.5.2	**Grain size**	Grain size may vary according to section thickness and/or thread deformation, but shall, when compared with plate II of ASTM E 112, not be coarser than five. Isolated grains not exceeding a mean diameter [b] of 0,23 mm are acceptable.	See 5.5.1.	Q A	3 Table 3
5.5.3	**Surface discontinuities** (before coating)	Cracks are not permitted. Open defects (seam) with less than or equal to 0,03 mm in depth are acceptable.	ISO 3452 Samples showing indications which are considered significant shall be subjected to a microscopic examination at a suitable magnification (e.g. × 100).	Q A	3 Table 3
5.5.4	**Surface contamination**	Depth of oxide penetration to 0,01 mm is permissible except on threads and surface bearing.	See 5.5.1.	Q A	3 Table 3

continued