



**SLOVENSKI STANDARD**  
**SIST EN 2943:2024**

**01-maj-2024**

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**Aeronavtika - Žični navojni vložki, vijačni navoji MJ in M - Tehnična specifikacija**

Aerospace series - Inserts, MJ and M screw threads, helical coil - Technical specification

Luft- und Raumfahrt - Draht-Gewindeeinsätze, MJ- und M-Gewinde - Technische Lieferbedingungen

Série aérospatiale - Filets rapportés, filetages MJ et M - Spécification technique

**Ta slovenski standard je istoveten z: EN 2943:2024**

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Bolts, screws, studs

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EUROPEAN STANDARD

EN 2943

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## Aerospace series - Insert, MJ and M screw threads, helical coil - Technical specification

Série aérospatiale - Filets rapporté, filetages MJ et M -  
Spécification technique

Luft- und Raumfahrt - Draht-Gewindeeinsatz, MJ- und  
M-Gewinde - Technische Lieferbedingungen

This European Standard was approved by CEN on 15 January 2024.

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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 CEN-CENELEC Management Centre has the same status as the official versions.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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## European foreword

This document (EN 2943:2024) has been prepared by ASD-STAN.

After enquiries and votes carried out in accordance with the rules of this Association, this document has received the approval of the National Associations and the Official Services of the member countries of ASD-STAN, 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of an identical text or by endorsement, at the latest by September 2024, and conflicting national standards shall be withdrawn at the latest by September 2024.

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 2943:2019.

This document includes the following significant technical changes with respect to EN 2943:2019:

- a) normative references updated;
- b) subclauses 4.1 and 4.2 updated;
- c) Table 1 “Technical requirements and test methods” revised;
- d) Table 3 “Test equipment” revised;
- e) Table 4 “Values of breakaway torque, self-locking torque and seating torque” and Table 5 “Values of breakaway torque, self-locking torque and seating torque” extended by more thread types;
- f) Annex A extended in accordance with the revised Table 4 and Table 5;
- g) document editorially revised.

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Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

**EN 2943:2024 (E)****1 Scope**

This document specifies the characteristics, qualification and acceptance requirements for helical coil screw thread inserts.

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.

EN 2398, *Aerospace series — Heat resisting steel FE-PA2601 (X6NiCrTiMoV26-15) —  $R_m \geq 900$  MPa — Bars for machined bolts —  $D \leq 25$  mm*

EN 2945, *Aerospace series — Inserts, screw thread, helical coil, self-locking — Assembly procedure*

EN 3044, *Aerospace series — Installation holes for inserts, screw thread, helical coil, self-locking — Design standard*

EN 3219, *Aerospace series — Heat resisting nickel base alloy (NI-P100HT) — Cold worked and softened — Bar and wire for continuous forging or extrusion for fasteners —  $3 \text{ mm} \leq D \leq 30 \text{ mm}$*

EN 9138, *Aerospace Series — Quality Management Systems — Statistical Product — Acceptance Requirements*

ISO 965-2, *ISO general purpose metric screw threads — Tolerances — Part 2: Limits of sizes for general purpose external and internal screw threads — Medium quality*

ISO 3353 (all parts), *Aerospace — Lead and runout threads*

ISO 5855-1, *Aerospace — MJ threads — Part 1: General requirements*

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

ISO 21920-3, *Geometrical product specifications (GPS) — Surface texture: Profile — Part 3: Specification operators*

**3 Terms and definitions**

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

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

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

**3.1****batch**

quantity of finished thread inserts, 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

Note 1 to entry: These particles may be isolated or arranged in strings.

## 3.3 test temperature

ambient temperature, unless otherwise specified

## 3.4 simple random sampling

sampling where a sample of  $n$  sampling units is taken from a population in such a way that all the possible combinations of  $n$  sampling units have the same probability of being taken

## 3.5 finished thread insert

thread insert ready for use, inclusive of any possible treatments and/or surface coatings, as specified in the product standards or specification document

## 3.6 specification document

document specifying all the requirements for finished thread inserts

## 3.7 self-locking torque

torque to be applied to the associated bolt to maintain its movement of rotation in relation to the thread insert assembly which is under no axial load and the thread insert locking zone being completely engaged with the bolt (minimum protrusion of two pitches, including the end chamfer)

## 3.8 seating torque

tightening torque to be applied to the thread insert and bolt assembly to introduce or to increase the axial load in the assembly

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### 3.9

#### **unseating torque**

untightening torque to be applied to the thread insert and bolt assembly to reduce or remove the axial load in the assembly

### 3.10

#### **breakaway torque**

torque required to start unscrewing the associated bolt with respect to the installed thread insert, with the insert locking zone still fully engaged on the bolt, but after the axial load in the assembly has been removed by unscrewing half a turn followed by a halt in rotational movement

## 4 Quality assurance

### 4.1 Approval of manufacturers

The manufacturer's operations shall be an approved production organization for aerospace products and shall demonstrate that it has implemented and is able to maintain a quality management system (e.g. according to EN 9100 or an equivalent aerospace accepted and established quality management system).

### 4.2 Qualification

The qualification procedure for aerospace standard products (e.g. according to EN 9133 or an equivalent aerospace accepted and established qualification procedure) may 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 thread inserts) are specified in Table 1. They shall be carried out on

- each type and diameter of thread insert and
- 26 thread inserts 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 thread inserts provided that the design and manufacturing conditions are identical.

### 4.3 Acceptance

#### 4.3.1 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 thread inserts constituting the batch satisfy the requirements of this standard.

#### 4.3.2 Conditions

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

Each thread insert may be submitted to several inspections or tests.

#### 4.3.3 Responsibility

Acceptance inspections and tests shall be carried out by the manufacturer, or under his responsibility.



#### 4.3.4 Inspection and test report

A test report showing actual numerical values shall be provided if specified in the purchase order.

### 5 Requirements

Requirements are according to Table 1.

Sampling test and examinations shall be in accordance with the requirements of EN 9138. Acceptance quality shall be based on zero imperfections.

For non-destructive tests (visual and dimensional): The random samples shall be selected from each production lot, the size for the sample to be as specified in Table 2. All dimensional characteristics are considered imperfect when out of tolerance.

For destructive tests – screw locking torque: The random sample shall be selected from each production sample lot as per Table 2. Normal size inspection shall be in effect until conditions for adjusting from normal to reduced size are satisfied. Normal size inspection shall resume when the conditions for switching from reduced to normal size occur.

Normal to reduced sample size switching: Switching from normal to reduced sample shall be instituted providing the following conditions are satisfied:

- a) the preceding 10 batches have been on normal inspection and all have been accepted;
- b) production of a sample item or items using similar processes has been continuous under normal size sampling without break longer than 90 days;
- c) reduced inspection is considered desirable.

Reduced to normal sample size switching: When reduced sample size inspection is in effect, normal sample size inspection shall be instituted if any of following conditions occur on original inspection:

- d) a batch is rejected;
- e) production of a sample item using similar processes ceases or is delayed for a period greater than 90 days;
- e) other conditions warrant that normal size inspection is resumed.

**Table 1 — Technical requirements and test methods**

Clause	Characteristic	Requirement	Inspection and test method	Q/A <sup>a</sup>	Sample size
5.1	Material	In accordance with the product standard or specification document	Chemical analysis or certificate of compliance issued by the manufacturer of the semi-finished product	—	—
5.2	Dimensions, tolerances and tolerances of form and position	In accordance with the product standard or specification document	—	—	—
5.2.1	Thread	In accordance with the product standard or specification document	The gauging shall be done from the opposite end to the drive tang. <sup>c</sup> The minimum requested number of coils above locking coil is 1,25°. Gauging to be	Q	5
				A	Table 2

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Clause	Characteristic	Requirement	Inspection and test method	Q/A <sup>a</sup>	Sample size
			conducted at the destructive test before the insert has engaged with a test bolt.		
5.2.2	Outer diameter	In accordance with the product standard or specification document	Usual measuring equipment	A	Table 2
5.2.3	Number of coils	In accordance with the product standard or specification document	Visual examination	A	Table 2
5.3	Manufacturing	—	—	—	—
5.3.1	Surface roughness	In accordance with the product standard or specification document	ISO 21920-3 Visual examination	Q	3
				A	2
5.3.2	Surface coating	In accordance with the product standard or specification document	According to applicable coating standard	Q	23
				A	Table 2
5.3.3	Colour	In accordance with the product standard or specification document	Visual examination	A	Table 2
5.4	Mechanical properties	Thread inserts shall be assembled into test equipment (according to Table 3) according to EN 2945.	—	—	—
5.4.1	Reusability set test of the locking coil (ambient temperature)	Measured torques of the thread. Inserts shall not exceed the maximum self-locking torque nor shall be less than the minimum breakaway torque, according to Table 4 and Table 5.	—	—	—
5.4.1.1	Self-locking torque at ambient temperature (15 cycles)	Shall be between the minimum breakaway torque and the maximum self-locking torque, according to Tables 4, for each cycle.	Lubricate the bolt using clean engine oil. Place the bolt in the spacer, fit the bolt in the thread insert, until it protrudes at least two pitches beyond the locking zone of the thread insert. Unscrew, until the bolt has completely left the locking zone. Start of cycles. Screw up again until the bolt protrudes at least two pitches beyond the locking zone of the thread insert, measuring the self-locking torque on screwing. Apply the seating torque to Table 5. Remove the load from the thread insert by unscrewing at least one half turn and until the spacer can be moved freely.	Q/A	Q 10 A 5