SLOVENSKI STANDARD
oSIST prEN 6104:2025

01-januar-2025

Aeronavtika - Trde kovice iz aluminija ali aluminijeve zlitine - Palčna serija - Tehnična specifikacija

Aerospace series - Rivets, solid, in aluminium or aluminium alloy - Inch series - Technical specification

Luft- und Raumfahrt - Vollniete aus Aluminium oder Aluminiumlegierung - Zoll-Reihe - Technische Lieferbedingung

Série aérospatiale - Rivets ordinaires en aluminium ou en alliage d´aluminium - Série en inches - Spécification technique

Ta slovenski standard je istoveten z: prEN 6104

ICS:

49.025.20	Aluminij	Aluminium
49.030.60	Kovice	Rivets
77.150.10	Aluminijski izdelki	Aluminium products

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EUROPEAN STANDARD

NORME EUROPÉENNE

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ICS 49.030.60

English Version

Aerospace series - Rivets, solid, in aluminium or aluminium alloy - Inch series - Technical specification

Série aérospatiale - Rivets ordinaires en aluminium ou en alliage d´aluminium - Série en inches - Spécification technique

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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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 (prEN 6104:2024) 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 document is currently submitted to the CEN Enquiry.

1 Scope

This document defines the characteristics and quality assurance requirements for solid rivets and slugs made in aluminium or aluminium alloys, inch series, for aerospace application. Following aluminium alloys are covered by this specification: 1050A-H14, 2017A-T42, 2117-T42, 5056A-H32 and 7050-T73.

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 2002-001, *Aerospace series — Metallic materials — Test methods — Part 1: Tensile testing at ambient temperature*

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 7870-1, *Control charts — Part 1: General guidelines*

ISO 7870-2, *Control charts — Part 2: Shewhart control charts*

ISO 7870-3, *Control charts — Part 3: Acceptance control charts*

NAS9800[1], *Head protrusion gaging, 100 ° flush head fasteners, gage block, gage diameters, and stylus*

SAE AMS2770[2], *Heat treatment of wrought aluminum alloy parts*

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
batches
quantity of finished rivets, manufactured using the same process, from a single material cast (single heat of alloy), having the same standard number, diameter and length code, heat treated together to the same specified condition and produced as one continuous run

3.2
rivet wire sample
length of wire, sampled at each end of the coil used for the manufacture of rivets of the batch

Note 1 to entry: The rivet wire samples undergo the same heat treatments as the rivets of the batch, at the same time.

1 Published by Aerospace Industries Association (AIA), available at: https://www.aia-aerospace.org/.
2 Published by: Society of Automotive Engineers (SAE), available at: https://www.sae.org/.

3.3
rivet sample
rivet sampled at random from the batch

3.4
crack
rupture in the material, which may extend in any direction and which may be intercrystalline or transcrystalline in character

3.5
seam
longitudinal open surface defect

3.6
lap
surface defect caused by folding over metal fins or sharp corners and then forming them into the surface

3.7
cold shut
doubling over of metal, this may occur during the cold heading operation

3.8
double ring
the discontinuity is wide but shallow and open to the surface at both ends of the discontinuity

3.9
pit
small cavity in a metal surface caused by non-uniform electro deposition or by corrosion

3.10
inclusion
non-metallic particles originating from the aluminium alloy making process

Note 1 to entry: They can exist as discrete particles or strings of particles extending in a longitudinal direction.

3.11
material separation
any loss of material from preformed head induced by installation of the rivet

3.12
defect
non-fulfilment of a requirement related to an intended or specified use

3.13
major defect
defect that is likely to result in a failure or to reduce materially the usability of the considered product for its intended purpose

3.14
minor defect
defect that is not likely to reduce materially the usability of the considered product for its intended purpose, or that represents a departure from established specification having little bearing on the effective use or operation of this product

3.15
hydrogen porosity (high temperature oxidation)
racks and fixtures used shall be constructed to preclude entrapment of water

Note 1 to entry: Ammonium fluorborate or equivalent can be used in air furnace as necessary.

3.16
blistering
defect in the metal on or near the surface, resulting from expansion of gas or entrapped lubricant from forging process in a sub-surface zone

3.17
eutectic melting
mixture of different phases with eutectic composition, which melts below the solidus temperature of the alloy

Note 1 to entry: Eutectic melting is characterised by small rosettes in the microstructure or by outlined grain boundaries, particularly at triple intersections. It can occur when raw material is not homogenized or worked properly

3.18
intergranular corrosion
selective corrosion attack along grain boundaries or closely adjacent regions without appreciable attack of the grains

3.19
sampling plan
plan according to which one or more samples are taken from a batch in order to do acceptance tests to demonstrate conformity of the batch

3.20
acceptable quality level
AQL
maximum percent defective (or the maximum number of defects per hundred units) that, for purposes of sampling inspection, can be considered satisfactory as a process average

Note 1 to entry: Variant: quality level, which in a sampling plan corresponds to a specified but relatively high probability of acceptance.

4 Quality assurance

4.1 General

4.1.1 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). The purpose of these procedures is to ensure that a manufacturer has a quality management system in place and is capable of continuous production of solid rivets complying with the specified quality requirements.

The Certification Authorities, or their appointed representative, who may be the prime contractor, shall grant the approval of the manufacturer.

4.1.2 Acceptance of solid rivets

The purpose of acceptance inspection and tests of a solid rivet is to check, as simply as possible, using a method which is inexpensive but the most representative of the actual conditions of use, with the uncertainty inherent in statistical sampling, that the solid rivets satisfy the requirements of this document.

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

The manufacturer is responsible for the quality of the solid rivets manufactured to this specification and adherence to this specification.

4.2 Acceptance inspection and test conditions

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

Each solid rivet may be submitted to several inspections or tests, provided that none of its characteristics has been altered during any of these inspections or tests.

The solid rivets to be subjected to destructive inspections or tests may be those on which non-destructive inspections or tests have been carried out.

In this case, the attribute(s), which caused the rejection, shall be verified using a sample of twice the normal size with the same AQL.

On demand of procurement quality department the sampling can be increased from normal control to reinforced control or vice versa.

If the reason for rejection results from the operating method, the test apparatus or from faulty heat treatment which can be rectified in a satisfactory manner, the tests may be repeated after elimination of the cause, provided that any surface treatment be removed prior to heat treatment, without being detrimental to rivet final use. A note to this effect shall be added to the corresponding inspection documents.

Unless otherwise specified, the test temperature shall be the ambient temperature.

4.3 Use of statistical process control (SPC)

When a characteristic is obtained by a controlled statistical process, the manufacturer has the possibility, in order to declare conformity of the characteristic, of refraining from the final systematic sampling provided for in this document, if they are capable of **formally justifying** this choice by using ISO/TR 13425 and the standards quoted in it as a basis.

This justification shall include the following phases:

— analysis of the product's key characteristics;

— analysis of the risks for each implemented process;

— determination of the parameters and/or characteristics to be respected under SPC;

— determination of the capabilities of each process;

— drawing up an inspection plan and integration in the manufacturing process;

— drawing up of routes and control charts (in accordance with ISO 7870-1, ISO 7870-2, ISO 7870-3);

— use of control charts for data consolidation;

— determination of the time schedule for the internal audits to be run and the control to be carried out to ensure reliability of the device.

To be usable in production, this process should have been validated beforehand by the qualifying body, either during the qualification phase, or afterwards by analysing the results of the controlled statistical process versus the qualification inspections as requested in Clause 5.

5 Requirements and test methods

Technical requirements and test methods shall be in accordance with Table 1.