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Aerospace series — Quick release fastening systems for non-structural applications

Part 01: Technical specification

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee ACE/12, Aerospace fasteners and fastening systems.

A list of organizations represented on this committee can be obtained on request to its secretary.

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CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

European foreword

This document (EN 4710-01:2015) 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 European 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of an identical text or by endorsement, at the latest by April 2016, and conflicting national standards shall be withdrawn at the latest by April 2016.

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1 Scope

This European Standard specifies the required characteristics, inspections, tests, quality assurance requirements, conditions for qualification acceptance and delivery of quick release fastening systems.

This European Standard applies to all fastening systems for use in fuselage interior equipment and non-structural or secondary structural area.

It may be applied when referred to in the product standard or in a design specification.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 2424, *Aerospace series — Marking of aerospace products*

EN 2826, *Aerospace series — Burning behaviour of non metallic materials under the influence of radiating heat and flames — Determination of gas components in the smoke*

EN 3844-2, *Aerospace series — Flammability of non metallic materials — Part 2: Small burner test, horizontal — Determination of the horizontal flame propagation*

EN 9100, *Quality Management Systems — Requirements for Aviation, Space and Defense Organizations*

EN 9102:2006, *Aerospace series — Quality systems — First article inspection*

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

EN 10204, *Metallic products — Types of inspection documents*

EN ISO 8785, *Geometrical product specification (GPS) — Surface imperfections — Terms, definitions and parameters (ISO 8785)*

EN ISO 9001, *Quality management systems — Requirements (ISO 9001)*

EN ISO 9227, *Corrosion tests in artificial atmospheres — Salt spray tests (ISO 9227)*

FAR/JAR/CS 25.853, *Compartment Interiors* [1)]

3 Terms and definitions

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

3.1
fasteners
quick release fastening systems are parts, capable of being easily and quickly operated, with or without usage of special tools for closing and opening, for fastening and release of parts such as covers, linings, equipment, etc.

1) Published by: European Aviation Safety Agency, Postfach 101253, D-50452 Koeln, Germany.

3.2
lot
finished parts of the same dimensions, made from the same material, produced in the same production run, heat treated and surface protected in the same manner and submitted for testing at the same time

3.3
qualification test
a test or series of tests to demonstrate that the products comply with the requirements stipulated in this specification and/or in a product standard and are accomplished according to documented parameters and under reproducible conditions

3.4
acceptance test
a test or series of tests to demonstrate that the characteristics of manufactured products comply with the requirements

3.5
first article inspection
FAI
complete, independent, and documented physical and functional inspection process to verify that prescribed production methods have produced an acceptable item as specified by engineering drawings, planning, purchase order, engineering specifications, and/or other applicable design documents

[SOURCE: EN 9102:2006, 3.5]

3.6
tolerance compensation
ability of the spring clamp to cover assembly and installation tolerances

4 Requirements

See Table 1, if not specified in the relevant product standard.

5 Inspections and tests

5.1 Qualification test

All product qualification activities shall be carried out in accordance with a Qualification Test Program prepared by the manufacturer and approved by the customer in accordance with EN 9133.

The satisfactory results of all tests, collected in a referenced Qualification Test Report, in accordance with EN 9133 or equivalent, shall be the basis of qualification for delivery to the customer.

The Qualification Test Report shall be carried out by the manufacturer's quality assurance department on a sample of parts that have been selected from a representative manufacturing batch. Similar parts may be used as a basis for qualification testing, and results formulated by analogy may be used providing prior agreement has been reached between the customer and the manufacturer. The nature and extent of further qualification tests have to be agreed upon separately between manufacturer and customer. The qualification procedure shall be accompanied by a mandated body who has to sign the QTP and QTR.

5.2 First article inspection

The manufacturer shall conduct a First Article Inspection on all initially manufactured parts, components, sub-assemblies and assemblies, as well as on the first complete manufacturing batch in accordance with accepted production practices and procedures. The vendor shall record the results of each First Article Inspection in an agreed report. The first components supplied to the customer shall be accompanied by a valid set of documentation and the First Article Inspection report. The vendor shall be informed in writing by the customer of any discrepancies that withhold approval.

5.3 Conformance/acceptance test

Unless otherwise specified, acceptance tests for each part shall be carried out by the manufacturer. The purpose of the acceptance test is to ensure conformity with specified requirements using approved testing methods. In cases where a manufacturer is not able to carry out the required tests due to the lack of suitable facilities or installations, they shall be carried out by suitable test facilities. The quantity of samples can be adjusted to respective production situation via inspection plan specification, i.e. at the discretion of the quality assurance management. This is based on continuous production monitoring according to the rules of statistical quality assurance. Changes to the acceptance test shall only be with written approval with the customer. Each delivery shall be accompanied by conformance test results and certified as defined in Table 1.

5.4 Requirements, inspections and tests

See Table 1.

Table 1 — Requirements, inspections and tests *(1 of 3)*

Clause	Characteristic	Requirements	Clause	Inspections and tests	A [a]	Q [b]
4.1	Materials	In accordance with the specifications of the relevant product standards.	5.4.1	The chemical composition shall be evidenced, i.e. by an inspection certificate as per EN 10204 issued by the semi-finished product manufacturer.	X	X
4.2	Dimensions and masses	In accordance with the relevant product standards.	5.4.2	The dimensions and masses have to be documented in accordance to EN 9102:2006.	X	X
4.3	Surface		5.4.3	Surface		
4.3.1	Surface defects	All surfaces shall be free from surface defects as defined in EN ISO 8785.	5.4.3.1	Visual examination as specified between customer and manufacturer	X	X
4.3.2	Surface treatment	In accordance with the relevant product standards.	5.4.3.2	The surface treatment as applied shall be substantiated, i.e. by an inspection certificate as per EN 10204.	X	X

Table 1 — Requirements, inspections and tests *(2 of 3)*

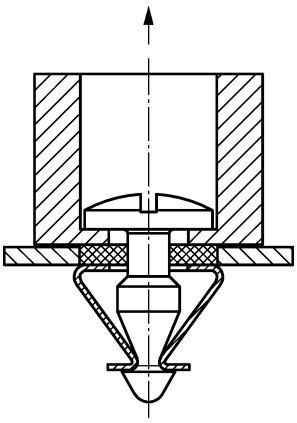
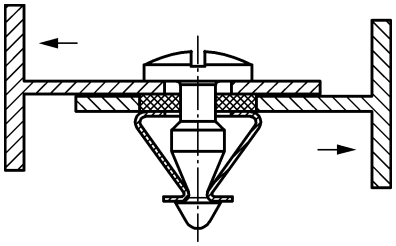
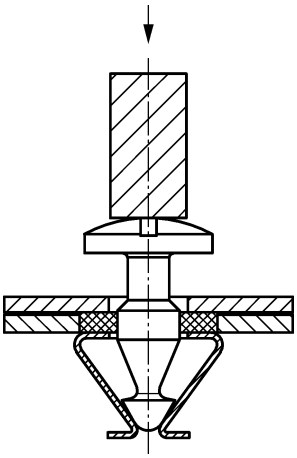
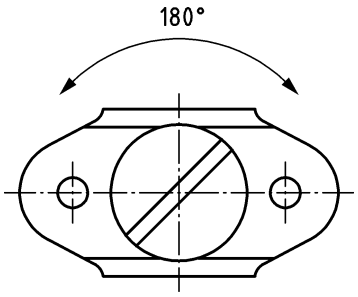
Clause	Characteristic	Requirements	Clause	Inspections and tests	A [a]	Q [b]
4.4	Mechanical properties		5.4.4	Mechanical properties		
4.4.1	Ultimate tensile loads	In accordance with the relevant product standards.	5.4.4.1	 According to 6.1.	–	X
4.4.2	Ultimate shear loads	In accordance with the relevant product standards.	5.4.4.2	 According to 6.2.	–	X
4.4.3	Push-in load	There shall be no permanent deformation after applying the loads specified in the relevant product standards.	5.4.4.3	 According to 6.3.	–	X

Table 1 — Requirements, inspections and tests *(3 of 3)*

Clause	Characteristic	Requirements	Clause	Inspections and tests	A [a]	Q [b]
4.4.4	Torque-out	There shall be no permanent deformation after applying the loads specified in the relevant product standards.	5.4.4.4	 According to 6.4.	–	X
4.5	Corrosion resistance	The parts shall show no evidence of corrosion after corrosion testing.	5.4.5	96 h salt spray test in accordance with EN ISO 9227.	–	X
4.6	Special requirements		5.4.6	Special requirements		
4.6.1	Burning Behaviour Silicone	According to FAR/JAR/CS 25.853, EN 2826 and EN 3844-2 as per Table 2.	5.4.6.1	See FAR/JAR/CS 25.853, EN 2826 A, EN 3844-2 or equivalent if not specified between customer and manufacturer	–	X
4.7	Functionality		5.4.7	Functionality		
4.7.1	Functionality	Safe function of each possible combination of studs with their appropriate spring clamps/ receptacles shall be guaranteed. Each possible combination shall mate together.	5.4.7.1	Testing shall be performed using suitable devices	–	X
4.7.2	Endurance	In accordance with the relevant product standards.	5.4.7.2	Testing shall be performed using suitable test fixture. The fastening system shall be subjected to the specified number of locking and un-locking cycles (from the fully opened and the fully closed position and return) and subsequently examined for wear.	–	X
4.8	Identification marking		5.4.8	Identification marking		
4.8.1	Identification marking of the product	The fasteners shall be marked as specified in the relevant product standards per EN 2424. The marking shall be visible after installation	5.4.8.1	Visual examination	X	X
4.8.2	Identification marking of the package	Each packaging unit shall bear the following information: — Designation; — Quantity; — Manufacturer's identification or name; — Date of packaging.	5.4.8.2	Visual examination	X	X

[a] Acceptance test for each lot.

[b] Qualification test.

Table 2 — Burning behaviour: Flammability, smoke emission and toxicity requirements for silicone

Properties			Symbols	Units	Requirements max. mean values
Flammability – Bunsen burner test, horizontal 15 s	Burn rate		–	mm/min	64
Maximum specific optical smoke density within 4 min.	Flaming mode		D_m	–	200
Maximum concentration of smoke gas components	Flaming mode	HCN	C_x	ppm	150
		CO			1 000
		NO/NO_2			100
		SO_2/H_2S			100
		HF			100
		HCI			150
	Non flaming mode	HCN			150
		CO			1 000
		NO/NO_2			100
		SO_2/H_2S			100
		HF			100
		HCI			150

Fire worthiness requirements for the pressurized fuselage according to FAR/JAR/CS 25.853, EN 2826 and EN 3844-2.

6 Test equipment and parameters

6.1 Ultimate tensile load

The ultimate tensile load has to be tested with a test fixture. During the test no plastic deformation is allowed.

— Test speed : V = 100 mm/min;

— Time to stop at maximum load : min. 5 s.

6.2 Ultimate shear load

The ultimate shear load has to be tested with a test fixture. During the test no plastic deformation is allowed.

— Test speed : V = 100 mm/min;

— Time to stop at maximum load : min. 5 s.

6.3 Push-in load

The push-in load has to be tested with a test fixture. During the test no plastic deformation is allowed.

— Test speed : V = 100 mm/min.

6.4 Torque-out load

The spring clamp should be riveted to a metal plate. The torque of values in both directions shall be the same.

— Test equipment : Torque wrench.

7 Quality assurance

7.1 Approval of manufacturers

The manufacturer's quality system shall be conforming to EN ISO 9001, EN 9100, or equivalent. The purpose of these procedures is to ensure, that a manufacturer has a quality system and the capability for continuous manufacture and release of parts complying with the specified quality requirements. The granting of an approval of the manufacturer is a function of the Certification Authorities, or their appointed representative as primary contact.

7.2 Qualification test

All product qualification activities shall be carried out in accordance with a Qualification Test Program prepared by the manufacturer and approved by the customer in accordance with EN 9133 or equivalent.

8 Sampling

8.1 Acceptance test sample

For series production acceptance 5 test samples are required.

8.2 Qualification test sample

For qualification test samples see Table 3.

Table 3 — Qualification test samples

Clause	Type of test or check	Number of test specimens													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
5.4.2	Dimensional Check	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5.4.2	Dimensional Check	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5.4.3.1	Visual Examination of Surface Defects	X	X	X	X	X									
5.4.4.1	Tensile Load Test						X	X	X	X	X				
5.4.4.2	Shear Load Test						X	X	X	X	X				
5.4.4.3	Push-in Load Test						X	X	X	X	X				
5.4.4.4	Torque-out Load Test						X	X	X	X	X				
5.4.5	Salt Spray Test											X	X		
5.4.6.1	Burning Behaviour Silicone	Material sample													
5.4.7.1	Functionality Test													X	X
5.4.7.2	Endurance Test													X	X
5.4.8.1	Identification marking of the product	X	X	X	X	X									
5.4.8.2	Identification marking of the package	X	X	X	X	X									

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BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

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