EASA	NOTIFICATION OF A PROPOSAL TO ISSUE A CERTIFICATION MEMORANDUM
	**EASA Proposed CM No.:** **EASA Proposed CM – S – 003 Issue: 01** **Issue Date: 17th of September 2013** **Issued by: Structures section** **Approved by: Head of Certification Experts Department** **Regulatory Requirement(s): CS VLA.601, CS VLA.603, VLA.607, CS VLR.601, CS VLR.602, CS VLR.603, CS VLR.607, CS 23.601, CS 23.603, CS 23.607, CS 25.601, CS 25.603, CS 25.607, CS 27.601, CS 27.602, CS 27.603, CS 27.607 and CS 29.601, CS 29.602, CS 29.603, CS 29.607, CS E 70, CS E 515, CS P 160, CS P 170**

In accordance with the EASA Certification Memorandum procedural guideline, the European Aviation Safety Agency proposes to issue an EASA Certification Memorandum (CM) on the subject identified below.

All interested persons may send their comments, referencing the EASA Proposed CM Number above, to the e-mail address specified in the "Remarks" section, prior to the indicated closing date for consultation.

EASA Certification Memoranda clarify the European Aviation Safety Agency's general course of action on specific certification items. They are intended to provide guidance on a particular subject and, as non-binding material, may provide complementary information and guidance for compliance demonstration with current standards. Certification Memoranda are provided for information purposes only and must not be misconstrued as formally adopted Acceptable Means of Compliance (AMC) or as Guidance Material (GM). Certification Memoranda are not intended to introduce new certification requirements or to modify existing certification requirements and do not constitute any legal obligation.

EASA Certification Memoranda are living documents into which either additional criteria or additional issues can be incorporated as soon as a need is identified by EASA.

Subject

Application of standard fasteners (nuts and bolts) within the scope of CS XXX.602 and CS XXX.607 to be used in critical installations

Log of Issues

Issue	Issue date	Change description
01	17.09.2013	First issue.

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1. INTRODUCTION

1.1. PURPOSE AND SCOPE

This Certification Memorandum provides guidance and is applicable to fastener installations using *standard fasteners* in critical installations in aeroplanes, rotorcraft, engines propeller attachments and appliances.

1.2. REFERENCES

It is intended that the following reference materials be used in conjunction with this Certification Memorandum:

Reference	Title	Code	Issue	Date
	Design and Construction – General			
CS LSA.---		CS-LSA		
CS VLR.601		CS-VLR		
CS VLA.601		CS-VLA		
CS 23.601		CS-23		
CS 25.601		CS-25	-	-
CS 27.601		CS-27		
CS 29.601		CS-29		
CS E.---		CS-E		
CS P.---		CS-P		
	Design and Construction – Critical parts			
CS LSA.---		CS-LSA		
CS VLR.602		CS-VLR		
CS VLA.---		CS-VLA		
CS 23.---		CS-23		
CS 25.---		CS-25	-	-
CS 27.602		CS-27		
CS 29.602		CS-29		
CS E.515		CS-E		
CS P.160		CS-P		
	Design and Construction – Materials			
CS LSA.---		CS-LSA		
CS VLR.603		CS-VLR		
CS VLA.603		CS-VLA		
CS 23.603		CS-23		
CS 25.603		CS-25		
CS 27.603		CS-27	-	-
CS 29.603		CS-29		
CS E.70		CS-E		
CS P.170		CS-P		

Reference	Title	Code	Issue	Date
CS LSA.--- CS VLR.607 CS VLA.607 CS 23.607 CS 25.607 CS 27.607 CS 29.607 CS E.--- CS P.---	Design and Construction – Fasteners	CS-LSA CS-VLR CS-VLA CS-23 CS-25 CS-27 CS-29 CS-E CS-P	-	-
21A.805	Subpart Q - Identification of critical parts	Part 21		29.09.2003
FAA AC 20-71	Dual Locking Devices on Fasteners	-	-	08.12.1970
-	Commission Regulation (EU) No 748/2012	-	-	-
-	Annex 1 Part 21 to Commission Regulation (EU) No 748/2012 and related AMC	-	-	-

1.3. ABBREVIATIONS

The following abbreviations are used in this Certification Memorandum:

Abbreviation	Meaning
AC	**A**dvisory **C**ircular (FAA)
AMC	**A**cceptable **M**eans of **C**ompliance (EASA)
CAW	**C**ontinued **A**irworthiness
CM	**C**ertification **M**emorandum
CS	**C**ertification **S**pecification
DAH	**D**esign **A**pproval **H**older
EASA	**E**uropean **A**viation **S**afety **A**gency
FAA	**F**ederal **A**viation **A**gency
GM	**G**uidance **M**aterial
LSA	**L**ight **S**ports **A**ircraft
MOA	**M**aintenance **O**rganisation **A**pproval
POA	**P**roduction **O**rganisation **A**pproval
VLA	**V**ery **L**ight **A**ircraft
VLR	**V**ery **L**ight **R**otorcraft

1.4. DEFINITIONS

The following definitions are used in this Certification Memorandum:

Definition	Meaning
Fasteners that are standard parts	Fasteners (nuts and bolts) being produced according to a certain standard which is not directly approved by the agency. They fall within the category of standard parts as defined in Commission Regulation (EU) No 748/2012 21.A.303(c).
Qualified standard fasteners	Standard fasteners for which means of conformance verification has been provided by the DAH to the POA and MOA.
Critical installations	Structural/mechanical assemblies including fasteners the failure of which (single or multiple due to common cause) is classified as hazardous or catastrophic.
.---	Requirement not available.
-	Not relevant.

2. BACKGROUND

Standard fasteners are widely used on fixed wing aircraft, rotorcraft, engines, propeller attachments and appliances certified by the Agency. The assumptions made during certification rely on adherence to the certified standard. Deviations from the standard may result in unexpected failure of the fastener with consequences at the aircraft level. Within the last few years an accumulation of failed standard fasteners (nuts and bolts) in aviation has been observed (refer to EASA Safety Information Bulletin 2012-06). The failures occurring in high strength steel fasteners may happen immediately after installation or in a worst case after only a few flight cycles. This unexpected failure of the fasteners may have severe consequences at the aircraft level when used in critical installations. The intent of this CM is to further inform DAHs and applicants for design approvals of the issue and provide guidance to help ensure that appropriate measures are considered for initial certification, including associated continued airworthiness aspects, to minimise the risk that the use of standard fasteners might compromise the intended level of safety. It is EASA's intent to issue a Continued Airworthiness Review Item (CARI) to TCHs to address the potential hazard for existing designs.

2.1. EXISTING REQUIREMENTS

There are existing requirements in Part 21 and the CSs related to critical parts, fasteners and materials which may be relevant within the context of this CM.

2.1.1. 21A.805 Identification of critical parts

"In addition to the requirement of 21A.804, each manufacturer of a part to be fitted on a type-certificated product which has been identified as a critical part shall permanently and legibly mark that part with a part number and a serial number."

2.1.2. CS 25.601 General

"The aeroplane may not have design features or details that experience has shown to be hazardous or unreliable. The suitability of each questionable design detail and part must be established by tests."

2.1.3. CS XXX.602 Critical parts (this requirement is available for rotorcraft only)

"(a) Critical parts - A critical part is a part, the failure of which could have a catastrophic effect upon the rotorcraft, and for which critical characteristics have been identified which must be controlled to ensure the required level of integrity.

(b) If the type design includes critical parts, a critical parts list shall be established. Procedures shall be established to define the critical design characteristics, identify processes that affect those characteristics, and identify the design change and process change controls necessary for showing compliance with the quality assurance requirements of Part-21."

2.1.4. CS 25.603 Materials (For Composite Materials see AMC 20-29)

"The suitability and durability of materials used for parts, the failure of which could adversely affect safety, must –

(a) Be established on the basis of experience or tests;

(b) Conform to approved specifications, that ensure their having the strength and other properties assumed in the desi1gn data (See AMC 25.603(b));"

2.1.5. CS XXX.607 Fasteners (requires compliance with the installation of self-locking fasteners)

"(a) Each removable bolt, screw, nut, pin or other fastener whose loss could jeopardise the safe operation of the rotorcraft must incorporate two separate locking devices. The fastener and its locking devices may not be adversely affected by the environmental conditions associated with the particular installation.

(b) No self-locking nut may be used on any bolt subject to rotation in operation unless a non-friction locking device is used in addition to the self-locking device."

3. EASA CERTIFICATION POLICY

3.1. EASA POLICY

Within the last few years an accumulation of failed standard fasteners (nuts and bolts) in aviation has been observed (refer to EASA Safety Information Bulletin 2012-06). Failures of standard fasteners may have severe consequences at the aircraft level when used in critical installations. The eventual improvement of the quality and conformance of standard fasteners by responsible parties does not address (remove or control) existing defective parts in the supply chain. This CM is therefore addressed to DAHs, to provide them with guidance on appropriate actions to ensure appropriate utilisation of standard fasteners in their designs, to help them to instruct POAs and MOAs as necessary to ensure CAW and to provide means by which unsafe conditions related to the use in design of standard fasteners can be prevented.

In order to reduce the risk of critical locations/assemblies failing through the inadvertent use of defective standard fasteners, the Agency recommends that all DAH and applicants for design changes perform a design review to ensure the risk posed by the continued use of standard parts is mitigated by:

- Creating a list of critical installations where only qualified standard fasteners (nuts and bolts) may be used. Redundancy of fasteners does not negate the need to qualify the fasteners as all the fasteners on a joint could originate from a common defective batch. Required double locking functions on fasteners may also need qualified standard fasteners to ensure the fail safe design philosophy is maintained in certain areas.
- Defining how the standard fastener is qualified wherever necessary.
- Clearly defining additional conformity checks as part of the design standard and specification requirements for approved suppliers and any other criteria necessary for acceptance and storage of standard fasteners that are appropriate for their use in the design.
- Ensuring through Maintenance Instructions that qualified standard fasteners are only replaced by other qualified standard fasteners.
- Considering introducing a DAH part numbering system for qualified standard fasteners, at which point they would become aviation parts controlled under the POA. (Note: If such part numbering is implemented and further part marking is not feasible due to the part's size or for other reasons, other means such as regular appropriate batch controls should be established and documentation provided according to Part 21.A.804(b).)

In addition, DAHs are reminded that certain existing Certification Specifications and regulations specifically address critical parts. Typically standard parts are not appropriate for use as critical parts and all critical parts are subject to a critical parts plan that controls their critical characteristics during production and service.

3.2. WHO THIS CERTIFICATION MEMORANDUM AFFECTS

This Certification Memorandum affects applicants who need to show compliance with CS-LSA, CS-VLR, CS-VLA, CS-23, CS-25, CS-27, CS-29, CS-E, CS-P or Part 21.

4. REMARKS

1. This EASA Proposed Certification Memorandum will be closed for public consultation on the **29th of October 2013**. Comments received after the indicated closing date for consultation might not be taken into account.
2. Comments regarding this EASA Proposed Certification Memorandum should be referred to the Certification Policy and Planning Department, Certification Directorate, EASA. E-mail CM@easa.europa.eu or fax +49 (0)221 89990 4459.
3. For any question concerning the technical content of this EASA Proposed Certification Memorandum, please contact:

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