EASA	NOTIFICATION OF A PROPOSAL TO ISSUE A CERTIFICATION MEMORANDUM
	**EASA Proposed CM No.:** **EASA Proposed CM - PIFS – 001 Issue: 01** **Issue Date: 29th of March 2011** **Issued by: Powerplant section** **Approved by: Head of Certification Experts Department** **Effective Date: [Standard date = 7 days after final CM Issue date]** **Regulatory Requirement(s): CS Definitions, CS 25**

In accordance with the EASA Certification Memorandum procedural guideline, the 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 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

Large Transport Aeroplanes with Composite Wing

Fuel Tank Fire Withstanding Capability

Log of Issues

Issue	Issue date	Change description
01	29.03.2011	First issue.

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1. INTRODUCTION

1.1. PURPOSE AND SCOPE

The purpose of **this** Certification Memorandum is to provide specific guidance for the integral fuel tanks within wing structure primarily made of composite material, regarding the ability of the tank structure to sustain fire.

1.2. REGULATORY REFERENCES & REQUIREMENTS

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

Reference	Title	Code	Issue	Date
---	Certification Specifications for Large Aeroplanes	CS-25	n/a	n/a
---	CS Definitions	---	n/a	n/a

1.3. ABBREVIATIONS

The following abbreviations are used in this Certification Memorandum:

Abbreviation	Meaning
CM	**C**ertification **M**emorandum
EASA	**E**uropean **A**viation **S**afety **A**gency
CS	**C**ertification **S**pecification
JAR	**J**oint **A**viation **R**equirement
FAR	**F**ederal **A**viation **R**equirement
BCAR	**B**ritish **C**ivil **A**viation **R**equirement

1.4. DEFINITIONS

The following definitions are used in this Certification Memorandum:

Definition	Meaning
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2. BACKGROUND

On the latest large transport aeroplanes, the wing, including the fuel tanks, is constructed primarily from composite material, which differs from traditional metallic construction as envisioned and applied by current airworthiness standards.

The existing CS requirements are not considered explicit enough regarding post-crash fire safety and performance standards for the wing fuel tanks constructed using composite materials. This document clarifies the EASA requirements in this respect.

2.1. CURRENT CS-25 RULES INTERPRETATION

CS 25 (and its ancestors, including FAR 25, JAR-25, BCAR, etc.) were established when large transport aeroplanes were built exclusively form light alloys based upon aluminium. The in-service experience of classic configuration based on light alloy structures being satisfactory no explicit regulation was issued requiring fire withstanding capabilities of wing fuel tanks. However a global review of the rules, including CS Definition, has highlighted current regulations rely on the assumptions aluminium wings have some inherent capabilities resulting from the physical characteristics of the light alloys used to manufacture them, regarding fire withstanding capabilities.

Composite material may or may not have capabilities equivalent to aluminium alloys, and current regulations do not provide objective performance requirements for wing and fuel tank structure with respect to post-crash fire safety. Additional substantiation by test and analysis are required to show that composite structure provides an acceptable level of safety with respect to the performance of the wings and fuel tanks during a fire. The objective is that the use of composite structure for the wing does not decrease the level of safety established by current large transport aircraft designs for flammability and fire protection of aircraft wing tank structure.

2.2. DISCUSSION

Applicants can demonstrate that a composite wing is equivalent to an aluminium wing. However this requires establishing the structure of a theoretical metallic wing structure for the sole purpose of showing compliance, and might therefore be considered as impractical..

Alternatively, in order to provide the same level of safety as exists with conventional aeroplane construction, applicants can also demonstrate that their product has sufficient survivability, in the event that the wings are exposed to a large fuel-fed ground fire, to enable occupants to safely evacuate. Factors in fuel tank survivability are the structural integrity of the wing and tank, flammability of the tank, burnthrough resistance of the wing skin and the presence of auto-ignition threats during exposure to a fire. Studies have shown that following a survivable accident, prevention of fuselage burnthrough for approximately five minutes can significantly enhance survivability. (Ref. FAA reports DOT/FAA/AR-99/57 and DOT/FAA/AR-02/49). Beyond five minutes there is little benefit due to the effects of the fuel fire itself. That assessment was carried out based on accidents involving aeroplanes with conventional fuel tanks, and considering the ability of aircraft occupants to evacuate the aeroplane and of the ground personnel to rescue occupants.

CS Definitions, defines fire resistant as follows: "Fire-resistant. … For materials this may be considered to be equivalent to the capability of withstanding a fire at least as well as aluminium alloy in dimensions appropriate for the purposes for which they are used." It is noteworthy that aluminium alloy is identified as the performance standard for fire resistance, though no thickness or heat intensities are defined. Therefore, and despite the absence of an explicit requirement for fire-resistant wing fuel tanks, it has been considered that the intent of CS 25 will be met if the applicant demonstrates that the composite structure is able to sustain a fire for five minutes.

Therefore to be consistent with existing capability and related requirements, composite fuel tanks must be capable of resisting a post-crash fire for at least five minutes. In

demonstrating compliance applicants must address a range of fuel loads from minimum to maximum as well as any other critical fuel load.

3. EASA CERTIFICATION POLICY

3.1. EASA POLICY

Applicants are required to show that the use of composite materials for the fuel tank structure does not reduce the level of safety relative to existing experience with metallic structure. This could be achieved by showing that:

- from a fire withstanding capability, the composite wing is at least equivalent to a similar wing manufactured of light alloy.

or

- the composite wing and the fuel tank design, including all access panels, can endure an external fuel fed fire for at least five minutes.

The assessment shall be performed evaluating all relevant parameters, including fuel loading. Considerations to be taken into account include fuel tank flammability, burn through resistance, fuel retaining capability of the wing, wing structural strength retention properties and auto-ignition threats.

3.2. WHO THIS CERTIFICATION MEMORANDUM AFFECTS

Applicants with a design featuring structural fuels tanks in wings made primarily of composite material.

4. REMARKS

1. This EASA Proposed Certification Memorandum will be closed for public consultation on the 11th of May 2011.
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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