



U.S. Department
of Transportation
**Federal Aviation
Administration**

Memorandum

Subject: **ACTION:** Request for Review and Concurrence with
Associated Equivalent Level of Safety (ELOS) ACE-02-05
For the Grob-Werke Grob G120A for 14 CFR § 23.865.

Date: JAN 24 2002

From: Grob Project Officer, Project Support Branch, ACE-112

Reply to Karl Schletzbaum
Attn. of: (816) 329-4146

To: Manager, Small Airplane Directorate, ACE-100

This memorandum documents concurrence for the subject ELOS. We request your office review and concur with the proposed ELOS findings to the 14 CFR § 23.865 Fire protection of flight controls, engine mounts and other flight controls.

Background: The Grob G120A airplane is a conventional empennage, low wing airplane with retractable landing gear, fabricated almost completely of composite materials. The requested certification basis is 14 CFR Part 23 at Amendment 54. The connection of the metallic engine mount to the composite fuselage structure was designed with specific provisions to alleviate the effects of a fire in the engine compartment (designated fire zone). The 14 CFR 23 requirements and the Joint Aviation Requirement (JAR) are different. Because of this, the Luftfahrt-Bundesamt (LBA) of Germany issued a special condition that required additional testing to substantiate compliance intended to satisfy the additional 14 CFR Part 23 requirement.

Applicable Regulations: The applicable regulations are 14 CFR Part § 23.865, which states:

§ 23.865 Fire protection of flight controls, engine mounts, and other flight structure. Flight controls, engine mounts, and other flight structure located in designated fire zones, or in adjacent areas that would be subjected to the effects of fire in the designated fire zones, must be constructed of fireproof material or be shielded so that they are capable of withstanding the effects of a fire. Engine vibration isolators must incorporate suitable features to ensure that the engine is retained if the non-fireproof portions of the isolators deteriorate from the effects of a fire.

The associated JAR 23.865 does not contain the statement "*or in adjacent areas that would be subjected to the effects of fire in the designated fire zones.*" The Luftfahrt-Bundesamt (LBA) of Germany required that a special condition be fulfilled that addressed the requirements of the 14 CFR 23.865 requirement. This is required because of the composite structure of the G120A

airplane. The LBA provided the following statement of issue, discussion, position and special condition:

Statement of Issue:

The G120A airplane is an airplane with a full composite airframe. The composite materials are not fire proof.

Discussion:

Due to the specific design of the G120A the engine mount is connected to a fuselage airframe manufactured with composite materials. So it has to expect a heat flow via the main engine mount bolts into this material which is in that primary structure.

Because of the low T_G ($T_G = \text{glass transition temperature -- FAA}$) Reinforced Fabric Material (RFM) in comparison with metallic structure there could be the possibility of loosing the structural integrity (strength) as well as the inflaming parts behind the firewall.

LBA Position:

The following Special Condition is proposed:

Fire Protection of the Connection between Metal Structure of Engine Mount and Composite Airframe

The Grob G120A is a full composite single engine aircraft with the engine mount fitted to the carbon fiber composite fuselage.

(a) In addition to the requirements of JAR 23.853 (f), 23.863 (b)(5), 23.865 (Fire protection of flight controls, engine mounts and other flight structure), and JAR 23.1191(f) and (g) (Firewalls) and 23.1193 (e) (Cowling and nacelle) it must be demonstrated by test that the interface between the metallic engine mount and the carbon fibre reinforced plastic fuselage is able to withstand a fire for 15 minutes while carrying loads under the conditions prescribed below;

(b) Compliance must be shown by a substructure - test as follows:

(1) With one lost engine mount fitting the loads are distributed over the remaining 3 engine mount fittings. The most critical of them has to be chosen for the test. The loads are:

(i) in Z - direction the mass of the propulsion unit multiplied by a maneuvering load factor resulting from a 30° turn for 15 minutes, superimposed by a gust load of 3 seconds representing the maximum positive gust load factor at a speed of V_A arising from JAR 23. 341(c).

(ii) in X - direction the engine propulsion force at max continuous power for 5 minutes.

(2) The flame to which the component test arrangement is subjected must provide

a temperature of 500° C within the target area.

(3) The flame must be large enough to maintain the required temperature over the entire test zone i.e. the fitting on the engine compartment side.

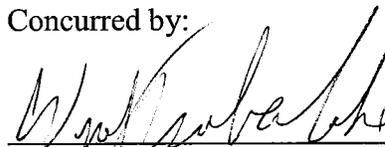
(4) It must be shown that the test equipment - e.g. burner and instrumentation - are of sufficient power, size and precision to yield the test requirements arising from subparagraphs (1) to (3) above. Guidance is to be drawn from advisory material AC 20-135 and AC 23-2.

FAA Position: The FAA concurs with the LBA position and will propose an ELOS based on the special condition required by the LBA.

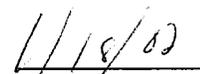
Compensating Features: The airplane design has been subjected to a test that fulfilled the requirements of the LBA special condition as stated above. In addition, the company has provided statements that it has complied with the requirements of JAR 23.853(f), 23.863(b)(5), 23.865, 23.1191(f) and (g) and 23.1193(e), the LBA has found compliance to these JAR parts. Compliance to these JAR parts fulfills 14 CFR Part 23 compliance for the same FAA regulations. The relevant parts, except for 23.865, are not significant regulatory differences.

Recommendation: We concur that the structural design of the Grob G120A as substantiated with tests and analysis performed for the LBA issues special condition, provides an Equivalent Level of Safety (ELOS) as envisioned in paragraph 14 CFR § 23.865.

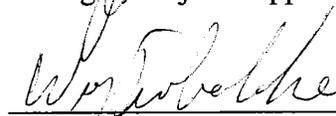
Concurred by:



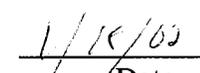
Manager, Project Support Branch, ACE-112



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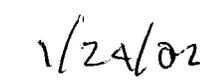
Manager, Standards Office, ACE-110



Date



Manager, Small Airplane Directorate, ACE-100



Date