

[4910-13]

**DEPARTMENT OF TRANSPORTATION**

**Federal Aviation Administration**

**14 CFR Part 25**

**[Docket No. FAA-2011-1107; Special Conditions No. 25-447-SC]**

**Special Conditions:** Gulfstream Aerospace LP (GALP) Model G280 airplane, Limit Engine Torque Loads for Sudden Engine Stoppage

**AGENCY:** Federal Aviation Administration (FAA), DOT.

**ACTION:** Final special conditions; request for comments.

**SUMMARY:** These special conditions are issued for the Gulfstream Aerospace LP (GALP) model G280 airplane. This airplane will have a novel or unusual design feature associated with engine torque loads imposed by sudden engine stoppage. The applicable airworthiness regulations do not contain adequate or appropriate safety standards for this design feature. These special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

**DATES:** The effective date of these special conditions is October 6, 2011. We must receive your comments by November 28, 2011.

**ADDRESSES:** You must mail two copies of your comments to: Federal Aviation Administration, Transport Airplane Directorate, Attn: Rules Docket (ANM-113), Docket No. FAA-2011-1107, 1601 Lind Avenue SW., Renton, Washington, 98057-3356. You may deliver two copies to the Transport Airplane Directorate at the above address. You must mark your

comments: Docket No. FAA-2011-1107. You can inspect comments in the Rules Docket weekdays, except Federal holidays, between 7:30 a.m. and 4:00 p.m.

**FOR FURTHER INFORMATION CONTACT:** Carl Niedermeyer, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue SW., Renton, Washington 98057-3356; telephone (425) 227-2279; facsimile (425) 227-1149.

**SUPPLEMENTARY INFORMATION:**

The FAA has determined that notice of, and opportunity for prior public comment on, these special conditions are impracticable because these procedures would significantly delay issuance of the design approval and thus delivery of the affected aircraft. In addition, the substance of these special conditions has been subject to the public-comment process in several prior instances with no substantive comments received. The FAA therefore finds that good cause exists for making these special conditions effective upon issuance.

**Comments Invited**

We invite interested people to take part in this rulemaking by sending written comments, data, or views. The most helpful comments reference a specific portion of the special conditions, explain the reason for any recommended change, and include supporting data. We ask that you send us two copies of written comments.

We will file in the docket all comments we receive, as well as a report summarizing each substantive public contact with FAA personnel about these special conditions. You can inspect the docket before and after the comment closing date. If you wish to review the docket in person, go to the address in the ADDRESSES section of this preamble between 7:30 a.m. and 4:00 p.m., Monday through Friday, except Federal holidays.

We will consider all comments we receive by the closing date for comments. We may change these special conditions based on the comments we receive.

If you want us to acknowledge receipt of your comments on these special conditions, include with your comments a self-addressed, stamped postcard on which you have written the docket number. We will stamp the date on the postcard and mail it back to you.

## **Background**

On March 30, 2006, GALP applied for a type certificate for their new Model G280 airplane. The G280 is an 8-10 passenger (19 maximum), twin-engine airplane with a 41,000-foot cruise altitude, maximum operating altitude of 45,000 feet, and a range of approximately 3,400 nautical miles.

## **Type Certification Basis**

Under the provisions of 14 CFR 21.17, GALP must show that the Model G280 airplane meets the applicable provisions of part 25 as amended by Amendments 25-1 through 25-117.

If the Administrator finds that the applicable airworthiness regulations (i.e., 14 CFR part 25) do not contain adequate or appropriate safety standards for the Model G280 airplane because of a novel or unusual design feature, special conditions are prescribed under the provisions of § 21.16.

Special conditions are initially applicable to the model for which they are issued. Should the type certificate for that model be amended later to include any other model that incorporates the same novel or unusual design feature, the special conditions would also apply to the other model.

In addition to the applicable airworthiness regulations and special conditions, the Model G280 airplane must comply with the fuel-vent and exhaust-emission requirements of 14 CFR part 34 and the noise-certification requirements of 14 CFR part 36; and the FAA must issue a finding of regulatory adequacy under § 611 of Public Law 92-574, the “Noise Control Act of 1972.”

The FAA issues special conditions, as defined in 14 CFR 11.19, in accordance with § 11.38, and they become part of the type-certification basis under § 21.17(a)(2).

### **Novel or Unusual Design Features**

The GALP Model G280 airplane incorporates a novel or unusual design feature involving engine size and related torque load that affect sudden engine-stoppage conditions.

### **Discussion**

The size, configuration, and failure modes of jet engines have changed considerably from those envisioned by 14 CFR 25.361(b), when the engine-seizure requirement was first adopted. Engines have become larger and are now designed with large bypass fans capable of producing much larger and more complex dynamic loads. Relative to the engine configurations that existed when the rule was developed in 1957, the present generation of engines is sufficiently different and novel to justify issuance of a special condition to establish appropriate design standards for the GALP Model G280 airplane type design.

Consideration of the limit engine torque load imposed by sudden engine stoppage due to malfunction or structural failure (such as compressor jamming) has been a specific requirement for transport-category airplanes since 1957. In the past, the design torque loads associated with typical failure scenarios have been estimated by the engine manufacturer and were provided to

the airframe manufacturer as limit loads. These limit loads were considered simple and pure torque static loads.

It is evident from service history that the engine-failure events that tend to cause the most severe loads are fan-blade failures, which occur much less frequently than the typical “limit” load condition.

The regulatory authorities and industry have developed a standardized requirement in the Aviation Rulemaking Advisory Committee (ARAC) forum. The technical aspects of this requirement have been agreed upon and have been accepted by the ARAC Loads and Dynamics Harmonization Working Group, and incorporated in EASA CS-25. The proposed special conditions outlined below reflect the ARAC recommendation and CS-25. In addition, the ARAC recommendation includes corresponding advisory material that is considered an acceptable means of compliance to the proposed special conditions outlined below.

To maintain the level of safety envisioned by § 25.361(b), more comprehensive criteria are needed for the new generation of high-bypass engines. These proposed special conditions would distinguish between the more-common engine-failure events and those rare events resulting from structural failures. The more-common events would continue to be treated as static torque limit load conditions. The more-severe events resulting from extreme engine-failure conditions (such as loss of a full fan blade at redline speed), would be treated as full dynamic-load conditions. These would be considered ultimate loads, and include all transient loads associated with the event. An additional safety factor would be applied to the more-critical airframe supporting structure.

## **Applicability**

As discussed above, these special conditions are applicable to the GALP Model G280 airplane. Should GALP apply at a later date for a change to the type certificate to include another model incorporating the same novel or unusual design feature, the special conditions would apply to that model as well.

## **Conclusion**

This action affects only certain novel or unusual design features on one model of airplane. It is not a rule of general applicability.

Under standard practice, the effective date of final special conditions would be 30 days after the date of publication in the Federal Register. However, as the certification date for the GALP Model G280 airplane is imminent, the FAA finds that good cause exists to make these special conditions effective upon issuance.

## **List of Subjects in 14 CFR Part 25**

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

The authority citation for these special conditions is as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701, 44702, 44704.

## **The Special Conditions**

Accordingly, pursuant to the authority delegated to me by the Administrator, the following special conditions are issued as part of the type-certification basis for GALP Model G280 airplane.

In lieu of 14 CFR 25.361(b), the following special conditions are proposed:

1. For turbine-engine installations, the engine mounts, pylons and adjacent supporting airframe structure must be designed to withstand 1g level flight loads acting simultaneously with the maximum limit torque loads imposed by each of the following:
  - (a) sudden engine deceleration due to a malfunction, which could result in a temporary loss of power or thrust; and
  - (b) the maximum acceleration of the engine.
2. For auxiliary power unit (APU) installations, the APU mounts and adjacent supporting airframe structure must be designed to withstand 1g level flight loads acting simultaneously with the maximum limit torque loads imposed by each of the following:
  - (a) sudden APU deceleration due to malfunction or structural failure; and
  - (b) the maximum acceleration of the APU.
3. For engine-supporting structure, an ultimate loading condition must be considered that combines 1g flight loads with the transient dynamic loads resulting from:
  - (a) the loss of any fan, compressor, or turbine blade; and separately
  - (b) where applicable to a specific engine design, any other engine structural failure that results in higher loads.
4. The ultimate loads developed from the conditions specified in paragraphs 3(a) and 3(b) of these special conditions are to be multiplied by a factor of 1.0 when applied to engine mounts and pylons, and multiplied by a factor of 1.25 when applied to adjacent supporting airframe structure.

5. Any permanent deformation that results from the conditions specified in paragraph 3 of these special conditions must not prevent continued safe flight and landing.

Issued in Renton, Washington, on OCT 06 2011



Ali Bahrami  
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