



## DEPARTMENT OF TRANSPORTATION

### Federal Aviation Administration

#### 14 CFR Part 25

[Docket No. FAA-2023-2437; Special Conditions No. 25-858-SC]

#### **Special Conditions: Gulfstream Aerospace Corporation Model GVIII-G700 and GVIII-G800 Series Airplanes; Flight Envelope Protection: Takeoff Stall Protection**

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

**ACTION:** Final special conditions.

**SUMMARY:** These special conditions are issued for the Gulfstream Aerospace Corporation (Gulfstream) Model GVIII-G700 and GVIII-G800 series airplanes. These airplanes will have a novel or unusual design feature when compared to the state of technology envisioned in the airworthiness standards for transport category airplanes. This design feature is an envelope protection function to protect the airplane from over- and rapid-rotation on takeoff. 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:** Effective [INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER].

**FOR FURTHER INFORMATION CONTACT:** Troy Brown, Performance and Environment Unit, AIR-621A, Technical Policy Branch, Policy and Standards Division, Aircraft Certification Service, Federal Aviation Administration, 1801 S Airport Rd, Wichita, KS 67209-2190; telephone and fax 405-666-1050; email [troy.a.brown@faa.gov](mailto:troy.a.brown@faa.gov).

## **SUPPLEMENTARY INFORMATION:**

### **Background**

On December 31, 2019, Gulfstream applied for an amendment to Type Certificate No. T00015AT to include the new Model GVIII-G700 and GVIII-G800 series airplanes. These airplanes, which will be derivatives of the Model GVI currently approved under Type Certificate No. T00015AT, are twin-engine, transport-category airplanes, with seating for 19 passengers, and a maximum take-off weight of 107,600 pounds (GVIII-G700) and 105,600 pounds (GVIII-G800).

### **Type Certification Basis**

Under the provisions of title 14, Code of Federal Regulations (14 CFR) 21.101, Gulfstream must show that the Model GVIII-G700 and GVIII-G800 series airplanes meet the applicable provisions of the regulations listed in Type Certificate No. T00015AT, or the applicable regulations in effect on the date of application for the change, except for earlier amendments as agreed upon by the FAA.

If the Administrator finds that the applicable airworthiness regulations (e.g., 14 CFR part 25) do not contain adequate or appropriate safety standards for the Gulfstream Model GVIII-G700 and GVIII-G800 series airplanes 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, or should any other model already included on the same type certificate be modified to incorporate the same novel or unusual design feature, these special conditions would also apply to the other model under § 21.101.

In addition to the applicable airworthiness regulations and special conditions, the Gulfstream Model GVIII-G700 and GVIII-G800 series airplanes must comply with the

exhaust-emission requirements of 14 CFR part 34, and the noise-certification requirements of 14 CFR part 36.

The FAA issues special conditions, as defined in 14 CFR 11.19, in accordance with 14 CFR 11.38, and they become part of the type certification basis under § 21.101.

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

The Gulfstream Model GVIII-G700 and GVIII-G800 airplanes will incorporate the following novel or unusual design feature:

An envelope protection function within the electronic flight control system (EFCS) to protect the airplane from over- and rapid-rotation on takeoff.

### **Discussion**

The Gulfstream Model GVIII-G700 and GVIII-G800 series airplanes are equipped with an envelope protection function within the EFCS that is designed to provide enhanced takeoff stall protection (TSP) function. This feature protects against excessive pitch rate and pitch attitude during takeoff using a limitation in the electronic flight controls. It is designed to provide conventional behavior using a normal takeoff technique, including “performance” takeoffs. The limit to pitch attitude will indirectly limit the angle of attack.

The TSP involves a control law update in the on-ground control mode only. The Model GVIII-G700 and GVIII-G800 series airplane's pitch control behavior, with regard to rotation rates and attitudes for normal takeoffs, will be similar to other Gulfstream airplanes equipped with side sticks; however, takeoffs with rapid rotation rates and over-rotation will be influenced by the TSP.

The current regulations in Subpart B of 14 CFR part 25 do not address envelope protections for electronic flight control systems as this technology is novel or unusual for transport category airplanes. These special conditions are specific to the GVIII–G700 and GVIII–G800 series airplanes. These conditions are necessary to ensure that the TSP

function supports safe operation and does not interfere with required maneuvering in normal and emergency operations and in foreseeable atmospheric conditions.

The 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.

### **Discussion of Comments and Final Special Conditions**

The FAA issued Notice of Proposed Special Conditions No. 25-24-01-SC, for the GVIII-G700 and GVIII-G800 series airplanes. This Notice was published in the *Federal Register* on January 18, 2024 (89 FR 3364). The only comment the FAA received was from the applicant (Gulfstream).

Gulfstream requested that the FAA revise the third paragraph of the Discussion section, to better reflect the content and scope of the proposed special conditions. The FAA agrees with this comment as it aligns with proposed regulation text from the Flight Test Harmonization Working Group Phase 2 Rev A Final Report. The identified text has been revised in a manner consistent with Gulfstream's request.<sup>2</sup>

Gulfstream requested that the FAA remove certain text from the first paragraph of the Discussion section. The FAA finds that the referenced text is unnecessary for the Discussion and has removed it in these final special conditions.

Gulfstream requested that the FAA revise the text of the Special Conditions section (i.e., the requirements) to align with the text of the Flight Test Harmonization

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<sup>2</sup> Specifically, the Discussion in Notice contained the following text: "These special conditions are specific to the GVIII-700 and GVIII-G800 series airplanes. These conditions are necessary to ensure a smooth transition from normal flight to the TSP mode and adequate maneuver capability. These conditions also ensure that the structural limits of the airplane are not exceeded. Furthermore, failure of the TSP function must not create hazardous flight conditions." This text is replaced in these final special conditions with: "These special conditions are specific to the Takeoff Stall Protection Function of the GVIII-G700 and GVIII-G800 series airplanes. These conditions are necessary to ensure that the TSP function supports safe operation and does not interfere with required maneuvering in normal and emergency operations and in foreseeable atmospheric conditions."

Working Group Phase 2 Rev A Final Report.<sup>3</sup> The primary difference is that the proposed special conditions included terms applicable to the “takeoff stall protection function,” but the term in the Report, which Gulfstream requested to be used, is the more general “envelope protection function.” The FAA agrees with Gulfstream’s request to make this change for consistency with the terminology in the Report; but notes that the design feature being addressed by these special conditions remains the same as proposed. The FAA has also added “simultaneous” to the beginning of paragraph (e) as a final conformance with the requested text of the Report.

### **Applicability**

As discussed above, these special conditions are applicable to the Gulfstream Model GVIII-G700 and GVIII-G800 series airplanes. Should Gulfstream apply at a later date for a change to the type certificate to include another model that incorporates the same novel or unusual design feature, or should any other model already included on the same type certificate be modified to incorporate the same novel or unusual design feature, these special conditions would apply to the other model as well.

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 Gulfstream Model GVIII-G700 and GVIII-G800 is imminent, the FAA finds that good cause exists to make these special conditions effective upon publication.

### **Conclusion**

This action affects only a certain novel or unusual design feature on Gulfstream Model GVIII-G700 and GVIII-G800 series of airplanes. It is not a rule of general applicability.

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<sup>3</sup> The Report is available at [https://www.faa.gov/regulations\\_policies/rulemaking/committees/documents/media/09%20-%20FTHWG\\_Final\\_Report\\_Phase\\_2\\_RevA\\_\\_Apr\\_2017.pdf](https://www.faa.gov/regulations_policies/rulemaking/committees/documents/media/09%20-%20FTHWG_Final_Report_Phase_2_RevA__Apr_2017.pdf); the requested text is at pages 43 and 221, and discussed beginning at page 238.

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

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

### **Authority Citation**

The authority citation for these special conditions is as follows:

**Authority:** 49 U.S.C. 106(f), 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 the Gulfstream Model GVIII-G700 and GVIII-G800 series airplanes, and will be applied by the FAA to the extent necessary to certify the envelope protection function within the electronic flight control system (EFCS) that protects the airplane from over- and rapid-rotation on takeoff.

For airplanes that employ envelope protection functions:

- (a) Envelope protection functions must not unduly limit the maneuvering capability of the airplane nor interfere with its ability to perform maneuvers required for normal and emergency operations.
- (b) Onset characteristics of each envelope protection function must be appropriate to the phase of flight and type of maneuver and must not conflict with the ability of the pilot to satisfactorily control the airplane flight path, speed, or attitude.
- (c) Excursions of a limited flight parameter beyond its nominal design limit value due to dynamic maneuvering, airframe and system tolerances, and non-steady atmospheric conditions must not result in unsafe flight characteristics or conditions.
- (d) Operation of envelope protection functions must not adversely affect aircraft control during expected levels of atmospheric disturbances, nor impede the application of recovery procedures in case of windshear.

(e) Simultaneous activation of envelope protection functions must not result in adverse coupling or adverse priority.

(f) In case of abnormal attitude or excursion of any flight parameters outside the protected boundaries, operation of envelope protection functions must not hinder airplane recovery.

Issued in Kansas City, Missouri, on March 12, 2024.

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