Exemption No. 11610

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
RENTON, WASHINGTON 98057-3356

In the matter of the petition of **Gulfstream Aerospace Corporation** for an exemption from § 25.813(e) of Title 14, Code of Federal Regulations	**Regulatory Docket No. FAA-2015-0230**

GRANT OF EXEMPTION

By letter dated January 30, 2015, Mr. Robert Nilson, Director, Gulfstream Aerospace Corporation, P.O. Box 2206, Savannah, Georgia, petitioned the Federal Aviation Administration (FAA) for an exemption from the requirements of § 25.813(e) of Title 14, Code of Federal Regulations (14 CFR). This exemption, if granted, would permit the installation of interior doors between passenger seats, which are occupiable during takeoff and landing, and the forward left hand emergency exit on Gulfstream Model GVII-G500 airplanes. The petitioner requests that the exemption be applicable to both private use aircraft (14 CFR part 91) and those used for hire (14 CFR part 135).

The petitioner requests relief from the following regulation:

Section 25.813(e) at Amendment 25-128 – No door may be installed between any passenger seat that is occupiable for takeoff and landing and any passenger emergency exit, such that the door crosses any egress path (including aisles, crossaisles, and passageways).

The petitioner supports its request with the following information:

This section quotes the relevant information from the petitioner's request, with minor edits for clarity. The complete petition is available at the Department of Transportation's Federal Docket Management System, on the Internet at http://regulations.gov, in Docket No. FAA-2015-0230.

> **Supportive Information**
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> At Amendment 25-1, 14 CFR 25.813(e) was revised to restrict installation of doors between passenger compartments. This did not restrict the installation of doors forward and aft of passenger compartments. As such, it continued to be common practice for business class aircraft to install doors which isolate the passenger seating areas from crew

working areas. These doors lower noise levels in the passenger cabin and create effective work environments. On October 27, 2004, Amendments 25-116 and 121-306, titled "Miscellaneous Cabin Safety Changes," were published in the Federal Register. This revised § 25.813(e) to restrict the installation of any interior door between a passenger seat and any emergency exit, effectively restricting the use of all interior doors. In addition, the FAA revised § 121.310(f)(6) to prohibit these doors in airplanes manufactured after November 27, 2006, and operated under part 121. However, at that time, the FAA chose not to amend part 135 or part 91. As a result, aircraft certified prior to Amendment 25-116, and operating under other than part 121, are permitted to incorporate these types of door installations.

When Amendment 25-116 was issued, the FAA noted that this change was incorporated due to concerns over passengers' ability to 1) recognize that an exit exists beyond an interior door forward or aft of the passenger compartment, and 2) reach the exit beyond the door in the event of failure of the interior door to open.

For the GVII-G500 aircraft, Gulfstream believes that it is possible to provide a level of safety consistent with the intent of the part 25 regulations while allowing for installation of certain interior doors. This will be accomplished by incorporating specific design features that provide an acceptable level of safety. These features will ensure the design will not diminish a passenger's ability to 1) effectively identify the exit, and 2) egress the aircraft.

Factors Supporting the Petition

The design features of the GVII-G500 interior doors are identical to the ones described in Exemption 10188 for the GVI and the following characteristics of the GVII-G500 interior doors and passenger cabin will ensure that the passengers' ability to effectively identify the exit is not diminished:

- The doors will be designed to automatically open (stow) based on the airplane being configured for landing and will remain open until the airplane has returned to an airborne flight configuration. The installation of the interior doors will therefore not adversely affect the passenger recognition of the main entry door (MED).

- The doors will only be installed forward of the passenger seating area and between passenger seats and the MED. The MED is the only door available to enter the aircraft and its location is inherently established for all passengers upon boarding.

- Emergency exit locator, marking signs, and emergency lighting will be provided. Gulfstream will comply with the criteria defined in equivalent level of safety (ELOS) memo AT5177AT-T-C-1 (ELOS to §§ 25.811(d) and 25.812(b)).

- The over wing emergency exits are optimally located in the passenger compartment, in clear and obvious view, and are in an area of high passenger density. These exits will also be indicated via locator signs and markers, as well as emergency escape path lighting. This heightened passenger awareness and ease of identification will increase the likelihood of passengers utilizing the over wing exits provided in the cabin versus defaulting to the entry door.

The following design features of the GVII-G500 interior doors and passenger cabin will ensure that the passenger's ability to effectively egress the aircraft is not diminished by ensuring that the doors will be open for taxi, take-off, and landing, without requiring passenger or crew action.

- The doors will be designed to automatically open (stow) when the airplane has been configured for landing (gear down or flaps down).

- The operation of the door to be closed (deployed position) will require manual activation. The doors will be designed so that they can only be closed (deployed) when the gear and flaps are fully retracted (airborne configuration), or for ground maintenance activity.

- The doors will be designed so that, in case of any failure of the closing/latching mechanism, they will default to the open (stowed) position.

- In accordance with Gulfstream's approach to compliance with § 25.1309, the failure to egress through any individual emergency exit is classified as Major. Gulfstream will demonstrate that the probability of failure to egress through the MED, including the probability of failure of both interior doors, will meet the criteria for a failure scenario classified as Major. This will include conducting a quantitative analysis that shows the probability of this scenario to be less than 10^{-5} per flight hour. This hazard criticality is based on § 25.783(b)(2).

- The doors will have a hold-open feature that will be shown to react all emergency landing loads specified under § 25.561(b).

- The doors will be placarded to be open and latched for taxi, take-off, and landing (TT&L). Manual operation to the open (stowed) position is the primary means by which the doors should be open and stowed for TT&L. The automatic opening feature will ensure egress paths in the event that manual operation has not occurred.

- An amber Caution Advisory System (CAS) message will alert pilots if an interior door is not in the proper open (stowed) position for TT&L.

- With the doors in the open (stowed) position, the critical forward emergency landing loads will not cause door to deploy and block access to the MED.

- The over wing emergency exits have been designed so that they can all be deployed at the same time to provide multiple, redundant egress paths for escape from the passenger compartment. Each of the four over wing emergency exits require single file egress and have been sized to provide a substantial egress area. This reduces the problems caused by passenger panic and congestion typical in single, larger exits. Smooth, effective egress of passengers through the existing over wing exits will also increase the likelihood of passengers utilizing the over wing exits as opposed to seeking alternate escape routes further away from the MED.

- Both doors will be designed to be frangible from either side of the door. In case of an emergency, this design will allow a 5th percentile female to create an aperture large enough for a 95th percentile male to escape.

Additional GVII Design Considerations:

- The main entry door is also the flight crew emergency exit. In the event of an emergency evacuation, a trained crew member will be responsible to ensure egress is maintained through this passageway to the MED.

- Through ELOS TC8700AT-T-C-1 to § 25.807(i)(2), Gulfstream has addressed FAA Policy Number ANM-115-08-02, and has demonstrated that the GVII exit pair will provide equivalent egress capability to that of a required Type III exit.

- The GVII-G500 emergency exits configuration is identical to the GVI emergency exits covered under the ELOS TC8700AT-T-C-1 and Gulfstream has demonstrated that the over wing exit pair was equivalent to the size and number of exits required by § 25.807(g). The GVII-G500 will comply with § 25.807(g) for required number of emergency exits through the over wing exits and Gulfstream has demonstrated that the MED was an emergency exit in excess of the minimum required on the left hand side of the aircraft.

- Compliance with § 25.807(i)(2) for ditching will be shown through the use of the over wing emergency exits as required by § 25.807(g). The forward entry door will not be utilized under this scenario for emergency evacuation and applicable placards will be provided. The airplane flight manual will define proper procedures for exiting the aircraft in these conditions.

Effect of the Exemption on Safety

Acceptance of the proposed GVII-G500 design will ensure that a level of safety consistent with the intent of the regulation has been provided. The design of the proposed interior doors will ensure the same level of safety for cabin egress as is required for any emergency exit and will provide a clear egress path. This, combined with other characteristics of the GVII such as redundancy of emergency exits, large area over-wing exits, and optimal location of emergency exits, will provide a level of safety exceeding that currently prescribed under part 25.

Although the current operational requirements under parts 91 and 135 for this type of aircraft have not been amended to correspond to the part 25 restriction, Gulfstream acknowledges that the part 25 change is an important enhancement to the level of safety offered by newly manufactured aircraft. The design criteria proposed by Gulfstream for the GVII raises the current level of safety to that envisioned by Amendment 25-128.

Issue of Public Interest

Gulfstream Aerospace Corporation designs, develops, manufactures, markets, and services the world's most technologically advanced business jet aircraft to an international market. Gulfstream's leadership position in the global business jet market is due to the efforts of its nearly ten thousand employees in the manufacturing plants, completion centers, and service centers across North America. The corporation utilizes numerous products, such as avionics and environmental control systems, from scores of suppliers located throughout the United States. Gulfstream competes for new business all over the world. This exemption will directly impact the cabin and flight deck acoustics and the effectiveness of flight crew sleeping facility design, thereby having a direct effect on GVII-G500 sales. The ability to provide an additional acoustical barrier from external noise for the flight deck and cabin are being requested by prospective aircraft operators who compare the GVII-G500 with products of foreign aircraft manufacturers. The inability to provide such features will ultimately cause a reduction in perspective sales. The manufacture, completion, and support of Gulfstream aircraft would aid in the stabilization of the job market as well as the growth of the American economy, which is in the interest of the public.

Since customers desire to have these interior doors, they may opt for aircraft designed to an earlier certification basis, in lieu of the GVII-G500. This will restrict advancements in safety introduced by Gulfstream with the GVII-G500, not only in the areas of cabin safety, but throughout the airplane. This is counterproductive to both Gulfstream and the FAA's goal of continuous improvement in overall safety. The advancement of aircraft safety is in the interest of the public.

Operation Outside the United States

The European Aviation Safety Agency (EASA) Certification Standard (CS) 25.813 regulation is not currently harmonized with 14 CFR 25.813 and does not restrict these types of door installations.

Regardless of EASA requirements, per 14 CFR 11.81(h), Gulfstream requests that consideration be given to extending this exemption for operation outside of the United States and projections are the same for the Model GVII. Granting this extension of privileges will allow for operations based within foreign countries, having bilateral agreements with the United States accepting FAA part 25 as their airworthiness standard for transport category aircraft. Gulfstream believes that limiting this exemption to use within the United States would put unfair restrictions on the marketability of this aircraft.

Conclusion

Gulfstream believes that the above arguments favor an exemption from 14 CFR 25.813(e) that would allow for installation of certain interior doors on the GVII aircraft. In addition, Gulfstream believes that an exemption is in the public interest and will provide a level of passenger safety consistent with the current part 25 regulations.

Federal Register publication

The FAA has determined that good cause exists for waiving the requirement for *Federal Register* publication for public comment because the request is identical in all material respects to previously granted exemptions; the exemption, if granted, would not set a precedent; and any delay in acting on this petition would be detrimental to Gulfstream Aerospace Corporation.

The FAA's analysis

Following accident experience in the 1960's, the FAA amended part 25 to prohibit the installation of doors "between passenger compartments" at Amendment 25-15. At the time of the amendment, it was common practice to divide the first class and tourist class cabins with a solid door. We determined, in the course of accident investigations, that this door could be detrimental in evacuation of passengers, who tended not to recognize that there was an exit beyond the door, even if it were the closest available. The resulting regulatory change was geared specifically at preventing this occurrence.

However, the regulation was worded such that doors may be installed between passengers and exits, provided that passengers are not on both sides of the door. For example, a door could be installed across the main passenger aisle at the end of a cabin. The regulations only required that the door be open for takeoff and landing. It is now considered undesirable to permit the installation of a door between any passenger and an exit. Either through omission or mechanical failure, such a door could become jammed prior to the need for an emergency evacuation, preventing or delaying persons from evacuating, and resulting in fatalities or injuries that would not have occurred if the door were not present. The hazards associated with a jammed door are still present whether or not passengers are on both sides of the door, and the recognition factor has not been mitigated. Either scenario could result in the same consequences - failure of some passengers to evacuate the airplane.

The Gulfstream GVII will have a maximum passenger capacity of 19. Part 25 requires such an airplane to have at least one Type III or larger exit in each side of the fuselage. The GVII will instead have a Type I entry door on the forward left side, and two paired over-wing emergency exits on each side of the aircraft (in a manner similar to previous Gulfstream airplanes) so as to maintain a family relationship with previous Gulfstream models. Each GVII over-wing exit will provide a 26-inch by 32-inch rectangular opening with its long axis oriented parallel to the floor. The GVII over-wing exit will have a step-up distance of 25.03 inches and a step-down distance of 35.18 inches.

By comparison, a Type III exit, as defined by § 25.807 (which is the regulatory requirement for an aircraft of this passenger capacity), is a rectangular opening not less than 20 by 36 inches, with its long axis oriented vertically. The Type III exit must have a step-up inside the airplane of not more than 20 inches and, if located over the wing, a step-down of not more than 27 inches.

Although the GVII over-wing exits do not meet the dimensional requirements of a Type III exit, each exit is larger in area (797 square inches) than a Type III exit (678 square inches). Gulfstream has been issued an equivalent level of safety (ELOS) to allow installation of the non-standard size over-wing exits in lieu of a true Type III exit.

The applicant states that the GVII aircraft complies with § 25.807(g) for required number of emergency exits through the over-wing exits and that the MED is an emergency exit in excess of the minimum required on the left-hand side of the aircraft. The FAA disagrees with Gulfstream's statement that the MED is in excess of the minimum because the MED is one of the compensating factors used to support issuance of the ELOS to allow installation of the non-standard size over-wing exits in lieu of a true Type III exit on the right-hand side of the aircraft. However, the FAA acknowledges that the aircraft has five exits in lieu of the required minimum two, as described above. The four over-wing exits provide a compensating factor to allow issuance of an ELOS to § 25.807(g). Each pair of over-wing exits must be shown to be equivalent to a single Type III exit. The substantiation of the over-wing exits must account for any obstructions of the exits as a result of other ELOS activity related to the exits.

Section 25.807(h) requires that the MED be readily accessible. Gulfstream has proposed several features to ensure the MED will remain readily accessible with the interior doors installed.

The FAA's decision

In consideration of the foregoing, I find that a grant of exemption is in the public interest. Therefore, pursuant to the authority contained in 49 U.S.C. §§ 40113 and 44701 delegated to me by the Administrator, I grant Gulfstream Aerospace Corporation an exemption from 14 CFR 25.813(e). The exemption is granted to the extent necessary to allow Gulfstream Aerospace Corporation to install interior doors on Gulfstream Model GVII airplanes.

This exemption is subject to the following conditions:

1. The doors must be designed to automatically open (stow) when the landing gear is down or the flaps are not fully retracted and must remain open until the landing gear and flaps are both fully retracted.

2. The doors must only be installed forward of the passenger seating area and between the passenger seats and the main entry door (MED).

3. Emergency exit locator, marking signs, and emergency lighting must meet the criteria defined in ELOS AT5177AT-T-C-1.

4. The doors must be designed so that they can only be closed (deployed) when the gear and flaps are fully retracted (airborne configuration), or for ground maintenance activity.

5. The doors must be designed so that for any failure of the closing/latching mechanism, the doors will default to the open (stowed) position.

6. Gulfstream must substantiate that the probability of failure to egress through the MED, including the probability of failure of both interior doors, to be less than 10^{-5} per flight hour. This hazard criticality is based on § 25.783(b)(2).

7. The doors must have a hold-open feature that will be shown to react to all emergency landing loads specified under § 25.561(b).

8. The doors must be placarded to be open and latched for taxi, takeoff, and landing (TT&L).

9. An amber CAS message must be installed that will alert the pilots if an interior door is not in the proper open (stowed) position for TT&L.

10. With the doors in the open (stowed) position, the critical forward emergency landing loads must not cause either door to deploy and block access to the MED.

11. The doors must be designed to be frangible from either side of the door. The design must allow a 5^{th} percentile female to create an aperture large enough to allow a 95^{th} percentile male to escape. The door must be easily broken/removed by the occupant when the door(s) is jammed and a placard must be installed on each side of the door(s) providing instruction on the operation of the frangibility feature of the door(s). A demonstration is required to show that a 5^{th} percentile female can break through or remove the door from both sides of the door(s). The 5^{th} percentile female test subject should be subjected to a typical preflight briefing and then may only use the information on the placard for determining how to operate the frangibility feature of the door(s). The demonstration must be conducted in accordance with an FAA approved test plan on a conformed installation. Additionally, the applicant must show that a 95^{th} percentile male subject can exit through the door(s) opening created by the 5^{th} percentile female.

Issued in Renton, Washington, on May 15, 2015.

/s/

Michael Kaszycki
Acting Manager, Transport Airplane Directorate
Aircraft Certification Service