Exemption No. 10188

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-2010-0446**

GRANT OF EXEMPTION

By letter dated August 27, 2009, Mr. Robert Glasscock, Gulfstream Aerospace Corporation, P.O. Box 2206, Savannah, GA 31402-2206, petitioned the FAA for an exemption from Title 14, Code of Federal Regulations (14 CFR) 25.813(e). The proposed exemption, if granted, would permit the installation of interior doors between passenger seats that are occupiable during takeoff and landing and the forward left hand emergency exit. The petitioner requests the exemption be applicable to aircraft operated under 14 CFR part 135 and not be limited to private use operation.

The petitioner requests relief from the following regulation:

Section 25.813(e), Amendment 25-116, 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, cross aisles and passageways).

The petitioner supports their request with the following information:

This section quotes the information from the petitioner's request.

"Relief from section 14 CFR Part 25.813(e) Amdt. 25-116

Gulfstream Aerospace Corporation (Gulfstream) of Savannah, Georgia has submitted an application to the FAA's Atlanta Aircraft Certification Office for type certification of a new, twin-engine, transport category aircraft to be known as the Gulfstream model GVI. FAA Project Number TC8700AT-T has been assigned to this effort. The GVI cabin interior relies on the installation of various doors to provide certain amenities and configuration options that have become the standard for Executive Class aircraft.

14 CFR 25.813(e), Amendment 25-116 – States in part that no door may be installed between any passenger seat that is occupiable for take off and landing and any passenger emergency exit, such that the door crosses any egress path (including aisles, cross aisles and passageways).

The GVI design incorporates two doors between the passenger seating areas and the main entry door. See Figure 1, Acoustic and Forward Vestibule Door Arrangement. One door will be an acoustic door provided between the forward vestibule and the main entry door. Its purpose is to maintain an acceptable acoustic level in the passenger cabin and pilot compartment and will be standard equipment. The second door will be a forward vestibule door and is offered on certain interior configurations. An example of one such configuration is depicted below. Its purpose is to provide:

1) Isolation of the crew rest facilities in accordance with guidance per AC 121-31;
2) Separation between passenger and crew areas including the galley, crew rest, and cockpit.

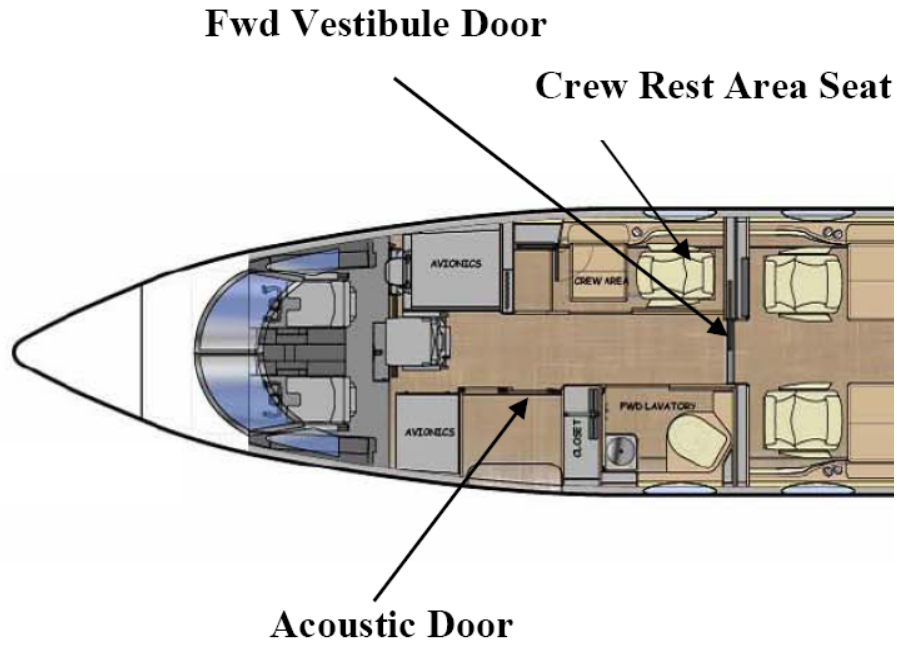

Figure 1 - Acoustic and Forward Vestibule Door Arrangement

In accordance with the provisions of 14 CFR 11.81, Gulfstream requests an exemption to 14 CFR 25.813(e) for installations of these cabin interior doors. This will allow the GVI aircraft to provide a safe, quiet operating environment for the crew and passengers, and meet the requirements for crew rest areas. Gulfstream proposes that specific design features, combined with the unique configuration of the GVI, will provide an overall level of safety beyond that intended when the FAA promulgated Amendment 25-116. The information provided herein will outline this rationale.

Supportive information

At Amendment 25-1, § 25.813(e) was revised to restrict installation of doors between passenger compartments. This did not restrict the installation of doors forward or 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 work 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 14 CFR 121.310(f)(6), to prohibit these doors in airplanes manufactured after November 27, 2006, and operated under 14 CFR part 121. However, at that time the FAA chose not to amend 14 CFR part 135 or 14 CFR part 91. As a result, aircraft certified prior to Amendment 25-116, and operating under other than 14 CFR 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 GVI aircraft, Gulfstream believes that it is possible to provide a level of safety consistent with the intent of the 14 CFR 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 passengers' ability to 1) effectively identify the exit and 2) egress the aircraft.

Factors supporting the Petition

The following design features of the GVI interior doors and passenger cabin will ensure that the passenger's 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 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 and marking signs and emergency lighting in accordance with §§ 25.811 and 25.812 will be provided.
- 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. Reference Figure 2, GVI Emergency Egress Routes.

The following design features of the GVI 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, takeoff and landing (TT&L), 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 the 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 for any failure of the closing/latching mechanism, the doors 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. Accordingly, Gulfstream will demonstrate that the probability of failure to egress through the Main Entry Door (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 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 clear egress paths in the event that manual operation has not occurred.
- An Amber CAS message will alert the pilots if an interior door is not in the properly open (stowed) position for TT&L.
- With the doors in the open (stowed) position, the critical forward emergency landing loads will not cause either door to deploy and block access to the main entry door.
- 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 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 (MED). Reference Figure 2, GVI Emergency Egress Routes.

Additional GVI 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.
- The GVI aircraft complies with § 25.807(g) for required number of emergency exits through the over wing exits. The MED is an emergency exit in excess of the minimum required on the left hand side of the aircraft.
- Compliance with § 25.807(i) 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.
- Many of the passengers typically utilizing Executive Class aircraft are frequent passengers who are familiar with the operation of the interior features and locations of emergency exits.

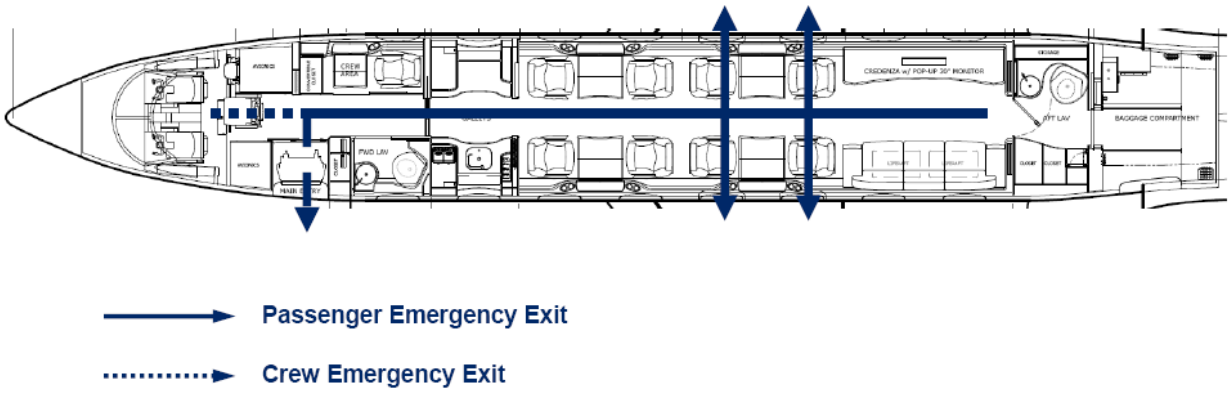

Figure 2 - GVI Emergency Egress Routes

Effect of the Exemption on Safety

Acceptance of the proposed GVI 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 GVI 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 14 CFR 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 GVI raises the current level of safety to that envisioned by Amendment 25-116 to part 25.

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 eight 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. Although the current world economy has slowed in comparison to previous years, the corporate aircraft market is expected to grow. This exemption will directly impact the cabin and flight deck acoustics and the effectiveness of flight crew rest facility design, thereby having a direct effect on GVI sales. The ability to provide additional acoustic barrier from external noise for the flight deck and cabin are being requested by prospective aircraft operators who compare the GVI with products of European and other 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 GVI. This will restrict advancements in safety introduced by Gulfstream with the GVI, 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 aircraft safety. The advancement of aircraft safety is in the interest of the public.

Operation Outside of the United States

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

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

Conclusion

Gulfstream believes that the above arguments favor an exemption from § 25.813(e) that would allow for installation of certain interior doors on the GVI 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**

A summary of the petition was published in the *Federal Register* on September 29, 2010 (Vol. 75, No. 188, FR 60164). No comments were received.

The FAA's analysis

Following accident experience in the 1960's the FAA amended part 25, in Amendment 25-15, to prohibit the installation of doors "between passenger compartments." At the time of the amendment, it was common practice to divide the first class and tourist class cabins with a solid door. It was 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 could result in the same consequences-- failure of some passengers to evacuate the airplane.

The Gulfstream GVI is being designed to 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 GVI 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 GVI over-wing exit will provide a 26 by 32 inches rectangular opening with its long axis oriented parallel to the floor. The GVI 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 GVI 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 GVI aircraft complies with § 25.807(g) for required number of emergency exits through the over wing exits and 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 position 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 of two, as described above. The four over wing exits provide a compensating factor to allow issuance of an ELOS. 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. GAC has proposed several features to ensure the MED will remain readily accessible with the interior doors installed.

These features include:

1. 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.
2. The doors will only be installed forward of the passenger seating area and between passenger seats and the MED.
3. Emergency exit locator and marking signs and emergency lighting in accordance with §§ 25.811 and 25.812 will be provided.
4. The operation of the door to the 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.
5. The doors will be designed so that for any failure of the closing/latching mechanism, the doors will default to the open (stowed) position.
6. In accordance with Gulfstream's approach to compliance with § 25.1309, the failure to egress through any individual emergency exit is classified as Major. Accordingly, 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).

7. The doors will have a hold-open feature that will be shown to react all emergency landing loads specified under § 25.561(b).
8. The doors will be placarded to be open and latched for 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 clear egress paths in the event that manual operation has not occurred.
9. An amber calibrated airspeed (CAS) message will alert the pilots if an interior door is not in the properly open (stowed) position for TT&L.
10. With the doors in the open (stowed) position, the critical forward emergency landing loads will not cause either door to deploy and block access to the main entry door.
11. 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.

In past practice the FAA has also required that interior doors have an Emergency Passage Feature (EPF) to allow passage of the occupants and/or rescue personnel in the event the door(s) become jammed. This EPF may be through frangibility and/or a removable emergency panel or equivalent. The EPF 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 EPF. A demonstration is required to show that a 5^{th} percentile female can break through or remove the EPF 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 EPF. 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 EPF opening.

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 the petition of the Gulfstream Aerospace Corporation for an exemption from § 25.813(e) to the extent necessary to allow installation of interior doors on Gulfstream Model GVI 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 will only be installed forward of the passenger seating area and between passenger seats and the main entry door (MED).
3. Emergency exit locator and marking signs and emergency lighting in accordance with §§ 25.811 and 25.812 will be provided.

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, take-off and landing (TT&L).
9. An Amber CAS message, that will alert the pilots if an interior door is not in the properly open (stowed) position for TT&L, must be installed.
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 main entry door.
11. The doors must have an Emergency Passage Feature (EPF) to allow passage of the occupants and/or rescue personnel if the door(s) become jammed. This EPF may be through frangibility and/or a removable emergency panel or equivalent. The EPF must be easily broken or 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 EPF. A demonstration is required to show that a 5^{th} percentile female can break through or remove the EPF 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 EPF. 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 EPF opening.
12. Each pair of over wing exits must shown to be equivalent to a single Type III exit. This substantiation must account for any obstructions of the exits as a result of other ELOS activity related to the exits.

Issued in Renton, Washington, on December 27, 2010.

/s/

Jeff Duven
Acting Assistant Manager, Transport Airplane Directorate
Aircraft Certification Service