

Exemption No. 9761

**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 §§ 25.562(a) and
25.785(b) of Title 14, Code of Federal
Regulations

Regulatory Docket No. FAA-2008-0758

GRANT OF EXEMPTION

By letter dated June 30, 2008, Mr. Robert Glasscock, Product Development Team Lead GVI Airworthiness and Certification, Gulfstream Aerospace Corporation (GAC), P.O. Box 2206, M/S R-03, Savannah, GA 31402-2206, petitioned the Federal Aviation Administration (FAA) for an exemption from the requirements of §§ 25.562(a) and 25.785(b) of Title 14, Code of Federal Regulations (14 CFR). The proposed exemption, if granted, would permit relief from the general occupant protection requirements for multiple-place side-facing seats in the passenger compartment on Gulfstream GVI airplanes.

The petitioner requests relief from the following regulations:

Section 25.562(a), Amendment 25-64

Emergency landing dynamic conditions.

- (a) The seat and restraint system in the airplane must be designed as prescribed in this section to protect each occupant during an emergency landing condition when--
- (1) Proper use is made of seats, safety belts, and shoulder harnesses provided for in the design; and
 - (2) The occupant is exposed to loads resulting from the conditions prescribed in this section.

Section 25.785(b), Amendment 25-88 – Each seat, berth, safety belt, harness, and adjacent part of the airplane at each station designed as occupiable during takeoff and landing must be designed so that a person making proper use of these facilities will not suffer serious injury in an emergency landing as a result of the inertia forces specified in §§ 25.561 and 25.562.

The petitioner supports its request with the following information.

“Amendment 25-64 revises the emergency landing conditions that must be considered in the design of the airplane. 14 CFR 25.561 was revised and an additional regulation, 14 CFR 25.562, for dynamic seat testing for all seats approved to be occupied for take-off and landing was added. The main focus of these regulations was to enhance occupant protection for standard forward-facing seats. Side-facing seat installations for transport category airplanes were not adequately considered when Amendment 25-64 was originally promulgated.

“Since the current regulations do not provide adequate criteria for evaluating side-facing seats, alternate standards are needed. Thus, an exemption from the general injury requirements of 14 CFR 25.785(b) and 25.562(a) will be necessary. This petition for exemption will provide alternate minimum criteria to be met for certification of multiplace side-facing seat installations on aircraft operated under Part 91 and 135.

Proposed Injury Criteria

“In accordance with guidance offered under FAA Policy ANM-03-115-30, GAC proposes the following as minimum acceptable injury criteria to be met for certification of multiplace side-facing seats:

- (1) Existing Criteria: All injury protection criteria of 14 CFR 25.562(c)(1) through (c)(6) apply to the occupants of side facing seating. Head Injury Criterion (HIC) assessments are only required for head contact with the seat and/or adjacent structures.
- (2) Body-to-Body Contact: Contact between the head, pelvis, or shoulder area of an Anthropomorphic Test Dummy (ATD) with the adjacent seated ATDs head, pelvis, or shoulder areas is not allowed during the tests conducted in accordance with 14 CFR 25.562(b)(1) and (b)(2). Contact during rebound is allowed.
- (3) Thoracic Trauma: If the torso of an ATD at the forward most seat place impacts seat and/or adjacent structure during testing, compliance with Thoracic Trauma Index (TTI) injury criterion must be substantiated by dynamic test or by rational analysis based on previous test(s) of a similar seat installation. TTI data must be acquired with a Side Impact Dummy (SID), as defined by 49 CFR Part 572, Subpart F, or an equivalent ATD or a more appropriate AD and must be processed as defined in Federal Motor Vehicle Safety Standard (FMVSS) Part 572.214, section s6.13.5. TTI must be less than 85, as defined in 49 CFR Part 572, Subpart F. Torso contact during rebound is acceptable and need not be measured.
- (4) Pelvis: If the pelvis of an ATD at any seat place impacts seat and/or adjacent

structure during testing, pelvic lateral acceleration injury criteria must be substantiated by dynamic test or by rational analysis based on previous test(s) of a similar seat installation. Pelvic acceleration data must be processed as defined in FMVSS § 571.214, s6.13.5.

(5) Body-to-Wall/Furnishing Contact: If the seat is installed aft of a structure such as an interior wall or furnishing that may contact the pelvis, upper arm, chest, or head of an occupant seated next to the structure, that structure or a conservative representation of the structure and its stiffness must be included in the tests. It is recommended, but not required, that the contact surface of the actual structure be covered with at least two inches of energy absorbing protective padding (foam or equivalent) such as Ensolite.

(6) Shoulder Strap Loads: Where upper torso straps (shoulder straps) are used for sofa occupants, the tension loads in individual straps must not exceed 1,750 pounds. If dual straps are used for restraining the upper torso, the total strap tension loads must not exceed 2,000 pounds.

(7) Occupant Retention: All side-facing seats require end closure or other means to prevent the ATDs pelvis from translating beyond the end of the seat at any time during testing.

Proposed General Guidelines

“The following general guidelines are to be used in testing the side-facing seats:

- (1) All seat positions are to be occupied by ATDs for the longitudinal tests.
- (2) A minimum of one longitudinal test, conducted in accordance with the conditions specified in 14 CFR 25.562(b)(2), is required to assess the injury criteria as follows. Note that if a seat is installed aft of structure (e.g., an interior wall or furnishing) that does not have a homogeneous surface, an additional test(s) maybe required to demonstrate that the injury criteria are met for the area which an occupant could contact. For example, different yaw angles could result in different injury considerations and may require separate tests to evaluate.
 - For configurations without structure (e.g., wall, bulkhead) installed directly forward of the forward seat place. Hybrid II ATDs or equivalent must be in all seat places.
 - For configurations with structure (e.g., wall, bulkhead) installed directly forward of the forward seat place, a SID or equivalent ATD or more appropriate ATD must be in the forward seat place and a Hybrid II ATD or equivalent must be in all other seat places.
 - The test may be conducted with or without a deformed floor.
 - The test must be conducted with either no yaw or a 10 degrees yaw for

evaluating occupant injury. Deviating away from the no yaw condition must not result in the critical area of contact not being evaluated. Allowing the test to be conducted at 10 degrees yaw will permit many occupant injury tests to be considered the structural test as well and is considered acceptable since an exemption is sought in lieu of compliance with part 25. Note that this condition does not provide relief from the requirement that torso restraint straps, where installed, must remain on the occupant's shoulder during the impact condition of 14 CFR 25.562(b)(2).

(3) For the vertical test, conducted in accordance with the conditions specified in 14 CFR 25.562(b)(1), Hybrid II ATDs or equivalent must be used in all seat positions.”

Issue of Public Interest

“An inability to offer side-facing seats would introduces the following issues:

“The ability to offer customer preferred items such as the side-facing seats could be crucial factors in marketing the GVI. In order to maintain this level of customer satisfaction, customers could opt to purchase earlier model Gulfstream aircraft, meeting different standards. This is in effect then denying customers the benefits of other safety advances incorporated on the later model, and contradictory to the goal of ultimately providing safer aircraft.

“The elite class of Gulfstream aircraft is also specifically designed to cater to customers who regularly conduct critical business while on-board the aircraft. The nature of these business transactions often time requires accommodations that provide seating facing a conference grouping (i.e., side-facing seating). The inability to offer these types of accommodations will again hamper GAC's ability to satisfy the customer market.

“Gulfstream Aerospace Corporation designs, develops, manufactures, markets and services the world's most technologically advanced business jet aircraft to an international market. GAC'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 through out the United States. GAC 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. The current regulations now restrict highly sought after customer items such as the acoustic and forward doors. This also restricts installation of doors typically utilized to meet the requirements for crew rest areas. Denial of these options on the GVI puts GAC at a marketing disadvantage to our current competitors who can still offer these conveniences. This exemption will directly impact the ability to market the GVI aircraft thereby having a direct

effect on GVI sales. The manufacture, completion, and support of GAC aircraft aids in the stabilization of the job market as well as the growth of the American economy, which is certainly in the interest of the public.

Effect of the Exemption on Safety

“Granting this exemption will have no adverse affect on the safety of the airplane or its occupants. As alternate criteria have been presented, the occupants of side-facing seats will be afforded an acceptable level of safety.

Operation outside the United States

“GAC requests consideration be given to extending this exemption for operation outside of the United States. Gulfstream aircraft are routinely registered and operated outside of the United States and projections are the same for the model GVI. GAC believes that limiting this exemption to use within the U.S. would put unfair restrictions on the marketability of this aircraft.

Conclusion

“GAC believes that the above arguments favor a grant of exemption from 14 CFR 25.562(a) and 25.785(b) for installation of multiple-place side-facing seats on the Gulfstream Model GVI aircraft and its derivatives. Granting of this exemption is in the public interest and will not adversely affect current transport airplane fleet safety.”

Federal Register publication

The FAA has determined that good cause exists for waiving the requirement for *Federal Register* publication because 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

The FAA considers the petitioner’s proposal to be in the public interest for the same reasons as those previously stated by the petitioner.

As more transport category airplanes have been configured (or re-configured) for “private use, not-for-common-carriage,” the FAA has given considerable attention to the issue of appropriate regulation of such airplanes. Some of the current regulations governing design certification of transport category airplanes are not compatible with “private use, not for-common-carriage.” Given this situation, we have received a number of petitions for exemption from certain regulations. We have granted such exemptions when we find that to do so is in the public interest and does not adversely affect the level of safety provided by the regulations. We have published a Notice of Proposed Rulemaking, Notice No. 07-13, Special Requirements for Private

use Transport Category Airplanes (72 FR 38732, July 13, 2007) which, if promulgated, would obviate the need for case-by-case review of individual petitions for exemption.

We are giving considerable attention to the issue of transport category airplanes operated for private use. There are several regulatory requirements, including some identified by the petitioner, that lend themselves to exemption when considering the differences between commercial and private use operations. We intend to summarize our views on these regulations and propose revisions to the requirements, where appropriate. The regulations that are the subject of this petition may be included in the proposed revisions.

Following is a discussion of the petitioner's request.

Side Facing Seats

Side-facing seats are considered a novel design for transport category airplanes that include Amendment 25-64 in their certification bases and were not anticipated when those airworthiness standards were issued. Therefore, the existing regulations do not provide adequate or appropriate safety standards for occupants of multiple-place side-facing seats. The FAA has been conducting research to develop an acceptable method of compliance with § 25.785(b) for multiple-place side-facing seat installations. Without an acceptable method of compliance, the FAA finds that it is in the public interest to grant an exemption to the petitioner for Gulfstream GVI airplanes. This conclusion does not justify granting exemptions once an acceptable method of compliance with §§ 25.562(a) and 25.785(b) is developed. As a result, it is the intent of the FAA to not grant similar exemptions once an acceptable method of compliance has been developed.

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, Gulfstream Aerospace Corporation is hereby granted an exemption from 14 CFR §§ 25.562(a) at Amendment 25-64 and 25.785(b) at Amendment 25-88. The petition is granted to the extent necessary to allow Gulfstream to install multiple-place side-facing seats in the passenger compartment on Gulfstream GVI airplanes. This exemption is subject to the following conditions:

1. Existing Criteria: All injury protection criteria of § 25.562(c)(1) through (c)(6) apply to the occupants of side-facing seating. The Head Injury Criterion (HIC) assessments are only required for head contact with the seat and/or adjacent structures.
2. Body-to-Body Contact: Contact between the head, pelvis, torso or shoulder area of one Anthropomorphic Test Dummy (ATD) with the head, pelvis, torso or shoulder area of the ATD in the adjacent seat is not allowed during the tests conducted in accordance with § 25.562(b)(1) and (b)(2). Contact during rebound is allowed.

3. Thoracic Trauma: If the torso of an ATD at the forward-most seat place impacts the seat and/or adjacent structure during testing, compliance with Thoracic Trauma Index (TTI) injury criterion must be substantiated by dynamic test or by rational analysis based on previous test(s) of a similar seat installation. TTI data must be acquired with a Side Impact Dummy (SID), as defined by 49 CFR part 572, Subpart F, or an equivalent ATD or a more appropriate ATD and must be processed as defined in Federal Motor Vehicle Safety Standard (FMVSS) § 571.214, S6.13.5. The TTI must be less than 85, as defined in 49 CFR 572, subpart F. Torso contact during rebound is acceptable and need not be measured.
4. Pelvis: If the pelvis of an ATD at any seat place impacts seat and/or adjacent structure during testing, pelvic lateral acceleration injury criteria must be substantiated by dynamic test or by rational analysis based on previous test(s) of a similar seat installation. Pelvic lateral acceleration must not exceed 130g. Pelvic acceleration data must be processed as defined in FMVSS § 571.214, S6.13.5.
5. Body-to-Wall/Furnishing Contact: If the seat is installed aft of a structure—such as an interior wall or furnishing that may contact the pelvis, upper arm, chest, or head of an occupant seated next to the structure—the structure or a conservative representation of the structure and its stiffness must be included in the tests. It is recommended, but not required, that the contact surface of the actual structure be covered with at least two inches of energy absorbing protective padding (foam or equivalent) such as Ensolite.
6. Shoulder Strap Loads: Where upper torso straps (shoulder straps) are used for sofa occupants, the tension loads in individual straps must not exceed 1,750 pounds. If dual straps are used for restraining the upper torso, the total strap tension loads must not exceed 2,000 pounds.
7. Occupant Retention: All side-facing seats require end closures or other means to prevent the ATD's pelvis from translating beyond the end of the seat at any time during testing.
8. Test Parameters:
 - (a) All seat positions need to be occupied by ATDs for the longitudinal tests.
 - (b) A minimum of one longitudinal test, conducted in accordance with the conditions specified in § 25.562(b)(2), is required to assess the injury criteria as follows. Note that if a seat is installed aft of structure (such as an interior wall or furnishing) that does not have a homogeneous surface, an additional test or tests may be required to demonstrate that the injury criteria are met for the area which an occupant could contact. For example, different yaw angles could result in different injury considerations and may require separate tests to evaluate.

- For configurations without structure (such as a wall or bulkhead) installed directly forward of the forward seat place, Hybrid II ATDs or equivalent must be in all seat places.
- For configurations with structure (such as a wall or bulkhead) installed directly forward of the forward seat place, a SID or equivalent ATD or more appropriate ATD must be in the forward seat place and a Hybrid II ATD or equivalent must be in all other seat places.
- The test may be conducted with or without a deformed floor.
- The test must be conducted with either no yaw or 10 degrees yaw for evaluating occupant injury. Deviating from the no yaw condition must not result in the critical area of contact not being evaluated. Allowing the test to be conducted at 10 degrees yaw will permit many occupant injury tests to be considered in conjunction with the structural test. This test is considered acceptable since an exemption is sought in lieu of compliance with part 25. Note that this condition does not provide relief from the requirement that torso restraint straps, where installed, must remain on the occupant's shoulder during the impact condition of § 25.562(b)(2).

(c) For the vertical test, conducted in accordance with the conditions specified in § 25.562(b)(1), Hybrid II ATDs or equivalent must be used in all seat positions.

Issued in Renton Washington, on September 24, 2008.

Signed by Michael J. Kaszycki

Michael J. Kaszycki
Acting Manager
Transport Airplane Directorate
Aircraft Certification Service