

Exemption No. 9900

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
WASHINGTON, DC 20591

In the matter of the petition of

**GULFSTREAM AEROSPACE AND
GULFSTREAM AEROSPACE LP (GALP)**

for an exemption from § 25.785(b)
of Title 14, Code of
Federal Regulations

Regulatory Docket No. FAA-2009-0390

GRANT OF EXEMPTION

By letter dated March 22, 2009, Mr. Baruch Marom, Airworthiness and Certification Manager, Gulfstream Aerospace LP, Ben Gurion International Airport, 70100, Israel, petitioned the Federal Aviation Administration (FAA) on behalf of Gulfstream Aerospace for an exemption from § 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 occupancy side-facing divans on the new Gulfstream G250 model airplane.

The Gulfstream G250 is a derivative of the current Gulfstream 200 (formerly Galaxy), which is approved under Type Certificate A53NM. The Gulfstream G250 certification is progressing under FAA Type Certification Project No. AT0329IB-T. The certification basis for this new airplane model is: 14 CFR part 25, Amendments 25-1 through 25-116, which includes compliance with the requirements of § 25.562 at Amendment 25-64.

The petitioner requests relief from the following regulation:

Section 25.785(b) requires general occupant protection for occupants of multiple-place side facing seats that are occupied during takeoff and landing.

The petitioner supports its request with the following information:

The petitioner includes the following statements supporting his request: “The Gulfstream model G250 airplane will be equipped with passenger seating arrangements that will include side-facing divans. The G250 will most often be used for executive air

transportation under Parts 91 and 135 of the Federal Aviation Regulations. Due to the nature of the transportation involved, many operators request the installation of side-facing divans during the initial outfitting of the aircraft.

Prior to Amendment 25-64, side-facing divan installations were not considered a novel design for transport category airplanes. Routine approvals of installations were made with findings of compliance to § 25.561, and were commonly provided in a wide variety of transport category business jet airplanes. On June 16, 1988, 14 CFR part 25 was updated to Amendment 25-64 and revised the emergency landing conditions that must be considered in the design of airplane interiors. Amendment 25-64 revised the static load conditions in § 25.561 and added a new rule § 25.562, which required dynamic testing for all seats approved for occupancy during taxi, takeoff, and landing. During the § 25.562 rule development, side facing divan and seat installations were not adequately considered, therefore currently side-facing divan and seat installations are addressed by Exemption and FAA Special Condition processes.

Under 14 CFR part 11, § 11.25, Gulfstream Aerospace LP hereby petitions for permanent exemption from 14 CFR §25.785(b) for multiple occupancy side-facing divans. It is intended that this exemption will be included in the type certificate requirements as a part of the certification basis for the model G250 airplane.”

The petitioner supplied the following justification for this petition:

“The intent of Amendment 25-64 was to provide an improved level of safety for occupants of transport category airplanes. However, because most seats that are found in transport category airplanes are forward-facing, the pass/fail criteria developed in Amendment 25-64 focused primarily on forward facing seat. The side-facing divan installations were not adequately taken into account when Amendment 25-64 was promulgated. FAA Memorandum, "Policy Statement on Side-Facing Seat on Transport Category Airplanes", dated November 19, 1997 and FAA Draft Issue Paper, "Dynamic Test Requirements for Side-facing Divans(Sofas)", dated March 31, 2003, identify occupant protection criteria for side-facing divans certified by exemptions and single place side-facing seats certified by special conditions on transport category airplanes.”

Petitioner’s Proposed Test Criteria:

“The following proposed injury criteria and testing guidelines represent the minimum acceptable standard as provided in the FAA draft issue paper dated November 12, 1997 for exemption from the general occupant injury criteria of § 25.785(b). These injury criteria and testing guidelines were also coordinated with the FAA for the model G250 airplane via Issue Paper CI-3, under FAA Project AT0329IB-T.

1. Existing Criteria: All injury protection criteria of § 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 one Anthropomorphic Test Dummy (ATD) on the adjacent seated ATD's is not allowed during the tests conducted in accordance with § 25.562(b)(1) and (b)(2). Incidental contact of the legs, feet, arms and hands that will not result in incapacitation of the occupants is acceptable. Contact during rebound is allowed.
3. Body-to-Wall/Furnishing Contact: If the divan is installed aft of a structure, such as an interior wall or furnishing, that may be contacted by the pelvis, upper arm, chest, or head of an occupant seated next to the structure, a conservative representation of the structure and its stiffness must be included in the tests. In most cases the representation of the structure would be more rigid and have less deflection under load than the actual installation on the airplane. It is recommended, but not required, that the contact surface of this structure be covered with at least two inches of energy absorbing protective padding, such as Ensolite.
4. Thoracic Trauma: Testing with a Side Impact Dummy (SID), as defined by 49 CFR part 572, Subpart F, or its equivalent, must be conducted and Thoracic Trauma Index (TTI) injury criteria acquired with the SID must be less than 85, as defined in 49 CFR part 572, Subpart F. SID TTI data must be processed as defined in Federal Motor Vehicle Safety Standard (FMVSS) part 571.214, section S6.13.5.
5. Pelvis: Pelvic lateral acceleration must not exceed 130g. Pelvic acceleration data must be processed as defined in FMVSS part 571.214, Section S6.13.5.
6. Shoulder Strap Loads: Where upper torso straps (shoulder straps) are used for divan occupants, 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.”

Petitioner's Proposed General Test Guidelines

The following test guidelines are supplied by the petitioner:

- “1. All side-facing seats require end closures or other means to prevent the occupant from translating off of the seat.
2. All seat positions need to be occupied for the longitudinal tests.
3. For the longitudinal tests, conducted in accordance with the conditions specified in § 25.562(b)(2), a minimum of two tests will be required, as follows:
 - a. One test will be required with ATD's in all positions, with undeformed floor, 10 degrees yaw, and with all lateral supports (armrests/walls). For configurations with a wall or bulkhead immediately forward of the forward seat position on the divan a Side Impact Dummy (SID) ATD will be used in the forward seat position and a Hybrid II ATD or equivalent must be in all other seat places. For configurations without a wall or bulkhead immediately forward of the divan, Hybrid II ATDs or equivalent must be used in all seat locations.
 - b. One test will be required with Hybrid II ATD(s) or equivalent in all positions, with deformed floor, 10 degrees yaw, and with all lateral supports (armrests/walls). This could be considered the structural test as well.
4. For the vertical test, conducted in accordance with the conditions specified in § 25.562(b)(1), Hybrid II ATD's or equivalent will be used in all seat positions.”

Petitioner's Statement of Public Interest

The petitioner makes the following statement of public interest regarding his petition:

“Gulfstream Aerospace Corporation / GALP provide marketing, sales, aircraft completion and product support services for the Gulfstream 250 airplane. Gulfstream Aerospace Corporation / GALP employ a very large staff to design, manufacture, and install the executive interiors for the G250 airplanes that are operated worldwide. The owners of business jet aircraft very often prefer a configuration that includes single or multiple place divans that may be used as a conference area or a comfortable rest area.

The importance of business aviation to the well being of the United States economy cannot be overstated. Business aviation enables a company to maximize its two most important assets, time and people. A business aircraft reduces not only flight time but total business travel time, allowing a higher degree of productivity through greater point-to-point service and the ability to better utilize the existing national airport network, in essence bringing the business closer to its intended customer. The office-like environment that exists on board the business aircraft allows the travel time of busy executives to be a more productive time.

Due to the high demand for these corporate aircraft and the benefits they present to business, it is essential that the petitioner be granted the regulatory relief requested. Failure to achieve this goal will result in a significant loss of income, both in domestic and foreign trade for the United States, the petitioner and the intended business operators of these aircraft. The stabilizing effect that manufacture and support of corporate aircraft has on the job market is significant and definitely in the public interest.”

Notice and Public Procedure Provided

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 petitioner has requested an exemption from 14 CFR 25.785(b) at amendment 25-88. Exemption from 14 CFR 25.562(a) at amendment 25-64 is also required. This regulation states;

Sec. 25.562

[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.

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

The 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 250 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 for the reasons given by the petitioner. Therefore, pursuant to the authority contained in 49 U.S.C. §§ 40113 and 44701, delegated to me by the Administrator, Gulfstream Aerospace Corporation and Gulfstream Aerospace LP (GALP) are hereby granted an exemption from §§ 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 G250 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 July 8, 2009.

Ali Bahrami/s/
Manager, Transport Airplane Directorate
Aircraft Certification Service