

Exemption No. 9459

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

In the matter of the petition of

Embraer

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

Regulatory Docket No. FAA-2007-27904

GRANT OF EXEMPTION

By letter dated April 3, 2007, Mr. Sergio Augusto Viana de Carvalho, Certification Manager, Embraer, 12227-901, Sao Jose dos Campos, Brazil, petitioned the Federal Aviation Administration (FAA) for an exemption from the requirements of § 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 Embraer ERJ 190-100 ECJ airplanes. The proposed exemption is specifically for the installation of executive interiors on Embraer ERJ 190-100 ECJ airplanes that have been designated as “private, not-for-hire.”

The petitioner requests relief from the following regulations:

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's supporting information is as follows:

“Petition and General Information”

“The proposed exemption, if granted, would permit relief from the general occupant protection requirements for multiple-place side-facing seats on the Embraer model ERJ 190-100 ECJ airplanes.

“The Embraer model ERJ 190-100 ECJ airplane will be equipped with passenger seating arrangements that will include side-facing divans. Prior to Amendment 25-64, side-facing divans 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 installed in a wide variety of transport category business jet airplanes. 14 CFR part 25 was amended by Amendment 25-64, to revise the emergency landing conditions that must be considered in the design of the airplane interior. Amendment 25-64 revised the static load conditions in § 25.561 and added a new § 25.562, which required dynamic testing for all seats approved for occupancy during takeoff and landing. However, the side facing divan installations were not adequately accounted for when the new rule was established so that demonstrating compliance for these type installations is not possible. In lieu of that, FAA developed criteria, which together with an exemption to § 25.785(b), could be used to certify side facing divans.

“Justification

“The intent of Amendment 25-64 was to provide an improvement 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 the forward-facing seats. 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 May 6, 2005 and FAA Draft Issue Paper, “Dynamic Test Requirements for Side-facing Divan (Sofas)”, dated March 31, 2003, identify occupant protection criteria for side-facing seats certified by exemptions on transport category airplanes.

“Proposed Test Criteria

“The following proposed injury criteria and installation/testing guidelines represent the minimum acceptable standards as provided in the FAA draft issue paper March 31, 2003 for exemption from the general occupant injury criteria of § 25.785(b).

“1. Existing Criteria: All injury protection criteria of § 25.562(c)(1) through (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) with the adjacent seated ATD’s head, pelvis, torso, or shoulder area 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, 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, 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) Part 571.214, 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 the 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 tests(s) of a similar seat installation. Pelvic lateral acceleration must not exceed 130g. Pelvic acceleration data must be processed as defined in FMVSS (Federal Motor Vehicle Safety Standard), Part 571.214, section 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 protective padding (foam or equivalent) such as Ensolite.

“6. Shoulder Strap Loads: Where upper torso straps (shoulder straps) are used for the divan 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.

“Proposed General Test Guidelines

“1. All seat positions need to be occupied by ATDs for the longitudinal tests.

“2. 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 (e.g., an interior wall or furnishing) that does not have a homogeneous surface, an additional test(s) 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 (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, an 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 places.

“The test may be conducted with or without deformed floor.

“The test must be conducted with either no yaw or 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 § 25.562(b)(2).

“3. 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.

“Statement of Public Interest

“Because the certification requirements proposed above provide an adequate level of protection for the passengers seated in the divan during the minor crash landing conditions established in 14 CFR part 25, the granting of this exemption will allow the installation and use of the side facing divan while simultaneously providing sufficient passenger protection. Allowing the installation and use of more comfortable and useful cabin amenities while maintaining an adequate level of passenger protection is in the public interest.

“Denial of this petition would negatively impact the ability of the ERJ 190-100 ECJ to compete with other airplanes in the executive market that have side facing divans either because they have earlier certification bases or because their authority granted them an exemption similar to that being requested here. This would negatively impact American manufacturers involved in the production of the ERJ 190-100 ECJ because, while this airplane is not manufactured in its entirety in the United States, a significant portion of the aircraft, including the engines, avionics, and interiors are manufactured by American companies. Denial of this petition would result in the loss of revenue for the American suppliers and have an adverse impact on the American balance of trade, both of which are counter to public interest.

“Together, these factors satisfy the requirement of §§ 11.81(d) and (e).

“Justification to Bypass Notice of Exemption Petition in the Federal Register

“Because this exemption petition is identical in substance to several exemptions that have been issued in the past, granting of this proposed exemption would not raise new issues or set any legal precedent. Accordingly Embraer requests that the FAA not delay granting of this exemption for publication of the petition summary in the Federal Register, as allowed by § 11.87.

“Operation outside the United States

“As a manufacturer and not an operator, Embraer does not intend to operate outside the United States under the terms of the exemption for which we are requesting, but our operators will certainly fly ERJ 190-100 ECJ internationally. The granting of the petition will not conflict with any of the terms of ICAO Annex 8, so the FAA will not need to file a difference with ICAO, as described in § 11.83.

“Summary

“The granting of this petition, together with the demonstration of compliance to the certification criteria described above, will ensure that side facing divans installations in the Embraer ERJ 190-100 ECJ will provide adequate occupant protection and will provide benefits to the passenger, operator, and American economy.”

Public Comment

A summary of this petition was not published in the Federal Register. The nature of this exemption is effectively identical to those of previous petitions for which there were no public comments received.

The FAA’s analysis/summary is as follows:

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 and 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, the FAA has received a number of petitions for exemption from certain regulations. The FAA has granted such exemptions when it finds that to do so is in the public interest and does not adversely affect the level of safety provided by the regulations. In the future, the FAA intends to propose regulations governing transport category airplanes in private use, obviating the need for case-by-case review of individual petitions for exemption.

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 Embraer ERJ 190-100 ECJ airplanes. This conclusion does not justify granting exemptions once an acceptable method of compliance with § 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.

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, Embraer is hereby granted an exemption from 14 CFR § 25.785(b), Amendment 25-88. The petition is granted to the extent necessary to allow Embraer to install

multiple-place side-facing seats in the passenger compartment on Embraer ERJ 190-100 ECJ 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) Part 571.214, section S6.13.5. The 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 lateral acceleration must not exceed 130g. Pelvic acceleration data must be processed as defined in FMVSS Part 571.214, section 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 Side Impact Dummy 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 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 August 2, 2007.

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