U.S. Department
of Transportation

Federal Aviation Administration

Memorandum

Subject: INFORMATION: Policy statement on acceptable methods of compliance with § 25.562(c)(5) for front row passenger seats

Date: December 14, 2005

From: Manager, Transport Airplane Directorate, Aircraft Certification Service, ANM-100

Reply to Attn. of: ANM-115-05-14

To: See Distribution

Regulatory Reference: *§§ 25.562, 25.785* AC 25.562-1B

Summary

The purpose of this memorandum is to clarify Federal Aviation Administration (FAA) policy on the acceptable methods used to provide protection under Title 14 Code of Federal Regulations (CFR) *§25.562(a)* when meeting the standards in *§ 25.562(c)* for "front row" seats. The FAA has determined that this policy provides an acceptable means of protection for front row occupants.

Front row seats are those seats located directly aft of a partition, monument, or any other commodity certificated to 9g. The policy does not apply to seats such as the new airline first class and business class "pod seats" (also known as mini suites) that often have an ottoman or credenza as part of the design. We did not consider these pod seats when developing this policy.

We identify the regulations or requirements referred to in this policy in italics.

Current Regulatory and Advisory Material

Title 14 CFR 25.562(c) provides the performance standards and *§ 25.562(b)* provides test conditions required for compliance with *§ 25.562(a).* Advisory Circular (AC) 25.562-1B contains current policy on the head injury criterion (HIC) performance levels.

Title 14 CFR 25.785(b) also requires that *each seat, berth, safety belt, harness, and adjacent part of the airplane at each station designated 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.*

Title 14 CFR 121.311(j) also requires that *after October 27, 2009, no person may operate a transport category airplane type certificated after January 1, 1958 and manufactured on or after October 27, 2009, in passenger-carrying operations under this part unless all passenger and flight attendant seats on the airplane meet the requirements of § 25.562 in effect on or after June 16, 1988.*

Seats installed in airplanes with *§ 25.562* in their type certification bases or affected by *§ 121.311(j)* (from now on referred to as "dynamic seats") may be approved under a published version of Technical Standard Order (TSO) C-127 as a component. TSO approval, however, does not provide installation approval.

In 1996 the FAA released policy statement, PS-ANM100-1996-00128 (also referred to as TAD-96-02) to simplify the procedures for addressing row-to-row HIC. That memorandum became known as "HIC Lite."

In addition, the FAA issued policy memorandum ANM-03-115-28, dated October 2, 2003, titled "Policy Statement on Use of Surrogate Parts When Evaluating Seatbacks and Seatback Mounted Accessories for Compliance with *§§ 25.562(c)(5) and 25.785(b) and (d).*" You may use that policy to show compliance with blunt force trauma for items mounted on the seatback. Certification delays and destruction of several production accessories results in significant costs to manufacturers and customers. The FAA has determined that it is, in most cases, acceptable to use a surrogate test article for blunt trauma assessments. This has reduced the burden and simplified the certification process.

Relevant Past Practice

Historically, *§ 25.785* and the related guidance of AC 25-17 has protected each occupant from head injury. These define the striking radius of the head as a 35-inch arc measured from the intersection of the seat back and bottom cushions. This dimension is comparable to the seated height of the 50th percentile adult male, *Title 49 CFR Part 572, Subpart B,* Anthropomorphic Test Device (ATD). This method was an acceptable way to comply with *§ 25.785(d)(2).*

The "HIC Lite" policy noted above reduced the regulatory burden and simplified the procedure for showing compliance for row-to-row seats. That policy reduced the number of tests typically performed for repetitive row seats, and captured a range of seat pitch, placement and occupant seated heights (5th percentile adult female to 95th percentile adult male). We will include the HIC Lite policy in the pending Advisory Circular 25.562-1B.

Compliance for non row-to-row (front row) seats has involved the following methods of compliance. These methods will continue to be acceptable:

1. No Contact
2. Shoulder Harnesses
3. Inflatable Restraints
4. HIC Compliant Bulkhead
5. Head Path Reducing Features

Note: Incorporating design features such as shoulder harnesses or inflatable restraints or those that reduce the headpath is not enough to show compliance without dynamic testing. All the means above involve dynamic test(s).

Discussion

This policy supports the congressional mandate to streamline certification of dynamic seats. We published the proposed front row policy adopted in this document for public comment and received several comments. We addressed all of the comments received in the comment disposition document. Where appropriate, we have incorporated some of those comments in this final policy. For clarity, and to address public comments, we separate this policy statement into a Discussion section and a Methods of Compliance section related to front row dynamic seats. Also, we updated the current regulatory and advisory material section to reflect the recently published 14 CFR part 121 seat rule. We also added a clarification that a TSO approval is not an installation approval, and referenced a recently issued policy memo on the use of surrogate parts. The "Relevant Past Practice" section and this section now include background on range of occupants and head injury.

Historically, the requirement in *§ 25.562(a)* that the seat and restraint system protect "each occupant" has been addressed by showing compliance for a range of occupants. We have typically defined the range as covering the 5^{th} percentile adult female to the 95^{th} percentile adult male. However, § 25.562(b) has never required dynamic testing using an ATD representing a 5^{th} percentile adult female or a 95^{th} percentile adult male dummy, although both of these ATDs are available for testing. Rather, *§ 25.562(b)* specifies dynamic testing with an ATD that represents a 50^{th} percentile adult male. Defining "each occupant" as a range of the overall adult population was, and is, intended to simplify showing compliance to requirements that make reference to "each occupant." The FAA never intended to require a demonstration that every occupant in that seat position would be able to withstand a head impact equivalent to a HIC of 1000. We established this definition as policy soon after the adoption of *§ 25.562*. The FAA believed that this policy established a reasonable balance between the cost of compliance methods and their safety benefits.

We believe that we have maintained this balance for row-to-row HIC with our "HIC Lite" policy and do not plan to make changes to that policy.

The cost of compliance methods for front row seats has been and continues to be significantly higher when compared to row-to-row seats. Because there are few front row seats when compared to row-to-row seats, there is a significantly higher cost associated with certification of front row seats on a per-seat basis. An operator could elect to show compliance by increasing the seat setback to accommodate the 95th percentile adult male which eliminates a row of seats, but this approach would increase the cost per seat-mile for airline operators. Alternatively, to prevent the loss of a row of seats, the headpaths of the occupants of the front row seats could be reduced to fit within the smaller setback distance, but this also increases design costs. The economic evaluation in the recently published § *121.311* rule confirms this assessment of front row cost.

Therefore, the FAA no longer believes that an appropriate balance has been achieved between the cost of compliance methods and their safety benefits for front row seats.

Policy

To bring the costs of HIC compliance methods for front row seats into balance with their safety benefits, this policy limits the range of occupant evaluation for HIC to that strictly covered by the test in *§ 25.562(b).* Using risk management principles, the unequal effort resulting in high costs for a small percentage of seats is not justified. This policy should streamline the front row seat certification process and reduce costs, and help to prevent the loss of a row of seats from particular cabin arrangements. We made this policy decision in concert with the recently published § *121.311* rule which will increase the occupant safety level across the newly manufactured operating fleet.

Methods of Compliance

Any of these methods is an acceptable means to show HIC protection for occupants in front row seats and show compliance with *§ 25.562(c)(5):*

- Perform dynamic testing as prescribed in *§ 25.562(b)* with solid head contact (i.e., not a slight scraping of the ATD head on the monument) occurring and show the HIC does not exceed 1,000 units. In this case, we would not require more substantiation.

- Perform a dynamic test to determine the head path arc of the *Title 49 CFR Part 572, Subpart B* ATD, or equivalent, and install the seat so that no contact by the ATD head would occur. In this case, we would not require more analyses or repositioning of the seat.

- For seats typically identified as "economy" class seats during air carrier operations, place the seats 42 inches or more from the potential contact point. For all other "front row" seats (e.g., first or business class) the setback distance must be 45 inches or more. You do not need a dynamic test for HIC or head path arc for seats which follow a design philosophy that includes the use of metallic components in the primary load path from the seat beams through the seat legs. This distance is measured from the seat reference point to the vertical plane at the aft most potential contact point. Advisory Circular 25-17 defines the seat reference point.

Neither this policy, nor the regulation on which this policy is based, defines a means to evaluate a specific level of HIC protection for occupants greater in stature than the Hybrid II 50th percentile adult male ATD. In addition, this policy does not address compliance with *§ 25.785.* We address the means to comply with *§ 25.785* in Policy Statement No. ANM-03-115-31 on Conducting Component Level Tests to Demonstrate Compliance with *§ 25.785(b) and (d).* As noted previously, the five methods listed in the "Relevant Past Practice" section will also continue to be acceptable methods of compliance for *§ 25.562(c)(5).*

Effect of Policy

The general policy stated in this document does not constitute a new regulation. The FAA individual that implements policy should follow this policy when applicable to the

specific project. Whenever a proposed method of compliance is outside this policy, that individual must coordinate it with Transport Standards Staff. This coordination should involve the project officer and technical specialists of both the Aircraft Certification Office and the Transport Standards Staff. Use an issue paper to document alternate methods of compliance outside this policy. If the Aircraft Certification Office becomes aware of reasons that an applicant's proposal should not be approved, the office must coordinate its response with the Transport Standards Staff.

Applicants should expect the certificating officials will consider this information when making findings of compliance relevant to new certificate actions. Also, as with all advisory material, this statement of policy identifies one means, but not the only means, of compliance.

Implementation

You should apply the compliance methods discussed in this policy to type certificate, amended type certificate, supplemental type certificate, and amended supplemental type certification programs whose application date is on or after the date the policy is finalized. For the certification programs whose date of application precedes the date this policy is effective and the methods of compliance have already been coordinated with and approved by the FAA or their designee, the applicant may continue to follow the previously acceptable methods of compliance or choose to follow the guidance contained in this policy.

/s/

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