Exemption No. 10743

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

In the matter of the petition of Learjet Incorporated for an exemption from § 25.562(a) and 25.785(b) of Title 14, Code of Federal Regulations	**Regulatory Docket No. FAA-2013-0028**

GRANT OF EXEMPTION

By letter dated December 28, 2013, Mr. Robert Cahn, Director of Certification and Regulatory Compliance, Learjet Inc., One Lear Way, Wichita, KS 67209-2942 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- and single-place side-facing seats in the passenger compartment on Learjet Model LJ-200-1A10 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:

This section quotes the relevant information from the petitioner's request, with minor edits for clarity. Their complete petition is available at the Department of Transportation's Federal Docket Management System, on the Internet at http://regulations.gov, in Docket No. FAA-2013-0028.

Learjet requests relief from the following regulation:

In accordance with 14 CFR Part 11, Learjet Inc. submits this petition for exemption from 14 CFR Part 25, Sections 25.562(a) Amendment 25-64 and 25.785(b) Amendment 25-88, for the installation of a single and multiple occupant side facing seat on the Learjet Model LJ-200-1A10. Learjet proposes to certify these side facing seats to the applicable requirements of 14 CFR Part 25, Section 25.562 including the additional requirements contained in FAA Policy ANM-03-115-30, Side-facing Seats on Transport Category Airplanes. This was the current policy at the time Learjet made application for their new Type Certificate. However, Learjet recognizes that the FAA has developed a new set of performance standards. These new standards are intended to provide a level of safety to those passengers occupying side facing seats equal to the level of safety provided to passengers occupying forward and aft-facing seats. Recognizing the importance of safety, Learjet proposes to include "state of the art" design features that will produce a level of safety equal to that of the new injury criteria outlined in FAA Policy PS-ANM25-03-R1, Technical Criteria for Approving Side-Facing Seats. Since the LJ-200 aircraft is expected to be operated under both Part 91 and Part 135, Learjet requests that this exemption be granted without any limitations.

The request is supported by the following information:

On January 11, 2008, Learjet submitted an application for a new Type Certificate for the LJ-200-1A10 aircraft (ref. Learjet letter L706-01-08-013). Later in the year on May 23, 2008, Learjet submitted the Project Specific Certification Plan (PSCP) and Conformity Plan for the new aircraft (ref. Learjet letter L706-05-08-273). After various discussions with the FAA over the next year, Learjet submitted a new application on February 9, 2009 (ref. Learjet Letter L706-02-09-062). This new application set the certification basis for the new aircraft at 14 CFR Part 25 as amended thru 25-127 along with applicable Orders, Policies, and Advisory Circulars.

On June 8, 2012, FAA Policy PS-ANM-25-03 titled Technical Criteria for Approving Side-Facing Seats was released. On November 5, 2012, the policy was revised (ref. PS-ANM-25-03-R1) to clarify some of the wording in positioning of the Anthropomorphic Test Dummy (ATD). This policy provides a new set of performance standards for compliance to 14 CFR Part 25, Sections 25.562 and 25.785(b) for the installation of single and multiple-occupant side-facing seats. Contained within the new policy are compliance methods that should be applied to new seat certification programs on type-certificate, amended type-certificate, supplemental type-certificate, and amended supplemental type-certificate programs that are not covered by existing exemptions for multiple-place side-facing seats and/or special conditions for a single-place side-facing seat. These compliance methods apply to those seat certification programs with an

approval date that is on or after the effective date of the policy. The policy states, “If the date of application for a project precedes the effective date of the final policy, then the applicant is expected to follow the ‘in-work’ section.” The in-work section provides two options; either follow the criteria contained in the policy or petition for an exemption. Learjet contends that the performance standards contained in this new policy should not be applicable as this policy was released over three years after application was made for the new Type Certificate. Learjet believes that the performance standards contained in FAA Policy ANM-03-115-30, which was the current policy at the time of application, should be applied to the LJ-200-1A10 aircraft.

As the FAA is aware, many of the performance standards contained in FAA Policy ANM-03-11-530 have been in effect since 1997. These performance standards have provided an acceptable level of safety for fifteen (15) years. However, Learjet recognizes that the FAA has been doing research since 2002 regarding neck injuries in side facing seats in order to develop neck injury criteria and injury tolerance levels. As part of that research, a battery of tests was conducted with a combination of Post Mortem Human Subjects (PMHS) and a Euro Side Impact Dummy (SID). The results revealed that there is a substantial risk for serious neck injuries under realistic crash load conditions. It was also discovered that there were other injuries that could compromise the escape capabilities of the aircraft occupants, e.g., unconsciousness by head angular acceleration, immobitization by fractures to the upper leg, multiple rib fractures from belt loading, or carotid artery tears, which can lead to a fatal stroke months after an accident. The results of this research were documented in DOT/FAA/AM-07/13, Assessment of Injury Potential in Aircraft Side-Facing Seats Using the ES-2 Anthropomorphic Test Dummy and DOT/FAA/AR-09/41, Neck Injury Criteria for Side-Facing Aircraft Seats. Recognizing the importance of occupant protection, Learjet proposes to include “state of the art” design features that will provide a level of safety equal to that of the injury criteria outlined in FAA Policy PSANM-25-03-R1.

Learjet intends to certify two side facing seating arrangements on the LJ-200 aircraft; one three place divan and one belted toilet. The three place divan will consist of three individual seats that are approximately twenty-six inches in width. Each seat will be equipped with a lap belt and shoulder harness, back and bottom cushions, and a storage compartment. The restraint system will be TSO C114 approved. The back and bottom cushions will consist of various densities of DAX foam. Installed on the forward and aft sides of the complete assembly will be an end cabinet. These end cabinets are expected to be structurally attached to the seat frames. Each seat frame will be structurally attached to the aircraft seat tracks at left buttock line 11.12 and 23.12 respectively. This seating arrangement will be installed approximately two and a half inches aft of a forward facing seat. Each position of the side facing divan is expected to be occupied for taxi, take-off, and landing. In order to provide a level of safety equivalent to FAA Policy PS-ANM-25-03-R1, Learjet proposes to include an airbag system in the shoulder harnesses for each of the occupants. This airbag system will be shown to comply with the requirements outlined in the FAA Policy PS-ANM-25-03-R1 (Attachment 1, Items 3 through 16). Learjet also proposes to provide a means to restrict the axial rotation of the upper leg of the most forward occupant. The other two occupants of the divan are expected to “load align’ such that the legs should kick out in a normal manner as if they were facing

forward. Learjet believes that these additional safety features will provide a level of safety equal to that of the injury criteria contained in FAA Policy PS-ANM-25-03-R1. Therefore, Learjet proposes to certify the three place divan to the applicable requirements of 14 CFR Part 25, Section 25.562. In addition, Learjet proposes to include the performance standards outlined in FAA Policy ANM-03-115-30 along with the requirements in FAA Policy PS-ANM-25-03-R1, Attachment 1, Items 3 through 16 for seats with an airbag system in the shoulder belts.

For the belted toilet installation, Learjet believes that the performance standards in FAA Policy ANM-03-115-30 provide a level of safety equivalent to that of the performance standards outlined in FAA Policy PS-ANM-25-03-R1. This belief takes into consideration the design features of the LJ-200 belted toilet arrangement. The belted toilet arrangement will consist of a toilet enclosure with back and bottom cushions, a lap belt, a full length partition approximately 10 inches forward of the seated occupant, and a full length contact pad. The combination of the lap belt and full length partition with contact pad are considered to be the restraint system for the occupant. The toilet enclosure will be manufactured from composite panels and designed to fully encapsulate the toilet. The enclosure will be secured to both the partition and the aft bulkhead using inserts and fasteners. The enclosure will also be structurally attached to the aircraft seat tracks at two locations. The bottom cushion will be approximately one inch thick and secured with Velcro to the lid of the enclosure. The back cushion will be approximately 2 inches thick and secured with Velcro to the Type III emergency exit. The lap belt will be TSO C22g approved and structurally attached to the aircraft fuselage. The partition along with the contact pad will be designed with energy absorbing features providing adequate protection for a full range of occupants' head, thoracic, and pelvic areas. The design features of the LJ-200 belted toilet arrangement are intended to be similar to the design features of the belted toilet on the Model 45.

Learjet recently received an exemption for the installation of a single side facing seat on the Model 45 (reference Exemption No. 10634). The performance standards outlined in the exemption are very similar to the performance standards in FAA Policy ANM-03-115-30 with one exception. The exemption includes an additional requirement consisting of preventing the lower limbs from flailing. In the absence of a means to prevent the lower limbs from flailing, the torsion in the femur must not exceed 1200 in-lbs. This additional requirement was included in a facsimile from Jeff Gardlin, Transport [Airplane] Directorate, to Dale Bleakney, Wichita ACO, back in March of 1997. The intent of the facsimile was to provide Learjet with a set of performance standards to certify the first side facing seat on the Model 45. This facsimile was used as the basis for certifying the first side facing seat on the Model 45 along with various changes to the side facing seat until last year when Learjet made application on November 7, 2011 for an Interior Upgrade.

In the initial design of the Model 45 side facing seat back in 1997, Learjet included a means to restrict the lower limbs from flailing. However, during the initial testing, it was shown that there was no unnatural leg flail therefore the retention device was removed. Since then, the seating arrangement has been dynamically tested three (3) more times due to a few design changes and the addition of new cabinet vendors. The results of those

tests with respect to occupant protection have been very similar. Each of the test results continued to show that there was no need for a retention device to restrict the lower limbs from flailing.

As indicated earlier, the performance standards in FAA Policy PS-ANM-25-03-R1 are partially based on the test results documented in DOT/FAA/AM-07/13, Assessment of Injury Potential in Aircraft Side-Facing Seats Using the ES-2 ATD. Over the last eight (8) years, biomechanical research has resulted in a better understanding of how to quantify the injury risks associated with side impacts in automobiles. These findings were then used to develop advanced test dummies and associated injury criteria. In 2004, the National Highway Traffic Safety Administration (NHTSA) issued a Notice of Proposed Rulemaking (NPRM NHTSA-2004-17694) to use a 50th percentile male-size ES-2re ATD and its associated injury criteria to assess new car safety. The ES-2re, a modified version of the European ES-2 side impact dummy (SID), has improved biofidelity and enhanced injury assessment capability compared to all other mid-size adult male dummies used today. To support the FAA policy making activities, testing was conducted by the FAA Civil Aerospace Medical Institute (CAMI) using the ES-2re ATD to evaluate the injury risks presented by a typical side-facing seating arrangement. The results of those tests are documented in the report mentioned above.

In test report DOT/FAA/AM-07/13, there is a section that summarizes the greatest risk for injury in the following seating configurations; Center, Close Wall, Far Wall, and Armrest. In Table 10 of the noted report, there doesn’t appear to be a risk for serious injury in the “Close Wall” seating configuration. The Close Wall seating configuration consisted of positioning the ATD’s centerline 10 inches from the wall. Since Learjet proposes to include a side-facing seating arrangement similar to the "Close Wall" configuration, the potential for serious injury should be negligible. Learjet recognizes that the ES-2re provides enhanced injury assessment capability compared to other side impact dummies. However in a close wall configuration, the use of the standard SID as required in FAA Policy ANM-03-115-30 should produce results similar to using an ES-2re. Therefore, Learjet proposes to certify the belted toilet arrangement to the applicable requirements of 14 CFR Part 25, Section 25.562 including the performance standards outlined in FAA Policy ANM-03-115-30.

The combination of these safety features should provide an equivalent level of safety for occupants seated in the side facing divan or belted toilet as if they were certified to the requirements outlined in FAA Policy PS-ANM-25-03-R1.

Public Interest:

Granting this petition for exemption would clearly be in the public interest. Considering the design features that Learjet is proposing for both the three place divan and belted toilet, the level of safety will be equal to that of the injury criteria in the current FAA policy PS-ANM-25-030-R1.

Learjet Inc. has been manufacturing executive business aircraft for a wide variety of customers, worldwide for more than forty-seven (47) years. The owners and operators of these business aircraft very often prefer to configure their aircraft interiors to facilitate

use of interior space for in-flight conferences and other work not normally accomplished aboard airline aircraft. Many of these interior configurations include side facing seating installations. In order to satisfy the customer demands and maintain its marketing competitiveness, Learjet is seeking to accommodate side-facing seating installations in its business aircraft. Doing this without compromising safety, can only increase the sales volume of these aircraft, benefiting Learjet, its employees and the local and national economies they support.

There are a number of other petitioners that have been granted similar exemptions or Special Conditions with the same injury criteria. These petitioners include, but are not limited to Gulfstream Aerospace (Exemption Nos. 9761, 9900; Special Condition Nos. 25-428-SC, 25-294-SC), Cessna Aircraft Company (Exemption No. 7625A), Raytheon Aircraft Company (Exemption No. 7512A; Special Condition No. 25-279-SC), and Gore Design Completions, Ltd. (Exemption No. 10339). These exemptions create an unfair disadvantage for Learjet, should Learjet be denied this petition.

Granting this request for exemption to Learjet is in the public interest as business aircraft reduce business travel time, reduce flight time, and allow for greater productivity by allowing executives to take their business to the customer. It also allows the executives to make commitments to varied locations on short schedules. Failure to grant the exemption will result in a significant loss of income for both Learjet and its potential customers; [and] loss of domestic and foreign trade for the U.S. which leads to loss of employment and slower economic growth.

Effect on Safety:

Learjet believes that the proposed design features for both the three place divan and belted toilet will provide a level of safety equal to the injury criteria outlined in FAA Policy PS-ANM-25-03-R1. Learjet and its parent company Bombardier Aerospace have thousands of aircraft in service that are equipped with single and multiple occupant side facing seats. Learjet and Bombardier have no record of any safety incidents related to the installation of these seating arrangements. Learjet contends that with the installation of shoulder harnesses equipped with an airbag system along with restricting the axial rotation of the upper leg, the three place divan should provide the level of safety for all three occupants as if they were seated in a forward or aft facing seat. In addition, Learjet believes that the design features of the belted toilet which will be similar to the Model 45 and to the “Close Wall” arrangement discussed in DOT/FAA/AM-07/13 will provide that same level of safety as originally intended by the rule.

Operation Outside of the United States:

In accordance with 14 CFR 11.81(h), Learjet requests consideration be given to extending this exemption for operation outside of the United States. Learjet aircraft are routinely registered and operated outside of the United States. 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. Learjet believes that

limiting this exemption to use within the U.S. would put unfair restrictions on the continued marketability of this aircraft.

Conclusion

Based on the above information, Learjet Inc. believes that granting this exemption would be in the public interest and would not adversely affect safety of the passenger traveling aboard the Learjet Model LJ-200-1A10.

Federal Register publication

The FAA has determined that good cause exists for waiving the requirement for Federal Register publication because the request is identical in all material respects to previously granted exemptions, and the exemption, if granted, would not set a precedent.

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.

Amendment 25-64 to 14 CFR part 25 was issued June 16, 1988, to revise the emergency-landing conditions that must be considered in the design of an airplane. Amendment 25-64 revised the static-load conditions in § 25.561, and added a new § 25.562 that required dynamic testing of all seats approved for occupancy during takeoff and landing. The intent of Amendment 25-64 was to provide an improved level of safety for occupants on transport-category airplanes. Because most seating is forward/aft facing on transport-category airplanes, the pass/fail criteria developed in Amendment 25-64 focused primarily on these seats. Side-facing seat installations were not adequately taken into account for transport-category airplanes when this amendment was issued. Therefore, in November of 1997, the FAA issued Memorandum "Side-Facing Seats on Transport Category Airplanes" and draft Issue Paper "Dynamic Test Requirements for Single Place Side-Facing Seats" to address the dynamic certification of side-facing seats. The memorandum and the issue paper introduced requirements for Thoracic Trauma Index (TTI) and lateral pelvic acceleration, which were in addition to the existing injury criteria requirements of § 25.562(c). The specified conditions are required to be measured and demonstrated during dynamic testing of the side-facing seats, and in compliance with the limitations.

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 conducted research to develop an acceptable method of compliance with § 25.785(b) for multiple-place side-facing seat installations and had published policy statement PS-ANM-25-03, dated June 8, 2012. Based on the past history of this particular case and the application date for this specific project, the FAA finds that it is in the public interest to grant an exemption to the petitioner for Learjet LJ-200-1A10 airplanes.

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, Learjet Inc. is hereby granted an exemption from 14 CFR 25.562(a) at Amendment 25-64 and 25.785(b) at Amendment 25-72. The petition is granted to the extent necessary to allow Learjet to install multiple- and single-place side-facing seats in the passenger compartment on Learjet LJ-200-1A10 airplanes. This exemption is subject to the following conditions:

1) Dynamic Test Requirements for Multiple- and Single-occupant Side-facing Seats

In addition to the airworthiness standards in §§ 25.562 and 25.785, the following limitations provide injury criteria and installation/testing guidelines that represent the minimum acceptable airworthiness standard for multiple- and single-occupant side-facing seats:

2) The Injury Criteria

a. 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.

b. 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.

c. 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 Standards, 49 CFR 571.214 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.

d. 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 49 CFR 571.214 S6.13.5.

e. 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®.

f. 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.

g. 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.

3) General Test Guidelines

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 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 (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.

d. Existing Criteria: All injury-protection criteria of § 25.562(c)(1) through (c)(6) apply to the occupant of a side-facing seat. The HIC assessments are only required for head contact with the seat and/or adjacent structures.

e. Body-to-Wall/Furnishing Contact: The seat must be installed aft of a structure, such as an interior wall or furnishing, that will support the pelvis, upper arm, chest, and head of an occupant seated next to the structure. 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 this structure be covered with at least two inches of energy-absorbing protective padding (foam or equivalent) such as Ensolite.

f. Thoracic Trauma: TTI injury criterion must be substantiated by dynamic test or by rational analysis based on previous test(s) of a similar seat installation. Testing must be conducted with a Side Impact Dummy (SID) Anthropomorphic Test Device (ATD), as defined by 49 CFR part 572, subpart F, or its equivalent. TTI 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 Standards, 49 CFR 571.214 S6.13.5.

g. Pelvis: Lateral pelvic acceleration must be shown by dynamic test or by rational analysis, based on previous test(s) of a similar seat installation, to not exceed 130g. Pelvic-acceleration data must be processed as defined in § 571.214 S6.13.5.

h. Shoulder-Strap Loads: Where upper-torso straps (shoulder straps) are used for 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.

i. Lower limbs: The lower limbs should be prevented from flailing. In the absence of a means to prevent the lower limbs from flailing, the torsion in the femur must not exceed 1200 in-lbs.

4) General Test Guidelines

a. One longitudinal test with the SID ATD or its equivalent, undeformed floor, no yaw, and with all lateral structural supports (armrests/walls). Pass/fail injury assessments: TTI and pelvic acceleration.

b. One longitudinal test with the Hybrid II ATD, deformed floor, with 10 degrees yaw, and with all lateral structural supports (armrests/walls). Pass/fail injury assessments: HIC; and upper-torso-restraint load, restraint-system retention, and pelvic acceleration.

c. A vertical (14g) test is to be conducted with modified Hybrid II ATDs with existing pass/fail criteria.

Issued in Renton Washington, on April 5, 2013.

/s/ Ali Bahrami

Ali Bahrami
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Aircraft Certification Service