

Signed at Washington, DC, on June 10, 2011.

Ralph Otto,

Deputy Director, Food and Community Resources, National Institute of Food and Agriculture.

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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No. NM458; Special Conditions No. 25-431-SC]

Special Conditions: Boeing Model 787 Series Airplanes; Seats With Inflatable Lapbelts

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final special conditions; request for comments.

SUMMARY: These special conditions are issued for the Boeing Model 787 series airplane. These airplanes will have a novel or unusual design feature(s) associated with seats with inflatable lapbelts. The applicable airworthiness regulations do not contain adequate or appropriate safety standards for this design feature. These special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

DATES: The effective date of these special conditions is June 13, 2011. We must receive your comments by July 18, 2011.

ADDRESSES: You must mail two copies of your comments to: Federal Aviation Administration, Transport Airplane Directorate, Attn: Rules Docket (ANM-113), Docket No. NM458, 1601 Lind Avenue, SW., Renton, Washington 98057-3356. You may deliver two copies to the Transport Airplane Directorate at the above address. You must mark your comments: Docket No. NM458. You can inspect comments in the Rules Docket weekdays, except Federal holidays, between 7:30 a.m. and 4 p.m.

FOR FURTHER INFORMATION CONTACT: Jeff Gardlin, FAA, Airframe and Cabin Safety Branch, ANM-115, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue, SW., Renton, Washington 98057-3356; telephone (425) 227-2136; facsimile (425) 227-1149.

SUPPLEMENTARY INFORMATION: The FAA has determined that notice of, and

opportunity for prior public comment on, these special conditions, are impracticable because these procedures would significantly delay issuance of the design approval and thus delivery of the affected aircraft. In addition, the substance of these special conditions has been subject to the public comment process in several prior instances with no substantive comments received. The FAA therefore finds that good cause exists for making these special conditions effective upon issuance.

Comments Invited

We invite interested people to take part in this rulemaking by sending written comments, data, or views. The most helpful comments reference a specific portion of the special conditions, explain the reason for any recommended change, and include supporting data. We ask that you send us two copies of written comments.

We will file in the docket all comments we receive, as well as a report summarizing each substantive public contact with FAA personnel about these special conditions. You can inspect the docket before and after the comment closing date. If you wish to review the docket in person, go to the address in the **ADDRESSES** section of this preamble between 7:30 a.m. and 4 p.m., Monday through Friday, except Federal holidays.

We will consider all comments we receive by the closing date for comments. We may change these special conditions based on the comments we receive.

If you want us to acknowledge receipt of your comments on these special conditions, include with your comments a self-addressed, stamped postcard on which you have written the docket number. We will stamp the date on the postcard and mail it back to you.

Background

On March 28, 2003, Boeing Commercial Airplanes applied for an FAA type certificate for its new Model 787 series airplane (hereafter referred to as "787"). Boeing later applied for, and was granted, an extension of time for the type certificate, which changed the effective application date to October 1, 2006. The 787 will be an all-new, twin-engine jet transport airplane with a two-aisle cabin. The maximum takeoff weight will be 476,000 pounds, with a maximum passenger count of 381. These airplanes will have a novel or unusual design feature associated with seats with inflatable lapbelts. The inflatable lapbelt is designed to limit occupant forward excursion in the event of an accident. This will reduce the

potential for head injury, thereby reducing the Head Injury Criteria (HIC) measurement. The inflatable lapbelt behaves similarly to an automotive airbag, but in this case the airbag is integrated into the lapbelt, and inflates away from the seated occupant. While airbags are now standard in the automotive industry, the use of an inflatable lapbelt is novel for commercial aviation.

Title 14, Code of Federal Regulations (14 CFR) 25.785 requires that occupants be protected from head injury by either the elimination of any injurious object within the striking radius of the head, or by padding. Traditionally, this has required a set back of 35 inches from any bulkhead or other rigid interior feature or, where not practical, specified types of padding. The relative effectiveness of these means of injury protection was not quantified. With the adoption of Amendment 25-64 to part 25, specifically § 25.562, a new standard that quantifies required head injury protection was created.

Section 25.562 specifies that each seat type design approved for crew or passenger occupancy during takeoff and landing must successfully complete dynamic tests or be shown to be compliant by rational analysis based on dynamic tests of a similar type seat. In particular, the regulations require that persons not suffer serious head injury under the conditions specified in the tests, and that protection must be provided or the seat be designed so that the head impact does not exceed a HIC of 1000 units. While the test conditions described for HIC are detailed and specific, it is the intent of the requirement that an adequate level of head injury protection be provided for passengers in a severe crash.

Because §§ 25.562 and 25.785 and associated guidance do not adequately address seats with inflatable lapbelts, the FAA recognizes that appropriate pass/fail criteria need to be developed that do fully address the safety concerns specific to occupants of these seats.

The inflatable lapbelt has two potential advantages over other means of head impact protection. First, it can provide significantly greater protection than would be expected with energy-absorbing pads, and second, it can provide essentially equivalent protection for occupants of all stature. These are significant advantages from a safety standpoint, since such devices will likely provide a level of safety that exceeds the minimum standards of the Federal aviation regulations. Conversely, inflatable lapbelts in general are active systems and must be relied upon to activate properly when

needed, as opposed to an energy-absorbing pad or upper torso restraint that is passive, and always available. Therefore, the potential advantages must be balanced against this and other potential disadvantages in order to develop standards for this design feature.

The FAA has considered the installation of inflatable lapbelts to have two primary safety concerns: First, that they perform properly under foreseeable operating conditions, and second, that they do not perform in a manner or at such times as would constitute a hazard to the airplane or occupants. This latter point has the potential to be the more rigorous of the requirements, owing to the active nature of the system.

The inflatable lap belt will rely on electronic sensors for signaling and a stored gas canister for inflation. These same devices could be susceptible to inadvertent activation, causing deployment in a potentially unsafe manner. The consequences of inadvertent deployment as well as failure to deploy must be considered in establishing the reliability of the system. Boeing must substantiate that the effects of an inadvertent deployment in flight either would not cause injuries to occupants or that such deployment(s) meet the requirement of § 25.1309(b). The effect of an inadvertent deployment on a passenger or crewmember that might be positioned close to the inflatable lapbelt should also be considered. The person could be either standing or sitting. A minimum reliability level will have to be established for this case, depending upon the consequences, even if the effect on the airplane is negligible.

The potential for an inadvertent deployment could be increased as a result of conditions in service. The installation must take into account wear and tear so that the likelihood of an inadvertent deployment is not increased to an unacceptable level. In this context, an appropriate inspection interval and self-test capability are considered necessary. Other outside influences are lightning and high intensity radiated fields (HIRF). Existing regulations regarding lightning, § 25.1316, and existing HIRF special conditions for the 787-8 airplane, 25-354-SC, are applicable. Finally, the inflatable lapbelt installation should be protected from the effects of fire, so that an additional hazard is not created by, for example, a rupture of the pyrotechnic squib.

In order to be an effective safety system, the inflatable lapbelt must function properly and must not introduce any additional hazards to occupants as a result of its functioning.

There are several areas where the inflatable lapbelt differs from traditional occupant protection systems, and requires special conditions to ensure adequate performance.

Because the inflatable lapbelt is essentially a single use device, there is the potential that it could deploy under crash conditions that are not sufficiently severe as to require head injury protection from the inflatable lapbelt. Since an actual crash is frequently composed of a series of impacts before the airplane comes to rest, this could render the inflatable lapbelt useless if a larger impact follows the initial impact. This situation does not exist with energy absorbing pads or upper torso restraints, which tend to provide continuous protection regardless of severity or number of impacts in a crash event. Therefore, the inflatable lapbelt installation should provide protection when it is required, by not expending its protection during a less severe impact. Also, it is possible to have several large impact events during the course of a crash, but there is no requirement for the inflatable lapbelt to provide protection for multiple impacts.

Since each occupant's restraint system provides protection for that occupant only, the installation must address seats that are unoccupied. It will be necessary to show that the required protection is provided for each occupant regardless of the number of occupied seats, and considering that unoccupied seats may have lapbelts that are active.

The inflatable lap belt should be effective for a wide range of occupants. The FAA has historically considered the range from the fifth percentile female to the ninety-fifth percentile male as the range of occupants that must be taken into account. In this case, the FAA is proposing consideration of a broader range of occupants, due to the nature of the lapbelt installation and its close proximity to the occupant. In a similar vein, these persons could have assumed the brace position, for those accidents where an impact is anticipated. Test data indicate that occupants in the brace position do not require supplemental protection, and so it would not be necessary to show that the inflatable lapbelt will enhance the brace position. However, the inflatable lapbelt must not introduce a hazard in that case when deploying into the seated, braced occupant.

Another area of concern is the use of seats, so equipped, by children whether lap-held, in approved child safety seats, or occupying the seat directly. Although specifically prohibited by the FAA operating regulations, the use of the

supplementary loop belt ("belly belt") may be required by other civil aviation authorities, and should also be considered with the end goal of meeting those regulations. Similarly, if the seat is occupied by a pregnant woman, the installation needs to address such usage, either by demonstrating that it will function properly, or by adding appropriate limitation on usage.

Since the inflatable lapbelt will be electrically powered, there is the possibility that the system could fail due to a separation in the fuselage. Since this system is intended as crash/post-crash protection means, failure to deploy due to fuselage separation is not acceptable. As with emergency lighting, the system should function properly if such a separation occurs at any point in the fuselage.

Since the inflatable lapbelt is likely to have a large volume displacement, the inflated bag could potentially impede egress of passengers. Since the bag deflates to absorb energy, it is likely that an inflatable lapbelt would be deflated at the time that persons would be trying to leave their seats. Nonetheless, it is considered appropriate to specify a time interval after which the inflatable lapbelt may not impede rapid egress. Ten seconds has been chosen as a reasonable time since this corresponds to the maximum time allowed for an exit to be openable (§ 25.809). In actuality, it is unlikely that an exit would be prepared by a flight attendant this quickly in an accident severe enough to warrant deployment of the inflatable lapbelt, and the inflatable lapbelt is expected to deflate much quicker than ten seconds.

In addition, during the development of the inflatable lap belt the manufacturer was unable to develop a fabric that would meet the inflation requirements for the bag and the flammability requirements of part I(a)(1)(ii) of appendix F to part 25. The fabrics that were developed that meet the flammability requirement did not produce acceptable deployment characteristics. However, the manufacturer was able to develop a fabric that meets the less stringent flammability requirements of part I(a)(1)(iv) of appendix F to part 25 and has acceptable deployment characteristics.

Part I of appendix F to part 25 specifies the flammability requirements for interior materials and components. There is no reference to inflatable restraint systems in Appendix F, because such devices did not exist at the time the flammability requirements were written. The existing requirements are based on both material types, as well

as use, and have been specified in light of the state-of-the-art of materials available to perform a given function. In the absence of a specific reference, the default requirement would be for the type of material used to construct the inflatable restraint, which is a fabric in this case. However, in writing a special condition, the FAA must also consider the use of the material, and whether the default requirement is appropriate. In this case, the specialized function of the inflatable restraint means that highly specialized materials are needed. The standard normally applied to fabrics is a 12-second vertical ignition test. However, materials that meet this standard do not perform adequately as inflatable restraints. Since the safety benefit of the inflatable restraint is very significant, the flammability standard appropriate for these devices should not screen out suitable materials, thereby effectively eliminating use of inflatable restraints. The FAA will need to establish a balance between the safety benefit of the inflatable restraint and its flammability performance. At this time, the 2.5-inch per minute horizontal test is considered to provide that balance. As the state-of-the-art in materials progresses (which is expected), the FAA may change this standard in subsequent special conditions to account for improved materials.

Finally, it should be noted that the special conditions are applicable to the inflatable lapbelt system as installed. The special conditions are not an installation approval. Therefore, while the special conditions relate to each such system installed, the overall installation approval is a separate finding, and must consider the combined effects of all such systems installed.

Type Certification Basis

Under the provisions of 14 CFR 21.17, Boeing Commercial Airplanes must show that the 787 series airplanes meet the applicable provisions of part 25, as amended by Amendments 25–1 through 25–120, 25–124, 25–125, and 25–128 with the following exceptions: § 25.1301 remains at Amendment 25–119 for cargo fire protection systems.

If the Administrator finds that the applicable airworthiness regulations (i.e., part 25) do not contain adequate or appropriate safety standards for the 787 series airplanes because of a novel or unusual design feature, special conditions are prescribed under the provisions of § 21.16.

Special conditions are initially applicable to the model for which they are issued. Should the type certificate for that model be amended later to

include any other model that incorporates the same novel or unusual design feature, the special conditions would also apply to the other model.

In addition to the applicable airworthiness regulations and special conditions, the 787 series airplanes must comply with the fuel vent and exhaust emission requirements of 14 CFR part 34 and the noise certification requirements of 14 CFR part 36; and the FAA must issue a finding of regulatory adequacy under § 611 of Public Law 92–574, the “Noise Control Act of 1972.”

The FAA issues special conditions, as defined in 14 CFR 11.19, in accordance with § 11.38, and they become part of the type certification basis under § 21.17(a)(2).

Novel or Unusual Design Features

The 787 series airplanes will incorporate the following novel or unusual design features: Boeing Commercial Airplanes is proposing to install an inflatable lapbelt on certain seats of 787 series airplanes, in order to reduce the potential for head injury in the event of an accident. The inflatable lapbelt works similar to an automotive airbag, except that the airbag is integrated with the lap belt of the restraint system.

The CFR states the performance criteria for head injury protection in objective terms. However, none of these criteria are adequate to address the specific issues raised concerning seats with inflatable lapbelts. The FAA has therefore determined that, in addition to the requirements of part 25, special conditions are needed to address requirements particular to installation of seats with inflatable lapbelts.

Accordingly, in addition to the passenger injury criteria specified in § 25.785, these special conditions are adopted for the 787 series airplanes equipped with inflatable lapbelts. Other conditions may be developed, as needed, based on further FAA review and discussions with the manufacturer and civil aviation authorities.

Discussion

From the standpoint of a passenger safety system, the inflatable lapbelt is unique in that it is both an active and entirely autonomous device. While the automotive industry has good experience with airbags, the conditions of use and reliance on the inflatable lapbelt as the sole means of injury protection are quite different. In automobile installations, the airbag is a supplemental system and works in conjunction with an upper torso restraint. In addition, the crash event is more definable and of typically shorter

duration, which can simplify the activation logic. The airplane operating environment is also quite different from automobiles and includes the potential for greater wear and tear, and unanticipated abuse conditions (due to galley loading, passenger baggage, *etc.*); airplanes also operate where exposure to high intensity electromagnetic fields could affect the activation system.

The following special conditions can be characterized as addressing either the safety performance of the system, or the system’s integrity against inadvertent activation. Because a crash requiring use of the inflatable lapbelts is a relatively rare event, and because the consequences of an inadvertent activation are potentially quite severe, these latter requirements are probably the more rigorous from a design standpoint.

Applicability

As discussed above, these special conditions are applicable to the 787 series airplane. Should Boeing Commercial Airplanes apply at a later date for a change to the type certificate to include another model incorporating the same novel or unusual design feature, the special conditions would apply to that model as well.

Conclusion

This action affects only certain novel or unusual design features on 787 series of airplanes. It is not a rule of general applicability.

The substance of these special conditions has been subjected to the notice and comment period in several prior instances and has been derived without substantive change from those previously issued. It is unlikely that prior public comment would result in a significant change from the substance contained herein. Therefore, because a delay would significantly affect the certification of the airplane, which is imminent, the FAA has determined that prior public notice and comment are unnecessary and impracticable, and good cause exists for adopting these special conditions upon issuance. The FAA is requesting comments to allow interested persons to submit views that may not have been submitted in response to the prior opportunities for comment described above.

List of Subjects in 14 CFR Part 25

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

The authority citation for these special conditions is as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701, 44702, 44704.

The Special Conditions

Accordingly, pursuant to the authority delegated to me by the Administrator, the following special conditions are issued as part of the type certification basis for Boeing Model 787 series airplanes.

1. Seats with Inflatable Lapbelts. It must be shown that the inflatable lapbelt will deploy and provide protection under crash conditions where it is necessary to prevent serious head injury. The means of protection must take into consideration a range of stature from a two year old child to a ninety-fifth percentile male. The inflatable lapbelt must provide a consistent approach to energy absorption throughout that range of occupants. In addition, the following situations must be considered:

- a. The seat occupant is holding an infant.
- b. The seat occupant is a child in a child restraint device.
- c. The seat occupant is a child not using a child restraint device.
- d. The seat occupant is a pregnant woman.

2. The inflatable lapbelt must provide adequate protection for each occupant regardless of the number of occupants of the seat assembly, considering that unoccupied seats may have active seatbelts.

3. The design must prevent the inflatable lapbelt from being either incorrectly buckled or incorrectly installed such that the inflatable lapbelt would not properly deploy. Alternatively, it must be shown that such deployment is not hazardous to the occupant, and will provide the required head injury protection.

4. It must be shown that the inflatable lapbelt system is not susceptible to inadvertent deployment as a result of wear and tear, or inertial loads resulting from in-flight or ground maneuvers (including gusts and hard landings), and other operating and environmental conditions (vibrations, moisture, *etc.*) likely to be experienced in service.

5. Deployment of the inflatable lapbelt must not introduce injury mechanisms to the seated occupant, or result in injuries that could impede rapid egress. This assessment should include an occupant who is in the brace position when it deploys and an occupant whose belt is loosely fastened.

6. It must be shown that inadvertent deployment of the inflatable lapbelt, during the most critical part of the flight, will either not cause a hazard to the airplane or its occupants, or it meets the requirement of § 25.1309(b).

7. It must be shown that the inflatable lapbelt will not impede rapid egress of

occupants 10 seconds after its deployment.

8. The system must be protected from lightning and HIRF. The threats specified in the certification basis regarding lightning, § 25.1316, and HIRF (special conditions) for the 787-8 airplane, are incorporated by reference for the purpose of measuring lightning and HIRF protection.

9. Inflatable lap belts, once deployed, must not adversely effect the emergency lighting system (*i.e.*, block proximity lights to the extent that the lights no longer meet their intended function).

10. The inflatable lapbelt must function properly after loss of normal airplane electrical power, and after a transverse separation of the fuselage at the most critical location. A separation at the location of the lapbelt does not have to be considered.

11. It must be shown that the inflatable lapbelt will not release hazardous quantities of gas or particulate matter into the cabin.

12. The inflatable lapbelt installation must be protected from the effects of fire such that no hazard to occupants will result.

13. There must be a means for a crewmember to verify the integrity of the inflatable lapbelt activation system prior to each flight or it must be demonstrated to reliably operate between inspection intervals. The FAA considers the loss of the airbag system deployment function alone (*i.e.*, independent of the conditional event that requires the airbag system deployment) is a major failure condition.

14. The inflatable material may not have an average burn rate of greater than 2.5 inches/minute when tested using the horizontal flammability test as defined in part 25, appendix F, part I, paragraph (b)(5).

Issued in Renton, Washington, on June 13, 2011.

Ali Bahrami,

Manager, Transport Airplane Directorate, Aircraft Certification Service, ANM-100.

[FR Doc. 2011-15094 Filed 6-16-11; 8:45 am]

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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA-2010-0853; Directorate Identifier 2010-NM-116-AD; Amendment 39-16720; AD 2011-12-13]

RIN 2120-AA64

Airworthiness Directives; The Boeing Company Model 737-600, -700, -700C, -800, -900, and -900ER Series Airplanes

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: We are adopting a new airworthiness directive (AD) for the products listed above. This AD requires repetitive testing of the stabilizer takeoff warning switches, and corrective actions if necessary. This AD was prompted by reports that the warning horn did not sound during the takeoff warning system test of the S132 ‘nose up stab takeoff warning switch.’ We are issuing this AD to detect and correct a takeoff warning system switch failure, which could reduce the ability of the flightcrew to maintain the safe flight and landing of the airplane.

DATES: This AD is effective July 22, 2011.

The Director of the Federal Register approved the incorporation by reference of a certain publication listed in the AD as of July 22, 2011.

ADDRESSES: For service information identified in this AD, contact Boeing Commercial Airplanes, *Attention:* Data & Services Management, P.O. Box 3707, MC 2H-65, Seattle, Washington 98124-2207; telephone 206-544-5000, extension 1; fax 206-766-5680; e-mail me.boecom@boeing.com; Internet <https://www.myboeingfleet.com>. You may review copies of the referenced service information at the FAA, Transport Airplane Directorate, 1601 Lind Avenue, SW., Renton, Washington. For information on the availability of this material at the FAA, call 425-227-1221.

Examining the AD Docket

You may examine the AD docket on the Internet at <http://www.regulations.gov>; or in person at the Docket Management Facility between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this AD, the regulatory evaluation, any comments received, and other information. The address for the Docket Office (phone: 800-647-5527) is