

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

In the matter of the petition of

THE BOEING COMPANY

for an exemption from §§ 25.812(g)(1)(ii),
and 25.809(a) of Title 14, Code of Federal
Regulations

Regulatory Docket No. FAA-2008-0348

PARTIAL GRANT OF EXEMPTION

By letter RA-11-01526, dated April 4, 2011, C. M. Thompson, Lead Project Administrator, Development Projects, The Boeing Company, PO Box 3707, Seattle, Washington, petitioned the Federal Aviation Administration for an amendment to Exemption No. 9793B to allow additional relief from the requirements of §§ 25.812(g)(1)(ii), and 25.809(a) of Title 14, Code of Federal Regulations (14 CFR) and revise associated Limitations 12 and 17c of Exemption No. 9793B. Currently, Limitation 12 and § 25.812(g)(1)(ii) require emergency lighting to provide adequate illumination at the ground end of the assist means, where an evacuee would normally make first contact with the ground, with the airplane in each of the attitudes corresponding to the collapse of one or more legs of the landing gear and worse case center of gravity location. Boeing requested this limitation be revised to allow reduced illumination level at the crew door with the escape slide at lowest sill height and in tail tip condition only when inertia reels are used over the escape slide at the ground contact area. Limitation 17c was included in Exemption No. 9793B based on § 25.809(a) at Amendment 25-116 being part of the airplane's certification basis. Because the certification basis has been revised and § 25.809(a) at Amendment 25-116 is no longer applicable, Boeing requested that Limitation 17c be removed. The current exemption is a partial grant which permits the carriage of six non-crewmembers (commonly referred to as supernumeraries) in a compartment behind the flight deck on Boeing Model 747-8F airplanes and allows in-flight access to the class E cargo compartment by these

supernumeraries, with certain limitations. If granted, this amended exemption would allow reduced illumination levels at the crew door with the escape slide at lowest sill height and in tail tip condition only when inertia reels are used over the escape slide at the ground contact area. This amended exemption would also completely remove Limitation No. 17c.

The petitioner requests relief from the following regulations:

Section 25.812(g)(1)(ii), at Amendment 25-28, provides illumination at each non-over-wing emergency exit, of not less than 0.03 foot-candle (measured normal to the direction of the incident light) at the ground end of the assist means and, for each non-over-wing exit in the side of the fuselage, over a spherical surface 10° to either side of the center of the assist means and from 30° above the 45° position of the assist means.

Section 25.809(a), at Amendment 25-116, each emergency exit, including each flight crew emergency exit, must be a movable door or hatch in the external walls of the fuselage, allowing an unobstructed opening to the outside. In addition, each emergency exit must have means to permit viewing of the conditions outside the exit when the exit is closed. Means must also be provided to permit viewing of the likely areas of evacuee ground contact. The likely areas of evacuee ground contact must be viewable during all lighting conditions with the landing gear extended as well as in all conditions of landing gear collapse.

Related section of 14 CFR:

Section 121.583(a) contains, in pertinent part, a listing of categories of persons who may be carried aboard an airplane in part 121 service without complying with all the requirements of part 121 pertaining to carriage of passengers.

The petitioner supports its request with the following information:

Excerpts from the petition submitted by The Boeing Company appear below. The complete petition is available on-line in the Federal Docket Management System at <http://www.regulations.gov>. The docket number is FAA-2008-0348.

As provided for in 14 CFR 11.61(b), Boeing hereby petitions for revisions to Exemption 9793B as follows:

<u>Requirement</u>	<u>Limitation</u>	<u>Which Requires</u>
Exemption 9793B	12	For the crew service door, emergency lighting must provide adequate illumination at the ground end of the assist means, where an evacuee would normally make first contact with the ground, with the airplane in each of the attitudes corresponding to the collapse of one or more legs of the landing gear and worse case center of gravity location. This condition does not apply to the overhead hatch.
Exemption 9793B	17c	For the crew service door, the viewing outside through the viewing window does not meet the requirements of § 25.809(a). With the door closed it is acceptable to only be able to view the general location where occupants would likely make first contact using the optional escape slide in normal gear conditions and lower sill height conditions. After the crew service door is open all locations where occupants would likely make first contact using the optional escape slide and/or the inertia reels must be visible from the exit opening.

The Extent of Relief Being Sought

While the 747-8F airplane has considerable capability for exterior emergency illumination . . . the following relief is necessary:

<u>Regulation</u>	<u>Requires:</u>	<u>Relief is necessary because:</u>
Exemption 9793B Limitation 12	Adequate illumination (post evacuation means deployment) at the ground end of the assist means used at the crew door for all gear collapse conditions.	The illumination level provided at the crew door is low with the escape slide at lowest sill height and in the tail tip condition only (when inertia reels are used over the escape slide) at the ground contact area.

Exemption 9793B Limitation 17c	Viewing of the ground contact area: 1) With the door closed to view the general location of the escape slide in normal and lower sill conditions. 2) With the door open to view all the first contact locations for both the escape slide and inertia reels	The certification basis of the 747-8F is anticipated to be updated to remove 14 CFR 25.809(a) at Amendment 116 from the requirements and thus relief from 14 CFR 25.809(a) Amendment 116 is no longer necessary and the limitation imposed by 9793B can be removed
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Description of the Issue

The Model 747-8F is a derivative aircraft based on the 747-400F. The fuselage of the 747-8F is 220” longer than the 747-400F. The 747-8F emergency exits, exterior body-mounted light for the escape slide and the escape means are the same design as the 747-400F with the exception that the escape slide is a customer selectable option on the 747-8F and was basic on the 747-400F. For the 747-8F, the escape slide has been selected by all current customers as the evacuation means at the crew door. A new body-mounted exterior light was added to the 747-8F to illuminate the ground contact area of the inertia reels when used independently, but it will also provide some illumination for the ground contact area of the escape slide in the tail down attitude when the inertia reels are used over the escape slide. The illumination provided by the inertia reel light of the ground contact area for the inertia reels used over the escape slide in the tail down attitude as well as the illumination provided by the escape slide light of the ground contact area of the escape slide in low sill and the impact of Exemption 9793A/9793B Limitation 12 is the subject of the petition herein.

Like the 747-400F, the 747-8F has a required flight crew of two (2) and is allowed the carriage of up to six (6) supernumeraries. Like the 747-400F and its predecessors, the 747-8F AFM will limit the airplane to eight (8) occupants. The eight (8) inertia reel descent devices located on the flight deck are identical in part number and location to the 747-400F and will be included on all 747-8F airplanes, with one for each airplane occupant to use either through the crew door or from the flight deck overhead exit. Additionally, there are eight (8) harnesses installed basic in the 747-8F supernumerary seating areas, two (2) more than the 747-400F, one for each occupant to don and connect to their descent device before evacuating the airplane.

In summary the 747-8F airplane has the following capability for exterior emergency illumination to meet the 9793B Limitation 12 and only minimal relief is required, as noted above.

<u>Regulation</u>	<u>Requires:</u>	<u>Capability of the 747-8F</u>
Exemption 9793B Limitation 12	Adequate illumination (post evacuation means deployment) at the ground end of the assist means used at the crew door for all gear collapse conditions.	0.03 FC of illumination is provided at the ground end of both the inertia reels and escape slide, at the crew door, in all conditions of gear collapse except for the escape slide in lowest sill height condition and the tail down attitude when the inertia reels are used over the escape slide.

The airplane capability will be described in further detail below.

Illumination of evacuation means (post deployment)

A method to show compliance to 14 CFR 25.812 for escape slides involves calculating the illumination levels of a rectangular grid of points placed at the toe end of the slide. Illumination levels of each point are calculated based on the performance measures of the light and the distance of the point from the light.

A new body-mounted exterior light was added to the 747-8F to illuminate the ground contact area of the inertia reels when used independently. This new inertial reel light was designed to § 25.812 at Amendment 120 thus providing adequate illumination in all combinations of gear collapse and meeting Exemption 9793B Limitation 12. The inertia reel contact points for all gear conditions was used in development and placement of the new body-mounted exterior light.

The existing exterior body-mounted light, designed to provide illumination for the escape slide, adequately illuminates the ground contact area of the escape slide in all combinations of gear collapse except the low sill height condition of right gear and nose gear collapse and the tail down attitude condition. In these extreme conditions, the exterior body-mounted light does not shine in the appropriate direction to provide the illumination as it was originally designed for the 747-100 to § 25.812 at Amendment 28 (normal gear).

It should be noted that the length of the escape slide will require that inertial reels be used over the slide if the airplane is in a tail down attitude and evacuation occurs through this exit. When the slide is deployed in this condition, initially, it will not touch the ground. If an evacuee enters the slide (with a reel) the weight of the evacuee will force the slide down until the toe end of the slide reaches the ground resulting in a slide too steep to use without inertia reels. In this condition, the inertia reel light provides some illumination of the ground contact area.

Both exterior lights will be installed on all airplanes regardless of evacuation means selected by the customer. These lights are activated (1) automatically upon loss of main electrical power (28 VDC bus) when the system is armed, or (2) manually via the emergency light switches located on the flight deck or in the supernumerary seating area.

Statement of No Adverse Affect on Safety

The petitioner strives to provide acceptable safety conditions such that 747-8F cargo operators can safely operate their airplane with evacuation means and procedures consistent with the current fleet. The majority (5 of 6) of the airline customers that have purchased the 747-8F also operate fleets of earlier model 747 Freighters, including the 747-400F. The surest, safest, and most cost effective manner of operating these cargo aircraft is to have consistent airplane designs and crew/supernumerary training with respect to evacuation safety features of the airplane. A grant of Exemption will result in consistent operator's procedures for evacuation of the 747-8F with the 747-400F fleet when the escape slide is installed and similar to other airplane models with only inertia reels installed, thus enhancing safety.

It is proposed that the FAA provide relief from Limitation 12 of Exemption No. 9793A/9793B for illumination of low sill height condition of right gear and nose gear collapsed and the tail down attitude when the escape slide is installed. Exemption No. 9793A/9793B Limitation 12 requires in part; *“For the crew service door, emergency lighting must provide adequate illumination at the ground end of the assist means, where an evacuee would normally make first contact with the ground, with the airplane in each of the attitudes corresponding to the collapse of one or more legs of the landing gear and worse case center of gravity location.”*

An acceptable level of safety is maintained without showing compliance to “adequate illumination at the ground end of the assist means” at low sill height condition of right gear and nose gear collapsed and the tail down attitude when the escape slide is installed based on:

- Limited number of trained supernumeraries
- Probability of occurrence of evacuation in the extreme airplane attitudes in dark conditions
- Illumination provided adjacent to the ground contact area is well above the minimum 0.03 foot-candles established by § 25.812
- The illumination condition requirement is better than for evacuees using the flight deck overhead exit
- Evacuees cannot drastically alter their landing location
- Maintaining all of the other aspects of Limitation 12.

The personnel (maximum of 8) aboard the 747-8F are required to be briefed by the flight crew prior to each flight on the use of the exits in accordance with Exemption No. 9793/9793A/9793B. Due to the limited number of airplane occupants the urgency of evacuation and associated rate of egress can be reduced allowing time to assess the initial evacuee's descent from the exit. This additional level of knowledge afforded to these occupants when compared to the normal passenger provides an enhancement in evacuation.

The probability, based on the 747 fleet, of an evacuation in the extreme gear collapse condition combined with dark conditions is extremely improbable. This improbable event also justifies an acceptable level of safety provided for the airplane.

The illumination provided by the inertia reel light at the ground area adjacent to the ground contact area where a person would land when using the escape slide in low sill conditions of right gear and nose gear collapsed and inertia reels over the escape slide when the airplane is in the tail down attitude is well above the minimum 0.03 foot-candles required for § 25.812 compliance and thus some areas of the ground contact area are likely to be at or above minimum requirements due to reflected light.

The illumination available from the inertia reel light for the ground contact area when evacuees are using inertia reels over slide during an airplane tail down event is better than for evacuees using inertia reels from the flight deck overhead exit during the same type of airplane event. Section 25.812(h) at Amendment 128 has established for flight deck exits that it is acceptable to not provide illumination of the contact area. It is understood that the training afforded to the flight crew as well as the typical evacuation means and location of the exit are considerations for not requiring the illumination. Flight crew exits are typically an overhead exit or flight deck window utilizing ropes or inertia reels. As such the landing location cannot typically be seen until an individual is past the point of no return and thus providing illumination of the landing area was considered unnecessary. Additionally, the landing location once the evacuation has been committed cannot drastically be altered as the individual progresses down the rope/inertia reel. Similarly, the supernumeraries on the 747-8F are required to be trained in the evacuation procedures. In this improbable case of a tail down attitude with the escape slide installed, the supernumeraries may choose to exit out the crew door using the inertia reels over the escape slide. In this case, the controlled descent of the inertia reels will slow the evacuation, but the landing location cannot be drastically altered, so providing a level of illumination at the anticipated contact point is of limited benefit. The fact that some illumination will be surrounding the contact area is better than what is required by the regulations for flight deck exits.

Finally, as noted above in the description of the issue, all other evacuation gear collapse conditions (for both evacuation means) will have adequate illumination

provided utilizing 0.03 foot-candles as a minimum for compliance to Limitation 12.

Statement of Public Interest

The public interest will be advanced by the grant of Exemption as it is in the best economic interest of the United States. Increased sales of airplanes contribute to the balance-of-trade, the gross domestic product, and economic health of the United States. Marketability of the 747-8F is improved, leading to increased sales, by keeping the sales price and operating cost of the 747-8F down while providing flexibility to the airlines in a choice of evacuation means.

Purchase prices could increase due to design changes, additional exterior body-mounted lights, associated with providing a fully compliant design for illumination of the escape slide evacuation means.

Operating costs are kept down by:

- Having common training and operating procedures with the 747 Freighter Fleet when the escape slide is installed while avoiding the cost of maintaining different material in the training, maintenance, dispatch and operations manuals for the 747-8F and 747-400F. Every 747-400F delivered from Boeing was equipped with an escape slide installed in a similar interior configuration and an exterior body-mounted light to illuminate the evacuee ground contact area of the escape slide. The majority of the airline customers that have purchased the 747-8F also operate fleets of earlier model 747 Freighters and will have the escape slides installed on their 747-8F, same as the 747-400F.
- Common training and operating procedures to other freighter models for those airlines selecting only the inertia reels as the evacuation means.
- Avoiding the weight and fuel penalty and system maintenance costs including any economic penalties associated with flight delays that would otherwise be realized by the required design changes as noted above in the purchase price impacts.
- Weight and fuel benefits for operators choosing the inertia reels as the evacuation means.

Lower purchase and operating cost will help maintain cargo shipping rates aboard Freighter airplanes at their current levels, which benefit the US economy as a whole.

A grant of exemption as requested in this petition is in the best interest of the travelling public through introduction of this new product into the marketplace that has advanced the certification basis in many areas as compared to the 747-400F. Enabling common operating procedures for evacuation not only maintains purchase price and operating cost as noted above, but avoids the potential for human error which may be introduced when procedures vary substantially for similar products. For the reasons noted above, it is the petitioner's opinion that the overall level of safety is improved by comparison to the previous 747 Freighter models that are certified with similar configurations and evacuation systems and safety is maintained which is in the public's best interest.

Privileges of this Exemption Outside the United States

Per 14 CFR 11.81(h), Boeing requests that the privileges of this Exemption be extended outside the United States. This extension of privileges is necessary for operations based within foreign countries having bilateral agreements with the United States accepting FAA 14 CFR Part 25 as their airworthiness standards for transport category aircraft. The 747-8F is intended for the global market place.

Conclusion

The 747-8F maintains the level of safety previously afforded on the 747 Freighter series from an exit rating and evacuation systems standpoint. The 35 year service history of the 747F series has proven its safety. Furthermore, it is Boeing position that the overall illumination from two exterior lights to the right side of the airplane outside the exit provides adequate illumination for safe egress in all gear collapse conditions. Granting relief from Limitation 12 is justified based on the capability of the airplane to provide safe evacuation means including illumination.

Federal Register publication

A summary of this petition was published in the *Federal Register* on April 20, 2011 (76 FR 22164). No comments were received.

The FAA's analysis

Boeing requested that Limitation 12 in Exemption No. 9793B be revised because it cannot comply with this limitation when the optional escape slide is installed at the crew service door. When the optional escape slide is installed the emergency lighting does not provide adequate illumination where an evacuee would normally make first contact with the ground in a low sill height condition of right gear and nose gear collapsed and the tail down attitude. For the basic airplane configuration, the only evacuation means at the crew door are the inertia reels and harnesses. To address the basic 747-8 configuration,

Boeing added a new exterior light to illuminate the ground contact point where an evacuee using the inertia reels and harness would normally make first contact with the ground, with the airplane in each of the attitudes corresponding to the collapse of one or more legs of the landing gear and the worse case center of gravity location. Adequate emergency lighting with the airplane in various positions has been included as a limitation since Exemption No. 9793 was first issued on November 26, 2008. This provision was included as a requirement in § 25.812 starting at Amendment 25-32.

Boeing requested that the escape slide installed at the crew door on the 747-400F airplane be allowed as an optional installation on the 747-8F without any modifications to the escape slide or airplane to comply with Limitation 12. The basic 747-8F airplane configuration does comply with this limitation because a new light was added to provide illumination for the airplane in each of the attitudes corresponding to the collapse of one or more legs of the landing gear and worse case center of gravity location. Boeing's position is that the light used to provide illumination for the crew door escape slide needs to illuminate the point of the ground where the evacuee would make first contact but not for all cases of landing gear collapse. The basis for Boeing's position is that the light providing this illumination is an unchanged area for the 747-8F and was originally certified on the 747-100 passenger airplane. However, this lighting was designed to comply with the requirements of § 25.812 at Amendment 25-28, which only considered all gear extended. Boeing states that an acceptable level of safety is maintained without full compliance with Limitation 12 based on:

- Limited number of trained supernumeraries
- Probability of occurrence of evacuation in the extreme airplane attitudes in dark conditions
- Illumination provided adjacent to the ground contact area is well above the minimum 0.03 foot-candles established by § 25.812
- The illumination condition requirement is better than for evacuees using the flight deck overhead exit
- Evacuees cannot drastically alter their landing location
- Maintaining all of the other aspects of Limitation 12.

We do not entirely agree with Boeing's position that the limited number of trained supernumeraries and their pre-flight briefing contributes to an acceptable level of safety. If there is a reason not to use the deployed escape slide that would be discovered with the illumination required by Limitation 12, the fact that there are a limited number of trained supernumeraries and their pre-flight briefing does not contribute significantly to the acceptable level of safety in lieu of complying with Limitation 12.

We do not agree with Boeing that a “probability of occurrence” argument is appropriate as a reason for not complying with this requirement. This requirement has been in the regulations since Amendment 25-32 and does not provide any relief based on a probability that the event would not occur. Also, in light of the regulation, the probability of occurrence would be “one” because the regulation requires all cases of gear collapse be considered.

Providing illumination adjacent to the required area does provide limited benefit, if the reason for not using the escape slide would be visible. However, not all reasons for not using the escape slide would be visible since they may not be in the adjacent area that is illuminated.

Boeing’s statement that the illumination condition requirement is better than for an evacuee using the flight deck overhead exit is correct, since this requirement was previously removed from Limitation 12. However, the illumination provided for the crew door with only the inertia reels and harnesses is better than what is provided when the optional escape slide is installed. In other words, Boeing is proposing we accept reduced visibility for the same requirement when the optional escape slide is installed versus the basic airplane configuration with only inertia reels and harnesses installed.

We agree that evacuees cannot drastically alter their landing location when using the escape slide. However, with the required illumination of the area where they would make first contact with the ground they would be able to determine whether or not the escape slide should be used before jumping onto it. Therefore, we do not consider this sufficient to consider that an acceptable level of safety has been established.

We do note, however, that there is a major difference in the emergency lighting certification requirements for the 747-8F as contained in Limitation 12 of all the previous versions of this exemption versus the requirements in the type certification basis of the 747-400F. The certification basis of the 747-400F only requires the lighting be adequate for the scenario where all legs of the landing gear are extended, which is what the regulation required prior to Amendment 25-32. Limitation 12 of all previous versions of this exemption requires that the 747-8F lighting be provided for not only that scenario, but also for “each of the attitudes corresponding to the collapse of one or more legs of the landing gear.” Boeing proposes to show the airplane emergency lighting not only provides illumination in the all gear extended condition, but in all of the possible combinations of gear collapse except for three conditions. From that point of view, the 747-8F would clearly provide an improvement in lighting over the certification requirements for the previous 747-400F model. Based on these facts we have determined that what is provided is an acceptable level of safety for the overall airplane evacuation systems.

We also agree that § 25.809(a) at Amendment 25-116 is no longer applicable to the Boeing Model 747-8 airplane. Therefore, Limitation 17c has been removed.

The FAA’s decision

In consideration of the foregoing, I find that a partial grant of exemption is in the public interest because this design provides an acceptable level of safety for the maximum number of occupants that will be allowed on the airplane. Therefore, pursuant to the authority contained in 49 U.S.C. §§ 40113 and 44701, delegated to me by the Administrator, The Boeing Company is hereby granted an amendment to Exemption No. 9793B from § 25.812(g)(1)(ii) and modification of Limitation 12 to the extent necessary to allow type certification of Boeing Model 747-8F series airplanes with provisions for the carriage of supernumeraries. Limitation 17c from Exemption No. 9793B has been removed from this amendment. All other limitations from Exemption No. 9793B are included below for clarity. The following limitations apply and limitation numbers 1-6 and 10-11 must be documented in the Limitations Section of the Airplane Flight Manual:

1. A maximum of six supernumeraries may occupy the area just aft of the flight deck. The total maximum occupancy of the airplane is limited to eight persons, including the flight crew.
2. The supernumeraries are limited to the categories specified in §§ 121.583(a)(1) through 121.583(a)(7).
3. Main Deck Class E Cargo Compartment Access Limitations:
 - a. Supernumeraries are prohibited from being in the cargo area during taxi, take-off, and landing. The pre-flight briefing must inform supernumeraries of this requirement.
 - b. Access into the main deck Class E cargo compartment in-flight is allowed for only three types of operation. They are:
 - Carriage of live animals requiring care/attention during flight and associated material only, no other cargo. The maximum number of supernumeraries allowed in the main deck Class E cargo compartment is six.
 - Cargo only, no live animal requiring care/attention during flight. The maximum number of supernumeraries allowed in the main deck Class E cargo compartment is three.
 - Carriage of live animals requiring care/attention during flight and other cargo. The maximum number of supernumeraries allowed in the main deck Class E cargo compartment is six.
4. Prior to each flight, a flightcrew member must brief the supernumeraries on the following:

- the use of exits, including instructions to inspect the ground to determine whether a safe landing can be achieved before using an assist means.
 - location and use of emergency equipment.
 - the prohibition from being in the cargo area during taxi, take-off, and landing.
 - the aural and visual decompression alerting system and what actions they are required to take.
 - the visual turbulence alerting system and the requirement that persons must return to their seats.
 - the aural and visual fire or smoke alerting system and what actions they are required to take.
 - that access is limited to the care and handling of animals and cargo only.
 - that access is limited to a maximum of three unless live animals requiring care/attention in-flight and associated material are being carried.
 - that access is limited to a maximum of six when live animals requiring care/attention in-flight are being carried.
 - that the smoke barrier must be secured (i.e., the door or curtain must be closed) except when entering or leaving the cargo compartment.
 - that a portable oxygen bottle (with full face mask attached) must be carried at all times when accessing the cargo compartment by each person entering the cargo compartment.
 - that smoking is not allowed within the cargo compartment.
 - that the compartment must not be entered in case of fire/smoke being detected inside the Class E cargo compartment.
5. The operator must determine that each supernumerary is physically able and trained to accomplish the necessary emergency procedures.
 6. Supernumeraries Portable Oxygen:
 - a. There must be at least one portable oxygen unit with a mask attached to it provided for each supernumerary allowed to enter the main deck Class E

cargo compartment during flight. The unit must provide an indication to the user that oxygen is flowing.

b. The portable oxygen unit must meet the performance requirements of § 25.1443(a) or § 25.1443(b), or the equipment must be shown to protect the supernumerary from hypoxia at an activity level required to return to his or her seat following a rapid decompression to 25,000 feet cabin altitude.

c. During flight, the supernumerary must carry the portable oxygen unit whenever he or she is in the Class E cargo compartment.

d. The supernumeraries must be trained in the use of the oxygen units. The supernumeraries must also be trained in making the determination whether oxygen is being delivered to the dispensing units.

e. The oxygen units must be sized adequately for continuous and uninterrupted use during worst-case flight duration following decompression, or must be of sufficient duration to allow the supernumeraries to return to their seats where oxygen is readily accessible for the remainder of the decompression.

f. Additionally, since the petitioner has decided to provide the same alert for both decompression and smoke/fire, the oxygen unit must meet the protective breathing equipment (PBE) requirements in §§ 25.1439(b)(1), (2)(i), and (4), and the equipment and system must be designed to prevent any inward leakage to the inside of the device and prevent any outward leakage causing significant increase in the oxygen content of the local atmosphere (i.e., full face mask type.)

7. An automatically activated aural and visual decompression alerting system must be present and immediately recognizable in accessible areas of the Class E cargo compartment to notify supernumeraries when to don oxygen masks. If there are two or more alerts that a supernumerary may hear or is expected to respond to there must be an automatic visual alert in addition to the automatic aural alert. The pre-flight briefing must include training in the sound of the alerting system, the meaning of the alerting system, and the response to the signal (i.e., procedures for donning the masks and activating the flow of oxygen).

8. Turbulence Alert:

A flightcrew operated visual alerting system, which is recognized in accessible areas in the Class E cargo compartment, must be installed to indicate, during turbulence, that persons must return to their seats.

Appropriate procedures and limitations must be established to ensure that the flightcrew alerting systems notify the supernumeraries to return to their seats

at the onset of turbulence and prior to landing. The pre-flight briefing must explain this alerting system to the supernumeraries.

9. Smoke/Fire Alert:

A flightcrew activated aural and visual alerting system, which is recognized in the Class E cargo compartment, must be installed. This aural or visual alerting system is to indicate that, in the event of fire or smoke in the Class E cargo compartment, persons must return to their seats and ensure that the smoke barrier is secured (i.e., the door or curtain is closed). Appropriate procedures and limitations must be established to ensure that, at the onset of a fire or smoke event, the flightcrew alerting systems notifies the supernumeraries to return to their seats and secure the smoke barrier. The pre-flight briefing must explain these alerting systems to the supernumeraries.

10. Placards:

Placards are to be located in the supernumerary area, in a conspicuous location either on or adjacent to the smoke barrier doors. The placards must indicate the following:

- Access is limited to the care and handling of animals and cargo only.
- Access is limited to a maximum of three unless live animals requiring care/attention in-flight and associated material are being carried.
- The smoke barrier must be secured (i.e., the door or curtain must be closed) except when entering or leaving the cargo compartment.
- A portable oxygen bottle (with full face mask attached) must be carried at all times when accessing the cargo compartment by each person entering the cargo compartment.
- Smoking is not allowed within the cargo compartment.
- The compartment must not be entered in case of fire/smoke being detected inside the Class E cargo compartment.
- Do not occupy the Class E cargo compartment during taxi, takeoff, and landing.

11. Alerting requirements:

- Must be distinctive and effective.

- Visual alerts must be visible from all occupant locations and orientations, during all expected operational conditions including a rapid decompression where moisture in the air may condense.
 - Aural alerts must be loud enough to be heard during all expected operational conditions including a rapid decompression where the ambient noise level will increase.
12. For the crew service door, emergency lighting must provide adequate illumination at the ground end of the assist means, where an evacuee would normally make first contact with the ground, with the airplane in each of the attitudes corresponding to the collapse of one or more legs of the landing gear and worst case center of gravity location, except when the crew slide is used in the extreme conditions of low exit sill height resulting from combined right and nose gear collapse and high exit sill height resulting from the tail down attitude. Illumination requirements do not apply to the overhead hatch.
 13. There must be eight inertia reels and harnesses installed on the flight deck. No flight deck door may be installed between the supernumerary compartment and the flightdeck that would prevent access to the overhead hatch and eight inertia reels and harnesses. In accordance with FAA-approved test plan(s), the intended inertia reels and harnesses must be demonstrated to be a suitable assist means for the expeditious and safe evacuation of the maximum number of trained occupants allowed by approved seating. This/these demonstration(s) should also address to the satisfaction of the FAA the capability of trained occupants to utilize the intended inertial reels and harnesses to safely and expeditiously evacuate incapacitated occupants. Additionally, this/these demonstration(s) should also address to the satisfaction of the FAA the suitability of the intended devices from both high and low sill heights representative of § 25.810(a)(1)(iii) gear-collapse conditions including worst case center of gravity location.
 14. For all cargo or mixed cargo and live animal operations involving four or more supernumeraries, a portable system that protects against smoke inhalation must be provided. A portable system (e.g., smoke hood, full face mask oxygen system, etc.) that affords protection from smoke inhalation must be carried at all times when accessing the cargo compartment. Note that a single system that meets both protection from smoke inhalation and hypoxia could be used (e.g., a full face mask with oxygen unit).
 15. Flight tests must be conducted to show compliance with the provisions of § 25.857 concerning the entry of hazardous quantities of smoke into compartments occupied by the crew or passengers. The amount of time that the smoke barrier is open, as a result of the supernumeraries evacuating the main deck cargo compartment, must be accounted for in the testing.

16. For airplanes with the optional escape slide installed at the Crew Service Door Boeing must develop instructions for sliding the escape slide aft to provide a passage from the main aisle and out of the exit at least 19 inches in width. These instructions must be added to the outboard side of the escape slide assemble so that rescue personnel can read the instructions and move the escape slide out of the way. These instructions must be demonstrated to be effective for rescue personnel.
17. For the upper deck occupancy the following items apply;
 - a. The requirement of § 25.783(g) that each passenger entry door must qualify as a Type A, Type I, or Type II passenger emergency exit. For this airplane the entry door is on the main deck of the airplane.
 - b. The crew service exit opening is the size of a Type I exit but has an 8-inch step up inside the airplane.

Note: The briefings and associated procedures in limitations 7, 8, and 9 are not required if an Airplane Flight Manual limitation is established to prohibit supernumeraries in the Class E cargo compartment during flight. If access is prohibited, placards must be revised to indicate this limitation.

Issued in Renton, Washington, on June 16, 2011.

Signed by Ali Bahrami

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