

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 §§ 25.785(j),
25.807(c), 25.857(e) and 25.1447(c)(1) of
Title 14, Code of Federal Regulations

Regulatory Docket No. FAA-2004-18657

PARTIAL GRANT OF EXEMPTION

By letter dated October 13, 2007, J. B. Indovina, Manager, Puget Sound Certification Office, Technical Services, The Boeing Company, PO Box 3707, Seattle, Washington, 98124, petitioned for an amendment to Exemption 8590, previously issued on July 27, 2005. That exemption granted The Boeing Company relief from Title 14, Code of Federal Regulations (14 CFR) 25.807(c), at Amendment 25-55, and 25.857(e), at Amendment 25-93, to allow carriage of 20 non-crewmembers (commonly referred to as supernumeraries) aft of the flight deck on Boeing Model 747-400 airplanes converted from a passenger to a freighter configuration. The petitioner now requests relief from §§ 25.785(j) and 25.1447(c)(1) as an amendment to Exemption No. 8590, which would permit access into the Class E main deck cargo compartment during flight by the supernumeraries for the purpose of attending to cargo types requiring care or inspection, or both, (e.g., live animals and/or hazardous materials).

The petitioner requests relief from the following regulations:

Section 25.785(j), at Amendment 25-88, states, “If the seat backs do not provide a firm hand hold, there must be a hand grip or rail along each aisle to enable occupants to steady themselves while using the aisles in moderately rough air.”

Section 25.1447(c)(1), at Amendment 25-87, requires, in part, that oxygen dispensing units must be automatically presented to the occupants before the cabin altitude exceeds 15,000 feet. The relief from this regulation is only requested for the occupants when they are in the cargo compartment.

The petitioner has previously been granted relief from the following regulations:

Section 25.807(c), at Amendment 25-55, requires, in part, that for passenger seating capacity of 20 through 39, the airplane be equipped with two pairs of exits. One pair must be at least the size of a Type II exit and the other pair must be at least the size of a Type III exit.

Section 25.857(e), at Amendment 25-93, requires, in part, that when a Class E cargo compartment is installed on the airplane, the airplane is used for carriage of cargo only.

Related sections of the regulations:

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's supportive information is as follows:

Exemption No. 8590 granted Boeing an exemption from meeting certain requirements as they pertain to the carriage of up to 20 non-crewmembers (supernumeraries) on a 747-400 passenger airplane converted to a freighter airplane and equipped with a main deck Class E cargo compartment. The exemption includes a number of limitations in the airplane flight manual (AFM); one limitation prohibits supernumerary access into the main deck cargo compartment during taxi, takeoff, landing, and flight. Boeing requests that the FAA remove the limitation pertaining to in-flight access. The limitation regarding main deck access during taxi, takeoff, and landing would remain in place. Boeing's request is based on the following:

- Operators of the 747-400BCF (Boeing Converted Freighter) want to use the airplane to routinely transport types of cargo that require care, or inspection, or both, during flight (e.g., live animals and/or hazardous materials). The effect of the AFM limitation prohibiting supernumerary access into the main deck cargo compartment during flight is creating a hardship for these operators because it is essentially limiting the types of cargo that can be carried while the limitation stays in effect.
- As recognized by 14 CFR 121.583, the purpose of the supernumeraries is to take care of animals and other types of cargo in flight (e.g., hazardous materials). The safe transport of these types of cargo requires supernumerary access to the Class E compartment during flight.

Boeing proposes the following safety features and limitations for the entry of supernumerary persons into the Class E cargo compartment during flight:

1. For each person expected to be inside the compartment at the same time, a portable oxygen supply with mask shall be provided. The supply with mask must be carried at all times by the person(s) entering the compartment.
2. Smoking shall be prohibited inside the Class E cargo compartment.
3. The door to the Class E cargo compartment must be closed at all times except for entry and exit. The compartment must not be entered in case of smoke/fire being detected inside the Class E cargo compartment.
4. Visual and aural alerting systems will be provided inside the Class E cargo compartment. The alerts will be audible and visible to persons throughout the length of the compartment.
5. The aural and visual alerts will both activate automatically (no flightcrew member action required) upon either of the following two conditions: (1) loss of cabin pressure or (2) smoke being detected inside the Class E cargo compartment. The procedure to be followed for these two scenarios will be the person(s) inside the compartment will immediately don their oxygen mask, initiate flow to it and immediately return to their seat. Such instruction will be included in the required preflight briefing to the supernumeraries.
6. In the event of air turbulence, the visual portion of the main deck alerting system will be manually activated by a flight deck crewmember. The procedure to be followed for this scenario will be the person(s) inside the compartment will immediately return to their seat. Such instruction will also be included in the required pre-flight briefing to the supernumeraries.
7. Handhold provisions will be provided in the supernumerary seating area. Since installation of handholds in the Class E cargo compartment is impractical, an acceptable level of safety will be provided by the crew-operated visual alert system's ability to indicate, at the onset of turbulence to supernumeraries in the cargo compartment, to return to their seats.
8. The following limitations/instructions shall be printed on a placard and placed on the supernumerary seating area side of the access door into the Class E cargo compartment. The placard wording is proposed to be the following:

Access to be used only to inspect/care for cargo.

Carry portable oxygen supply with mask when entering compartment.

No smoking in the cargo compartment.

Keep door closed except during entrance and egress. In the event of smoke or cargo fire, do not enter cargo compartment.

9. In addition, the AFM shall instruct the flightcrew member to brief the supernumeraries before each flight about the limitations and procedures in case of entry into the Class E compartment during flight.

Boeing requests that the FAA amend the subject exemption for the 747-400BCF and revise the limitation to allow supernumerary personnel access into the Class E compartment during flight in order to fulfill their duties to inspect or care for cargo, thereby avoiding any further operational limitation of the airplane's use.

Boeing states granting this amended exemption is in the public interest because it will:

- Improve the utility of the airplane by ensuring that cargo management personnel will be available in flight and at every destination;
- Improve cargo carrying efficiency and help reduce airfreight rates because it will promote competitive pricing structures among freight operators; and
- Elevate safety because as 747-400 passenger and 747-400 passenger/freighter combination airplanes are moved into cargo service, airlines will replace them with airplanes that comply with newer safety requirements.

Boeing's complete petition for an amended exemption can be found under docket number FAA-2004-18657 at www.regulations.gov.

Federal Register publication

A summary of the petition was published in the Federal Register on January 3, 2008 (73 FR 535). The FAA received comments from Cathay Pacific Airways Ltd., Japan Airlines, and Korean Air.

Both Cathay Pacific Airlines and Korean Air state that the AFM for the Boeing Model 747-400BCF prohibits supernumerary access to the main deck cargo compartment whereas the AFM for the Boeing Model 747-400F does not. Therefore, they state that access to the main deck cargo compartment by the supernumeraries is allowed on the 747-400F but not on the 747-400BCF. The type design, as originally delivered from Boeing, of the Boeing Model 747-400F includes the installation of a placard on the door that prohibits access to the cargo compartment. The placard is viewable from the supernumerary area on the upper deck and states "Door must remain closed during taxi, takeoff, flight and

landing.” This placard has the same effect as an AFM limitation prohibiting access to the main deck cargo compartment during flight.

Japan Airlines intends to start using Boeing Model 747-400BCF by the end of next year. The airline supports the petition for an amended exemption.

The FAA's analysis/summary is as follows:

Exemption No. 8590 granted The Boeing Company relief from §§ 25.807(c) and 25.857(e). The exemption from those regulations still applies to the Boeing Model 747-400 airplanes converted from a passenger to a freighter configuration.

The FAA considers the petitioner’s proposal to amend that exemption to be in the public interest for the following reasons:

- These supernumeraries are seen as a benefit to airplane safety and efficient operations of air cargo.
- A significant disruption of air commerce could occur if the petition was not granted.
- The FAA has granted several exemptions for the carriage of supernumeraries with access into the Class E cargo compartment in-flight to attend to cargo on freighter airplanes.

The original petition for exemption did not include a request to permit supernumerary access to the Class E cargo compartment. Therefore, the exemption was granted with a limitation stating that access to the Class E cargo compartment during taxi, take-off, landing, and flight was prohibited. The petitioner has submitted additional information and proposed limitations to allow supernumerary access to attend to cargo in the Class E cargo compartment during flight.

The FAA has previously granted exemptions for in-flight access of the Class E cargo compartment by supernumeraries, provided that certain other conditions are met. These conditions have varied, depending on the airplane design and the number of supernumeraries involved. We have been reviewing the operational need for access into the Class E cargo compartment in-flight and the number of persons needed in the cargo compartment for the type of operation. We have divided access into the cargo compartment into two types of operations. They are:

1. Carriage of live animals and associated material only, no other cargo.
2. Cargo only, no live animal carriage.

In the first type of operation we understand that the industry standard for the carriage of horses is one supernumerary for every three or four horses. Considering the size of the 747-400 airplane there could be several dozen horses in the main deck cargo compartment. In considering this type of operation, we have considered that live animals are less flammable than other cargo. Therefore, we have allowed less restrictive access to the cargo compartment.

With regard to the second type of operation, we have limited access into the cargo compartment to a very small number of supernumeraries (one to three). This number of supernumeraries should be capable of addressing the need to have access to hazardous materials and valuable or perishable goods during flight.

The certification regulations for transport category airplanes address airplane occupants as being either “crew” or “passengers.” Due to differences in training, physical capabilities, and other factors (such as familiarity with the airplane), the means required by part 25 to address emergency evacuation and emergency equipment for passengers and crewmembers differ. Because supernumeraries are not crewmembers, they must be considered “passengers” by default with respect to part 25. However, supernumeraries do hold a special status because of their training and other factors.

To comply with §§ 25.855(h)(2) and 25.857(e)(4), there must be suitable means of preventing smoke penetration into areas that are occupied. The petitioner’s design accounts for this by providing a barrier, which must comply with the smoke penetration requirements for the flight deck and the supernumerary compartment. However, the petitioner indicated that configurations may be approved that will allow supernumeraries to enter the Class E cargo compartment. To gain access, the supernumeraries would open the smoke barrier between the cargo compartment and the supernumerary compartment. To provide an appropriate level of safety, the petitioner must install a placard indicating that the smoke barrier is to be secured (i.e., the door or curtain must be closed) except when entering or exiting the cargo compartment. The placard must be located in a conspicuous place, either on or next to the smoke barrier.

The FAA has a concern associated with the quantity of smoke that may enter the occupied areas in the event of a fire on the main deck. The amount of smoke that would enter the supernumerary compartment and flight deck when the smoke barrier is open during evacuation of the cargo compartment by the supernumeraries must not create a hazard to the occupants. This smoke source must be considered when demonstrating compliance with § 25.855(h)(2).

On previous certification programs, if access into the Class E cargo compartment was allowed, an alert, aural, visual, or both, operated by a flightcrew member and recognized in the Class E cargo compartment was required to be installed. The alert immediately notified the supernumeraries in the compartment that there was smoke/fire in the compartment. The aural, visual, or both, alert indicated that

persons must return to their seats and secure the smoke barrier (i.e., close the door or curtain) if there was a fire. Appropriate procedures and limitations were required to ensure that a flightcrew member alerted the supernumeraries to return to their seats and secure the smoke barrier at the onset of a fire. The pre-flight briefing included an explanation of this alert to the supernumeraries.

On this certification program the petitioner has proposed that smoke/fire and decompression events would have identical aural and visual alerts and that the response to the alerts would be the same. That is, the supernumeraries inside the Class E cargo compartment would immediately don their oxygen masks, initiate oxygen flow, and then return to their seats. Although this procedure differs from previous programs, we find this action acceptable, provided the portable oxygen equipment provided to the supernumeraries, in addition to meeting the requirements of § 25.1443(a) or (b), also meets the appropriate requirements of protective breathing equipment (PBE) in § 25.1439. The same aural/visual alerts, and procedures proposed for both a decompression and smoke/fire event are therefore acceptable.

Due to the way that fire in the cargo compartment is to be controlled, it is necessary to limit persons on the airplane to supernumeraries who have been found physically fit by the operator and have been briefed on the use of the emergency equipment. This limitation on the occupants is consistent with previous approvals and is included in this approval.

The petitioner indicated that configurations may be approved that will allow the supernumeraries to enter the Class E cargo compartment in-flight to tend to animals or hazardous cargo. When operating above 25,000 feet, § 25.1447(c)(1) requires an “immediately available” supply of oxygen for each supernumerary. To provide an acceptable level of safety while they are in the Class E cargo compartment, each supernumerary must carry on his or her person a portable oxygen bottle with a mask connected to it.

Section 25.1447(c)(1) also requires automatic presentation of the oxygen dispensing units. For seated passengers in typical passenger airplanes, the automatic presentation of masks throughout the cabin indicates the need to don an oxygen mask. However, supernumeraries in the Class E cargo compartment would not have this indication. To provide an acceptable level of safety, an automatically activated aural decompression alert must be provided that is immediately recognizable throughout the accessible areas in the Class E cargo compartment. If there are two or more aural alerts that supernumeraries in the Class E cargo compartment are expected to react to differently (e.g., “don oxygen mask, initiate the flow of oxygen, return to seat” versus “return to seat immediately”) there must be an automatic visual alert in addition to the automatic aural alert for the decompression event. As a backup to the automated alert system, the flightcrew members must be able to manually initiate the alerts. However, as discussed above, on this program the petitioner has proposed to have

both aural and visual alerts for decompression and smoke/fire with the supernumeraries responding in the same way for both events.

Supernumeraries must be trained about the location and use of the oxygen equipment and the alerts for its use. The oxygen units must be sized adequately for continuous and uninterrupted use during worst-case flight duration following decompression. Additionally, the portable oxygen device must meet the requirements for flightcrew member oxygen masks (§§ 25.1443(a) or (b)), or the equipment must be shown to protect the supernumerary from hypoxia at the activity level required to return to his or her seat following a rapid decompression to 25,000 feet cabin altitude. The oxygen units must also meet the intent of § 25.1449, which states that there must be a means for the crew to determine whether oxygen is being delivered to the dispensing units. The FAA has determined that it would be an acceptable means of compliance to train the supernumeraries in making this determination and to provide oxygen flow indication in the oxygen equipment.

The requirement of § 25.785(j), at Amendment 25-88, for handholds, is to ensure that occupants have a means to steady themselves in moderately rough air while traversing the main aisles of typical passenger airplanes. On the proposed airplane, we concur with the petitioner that an acceptable level of safety will be provided by the crew-operated visual alert system. This visual alert system enables the crew to indicate, at the onset of turbulence, that supernumeraries in the cargo compartment return to their seats. The visual alert must be recognized in accessible areas in the Class E cargo compartment, and indicate, during turbulence, that persons must return to their seats.

Configurations may be approved for carrying cargo that would not require supernumeraries to access the Class E cargo compartment. For these configurations, an aural decompression alert is not required to be recognized in the Class E compartment if an AFM limitation is established to prohibit supernumeraries from being in the Class E cargo compartment during flight. Placards and procedures must also be changed to be consistent with the AFM limitations.

The FAA has a concern about the removal of an incapacitated person from the cargo compartment since the access means to the main deck cargo compartment is a ladder. The Boeing Company should develop procedures for removing an incapacitated person from the cargo compartment and provide these procedures to the airplane operators. There is no need to combine this condition with any other failure condition (i.e., only normal flight conditions need to be considered).

Note that this exemption does not provide relief, beyond that explicitly stated, from applicable airworthiness requirements. This exemption discusses specific regulations that must be met for approval of the proposed design but does not discuss all the applicable regulations.

The FAA's decision

In consideration of the foregoing, I find that an amended partial 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 Acting Administrator, The Boeing Company is granted an amended partial exemption from 14 CFR 25.785(j), 25.807(c), 25.857(e), and 25.1447(c)(1) to the extent necessary to allow type certification of Boeing Model 747-400 passenger airplanes converted to a freighter airplane, with provisions for the carriage of supernumeraries. This exemption is subject to the conditions and limitations below.

The original grant of exemption, Exemption No. 8590, was issued for airplanes that did not allow supernumerary access to the Class E cargo compartment. For this amended exemption, the FAA considers there are two types of operations that will occur in service:

- I. The airplane does not carry cargo that requires special attention during any operation. Therefore, supernumeraries do not need to access the Class E cargo compartment in flight during any operation. This would be typical of airplanes that were operated under the original grant of exemption, Exemption No. 8590. Only limitation 1, below, applies and must be documented in the Limitation Section of the Airplane Flight Manual (AFM). Access to the cargo compartment is prohibited during taxi, takeoff, flight and landing.

- II. The airplane does carry cargo that needs special attention during flight, therefore requiring supernumerary access to the Class E cargo compartment during flight. For those operations, limitations 1 through 10 apply, except limitation 1.e. must be documented in the Limitations Section of the Airplane Flight Manual. Access to the cargo compartment is prohibited during taxi, takeoff, and landing.

The Conditions and Limitations are:

1. Supernumeraries:
 - a. A maximum of 20 supernumeraries may occupy the area just aft of the flight deck. The total maximum occupancy of the airplane is limited to 24 persons, including the flight crewmembers (2 on-duty flightcrew members and 2 off-duty flight crewmembers).
 - b. The supernumeraries are limited to the categories specified in §§ 121.583(a)(1) through 121.583(a)(7).
 - c. Prior to each flight, a flightcrew member must brief each supernumerary on the use of exits, including instructions to inspect the ground to determine

whether a safe landing can be achieved, before using an assist means and emergency equipment.

d. The operator must determine that each supernumerary is physically able and trained to accomplish the necessary emergency procedures.

e. Supernumeraries are prohibited from being in the cargo area below the smoke barrier during taxi, takeoff, landing, and flight. The pre-flight briefing must inform supernumeraries of this requirement.

2. Main Deck Class E Cargo Compartment Access Limitations:

a. Supernumeraries are prohibited from being in the cargo area during taxi, takeoff, and landing. The pre-flight briefing must inform supernumeraries of this requirement. Access is limited to the main deck Class E cargo compartment.

b. Access into the main deck Class E cargo compartment in-flight is allowed for only two types of operation. They are:

- Operations for carriage of live animals and material to support the safe transport of the animals, no other cargo. The maximum number of supernumeraries allowed in the cargo compartment in-flight is 20.
- Operations for cargo only, no live animal carriage. The maximum number of supernumeraries allowed in the cargo compartment in-flight is 3.

3. Supernumeraries' Portable Oxygen:

a. There must be at least one portable oxygen unit with a mask connected 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 when 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. The portable units must be located outside the cargo compartment (e.g., in the common area).

d. Each supernumerary must carry a portable oxygen unit whenever he or she is in the cargo compartment during flight.

- e. 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.
- f. 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 supernumerary to return to his or her seat where additional oxygen for the remainder of the decompression is readily accessible.
- g. 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), 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.

4. Decompression and Smoke/Fire Alert:

Based on the petitioner's proposal, an automatically activated aural and visual decompression and smoke/fire alert must be provided and immediately recognizable in accessible areas of the Class E cargo compartment to notify supernumeraries when to don the portable oxygen units, return to their seats and ensure that the smoke barrier is secured (i.e., the doors are closed). As a backup to the automated alert system, the flightcrew must be able to manually activate the alerts. The pre-flight briefing must include training in the sound of the alert, the meaning of the alert, and the response to the alert (i.e., procedures for donning the masks and activating the flow of oxygen).

5. Turbulence Alert:

Based on the petitioner's proposal, a flightcrew member operated visual alert, which is recognized in the supernumerary seating area and in accessible areas in the Class E cargo compartment, must be installed to indicate, during turbulence or predicted turbulence, that persons must return to their seats. The alert must be clearly distinguishable from the decompression/fire/smoke alert, so that supernumeraries do not waste time putting on the oxygen masks before returning to their seats. Appropriate procedures and limitations must be established to ensure that the flightcrew member alerts the supernumeraries to return to their seats at the onset of turbulence. The pre-flight briefing must explain this alert to the supernumeraries.

6. Placards:

Placards are to be located outside the cargo compartment in a conspicuous location, either on or adjacent to the smoke barrier door. The placards must indicate the following :

- Occupancy of the Class E cargo compartment is prohibited during taxi, take-off, and landing.
- Access is limited to the care and handling of animals and hazardous/perishable cargo only.
- Access is limited to a maximum of 3 persons unless transporting live animals and associated material. Access is limited to 20 persons when transporting live animals.
- 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 mask attached) must be carried at all times when in the cargo compartment.
- Smoking is not allowed in the cargo compartment.
- The compartment must not be entered in case of fire/smoke being detected inside the Class E cargo compartment.

7. Alerting Requirements:

- Must be distinctive and effective. The alert for turbulence must be clearly distinguishable from the alerts for decompression/fire/smoke.
- 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.

8. Supernumerary Emergency Exit:

For the exits designated for supernumerary use, 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. For airplanes that retain the passenger evacuation slides on the upper deck and associated emergency lighting systems, these systems are acceptable for this condition.

9. Public Address System:

A standard airplane public address (PA) system must be installed. It must be audible throughout the supernumeraries' seating area and must be capable of being activated either from the flight deck or from the supernumerary seating area.

10. Flight Tests:

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.

Issued in Renton Washington, on My 1, 2008.

/s/

Michael J. Kaszycki
Acting Manager, Transport Airplane Directorate
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