

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(d),
25.807(c)(1) and (c)(5), 25.809(f)(1),
25.813(b), 25.857(e), and 25.1447(c)(1) of
Title 14, Code of Federal Regulations

Regulatory Docket No. FAA-2016-5903

PARTIAL GRANT OF EXEMPTION

By letter no. RA-16-00523, dated February 10, 2016, Mr. Douglas M. Lane, ODA Deputy Lead Administrator, The Boeing Company, P.O. Box 3707, MC 03-56, Seattle, WA, 98124-2207, petitioned the Federal Aviation Administration (FAA) for an exemption from the requirements of §§ 25.785(d), 25.807(c)(1) and (c)(5), 25.809(f)(1), 25.813(b), 25.857(e), and 25.1447(c)(1) of Title 14, Code of Federal Regulations (14 CFR). This exemption, if granted, would permit the carriage of up to six supernumeraries aft of the flight deck on Boeing Model 747-400F airplanes, and would allow them access into the Class E main-deck cargo compartment during flight, for the purpose of attending to cargo that requires care, inspection, or both (e.g., live animals or hazardous materials).

The petitioner requests relief from the following regulation(s):

Section 25.785(d), at Amendment 25-64, requires, in pertinent part, a firm handhold to enable occupants to steady themselves when moving through the aisles in moderately rough air.

Section 25.807(c)(1), at Amendment 25-67, requires, in part, that an airplane with a seating capacity (crewmember seating excluded) of up to nine passengers must have at least one Type IV emergency exit for each side of the fuselage.

Section 25.807(c)(5), at Amendment 25-67, requires that, for airplanes on which the vertical location of the wing does not allow the installation of overwing exits, an exit of at least the dimensions of a Type III exit must be installed instead of each Type IV exit required by § 25.807(c)(1).

Section 25.809(f)(1), at Amendment 25-47, requires, in part pertinent to the certification basis of the 747-400F, that each passenger emergency exit (other than overwing exits) located more than 6 feet from the ground must be provided with a self-supporting slide or equivalent to assist the occupants in descending to the ground. It further defines certain criteria for the assist means: automatic deployment capabilities; maximum erection times; and usability under certain landing-gear-collapse conditions and 25-knot wind conditions. Section 25.809(f)(1)(v) testing requirements are excepted.

Section 25.813(b), at Amendment 25-46, requires, in part, enough space next to each exit located more than 6 feet from the ground to allow a crewmember to assist in the evacuation of passengers without reducing the unobstructed width of the passageway below that required for the exit.

Section 25.857(e), at Amendment 25-60, requires, in pertinent part, that when a Class E cargo compartment is installed on the airplane, the airplane is used to carry cargo only.

Section 25.1447(c)(1), at Amendment 25-41, requires that oxygen dispensing units must be automatically presented to the occupants before the cabin altitude exceeds 15,000 feet. The total number of dispensing units and outlets must exceed the number of seats by at least 10 percent. The extra units must be uniformly distributed throughout the cabin as practicable. At least two oxygen dispensing units must be connected to oxygen terminals in each lavatory.

Related sections of 14 CFR

Section 25.805 requires that, for airplanes with a passenger capacity of 20 or fewer in which the proximity of passenger emergency exits to the flightcrew area offers a convenient and readily accessible means of evacuation for the flightcrew, the airplane must have either one exit on each side of the airplane or a top hatch in the flightcrew area. Exit size and location are further specified.

Section 25.809(f)(2), at Amendment 25-47, requires that the assisting means for flightcrew emergency exits may be a rope or any other means demonstrated to be suitable for the purpose, and specifies certain requirements for this means.

Section 121.583(a) contains, in part, a list 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:

This section quotes, in pertinent part, the petitioner's request. The complete petition is available at the Department of Transportation's Federal Docket Management System, on the Internet at <http://regulations.gov>, in docket no. FAA-2016-5903.

Background

The Boeing Company petitioned for and received an exemption to the requirements of 14 CFR 25.807(c)(1)(5), 25.809(f)(1), and 25.813(b). The exemption permitted carriage of up to six non-crewmembers (commonly referred to as supernumeraries) located aft of the flight deck on Boeing 747-400F freighter airplanes.

With this petition, Boeing hereby requests an amendment to Exemption No. 1870E that will allow supernumerary access into the 747-400F main deck Class E cargo compartment during flight when the airplane is equipped with the necessary emergency equipment, airplane systems, and crew procedures for allowing main deck access. Access into the main deck cargo compartment is specifically for the purpose of attending to cargo types requiring care and/or inspection (e.g., live animals and/or hazardous materials).

It should be noted that some operators, on some flights, may carry live animals exclusively in the main deck cargo compartment. Other operators intend to carry a mix of live animals and cargo, or carry hazardous materials as cargo. Boeing is requesting approval of main deck access during flight for both types of airplane operation.

Section of 14 CFR from which Exemption is Requested

In addition to those 14 CFRs exempted in Exemption No. 1870E, Boeing is seeking an exemption from the following sections of 14 CFR for the Model 747-400F:

14 CFR 25.785(d) [Amendment 25-64], Seats, berths, safety belts, and harnesses:

(d) If the seat backs do not have 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.

14 CFR 25.1447(c)(1) [Amendment 25-41], Equipment standards for oxygen dispensing units:

(c) If certification for operation above 25,000 feet is requested, there must be oxygen dispensing equipment meeting the following requirements:

(1) There must be an oxygen dispensing unit connected to oxygen supply terminals immediately available to each occupant, wherever seated. If certification for operation above 30,000 feet is requested, the dispensing units providing the required oxygen flow must be automatically presented to the occupants before the cabin pressure altitude exceeds 15,000 feet and the crew must be provided with a manual means to make the dispensing units immediately available in the event of failure of the automatic system. The total number of dispensing units and outlets must exceed the number of seats by at least 10 percent. The extra units must be as uniformly distributed throughout the cabin as practicable.

Related section of the regulations:

14 CFR 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 persons.

Extent of Relief Sought and Reason

Boeing is requesting relief from the design and performance requirements of 14 CFR 25.785(d) and 14 CFR 25.1447(c)(1) for the Class E cargo compartment on the main deck of the 747-400F.

14 CFR 25.785(d) requires that a firm handhold be provided for non-seated airplane occupants to safely move about the cabin in moderately rough air. Exemption from 25.785(d) is necessary because such handholds are not available within the main deck cargo compartment.

14 CFR 25.1447(c)(1) requires, in part, automatically dispensing oxygen units for each occupant in airplanes certified for operation above 30,000 feet. Exemption from 25.1447(c)(1) is necessary because automatically dispensing oxygen units are not available within the main deck cargo compartment.

In Exemption No. 1870E, Boeing has been granted exemption from meeting certain requirements as they pertain to the carriage of up to six non-crewmembers (supernumeraries) on board a 747-400F freighter airplane equipped with a main deck Class E cargo compartment. The exemption includes a number of AFM limitations, one being that supernumerary access into the main deck cargo compartment is prohibited during taxi, takeoff, landing and flight. Boeing is requesting 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 747-400F want to use the airplane to routinely transport types of cargo that require care and/or inspection during night (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 in that it is essentially limiting the types of cargo that they can carry while the limitation stays in effect.

As recognized by 14 CFR 121.583, the purpose of the supernumeraries is among others to take care of animals and other types of cargo requiring access in-flight (e.g., hazardous materials). The safe transport of these types of cargo requires supernumerary access to the Class E compartment during night.

Additionally, safety features for persons on the main deck during flight are being added in anticipation of the FAA approving this request. Such features are described below.

Boeing proposes the following safety features and limitations for the entry of supernumerary persons into the Class E 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 compartment.
3. The door to the Class E 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 compartment.

4. Visual and aural alerting systems will be provided inside the Class E 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 flight crew action required) upon either of the following two conditions: (1) loss of cabin pressure or (2), smoke being detected inside the Class E 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 pre-flight 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 main deck 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 persons in the cargo compartment, to return to their seats.
8. Limiting access to a maximum of 3 persons unless transporting live animals and associated materials. Access is limited to 6 persons when transporting live animals.
9. The following limitations/instructions shall be printed on a placard and placed on the supernumerary seating area side of the access door into the compartment. The placard wording is proposed to be the following:

In-flight Access is Limited:

Max 3 Persons for Cargo Operations, No Animals

Max 6 Persons for Animal Carriage Operations

Occupancy of the Main Deck Cargo Compartment is Prohibited During Taxi, Takeoff and Landing

Each Occupant Must Carry Portable Oxygen Bottle with Full Face Mask When Entering the Main Deck Cargo Compartment

In the Event of Lights Flashing Return to the Upper Deck

In the Event of Aural Warning Don Oxygen Mask and Return to the Upper Deck

No Smoking in the Main Deck Cargo Compartment

Keep Door Closed Except During Entrance and Egress

In the Event of Smoke or Cargo Fire, Do Not Open

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

In consideration of the above and the level of safety being provided to all airplane occupants on airplanes approved for main deck access during flight, Boeing requests that the FAA amend the subject exemption for the 747-400F and revise the limitation to allow supernumerary personnel access into the Class E compartment during flight in order to fulfill their duties to inspect and/or care for cargo, thereby avoiding any further limitation of the aircraft use.

Public Interest

The granting of this petition for amendment to Exemption No. 1870E will improve the utility of the airplane for the operator by ensuring needed cargo management personnel will be available in-flight and at each flight destination. The presence of trained personnel when cargo is carried aboard the aircraft will preserve proper flight safety and is therefore in the public interest.

These capabilities will improve cargo carrying efficiency and will reduce overall airfreight rates, as competitive pricing structures among freight operators will be promoted; the public interest is served by lower freight rates and competitive pricing.

Reasons why Granting the Exemption Would Not Adversely Affect Safety

The proposed safety features and limitations outlined in section (c) of this petition are designed to increase the level of safety during flights when live animals and/or hazardous cargo are transported, and will not degrade the level of safety as required by the regulations.

Additional Information in support of the exemption request

The reasons presented for main deck Class E compartment access during flight on the Model 747-400F are identical or similar to those for which a number of exemptions have already been granted for other aircraft types [see Exemption No's 7965, 8057, 8136, 8248, 8258, 8350A, 8587, 8625, 8335A, 8590A, 9696A, and 9793C]. Therefore, this request will not set a precedent and accordingly, Boeing requests a waiver for the publication and comment period of this exemption, similar to those granted to other applicants for the same operational capability. Boeing believes that good cause exists to waive the publication and comment requirements of 14 CFR 11.85, 11.87 and 11.89. In particular, we feel that the main purpose of this petition for an amendment to Exemption No. 1870E, and the reasons presented in it, are identical to those for exemptions previously granted by the FAA and for which no public comments were received (ref. Exemption No. 8350A).

Application of Exemptions outside the United States

This exemption applies to the type design for a transport airplane designed to transport live animals and/or hazardous cargo. The privileges for this exemption for this aircraft are necessary to be made available outside of the United States in order to recognize the economic and safety benefit of this means of air transport.

Federal Register publication

The FAA has determined that good cause exists for waiving the requirement for **Federal Register** publication for public comment because the request is identical in all material respects to previously granted exemptions; the exemption, if granted, would not set a precedent; and any delay in acting on this petition would be detrimental to The Boeing Company.

The FAA's analysis

The petitioner requested an amendment to exemption no. 1870E to allow carriage of up to 6 supernumeraries, with access to the Class E cargo compartment, when carrying cargo or mixed cargo and live animals that require care or attention during flight. Exemption no. 1870E does not permit access to the Class E cargo compartment. Rather than amending exemption no. 1870E, the FAA has decided to issue this new exemption to prevent confusion with the other 747 models to which exemption no. 1870E applies. This exemption applies only to the Boeing Model 747-400F airplane.

By allowing the carriage of supernumeraries aboard cargo flights, operators will be able to optimize the utility of the airplanes and the airports. The FAA considers the petitioner's proposal to be in the public interest for the following reasons:

- These supernumeraries are seen as a benefit to airplane safety and efficient operations of cargo.
- A significant disruption of air commerce could occur if the petition were not granted.
- The FAA has granted many exemptions for the carriage of supernumeraries on freighter airplanes, and allowed them access to a Class E cargo compartment in-flight under certain conditions.

While the petitioner did not request relief from the requirements of § 25.857(e), which allows only the carriage of cargo when a Class E cargo compartment is installed on the airplane, we added it to this exemption to permit the carriage of the supernumeraries. Class E cargo compartments are usually remote from the flight deck and encompass the entire interior of the airplane. The means of controlling fires that is required for a Class E cargo compartment is to starve the fire of oxygen. This is accomplished by shutting off the ventilating airflow, and may be enhanced by depressurizing the airplane and maintaining an altitude that will not support combustion. For this reason, only crewmembers are permitted on board such airplanes, and they are prohibited from entering the Class E cargo compartment 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.

The FAA has determined that, due to the method of controlling fire in Class E cargo compartments, the operator must determine that all supernumeraries (persons) on the airplane are

physically fit. All supernumeraries must also be briefed on the use of the emergency equipment. These limitations on the occupants are consistent with previous approvals and are included in this approval.

Incapacitated persons in the cargo compartment

Another safety concern is the removal of an incapacitated person from the cargo compartment. This concern is increased because the access means to the main-deck cargo compartment on this airplane is a ladder. The Boeing Company must develop procedures for the safe removal of an incapacitated person from the cargo compartment and provide these procedures to the airplane operator. This condition does not need to be combined with any other failure condition (i.e., only the normal flight condition needs to be considered).

Handholds

The purpose of the requirement for handholds in § 25.785(d) at Amendment 25-64 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 cargo airplane, we concur with the petitioner that an acceptable level of safety to protect against the hazard presented by turbulence will be provided by the crew-operated visual-alert system. This visual-alert system allows the crew to indicate, at the onset of turbulence, to supernumeraries in the cargo compartment that they must return to their seats. The visual alert must be recognized in the accessible areas of the Class E cargo compartment, and must indicate, during turbulence, that persons must return to their seats and secure (close) the smoke barrier door or curtain. The pre-flight briefing must explain this alert to the supernumeraries.

Smoke penetration

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 certain configurations may be approved that would 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 must 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 is concerned about preventing a hazardous quantity of smoke from entering 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 accounted for when demonstrating compliance with § 25.855(h)(2).

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

must return to their seats and secure the smoke barrier (i.e., close the door or curtain) in the event of a fire. The pre-flight briefing included an explanation of this alert to the supernumeraries.

Immediately available oxygen

The petitioner indicated that certain configurations may be approved that would allow the supernumeraries to enter the Class E cargo compartment in-flight to attend to animals or hazardous cargo. Section 25.1447(c)(1) requires an “immediately available” supply of oxygen for each supernumerary when the airplane is operating above 25,000 feet. To provide each supernumerary with an acceptable level of safety while they are in the Class E cargo compartment, each supernumerary must carry a portable oxygen bottle with a full-face oxygen mask upon entering the cargo compartment, as the petitioner proposed.

Protective breathing equipment for evacuation using the main-deck entry door

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, any supernumeraries in the Class E cargo compartment would not have this indication. As the number of supernumeraries accessing the Class E cargo compartment increases, and the duration of exposure increases, we must ensure a reasonable level of protection from smoke inhalation. Due to the unusual egress concerns presented by the Boeing Model 747’s ladder between the main deck and the upper deck, the petitioner proposed to require that a portable oxygen supply with mask be carried at all times while accessing the Class E cargo compartment. The FAA agrees.

The petitioner has proposed an aural and visual alerting system in the Class E cargo compartment and is providing the supernumeraries with portable walk-around oxygen bottles equipped with a full face mask. To ensure adequate hypoxia protection during non-sedentary use, the portable oxygen device(s) must meet the requirements for flightcrew oxygen equipment in § 25.1443(a) or (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. Since the portable oxygen equipment may also be used for protection from smoke in the event of a fire in the cargo compartment, the portable oxygen equipment must also meet the protective breathing equipment requirements in § 25.1439.

The portable oxygen units must still 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. We find 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.

Section 25.1447(c)(1) also requires 10 percent more oxygen masks than occupant seats. The intent is that children sitting on passengers’ laps, and flight attendants, will use these masks. Because neither children nor flight attendants will be on-board the airplane, installing 10 percent more oxygen masks is not required.

Supernumeraries must be trained regarding the location and use of oxygen equipment and the alerts that indicate the need to don oxygen equipment. The oxygen units must be sized adequately for continuous and uninterrupted use during worst-case flight duration following decompression.

Type and number of exits

Exemption no. 1870E incorrectly identifies the crew service door on the right side of the upper deck of the Model 747-400 as a Type I exit. This exit is the size of a Type I exit; however, this exit is not floor level. This exit has a step up from the floor to the exit, which is not allowed for Type I exits. The crew service door does qualify for a Type III exit rating. This change and correction are applicable to all types of operations under this exemption.

In reviewing the requirements of §§ 25.807(c)(1) and (c)(5), 25.809(f)(1), and 25.813(b) relative to the design of the Model 747-400F airplane and its intended operations, the FAA notes that these requirements, as well as related requirements, were intended to address flightcrew evacuations and passenger evacuations. They did not envision the category of occupant commonly known as “supernumeraries” or “persons” who are quasi-crewmembers possessing knowledge, training, and abilities beyond that expected of passengers.

Section 25.807(c)(1) and (c)(5), at Amendment 25-67, requires, for passengers, a minimum of a Type III exit on each side of the fuselage. The Model 747-400F is equipped on the right side with a Type III crew service door, which exceeds the noted requirement for the right side of the airplane. The other side of the fuselage does not have a similar door. However, an overhead hatch to the left of the centerline is located in the cockpit, and complies with flightcrew emergency exit requirements of § 25.805. A full demonstration of this means of egress, as required by § 25.805 and in accordance with § 25.803 procedures, was successfully conducted on a Model 747-200C airplane in 1973. The test subjects participating in that demonstration were intended to represent five flightcrew and three crewmembers. Statistical data for line flightcrew exists to validate the selection of representative flightcrew test subjects. However, since no such data are known to exist for crewmembers, the test results obtained are of limited usefulness. The degree of usefulness of those results decreases as the ratio of crewmembers increases, as is intended on the 747-400F. However, because this exemption is limited to eight total occupants, the test results are valid for this configuration.

Assist Means

Section 25.809(f)(1) requires that a self-supporting slide or equivalent must be provided to assist the occupants in descending to the ground for each passenger emergency exit located more than 6 feet from the ground. The Model 747-400F crew service door has an inflatable escape slide that is self-supporting with the landing gear extended. The overhead hatch is equipped with eight inertia reels and eight harnesses which were not envisioned by this requirement (for use by the six supernumeraries), but are considered by the FAA to be adequate for use by flightcrew and crewmembers, in accordance with the requirements of § 25.809(f)(2) at Amendment 25-47.

Section 25.809(f)(1)(i) requires that the assist means must be automatically deployed. This has been a certification requirement applicable to all Model 747 airplanes, and has been a subject of exemption no. 1870 as originally granted and as subsequently amended. However, none of the associated petitions or corresponding exemptions clearly indicate if exemption was sought from automatic deployment requirements, nor if one was granted. In any event, whether initially intended or not, the result has been that the majority of affected airplanes in service are equipped with manually deployed slides. No adverse experience has been reported with these manually deployed slides provided for specially trained crewmembers, which suggests the validity of a

determination at this point to continue to allow them. The FAA therefore concurs with the petitioner's arguments for continuing to allow manually deployed slides in lieu of automatically deployed slides. The manually deployed inertia reels for the overhead hatch are not considered to be subject to this requirement.

Section 25.809(f)(1)(ii) requires that the assist means must be automatically erected within 10 seconds after deployment is begun. Both the automatically and manually deployed escape-slide designs for the crew service door meet this requirement. The inertia reels do not erect, and are not considered to be subject to this requirement.

Section 25.809(f)(1)(iii) requires that the assist means must be of such length after full deployment that the lower end is self-supporting on the ground and provides safe evacuation of occupants to the ground after collapse of one or more legs of the landing gear. Neither design of the escape slides for the crew service door are self-supporting on the ground in all cases of gear collapse, and the inertia reels are too short to reach the ground in all cases of gear collapse. However, the escape means provided have been demonstrated to be effective at providing safe evacuation of occupants to the ground.

Section 25.809(f)(1)(iv) requires certain performance capabilities in 25-knot wind conditions. The petitioner has indicated that the 747-400F slides continue to comply with this requirement, as have slides on previously affected airplanes, and that it does not seek exemption from this requirement. Accordingly, the FAA is not addressing that requirement here.

Assist space

Section 25.813(b), requiring assist space for passenger evacuations, has not been addressed in the 747-400F design at either the crew service door or the overhead hatch. However, the FAA concurs with the petitioner that a dedicated assist space is not necessary at the crew service door for specially trained crewmembers, and adequate space has been demonstrated to be available in the cockpit for flightcrew to assist crewmembers in evacuating from the cockpit hatch.

Number of Supernumeraries

The FAA has previously granted exemptions for supernumerary in-flight access to the Class E cargo compartment, provided that certain conditions are met. These conditions have varied depending on the airplane design, the number of persons involved, the type of cargo permitted to be transported in the main-deck Class E cargo compartment, and the number of persons needed in the cargo compartment for the type of operations. We have divided access to the cargo compartment into three different types of operations:

1. Carriage of live animals requiring care and attention during flight, and associated material, only. No other cargo.
2. Cargo only. No live animals requiring care and attention during flight.
3. Carriage of live animals requiring care and attention during flight, and other cargo.

All large animals shipped by air need supernumeraries on board for their care and attention during flight because the carriage of large animals implies a potential risk due to the brute force they are capable of, which can endanger safety of flight. Horses are routinely shipped by air and

are one of the large animals that require care and attention during flight because of the brute-force issue. Also, horses shipped by air typically are high-value animals, and the owners and insurance policies require in-flight care and attention. An industry standard for the air transport of horses recommends one supernumerary (groom/handler) for every three or four horses. We agree that this recommendation is appropriate to ensure safety of flight.

In the first type of operation (live animals only), considering the size of the 747-400F airplane, there could be a large number of horses in the main-deck cargo compartment. As a result of the potential for a large number of horses or other large animals, an appropriate number of supernumeraries (grooms/handlers) would be required. We have granted exemptions in the past to allow larger numbers of supernumeraries access into the main-deck cargo compartment when animals are carried, than would be allowed for cargo-only operations. We have considered that live animals are less flammable than other types of cargo; therefore, we have allowed less-restrictive access for this type of cargo.

Regarding the second type of operation (cargo only), we have limited access into the cargo compartment to a maximum of three supernumeraries only. Three supernumeraries should be capable of addressing the access needs for the hazardous materials and valuable or perishable goods during flight. Therefore, the maximum number of supernumeraries allowed into the Class E cargo compartment to care/attend to hazardous cargo is three.

Concerning the third type of operation (live animals requiring care/attention during flight, and other cargo), we understand that this is the most common operation used for transporting horses. The addition of cargo to a live-animal carriage operation causes additional risk of exposure from the smoke and fumes of a fire. As the number of supernumeraries increases, and the duration of exposure increases, we must ensure a reasonable level of protection from smoke inhalation. Several factors are considered when making a determination for the acceptable level of safety. Past industry practice, the number of supernumeraries with access, the airplane configuration, cargo compartment size, limited egress paths, potential cargo present, and the duration of exposure are all relevant factors. We accept the petitioner's proposal for allowing a maximum of six supernumeraries into the main-deck Class E cargo compartment during flight for the care and attention of live animals and to inspect the other cargo.

The FAA's decision

In consideration of the foregoing, I find that a 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 Administrator, I grant the Boeing Company an exemption from 14 CFR 25.785(d), 25.807(c)(1) and (c)(5), 25.809(f)(1), 25.813(b), 25.857(e), and 25.1447(c)(1). The petitioner must meet the requirements of § 25.1447(c)(1) as it applies to the supernumerary seating area. This exemption is granted to the extent necessary to allow type certification of Boeing Model 747-400F airplanes with provisions for the carriage of supernumeraries.

This exemption is subject to the following conditions and limitations:

1. A maximum of 6 supernumeraries may occupy the area just aft of the flight deck. The total maximum occupancy of the airplane is limited to 8 persons, including the flightcrew, depending on the operational type.

2. The following limitations must be documented in the AFM:
 - a. A maximum of six supernumeraries, limited to the categories specified in § 121.583(a)(1) through (7), may occupy the area just aft of the flight deck.
 - b. The operator must determine that each supernumerary:
 - i. Is physically able and trained to accomplish the necessary emergency procedures.
 - ii. Has been trained in the use of the oxygen units, including making the determination whether oxygen is being delivered to the dispensing units.
 - c. Prior to each flight, a flight crewmember must brief each supernumerary on the following:
 - i. The use of the exits, including instructions to inspect the ground to determine whether a safe landing can be achieved before using an assist means and emergency equipment.
 - ii. The meaning of all alerts required by this exemption.
 - iii. That access to the cargo area below the smoke barrier is prohibited during taxi, takeoff, and landing.
 - d. During flight, each supernumerary must carry a portable oxygen unit whenever he or she is in the Class E cargo compartment.
3. Supernumerary Oxygen:
 - a. There must be at least one portable oxygen unit, with a full-face oxygen 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 either § 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 oxygen units must be located outside the cargo compartment (e.g., in the common area) except when in use in the Class E cargo compartment.
 - d. The portable oxygen units must be sized adequately for continuous and uninterrupted use during the 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 is readily accessible for the remainder of the decompression.
 - e. Because the petitioner has decided to provide the same alert for decompression, turbulence, and smoke/fire, the oxygen unit must meet the protective breathing equipment 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 to prevent any outward leakage causing significant increase in the oxygen content of the local ambient atmosphere (i.e., full-face mask type).

4. 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.
5. For the exits designated for supernumerary use, eight descent devices (inertia reels), and eight harnesses for use with the descent devices, must be provided. This condition does not apply to airplanes that retain the passenger-evacuation slide on the upper deck.
6. Alerting Requirements:
 - a. Visual alerts must be visible and recognizable in the accessible areas of the Class E cargo compartment at all occupant locations and orientations, during all expected operational conditions, including a rapid decompression where moisture in the air may condense.
 - b. The pre-flight briefing must explain the alert to the supernumeraries.
 - c. Decompression and Smoke/Fire Alerts:

An automatically activated aural and visual alerting system must be present and immediately recognizable in all accessible areas of the Class E cargo compartment to notify supernumeraries when to don oxygen masks, initiate flow to the masks, and immediately to return to their seats and ensure that the smoke barrier is secured (i.e., the door or curtain is closed).
 - d. 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.
7. Placards must indicate the following:
 - a. In-flight access is limited to the care and handling of animals and hazardous/perishable cargo only:

Max. 3 persons for cargo operations without live animals
Max. 6 persons for animal-carriage operations
 - b. Occupancy of the main-deck cargo compartment is prohibited during taxi, takeoff, and landing.
 - c. Each occupant must carry a portable oxygen bottle with full face mask when entering the main-deck cargo compartment.

- d. In the event of visual warning (i.e., lights flashing), return to seat on the upper deck.
 - e. In the event of aural warning, don oxygen mask and return to seat on the upper deck.
 - f. Smoking is not allowed within the cargo compartment.
 - g. The smoke barrier must be secured (i.e., the door or curtain must be closed) except when entering or leaving the cargo compartment.
 - h. The Class E cargo compartment must not be entered in case of fire or smoke being detected inside that compartment, except during evacuation.
8. The placards required by limitation 7 must be installed in a conspicuous location in the supernumerary area on or adjacent to the access door to the cargo compartment.
9. Main-deck Class E cargo compartment access limitations:
- a. Access into the main-deck Class E cargo compartment in-flight is allowed for the following three types of operation:
 - i. Carriage of live animals requiring care and attention during flight, and associated material only. No other cargo.
 - ii. Cargo only. No live animals requiring care and attention during flight.
 - iii. Carriage of live animals requiring care and attention during flight, and other cargo.
 - b. The maximum number of supernumeraries allowed in the main-deck Class E cargo compartment is six for animal carriage and three for cargo operations with no animal carriage.

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/s/

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