



DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No. FAA-2024-0190; Special Conditions No. 25-877-SC]

Special Conditions: The Boeing Company, Boeing Model 747-8 Series Airplane; Short-Term Occupancy of Lower Lobe During Flight and Installation of Stairway Between Main Deck and Lower-Lobe

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final special conditions.

SUMMARY: These special conditions are issued for the The Boeing Company (Boeing) Model 747-8 series airplane. This airplane, as modified by Boeing, will have a novel or unusual design feature when compared to the state of technology envisioned in the airworthiness standards for transport category airplanes. This design feature is the installation of stairs for flightcrew to access the forward and aft lower lobe compartments during flight. These compartments will have two main functions: storage of service items and that of a Class C cargo compartment. The applicable airworthiness regulations do not contain adequate or appropriate safety standards for this design feature. These special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

DATES: Effective [INSERT DATE 30 DAYS AFTER PUBLICATION IN THE *FEDERAL REGISTER*].

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SUPPLEMENTARY INFORMATION:

Background

On July 2, 2018, Boeing applied for a supplemental type certificate (STC) for the installation of stairs for inflight flightcrew to access the forward and aft lower lobe compartments that will have two main functions: access of service items that have been stored and that of a Class C cargo compartment in the Model 747-8 series airplane. The modified Boeing Model 747-8 series airplane, which is a derivative of the Model 747-8F series airplane currently approved under Type Certificate No. A20WE, is a four-engine, transport category airplane with a VIP interior configuration, not for common carriage, seating for 93 passengers and 15 flightcrew, and a maximum takeoff weight of 987,000 pounds.

Type Certification Basis

Under the provisions of title 14, Code of Federal Regulations (14 CFR) 21.101, Boeing must show that changes to the Boeing Model 747-8 series airplane, as changed, continues to meet the applicable provisions of the regulations listed in Type Certificate No. A20WE or the applicable regulations in effect on the date of application for the change, except for earlier amendments as agreed upon by the FAA.

If the Administrator finds that the applicable airworthiness regulations (e.g., 14 CFR part 25) do not contain adequate or appropriate safety standards for the Boeing Model 747-8 series airplanes because of a novel or unusual design feature, special conditions are prescribed under the provisions of § 21.16.

Special conditions are initially applicable to the model for which they are issued. Should the applicant apply for an STC to modify any other model included on the same

type certificate to incorporate the same novel or unusual design feature, these special conditions would also apply to the other model under § 21.101.

In addition to the applicable airworthiness regulations and special conditions, the Boeing Model 747-8 series airplanes must comply with the exhaust-emission requirements of 14 CFR part 34, and the noise-certification requirements of 14 CFR part 36.

The FAA issues special conditions, as defined in 14 CFR 11.19, in accordance with § 11.38, and they become part of the type certification basis under § 21.101.

Novel or Unusual Design Feature

Certain Boeing Model 747-8 series airplanes will incorporate the following novel or unusual design feature:

The installation of stairs for flightcrew to access the forward and aft lower lobe compartments during flight. The compartments will have two main functions: storage of service items and that of a Class C cargo compartment.

Discussion

Existing regulations address service areas and Class C cargo compartments independently, but do not address compartments that have both uses. A service compartment can be occupied, and a Class C cargo compartment cannot. Further, firefighting is dealt with differently in each compartment. The crew fights a fire in a service compartment and a flooding suppression system is used to fight a fire in a Class C cargo compartment.

The special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

Discussion of Comments

The FAA issued Notice of Proposed Special Conditions No. 25-24-01-SC, for the Boeing Model 747-8 airplane airplane, which was published in the *Federal Register* on November 29, 2024 (89 FR 94620).

The FAA received one response, from an individual. The commenter recommends that the FAA clarify in the final special conditions whether there will be a suppression system in the service compartment or if the crew is to fight a fire in this area.

There will be a fire suppression system in the service compartment. As explained in the Notice of Proposed Special Conditions, this project modifies the lower lobe forward and aft Class C cargo compartments to function as storage of service items (also known as the service area in this document) that can be used during flight, and for other cargo or baggage that is the traditional function of a Class C cargo compartment. The service areas are within the Class C cargo compartments and as such, these service areas must be covered by the Class C cargo compartment built-in fire extinguishing or suppression system per 14 CFR 25.857(c)(2).

In addition, these special conditions address only the aspects of this novel or unusual design feature that were not envisaged by the current airworthiness standards for transport category airplanes. All other applicable regulations for transport category airplanes apply to this project and are not included in these special conditions. For example, Class C cargo compartments are required to incorporate an approved built-in fire extinguishing or suppression system controllable from the cockpit per 14 CFR 25.857(c)(2).

Further, Title 14 CFR 91.505(b) requires that crewmembers must be familiar with emergency equipment and with the procedures for the use of that equipment in an emergency situation (e.g., fighting a fire in an area on the airplane as appropriate for such action, such as the cabin, a galley, etc.). Those procedures are required by

14 CFR 121.135 to be included in applicable crew manuals for all flight crew and cabin crew members on transport category airplanes and are required for certification.

Therefore, the FAA did not include those regulations or include the associated actions in these special conditions.

The commenter also recommends that "... the procedure for dealing with a fire that spreads across the entire lower lobe should be clarified. If a fire starting in the cargo hold were to spread to the service compartment before fire door activation and suppressant release in the cargo area, the flight crew could be unnecessarily endangered by having to re-enter the lower lobe and fight the spread of the fire after the suppressant was released in the cargo area."

The FAA concurs that normal, abnormal, and emergency procedures must be provided as required in 14 CFR 25.1585, 121.133 and 121.135. However, these procedures are developed upon completion of a failure hazard assessment and system safety evaluations that consider the likelihood of the event occurring (i.e., the probability of the failure/fire scenario).

Historically, the FAA has considered the likelihood of multiple fires in separate compartments on a transport category airplane to be extremely improbable. The lower lobe Class C cargo compartments are physically separate from each other and from the access stairwell.

The boundaries of the Class C cargo compartments (i.e., composed of liner material and hardwall surfaces) must meet the flammability and heat resistance requirements in 14 CFR 25.855 and Appendix F. The FAA finds that these requirements are appropriate based upon in-service experience. Access doors are provided for each Class C cargo compartment in this airplane design and those access doors must meet the requirements in 14 CFR 25.855.

In addition, the crewmembers who access the lower lobe Class C cargo compartments are required to be trained and expected to follow procedures that ensure the access doors must remain closed except when a crewmember is entering or exiting the compartment. For the reasons explained above, the FAA finds that the scenario the commenter describes is extremely improbable, and did not change these special conditions as a result of this comment.

Applicability

As discussed above, these special conditions are applicable to the Boeing Model 747-8 airplanes as modified by Boeing. Should the applicant apply for a STC to modify any other model included on the same type certificate to incorporate the same novel or unusual design feature, these special conditions would apply to the other model as well.

Conclusion

This action affects only a certain novel or unusual design feature on one model; Boeing Model 747-8 series of airplanes. It is not a rule of general applicability and affects only the applicant who applied to the FAA for approval of these features on the airplane.

List of Subjects in 14 CFR Part 25

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

Authority Citation

The authority citation for these special conditions is as follows:

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

The Special Conditions

Accordingly, pursuant to the authority delegated to me by the Administrator, the following special conditions are issued as part of the type certification basis for the Boeing Model 747-8 series airplane.

Requirements specific to lower lobe access

(a) Alerts and indications are required in the lower lobe compartments to indicate decompression, smoke/fire detection, and the need to return to one's seat. The definition for alert categorization must be consistent with 14 CFR 25.1322.

(1) There must be a flight deck indication to advise the flightcrew when the lower lobe service/cargo compartment(s) are occupied. The indication must be accompanied by a placard or message in the flight deck indicating someone is in the lower lobe compartment(s). The flight deck indication must be initiated automatically when the compartments become occupied, without input from the occupying flightcrew other than required to gain access. The flight deck indication must be canceled automatically when the compartment(s) are no longer occupied, and the means of access is returned to the unoccupied configuration.

(i) There must be flight deck indication to advise the flightcrew that the in-flight accessible doors to the lower lobe compartments are closed prior to initiation of the fire suppression system.

(2) There must be an "on/off" visual alert light located outside and on or near the access doors to each lower lobe service/cargo compartment with a placard stating, "When light is illuminated entrance is prohibited" (or similar words). The alert is to be automatic in the event of decompression, smoke/fire detection or anytime the compartment visual alerting system is activated.

(3) A flightcrew operated visual alerting system, which is recognized in accessible areas within the lower lobe compartment(s), must be installed to indicate, during turbulence, that persons must return to their seats. Appropriate procedures and limitations (if required) must be established to ensure that the flightcrew alerting systems notify the occupants to return to their seats at the onset of turbulence and prior to taxi, takeoff and landing.

(4) An automatically activated aural and visual decompression alerting system must be present and immediately recognizable in accessible areas of the lower lobe compartments to notify occupants when to don oxygen masks.

(5) An automatically activated aural and visual alerting system, which is recognized in the lower lobe compartment(s), must be installed. This aural and visual alerting system is to indicate that, in the event of smoke detection in the lower lobe compartment(s), persons must don their oxygen masks and initiate oxygen flow, exit the compartment, ensure that the door is closed (smoke barrier) and that communication with the flight deck is established. Entry must not be allowed during flight after release of fire suppressant.

(6) These alerting requirements must be distinctive and effective, and:

(i) Visual alerts must be visible from all occupant locations during all expected operational conditions including a rapid decompression where moisture in the air may condense.

(ii) 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.

(iii) If there are two or more alerts that an occupant may hear or is expected to respond to, there must be an automatic visual alert in addition to the automatic aural alert. There must be 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).

(b) Placards

(1) There must be appropriate placards installed inside and outside each access door to the lower lobe compartment(s) to indicate:

(i) The maximum number of occupants allowed, or number of occupants required, as applicable to the compartment.

- (ii) Occupancy is restricted to crewmembers trained in the procedures of the lower lobe compartment(s).
 - (iii) Occupancy is prohibited during taxi, takeoff, and landing, and whilst the fire suppression system is activated.
 - (iv) The access door must remain closed except when someone is entering or exiting the compartment.
 - (v) Occupancy of the compartment should be of minimum duration.
 - (vi) Anyone entering the lower lobe compartment(s) during flight must carry portable oxygen equipment for the entire time that they are in the compartment.
- (2) There must be appropriate placards located conspicuously on or near each lower lobe compartment exit defining the location and operating instructions for each evacuation route. Placards must be readable from a distance of 30 inches under emergency lighting conditions.
- (3) There must be a placard located adjacent to the visual alert light required by condition (a) (2) of these special conditions that state, "When light is illuminated, entrance is prohibited" (or similar words).
- (4) In addition to the above special conditions, the following additional placards must be included for an electronics equipment (E/E) Bay:
- (i) No stowage allowed within an E/E Bay.
 - (ii) In-flight access for panels/cabinets not designed to be used in-flight is prohibited.
 - (iii) Provided the section (g) in-flight maintenance requirements in instructions for continued airworthiness (ICA) are met, placarding must declare that "Entrance is prohibited except by permission of the pilot in command" (or similar words).
 - (iv) "Access is not permitted during flight" if the in-flight maintenance requirements in ICA section (g) are not met.

(v) A placard must be installed on all access panels and doors within lower lobe compartments prohibiting use of those that are not intended for use in flight.

(c) Equipment: In lieu of that required by §§ 25.819, 25.851(a), 25.1439(a) and 25.1447(c) the following equipment is required:

(1) There must be a portable oxygen bottle with mask attached to it meeting the requirements § 25.1439(b)(1), (b)(2)(i) and (b)(4) for each crewmember occupying the lower lobe compartment(s). The equipment must be mounted outside each access door to the lower lobe service/cargo compartment(s). 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). A portable oxygen bottle must be carried by each crewmember who is occupying the lower lobe service/cargo compartment. The portable oxygen bottle must also meet the minimum performance requirements of § 25.1443(a) or (b), or the equipment must be shown to protect the occupant from hypoxia at an activity level required to return to a seat on the main deck where oxygen is available following a rapid decompression.

(2) In addition to the emergency illumination required by § 25.819(a), at least two flashlights, each equipped with a locator light, must be provided. One flashlight must be located adjacent to each emergency exit and entrance in the lower lobe compartment(s).

(3) In addition to the evacuation route requirements of § 25.819(a), all entrances and exits from the lower lobe service/cargo compartment must be capable of being closed after entering and exiting and, after closing, must prevent hazardous quantities of smoke, flames, or fire suppressant agent from entering any compartments occupied by passengers or crew and must prevent loss of fire suppressant agent when activated.

(4) In lieu of the emergency equipment required by §§ 25.851(a) and 25.1439(a), when the procedures allow for a single occupant in a potential “dead end” volume further than

5 feet from an exit in the lower lobe compartment(s) there must be a readily accessible fire extinguisher, appropriate to the types and kinds of fires that may occur.

(5) A means must be in place to preclude anyone from being trapped inside the lower lobe compartment(s). If a locking mechanism is installed in the door, it must be capable of being unlocked from the either side of the door without the aid of any tools.

(6) A means must be in place to restrict access and prevent inadvertent damage to critical aircraft systems and equipment located within the compartment during flight.

(7) There must be a means to communicate with the flight deck from within the E/E Bay.

(d) Training: Training manuals and training must include:

(1) Use and actions associated with aural and visual alerts and placards specified herein.

(2) Entering and exiting the lower lobe compartment(s), including emergency exiting.

(3) Checking the oxygen bottle pressure for adequacy prior to entering the lower lobe service/cargo compartment.

(4) Carrying the oxygen bottle when entering the lower lobe compartment(s) and using the bottle in emergency situations.

(5) Maintaining exit path aisle and access for the evacuation routes.

(6) Identification of equipment related hazards such as the potential for electric shock and burns.

(7) Limiting the occupancy for duration of the required tasks.

(e) Procedures

(1) A procedure must be established to ensure that the appropriate actions are taken in the event of smoke/fire detection. These actions are to include evacuation of the lower lobe compartments if occupied, communication with flight deck, determination of the event severity and the closure of the compartment doors for compartment sealing. These actions ensure the fire barriers (i.e., doors) are closed prior to release of fire suppressant agent in the cargo compartments. Reentry into the lower lobe service/cargo compartments

after a smoke/fire detection event would only be allowed by the pilot in command, via controlled procedures.

(2) A procedure must be established to ensure that required equipment, such as portable oxygen, fire extinguishers, protective breathing equipment, and warning light are functional prior to takeoff.

(f) Limitations of Special Condition

(1) An FAA approved cabin crew manual requiring the cabin crew verify the lower lobe compartment(s) are not occupied during taxi, takeoff, landing, or after fire suppression activation must be created. The cabin crew manual must include instructions for allowing access; procedures for fire/smoke detection/firefighting; procedures for decompression. The cabin crew manual must be specified by the master drawing list and called out on the description of type design change section of the STC.

(2) The airplane flight manual (AFM) supplement must include instructions for: allowing access; procedures for fire/smoke detection/firefighting; and procedures for decompression.

(3) The weight and balance manual must include cargo loading restrictions to maintain escape paths.

(g) Instructions for Continued Airworthiness (ICAs)

(1) The ICAs must contain appropriate procedures to ensure maintenance can be safely accomplished in-flight.

(i) The ICA supplement must contain instructions that highlight the special considerations associated with in-flight maintenance. This content includes any assumptions or requirements for compliance with §§ 25.1309, 25.1360, 25.1529 and 25.1721.

(ii) The ICAs must establish an appropriate foreign object damage (FOD) control process for performing maintenance in-flight. The hazards associated with FOD may be mitigated by design and existing FOD control processes.

(iii) The ICAs must establish an appropriate lock-out/tag-out procedure for performing maintenance in-flight. A new single lock-out/tag-out procedure may be created for both ground and flight.

Requirements specific to the stairway

(h) The stairway must have essentially straight route segments with a landing at each significant change in segment direction.

(i) The stairway must have essentially rectangular treads.

(j) The stairway must accommodate the carriage of an incapacitated occupant from the lower deck to the main deck. The crewmember procedures for such carriage must be established and included in the AFM.

(k) In normal operation, the general illumination level must not be less than 0.05 foot-candles when measured along the center lines of each tread and landing.

(l) The stairway must have a handrail on at least one side to allow occupants to steady themselves during moderate turbulence in flight. The handrail(s) must be constructed so there is no obstruction on them that will cause the user to release his/her grip or hinder the continuous movement of the hands along the handrail. The design must accommodate the stature of a 5th percentile female and a 95th percentile male.

(m) The public address system must be intelligible in the stairway during all flight phases.

(n) "Return to seat" signs must be installed and visible in the stairway both going up and down and at the stairway entrances.

(o) Appropriate placards must be located outside each main deck entrance to the lower lobe access stairs to indicate:

- (1) The maximum number of occupants allowed in flight.
- (2) Occupancy during flight is restricted to crewmembers that are trained in the procedures for the lower lobe compartments.
- (3) Occupancy is prohibited during taxi, take-off, and landing.
- (4) The stowage of cargo or passenger baggage is not allowed in the stair enclosure. This placard is also required at each stair landing.
- (p) Passengers must be prevented from entering the stairway in the event of an emergency or when no flight attendant is present.
- (q) The means required by condition (p) must be capable of being quickly opened from inside the stairway, even when crowding occurs at the passenger cabin side of the stair entrance.
- (r) A means must be in place to preclude anyone from being trapped inside the stairway. If a locking mechanism is installed, it must be capable of being unlocked from either side without the aid of tools.
- (s) There must be appropriate placards conspicuously located as follows:
 - (1) Inside the stairs on or near each exit to the main deck defining the operating instructions for the door.
 - (2) On the cabin side, when the door is closed, no higher than 4 feet from the floor, indicating that the door is not an emergency exit.
- (t) For the placards required by condition (s) the following applies:
 - (1) Placards must be readable from a distance of 30 inches under emergency lighting conditions.
 - (2) Placards must be illuminated to at least 160 micro-lamberts under emergency lighting conditions.
- (u) There shall be a means (visible and audible) to notify an occupant of the stairway of the need to don supplemental oxygen equipment in the event of a decompression. The

aural and visual alerts must activate before the cabin pressure altitude exceeds 15,000 feet.

(v) A means must be available, in the event of failure of the airplane's main power system, or of the normal stairway lighting system, for emergency illumination to be automatically provided in the stairway.

(1) This emergency illumination must be independent of the main lighting system.

(2) The sources of general illumination may be common to both the emergency and the main lighting systems if the power supply to the emergency lighting system is independent of the power supply to the main lighting system.

(3) Emergency illumination must be provided so that, when measured along the centerlines of each tread and landing, the illumination is not less than 0.05 foot-candles.

Issued in in Kansas City, Missouri, on June 4, 2025.

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