Exemption No. 11008

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

In the matter of the petition of **Flight Structures, Inc.** for an exemption from § 25.813(e) of Title 14, Code of Federal Regulations	**Regulatory Docket No. FAA-2014-0102**

GRANT OF EXEMPTION

By letter A14-18LTR, dated February 17, 2014, Ms. Sue McCormick, Certification Supervisor, Flight Structures, Inc. (FSI), 6330 31st Avenue NE, Marysville, Washington 98271, petitioned the Federal Aviation Administration (FAA) for an exemption from the requirements of § 25.813(e) of Title 14, Code of Federal Regulations (14 CFR). This exemption would permit the installation of doors on mini-suites in the upper-deck passenger compartment of Boeing Model 747-400 series airplanes.

The petitioner requests relief from the following regulations:

> **Section 25.813(e), Amendment 25-46 –** No door may be installed between any passenger compartments.

The petitioner supports its request with the following information:

This section quotes, in pertinent part, the petitioner's request, with minor edits for clarity. 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 2014-0102.

> **Extent of relief Being Sought and Reasoning:**
>
> The purpose of the request for exemption is to permit the installation of six mini-suites on the upper deck of certain Boeing Model 747-400 series aircraft. The doors that are provided on the mini-suites require that FSI receive the requested exemption from 14 CFR 25.813(e), Amendment 25-46 for the installation. This regulation requires that "no door may be installed in any partition between passenger compartments."

Operators are requesting FSI to install mini-suites in a cabin of a Boeing 747-400 series aircraft. The mini-suites consist of a seat, credenza assembly, and passenger entertainment system. The seat is proposed to be occupied for taxi, takeoff, and landing and will be surrounded by a partial height partition and sliding door to provide the occupant with additional comfort.

Description of the Issue and Historical Supporting Information:

Following accident experience in the 1960's, the Federal Aviation Administration (FAA) amended 14 CFR Part 25, in Amendment 25-1, to prohibit installation of doors "between passenger compartments." At the time of the amendment, it was common practice to divide first class and tourist class cabins with a solid door. It was determined in the course of accident investigations that this door could be detrimental in evacuation of passengers. The resulting regulation change was geared specifically at preventing this occurrence.

For many years the FAA has been granting exemptions for installation of doors between passenger compartments for non-commercially operated transport category airplanes. These exemptions include limitations that the airplanes are not operated for hire or offered for common carriage. This limitation does not preclude the operator from receiving remuneration to the extent consistent with 14 CFR 125 and 91, subpart F. Also, these exemptions included the following conditions:

1. Each door between passenger compartments must be frangible.
2. Doors must be in the open position during taxi, takeoff, and landing.
3. Appropriate procedures must be established to signal the flight crew that a door between passenger compartments is closed and to prohibit takeoff or landing when a door between passenger compartments is not in the proper position.
4. Doors between passenger compartments must have dual means to retain them in the open position, each of which must be capable of withstanding the inertia loads specified in § 25.561.

Additionally, on May 8, 2009, the FAA amended the airworthiness standards for transport category airplanes by adding new interior criteria for operators of private use, not for hire, not for common carriage airplanes. Special federal aviation regulation (SFAR) 109 provides alternate criteria for transport category airplanes that are operated for private use while continuing to provide an acceptable level of safety for those operations. Specifically, item 10 permits the following requirements in lieu of the requirements of § 25.813(e).

a. Each door between any passenger seat, occupiable for taxi, takeoff, and landing, and any emergency exit must have a means to signal to the flightcrew, at the flight deck, that the door is in the open position for taxi, takeoff, and landing.
b. Appropriate procedures/limitations must be established to ensure that any such door is in the open configuration for takeoff and landing.
c. Each door between any passenger seat and any exit must have dual means to retain it in the open position, each of which is capable of reaching the inertia loads specified in § 25.561.
d. Doors installed across a longitudinal aisle must translate laterally to open and close, e.g., pocket doors.

e. Each door between any passenger seat and any exit must be frangible in either direction.
f. Each door between any passenger seat and any exit must be operable from either side, and if a locking mechanism is installed, it must be capable of being unlocked from either side without the use of special tools

The installation of mini-suites on a variety of aircraft have been acceptable for common carriage and the mini-suites proposed to be installed by FSI are similar in design and function to those previously installed. FSI proposes the following list of compensating features:

1. Installation of mini-suites on the Boeing Model 747-400 upper deck reduces occupancy in a given area by a factor of 6. All other things being equal, reduction in the total number of occupants in a given part of the cabin is an enhancement to safety.
2. Only single occupancy is allowed during taxi, takeoff, and landing.
3. Mini-suite entrance can only provide access to the specific mini-suite.
4. Mini-suites cannot provide an egress path for evacuation other than the path out of the mini-suite for its single occupant.
5. Installation of mini-suites must not introduce any additional deterrents to evacuating passengers, even from other parts of the cabin.
6. Mini-suites doors must be open during taxi, takeoff, and landing.
7. Hold open retention mechanisms for mini-suite doors must hold doors open under § 25.561(b) emergency landing loads.
8. There must be a secondary, backup hold open retention mechanism for mini-suite doors that can be used to “lock” doors in the open position if there is an electrical or mechanical failure of the primary retention mechanism. The secondary retention mechanism must hold the doors open under § 25.561(b) emergency landing conditions.
9. Appropriate placards, or other equivalent means must be provided to ensure mini-suite doors are in the open position for taxi, takeoff, and landing.
10. Training and operating instruction materials regarding proper configuration of mini-suite doors for taxi, takeoff, and landing must be provided to the operator for incorporation into their flight attendant’s training programs and appropriate operational manuals.
11. A dual means of egress out of mini-suites must be provided such that either egress path can accommodate the range of occupants from 5th percentile female to 95th percentile male. One such means of providing an egress path is installation of a pair of sliding doors in the mini-suite entrance. The doors must translate longitudinally in opposite direction, fore and aft. This ensures that in the event of a retention failure, only one of the mini-suite doors will be closed. That is, inertial loads that tend to force one door in the closed position act to force the opposite door to the open position.
12. The height of the mini-suites walls and doors must be such that a 95th percentile male can fit between them and the airplane’s interior furnishings. An evacuation demonstration is required showing that a 5th percentile female and a 95th percentile male will be able to exit the mini-suite in the event both doors are closed and unopenable. The demonstration must be conducted for each different mini-suite layout.
13. No mechanism to latch doors together in the closed position is allowed.
14. Mini-suite doors must be openable from the inside and outside with 25 pounds force or less regardless of power failure conditions.

15. If mini-suite doors are electrically powered, the doors must remain “locked” in the open position after power loss to the mini-suite.
16. Mini-suite installations must maintain required main aisle, cross aisle, and passageways.
17. Mini-suite doors must not impede main aisle or cross aisle egress paths in the open, closed or translating position.
18. Mini-suite doors must be openable even with a crowded aisle.
19. An additional flight attendant above the minimum required by applicable operating rules, whose primary duty during taxi, takeoff, and landing is necessary to ensure that mini-suite doors are properly latched in the open position.
20. Each mini-suite door must have a discrete hold-open mechanism that cannot be easily misused by a seated, belted occupant of the mini-suite. These hold-open mechanisms must be engaged for taxi, takeoff, and landing.
    a. For electrically operated doors this could be a deactivation switch for the door(s) closing mechanism. It would be the additional flight attendant’s duty to deactivate mini-suites doors for taxi, takeoff, and landing.
    b. For mechanical doors this could be a latching mechanism that cannot be easily activated by a seated, belted occupant of the mini-suite. It would be the additional flight attendant’s duty to engage these latches for taxi, takeoff, and landing.

Statement of Public Interest:

The petition for exemption is essentially an alternative method of achieving an appropriate level of safety, as previously documented for the Boeing 777 aircraft; however, the incorporation of mini-suites allows operators to provide attractive features for the flying public. Mini-suites installed on commercial aircraft are being requested by an increasing number of aircraft operators consistent with cabin interiors that already have similar mini-suite designs approved on their products. Customers want a consistent cabin operation and passengers experience across their fleet, and will continue to require mini-suite additions which have doors. The ability to provide mini-suites will expand sales for operators and aircraft modifiers which seek approval by supplemental type certificates. This in turn will expand sales for modifiers which will benefit the economic health of the United States. This serves the public interest by serving economic interests of the United States.

Statement of No Adverse Effect on Safety or Level of Safety at Lease Equal to the Rule:

Based on the design of the mini-suites and additional systems and operational procedures which will be in-place (ref: ELOS Memo PS05-0272-C-1), these features will ensure that the mini-suites will be, and remain, open for taxi, takeoff, and landing such that the safe evacuation of any occupant will not be compromised due to the doors.

Request to exercise privileges of exemption outside the U.S.:

Per 14 CFR 11.81(h), FSI requests that the privileges of this exemption be extended outside the United States. This extension of privileges is necessary for operations based within foreign countries having bilateral agreements with the United States accepting FAA

14 CFR Part 25 as their airworthiness standards for transport category aircraft. Similar interior modifications with mini-suites installed are intended for the global market place.

Request for Wavier of Publication:

FSI requests that the public comment period be waived since this request is identical in all material aspects to several previously granted exemptions for which no comments were received and if the petition for exemption were granted, would not set a precedent. Additionally, FSI wished to start modification of aircraft shortly and any delay in acting on this petition would be detrimental to the company.

***Federal Register* publication**

The FAA found good cause not to publish this petition in the *Federal Register* for public comment for the same reasons stated by the applicant.

The FAA's analysis

The FAA considers the petitioner's proposal to be in the public interest for the following reasons:

- As with most wide-body aircraft, the 747-400 is to be used primarily on long-haul routes. On flights lasting upwards of 14 hours, operators desire to provide the traveling public with a very high level of comfort and care, and the ability to install mini-suites with doors is an integral part of that goal.

- A majority of the flying public will see benefit from lower ticket prices. Very often, premium-class passengers will pay for a very high level of comfort and care on long-haul flights. Accordingly, aircraft operators strongly prefer to configure their cabins in such a way that the special needs of these premium-class passengers can be met. One of the most popular configurations requested by a wide array of operators is mini-suites with doors. The ability to offer mini-suites with doors as part of the passenger experience allows the operators to generate additional revenue beyond that which would be available with more conventional seat solutions, allowing the opportunity to further reduce the cost of economy class travel. [Premium cabin seats account for 40-60% of an operator's revenue compared with 15-27% of total number of seats per flight. Source: NY Times 11/20/2011].

- Grant of exemption as requested in this petition is in the best interest of the travelling public through introduction of this new product, which has an advanced certification basis, into the marketplace. Enabling common operating procedures across a fleet not only keeps operating cost down as noted above, but avoids the potential for human error that may be introduced when procedures vary substantially for similar products. For the reasons noted above, it is the petitioner's opinion that the overall level of safety is improved, which is in the public's best interest.

Following accident experience in the 1960s, the FAA amended 14 CFR part 25, in Amendment 25-1, to prohibit the installation of doors "between passenger compartments." At the time of the amendment, it was common practice to divide the first-class and tourist-class cabins with a solid

door. It was determined in the course of accident investigations that this door could be detrimental in evacuation of passengers. The resulting regulatory change was specifically intended to prevent this occurrence.

Until recently, part 25 allowed the installation of doors between an emergency exit and passenger seats. Amendment 25-116 to part 25 prohibits interior doors between the exit and passenger seats. In addition, 14 CFR 121.310(f)(6), Amendment 121-306, prohibits these doors in airplanes manufactured after November 27, 2006, operated under 14 CFR part 121. Amendments 25-116 and 121-306, titled "Miscellaneous Cabin Safety Changes," were published in the Federal Register on October 27, 2004 (69 FR 62788). FSI did not petition for an exemption from the requirements of § 121.310(f)(6).

The FAA granted an equivalent-level-of-safety (ELOS) finding for the Boeing Model 777 series airplanes for § 25.813(e). The certification basis of the Boeing 777 series airplanes does not include Amendment 25-116 to part 25. For that reason, when Boeing proposed the installation of mini-suites configured with doors for Boeing 777 series airplanes, the FAA found good cause to grant an ELOS finding. Since the FAA granted that ELOS finding for the Boeing Model 777 series airplanes for § 25.813(e), we have reconsidered the approach needed to allow the installation of doors on mini-suites. We have determined that the exemption route is the appropriate method for allowing the installation of doors on mini-suites.

For many years, the FAA has been granting exemptions for the installation of doors between passenger compartments for non-commercially operated transport-category airplanes. These exemptions include limitations that the airplanes are not operated for hire or offered for common carriage. This limitation does not preclude the operator from receiving remuneration to the extent consistent with 14 CFR parts 125 and 91, subpart F. Also, these exemptions include the following conditions:

1. Each door between passenger compartments must be frangible.

2. Doors must be in the open position during taxi, takeoff, and landing.

3. Appropriate procedures must be established to signal the flightcrew that a door between passenger compartments is closed, and to prohibit takeoff or landing when a door between passenger compartments is not in the proper position.

4. Doors between passenger compartments must have dual means to retain them in the open position, each means of which must be capable of withstanding the inertia loads specified in § 25.561.

Several operators of small transport airplanes and Boeing Business Jets (BBJ) have requested that these exemptions be expanded to include commuter and on-demand operations under 14 CFR part 135. In all of these cases, the FAA has not accepted the operators' requests. When the small transports and the BBJs are operated under part 135, the doors between the passenger compartments must be removed from the type design of the airplane.

Additionally, the FAA has granted several ELOS findings for small transport airplanes (e.g., Cessna, Dassault), typically 19 or fewer passenger seats, where the lavatory is occupied for taxi,

take-off, and landing. These findings were limited to one additional passenger to the total passenger-seating configuration because these sizes of airplanes have only a single lavatory. The following conditions were levied in addition to the certification requirements for the airplanes:

1. There must be an egress panel installed in the door. The emergency egress panel can be removed easily by either the occupant of the lavatory or another person in the cabin even when the door is jammed from fuselage distortion.

2. The size, location, and wording of the placarding must clearly indicate that the door must be in the open position during taxi, takeoff, and landing.

3. Egress of the lavatory occupant must not be hampered, considering both the space in which the occupant can maneuver within the lavatory, and the width of the emergency panel.

4. The means to secure the door open must be easily used, reliable, and strong enough to withstand crash loads. The door, including the frangible panel and the door-attachment hardware, must also be strong enough to remain intact under crash loads.

The use of doors on mini-suites differs from previous applications where doors have been limited to private use in several ways. First, the installation of mini-suites necessarily reduces the passenger capacity of the airplane, which has the effect of increasing the evacuation capability of the airplane overall. Second, each mini-suite is designed for a single occupant, so no other passenger is affected. By limiting the mini-suite to one occupant, and by restricting the egress routes to permit only one way in and out of the mini-suite, the potential for confusion or inadvertent blockage of the evacuation route for any individual is reduced. Third, the passenger controls the position of the door, so is not dependent on the actions of another passenger to maintain egress capability. Lastly, as part of the limitations of this exemption, additional crewmembers will be required, whose primary duty will be to ensure that the mini-suite doors are positioned correctly for taxi, takeoff, and landing.

The preamble to Amendment 25-116 cited safety risks that justified the prohibition against interior doors:

> It was determined in the course of accident investigations that this door could be detrimental in evacuation of passengers, who tended not to recognize that there was an exit beyond the door, even if it were the closest available…. Should such a door (either through omission or mechanical failure) become jammed in the event of an emergency evacuation, persons could be prevented or delayed in evacuating which could result in fatalities or injuries that would not otherwise have occurred. The hazards associated with a jammed door are still present whether or not passengers are on both sides of the door, and the recognition factor has not been mitigated. Either could result in the same consequences—failure of some passengers to evacuate the airplane.

To prevent these cited safety risks and provide a level of safety at least equal to that provided by the rule, the limitations on this exemption will ensure the following:

- The doors to the mini-suites will remain in the open position in taxi, takeoff, and landing; can be opened easily if necessary; and will not interfere with evacuation of any other passenger.

- The mini-suite doors or walls are low enough that a 5th percentile female and a 95th percentile male will be able to exit the mini-suite in the event both doors are closed and unopenable.

- Failure modes associated with powered doors are correctly accounted for.

- Operational procedures are adequate, including training and information associated with the mini-suites, placards, and the need for additional flight attendants.

The fact that the exit is beyond the mini-suite door is easily recognized by the occupant, so that safety risk is not a factor in these mini-suites. Under the conditions and limitations of this exemption, the exemption is not limited to private use.

Due to security concerns following the events of September 11, 2001, the Transportation Security Administration (TSA) has required the removal of curtains that separate the different parts of the passenger cabins. TSA has allowed curtains that separate the galley area from the passenger area. One of the reasons they allow these curtains is that crew members, not passengers, occupy the galley area. At this time, it is unclear if TSA would accept doors installed on these mini-suites for airplanes used by operators subject to security-program requirements (e.g., 49 CFR 1544).

The FAA's decision

In consideration of the foregoing, I find that a 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, Flight Structures, Inc., is hereby granted an exemption from 14 CFR 25.813(e), Amendment 25-46. The petition is granted to the extent necessary to allow Flight Structure, Inc., to install doors on mini-suites on Boeing Model 747-400 airplanes. Specifically, the exemption allows relief from the requirement that prohibits the installation of interior doors between passenger compartments.

Flight Structures, Inc., did not petition for an exemption from 14 CFR 121.310(f)(6) and is not granted an exemption from this requirement. This exemption also does not constitute TSA acceptance of the doors installed on these mini-suites.

This exemption is subject to the following conditions and limitations. Limitation numbers 1, 6, 9, 10, and 21 must be documented in the Limitations section of the Airplane Flight Manual:

1. The maximum total number of passenger in the upper-deck seats, including mini-suites, is limited to 6.

2. Installation of mini-suites on the Model 747-400 airplane is limited to 12 on the upper deck.

3. Each mini-suite can only provide accommodation for one single occupant for taxi, takeoff, and landing.

4. Each mini-suite entrance can only provide access to that specific mini-suite (i.e., no other access to any other mini-suite or part of the airplane).

5. Mini-suites cannot provide an egress path for evacuation for any person other than the single occupant of the mini-suite.

6. Installation of the mini-suites must not introduce any additional deterrents to evacuating passengers, even from other parts of the cabin.

7. The mini-suite doors must be open during taxi, takeoff, and landing.

8. The hold-open retention mechanism for mini-suite doors must hold the doors open under § 25.561(b) emergency landing conditions.

9. There must be a secondary, backup, hold-open retention mechanism for the mini-suite doors that can be used to "lock" the doors in the open position if there is an electrical or mechanical failure of the primary retention mechanism. The secondary retention mechanism must hold the doors open under § 25.561(b) emergency landing conditions. Secondary retention-mechanism control will be positioned such that a seated and belted occupant would not be able to operate it.

10. Appropriate placards, or other equivalent means, must be provided to ensure that the mini-suite doors are in the open position for taxi, takeoff, and landing.

11. Training and operating-instruction materials regarding the proper configuration of the mini-suite doors for taxi, takeoff, and landing must be provided to the operator for incorporation into their flight attendant's training programs and appropriate operational manuals.

12. A dual means of egress out of mini-suites must be provided such that either egress path can accommodate either a 5th percentile female or a 95th percentile male. One such means of providing an egress path is the installation of a pair of sliding doors in the mini-suite entrance. The doors must translate longitudinally in opposite directions, fore and aft. This ensures that in the event of a retention mechanism failure, only one of the mini-suite doors will be closed. That is, inertial loads that tend to force one door in the closed position act to force the opposite door to the open position.

13. The height of the mini-suite walls and doors must be such that a 95th percentile male can fit between them and the airplane's interior furnishings. An evacuation demonstration is required showing that a 5th percentile female and a 95th percentile male will be able to exit the mini-suite in the event both doors are closed and unopenable. This demonstration must be conducted for each different mini-suite layout.

14. No mechanism to latch the doors (if applicable) together in the closed position is allowed.

15. The mini-suite doors must be openable from the inside or outside with 25 pounds force or less regardless of power-failure conditions.

16. If the mini-suite doors are powered, the doors must remain locked in the open position after power loss to the mini-suite.

17. Mini-suites installation must not reduce the dimensions of the main aisles, crossaisles, and passageways below the regulatory minimum.

18. Mini-suite doors must not impede main-aisle or crossaisle egress paths in the open, closed, or translating position.

19. The mini-suite doors must be openable even with a crowded aisle.

20. An additional flight attendant, above the minimum required by the applicable operating rules, is required on each deck of the airplane where mini-suites are installed, and whose principle duty during taxi, takeoff, and landing is to ensure that the mini-suite doors are properly latched in the open position.

21. Each mini-suite door must have a discrete hold-open mechanism that cannot be easily disengaged by a seated, belted occupant of the mini-suite. These hold-open mechanisms must be engaged for taxi, takeoff, and landing.

    a. For powered doors, this could be a deactivation switch for the door-closing mechanism. It is the flight attendant's duty to deactivate the mini-suite doors for taxi, takeoff, and landing.

    b. For manually operated doors, this could be a latching mechanism that cannot be easily activated by a seated, belted occupant of the mini-suite. It is the flight attendant's duty to engage these latches for taxi, takeoff, and landing.

22. Powered-door operations must not be hazardous to occupants. For example, compressive force of the door closing on body parts between the door and the door jam must not be a hazard. Both crushing of body parts and asphyxiation need to be considered.

23. The powered-door system must be designed to protect components from damage caused by items blocking door operation, misalignment of the mechanism, and minor deformation of the structure that would prevent the door from being correctly positioned for taxi, takeoff, and landing.

24. The powered-door system must be designed to prevent overheating of the components that could be an ignition source.

25. Powered doors must be able to be opened from either side of the doors regardless of the side from which the door was closed. If latches/locks are powered, the doors must be able to be opened from either side of the door regardless of the side from which the latches/locks are engaged.

Issued in Renton Washington, on June 18, 2014.

/s/ Michael Kaszycki

Michael Kaszycki
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Aircraft Certification Service