Exemption No. 10744

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

In the matter of the petition of **Structural Integrity Engineering, Inc.** for an exemption from §§ 25.807(f)(2) and (g)(5), 25.857(e) and (e)(3), and 25.1447(c)(1) of Title 14, Code of Federal Regulations	**Regulatory Docket No. FAA-2012-0799**

PARTIAL GRANT OF EXEMPTION

By letter dated September 7, 2012, Mr. William Kernkamp, Chief Technology Officer, for Structural Integrity Engineering, Inc., representing ORBIS International, 9525 Vassar Ave., Chatsworth, CA 91311, petitioned the Federal Aviation Administration (FAA) for an exemption from the requirements of §§ 25.807(f)(2) and (g)(5), 25.857(e) and (e)(3), and 25.1447(c)(1) of Title 14, Code of Federal Regulations (14 CFR). This exemption allows 48 non-crewmembers on a Boeing Model MD-10-30F freighter airplane configured as an eye hospital, and allows access for up to three supernumeraries into the Class E main-deck cargo compartment during flight for the purpose of fighting fires.

The petitioner requests relief from the following regulations:

Section 25.807(f)(2), at Amendment 25-114, requires, in pertinent part for emergency-exits, that if only one floor-level exit per side is prescribed … the floor-level exits must be in the rearward part of the passenger compartment unless another location affords a more effective means of passenger evacuation.

Section 25.807(g)(5), at Amendment 25-114, requires, in pertinent part for emergency-exits, that for a passenger seating configuration of 41 to 110 seats, there must be at least two exits, one of which must be a Type I or larger exit, in each side of the fuselage.

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

Section 25.857(e)(3), at Amendment 25-93, requires, in pertinent part, that means are available to shut off the ventilating airflow to, or within, the cargo compartment, and the controls for these means are accessible to the flight crew in the crew compartment.

Section 25.1447(c)(1), at Amendment 25-41, requires, in pertinent part, that oxygen-dispensing units must be automatically presented to the occupants before the cabin altitude exceeds 15,000 feet, 10 percent extra oxygen masks, and two oxygen masks in each lavatory.

Related sections:

Title 14, Code of Federal Regulations 121.583(a) contains, in pertinent part, a listing of categories of persons who may be carried aboard an airplane in part 121 service without complying with all the requirements of part 121 pertaining to carriage of passengers.

The petitioner supports its request with the following information.

This section quotes the relevant information from the petitioner's request, with minor edits for clarity. The petition is available at the Department of Transportation's Federal Docket Management System, on the Internet at http://regulations.gov, in docket no. FAA-2012-0799.

> Under the subject FAA project, Structural Integrity Engineering (SIE) has been appointed as the acting agent for the applicant, ORBIS International, to obtain a one time STC to reconfigure an MD-10-30F Freighter to transport Modular Hospitals loaded on Pallets. The Modular Hospitals will be deployed in support of ORBIS International's efforts to improve eye care throughout the developing world. In support of this project, SIE is requesting a partial grant of exemption from the requirements of certain 14 CFR Part 25 regulations for this aircraft.
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> As part of the STC application process, SIE has identified, and reviewed with the FAA, the Title 14, Code of Federal Regulations relevant to this effort. These are contained in the Project Specific Certification Plan (PSCP), SIE report SIE-400-101 (currently at Rev. C).
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> The Flying Eye Hospital (FEH) is a teaching hospital that allows people in the forward cabin, the "classroom", to follow operations with the help of audio-visual equipment. The existing 9G restraint location will be placed further aft at approximately FS 758 to allow for the classroom to double as a supernumerary area. The total number of seats installed in the supernumerary area will be forty eight (48), which includes two (2) flight attendant stations in the forward galley area and the remaining forty six (46) seats will be passenger type seating in the classroom. These crew members will be in addition to the two (2) flight crew, one (1) flight engineer seat, and two (2) observers located in the cockpit for a total of fifty-three (53) occupants on board. The supernumeraries will be

ORBIS employees including volunteer faculty and sub contractors to: 1) Accompany the hospital on each mission to perform set-up/take-down duties and ensure safe and secure handling of medical equipment and materials in accordance with FAR 125.331; and 2) Support hospital operations including in-country screening and training. The supernumerary seats and equipment will be equivalent to a passenger interior except that egress is provided through just one door on each side (L1 and R1). The doors will be equipped with standard slides/rafts with a capacity of thirty two (32) or thirty seven (37) overload per side and an additional life raft for sixteen (16) to meet the requirements of 25.1415(b)(1) Amdmt 82 (latest). The existing Class E main deck cargo compartment will be retained aft of the new location of the 9G barrier at approximately FS 758. The main deck cargo compartment is not occupied during flight; however, it is an "accessible Class E cargo compartment" for the purpose of fire fighting.

This petition is presented for relief to the requirements of the following sections of the 14 CFR Part 25 regulations for the MD-10-30F aircraft being reconfigured for the teaching hospital mission.

1 - §25.857 amendment 25-93, Sub paragraph (e) and (e)(3). Sub paragraph (e) defines a class E cargo compartment as one used only for the carriage of cargo. Sub paragraph (e)(3) requires a means to shut off the ventilating airflow to, or within the compartment.

2 - §25.807 amendment 114, Sub paragraph (f)(2), (g)(5) Sub paragraph (f) deals with the location of the exits. Sub paragraph (f)(2) requires that floor-level exits must be in the rearward part of the passenger compartment unless another location affords a more effective means of passenger evacuation. Sub paragraph (g) defines the type and number of doors required and (g)(5) requires two doors per side for cabins with 41 to 110 seats.

Supporting Information - Section Requirements

1 - §25.857 Cargo Compartment classification, amendment 25-93, Sub paragraph (e) and (e)(3)

Paragraph (e) defines a Class E cargo compartment as one on airplanes used only for the carriage of cargo. As stated earlier in the discussion on page one of this petition, the ORBIS teaching hospital requires forty six (46) supernumeraries for its operation beyond the two flight attendant stations, two flight crew, one flight engineer seat and two observers.

The DC-10 certification (see TCDS Page 38) includes Exemption Number 2453 issued September 26, 1977 an exemption from §25.807(c)(1) to "permit evacuation of passengers with one oversize Type I emergency exit meeting the conditions specified in Exemption No. 1573 on each side of the fuselage with a passenger seating capacity of 50."

The FAA has previously granted Exemption 6652, issued June 26, 1997 to Federal Express. This Exemption allows for the carriage of up to 24 supernumeraries inside a Class E Cargo Compartment on DC-10 aircraft. In addition, Exemption 6873 is part of the MD-10 certification basis. This exemption allows the carriage of an additional four (4) supernumeraries in front of the 9G Barrier. The total supernumeraries allowed on the MD-10 aircraft is, therefore 28. In granting the Exemption 6652, the FAA nonetheless expressed a concern about "a trend toward proposals for rather more ambitious accommodations." This refers back to a lack of intent towards "large numbers of supernumeraries" in [14 CFR] 121.583. The current proposal does indeed request a "large" number of supernumeraries. This large number is acceptable, in this case only, because it is limited to: 1) Part 125 Operations instead of Part 121; and 2) Carriage of Mobile Hospitals. The first condition precludes the commercial use of the exemption and the second condition includes a very specific purpose. This purpose while obviously different in nature, is just as specific as the previously allowed horse carriage.

Paragraph 25.857(e)(3) requires the air supply to the Class E compartment to be shut off in case of fire. This feature remains active on the current aircraft. However, the means of fighting a fire per the Airplane Flight Manual will be changed from decompression procedures to crew fire fighting. We will request an equivalent level of safety finding for the specific crew firefighting procedure. The crew firefighting is preferred for this application, because: 1) The modular hospital cargo is, by its nature accessible (and will be required to be accessible in the operational manuals); and 2) Flare-up of a fire in descend when the decompression method is no longer available is eliminated as a risk factor. Furthermore, the crew will not be exposed to prolonged operation at low atmospheric pressure during a fire event.

2 - §25.807 Emergency exits, amendment 25-114, Sub paragraph (f)(2), (g)(5)

This regulation defines the number, location, and type of emergency exits required for various passenger quantities. The aircraft has a single door per side where two would be required for passenger operation (g)(5). The doors are located at the front of the supernumerary area where (f)(2) expresses a strong preference for an aft location for passenger operation.

The existing L1 and R1 doors, which have an opening of 32"x76", meet the requirements of a Type B door. Type B doors are qualified for a maximum number of seventy five (75) passenger seats per pair (left/right). This number is more than 50% larger than the number of supernumeraries.

FAA has previously addressed egress issues for combi airplanes with only one pair of exits for passenger egress in Policy Number PS-ANM100-1987-00033, dated 11/02/1987. This Policy identifies and approves a maximum capacity of fifty passengers for the oversize Type I (a Type B) door available on the aircraft. The Exemption 2453, part of the Certification Basis of the aircraft is consistent with this policy. The number allowed exceeds the requested number of supernumeraries.

Information to Support Grant of Exemption:

Per the provisions of 14 CFR Part 125.331 (Carriage of persons without compliance with the passenger-carrying requirements of this part), a minimum of two supernumeraries will have special training in the use of emergency equipment, emergency egress, and flight operations associated with controlling a fire in an accessible Class E compartment.

The supernumerary seating will be provided using seating, emergency egress provisions and emergency oxygen systems from a decommissioned DC-10 passenger aircraft as part of the STC project. The supernumerary compartment will have been outfitted with liners, overhead bins and galleys prior to STC from the same decommissioned DC-10 aircraft. Therefore, this compartment will meet the flammability requirements per the DC-10 TCDS.

A placard indicating that the door in the 9g rigid barrier is to be closed at all times during flight, except to gain access in an emergency fire fighting condition, will be located in a conspicuous place on or next to the smoke barrier. The safety of the crew members entering the cargo hold for the fire-fighting role is ensured with protective clothing and a breathing apparatus. These crew members have helmet mounted lights to supplement the ambient lighting provided in the hold.

The historical deployment schedule of the Flying Eye Hospital calls for three-week deployments. The extended on-ground time for deployment causes the number of flights and flight hours to be much lower than a normal passenger or freighter operation. The expected number of flights over 20 years of operations is about equal to the number of flights per year during the aircraft's use as a FEDEX freighter.

Evaluation of Public Interest:

The availability of an Airborne Hospital that can be rapidly deployed to any location in the world is in the public interest. The specific purpose of this particular Airborne Hospital is to cure blindness worldwide. This is also in the public interest.

Petition for Exemption:

SIE requests authorization to carry 48 supernumeraries, in accordance with the provisions of 14 CFR Part 125.331 Carriage of persons without compliance with the passenger-carrying provisions of this part. In consideration of the foregoing discussion, SIE petitions for exemption from the following 14 CFR Part 25 regulations for the ORBIS reconfigured MD-10-30F aircraft undergoing reconfiguration by FAA project ST14145LA-T.

1 - 25.857 amendment 25-93, Sub paragraph (e) and (e)(3),

- Forty eight (48) supernumeraries in addition to the two flight deck crew members, flight engineer and two observers may be carried.

- (e)(3) The air supply will be shut off, but the aircraft will not be decompressed for fire abatement.

2 - 25.807 Emergency exits, amendment 25-114, Sub paragraph (f)(2) and (g)(5)

- (f)(2) The single emergency exit doors 1L and 1R are located at the forward end of the supernumerary seating compartment.

- (g)(5) A single door per side (Type B Doors 1L and 1R) will be available for emergency egress for no more than fifty (50) supernumeraries.

The applicant would like the public comment phase to be eliminated from the Exemption process, because there is no industry-wide effect from a grant of exemption for this unique purpose.

Federal Register publication

The FAA has determined that good cause exists for waiving the requirement for Federal Register publication because this exemption, if granted, would not set a precedent.

The FAA's analysis

By allowing the carriage of supernumerary persons aboard cargo flights, operators can optimize the utility of the airplanes and the airports. The FAA considers the petitioner's proposal to be in the public interest because these supernumeraries are seen as a benefit to both airplane safety and the airplane's humanitarian operations as an airborne eye hospital, which can be deployed rapidly to any location in the world to aid in restoring sight.

The petitioner has requested relief primarily from the requirements of § 25.857(e), which permits carriage of only cargo when a Class E cargo compartment is installed on the airplane. They have also requested relief from § 25.857(e)(3), which requires that means are provided to shut off the ventilating airflow to, or within, the compartment; and the controls for these means are accessible to the flight crew in the crew compartment. Class E cargo compartments are usually remote from the flight deck and encompass the entire interior of the airplane. The usual means of controlling fires that might occur in the cargo compartment is to starve the fire of oxygen. This is accomplished by depressurizing the airplane and maintaining an altitude that will not support combustion. For this reason, only crewmembers are permitted on board such airplanes. In lieu of depressurizing the airplane, the petitioner is requesting that supernumeraries be permitted to enter the Class E cargo compartment to fight fires.

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 previously granted exemptions for supernumerary in-flight access to Class E cargo compartments, provided that certain other conditions are met. These conditions have varied, depending on the airplane design, certification basis, and the number of supernumeraries involved. The FAA has been reviewing the operational need for access into the Class E cargo compartment in-flight, and the number of persons needed in the cargo compartment for the type of operation.

The petitioner has requested that a maximum of three supernumeraries be allowed to access the Class E cargo compartment in-flight for the purposes of fighting in-flight fires. We accept the proposal for a maximum of three supernumeraries to be allowed access into the main-deck Class E cargo compartment in-flight for the purposes of fighting in-flight fires, provided that the following factors are considered when making a determination of the acceptable level of safety in this case:

- the number of supernumeraries with access
- cargo-compartment size
- limited egress paths
- airplane configuration as an airborne eye hospital
- types of cargo present, and the location of the cargo, are well-known to the operator
- control of the types of cargo carried
- minimal operational exposure/flight cycles
- the operator’s past service practices

Considering the above factors, in the general case, if the Class E cargo-compartment access is approved for this mode of operation, each supernumerary must, before accessing the class E cargo compartment, wear protective equipment intended for use while combating a fire.

The FAA has determined that, due to the petitioner’s proposed cargo-compartment fire-control method, the operator must determine the supernumeraries (persons) on the airplane to be physically fit. 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. Supernumeraries intended to perform firefighting operations must also be trained in effective firefighting techniques.

The petitioner proposed that safety of the crew members entering the cargo hold for the fire-fighting role is ensured through protective clothing and a breathing apparatus. The crew members would also have helmet-mounted lights to supplement the ambient lighting provided in the hold. The FAA concurs with the intent proposed by the petitioner. Prior to entering the Class E cargo compartment, supernumeraries must don protective equipment intended for use while combating fires. The portable breathing apparatus must meet §§ 25.1439(b)(1), (2), and (4); be designed to prevent any inward leakage to the inside of the mask; and prevent any outward leakage causing significant increase in the oxygen content of the local atmosphere. The available breathing supply must be indicated to the user and sized adequately for continuous and uninterrupted use during firefighting operations.

Note that the certification basis for the Boeing Model MD-10-30F airplane is at amendment 25-51. Therefore, § 25.785(d), not (j), is the regulation the petitioner intended to cite, as the requested exemption pertains to these airplanes.

Although the applicant has requested relief from § 25.857(e)(3), the FAA has determined that the applicant's design and operation, which includes a means to shut off the ventilating airflow to, or within, the Class E cargo compartment, meets the intent of this regulation. Therefore, no exemption to this requirement is needed.

To comply with §§ 25.855(h)(2) and 25.857(e)(4), the airplane must have a suitable means of preventing smoke penetrating into the occupied areas. 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 has indicated that the configuration will allow supernumeraries to enter the Class E cargo compartment, requiring them to open a door through the smoke barrier between the cargo compartment and the supernumerary compartment for the purposes of fighting fire. To provide an appropriate level of safety, the petitioner must install a placard indicating that the door through the smoke barrier is to be secured (i.e., the door 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 door.

The FAA is concerned about the quantity of smoke that may enter the occupied areas in the event of a fire on the main deck. The amount of smoke that would enter into the supernumerary compartment and flight deck, when the smoke barrier is open during firefighting operations, must not create a hazard to the occupants. This smoke source must be considered when demonstrating compliance with § 25.855(h)(2).

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

The FAA's decision

In consideration of the foregoing, I find that 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, Structural Integrity Engineering, Inc., is hereby granted an exemption from 14 CFR 25.807(f)(2) and (g)(5), and 25.857(e)(3). The petition is granted to the extent necessary to allow type certification of Boeing Model MD-10-30F series freighter airplanes with provisions for the carriage of supernumeraries, but limits the supernumeraries' Class E cargo compartment access to fighting in-flight fires in the cargo compartment. This exemption is subject to the conditions and limitations below.

Conditions and Limitations

1. Supernumeraries

    a. A maximum of forty-eight (48) supernumeraries may occupy the supernumerary area located aft of the flight-deck compartment. The total occupancy of the airplane is limited to two (2) flight crew, one (1) flight engineer seat, and two (2) observers located in the cockpit, and up to 48 supernumeraries in the supernumerary area.

    b. The supernumeraries are limited to the categories specified in 14 CFR 121.583(a)(1) through 121.583(a)(7).

    c. Prior to each flight, a flightcrew member must brief each supernumerary on the use of exits, including instructions to inspect the ground to determine whether a safe landing can be achieved, before using an exit-assist means and emergency equipment.

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

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

2. Main-Deck Class E Cargo Compartment Access Limitations

    a. Supernumeraries are prohibited from being in the cargo area behind the smoke barrier during taxi, takeoff, and landing. The pre-flight briefing must inform supernumeraries of this requirement. Access is limited to three (3) supernumeraries in the main-deck Class E cargo compartment.

    b. Access into the main-deck Class E cargo compartment in-flight is allowed only for the purpose of fighting an in-flight fire in the cargo compartment.

3. Prior to each flight, a flightcrew member must brief the supernumeraries on the following:

   - the use of exits, including instructions to inspect the ground to determine whether a safe landing can be achieved before using an assist means
   - location and use of emergency equipment
   - the prohibition from being in the cargo area during taxi, take-off, and landing
   - the cargo compartment alerting system, and what supernumerary actions are required
   - the lavatory visual decompression-alerting system, and what supernumerary actions are required
   - access into the main-deck Class E cargo compartment is limited to fighting an in-flight fire in the cargo compartment
   - in event of fire in-flight, access to the main-deck Class E cargo compartment is limited to a maximum of three (3) supernumeraries
   - the smoke barrier always must be secured (i.e., the door or curtain must be closed) except when entering or leaving the cargo compartment
   - prior to entering the main-deck Class E cargo compartment during flight, each person must wear firefighting equipment, including a portable breathing supply
   - smoking is not allowed within the cargo compartment

4. Supernumeraries' Portable Breathing Supply:

   a. Locations and Use:

      At least one portable breathing unit, intended for use while firefighting, must be provided for each supernumerary allowed to enter the main-deck Class E cargo compartment during flight. These portable units must be located outside the cargo compartment (e.g., in the common area).

   b. Design Requirements:

      i) The breathing units must indicate to the user that the breathable gas is flowing through the unit.

      ii) The breathing units must provide indication to the user of the remaining breathing supply.

      iii) The breathing units must be sized adequately for continuous and uninterrupted use during the firefighting operations.

      iv) The breathing units must be designed to prevent any inward leakage to the inside of the mask, and prevent any outward leakage causing significant increase in the oxygen content of the local atmosphere.

v) One acceptable means of compliance is to install portable protective breathing equipment which meets TSO-C116a, or a suitable alternative. However, the portable breathing equipment does not need to protect the user's head and neck from potential drippings and radiant heat provided that additional firefighting equipment intended for this function is also donned prior to use in firefighting operations.

5. Training:

a. The supernumeraries must be trained in:

i) the use of the firefighting equipment and effective firefighting techniques.

ii) making the determination whether both breathable gas is being delivered to the portable breathing units and the amount of remaining protective breathing supply remaining.

6. Alert:

a. Appropriate procedures and limitations must be established for communications (e.g., return to seat) from the flight crew to communicate appropriately to occupants in the Class E cargo compartment when they must return to their seats and secure the smoke-barrier door. The pre-flight briefing must explain this alert to the supernumeraries.

b. If an automatically activated alerting system is installed for the Class E cargo area, the alert must be provided and immediately recognizable in accessible areas of the Class E cargo compartment to notify supernumeraries when to return to their seats, and to ensure that the smoke barrier is secured (i.e., the door or curtain is closed). As a backup to the automated alert system, the flight crew must be able to manually activate the alert.

7. Placards:

Placard(s) are to be located outside the cargo compartment in a conspicuous location, either on or adjacent to the smoke-barrier door or curtain. The placards must indicate the following:

a. Occupancy of the Class E cargo compartment is prohibited during taxi, take-off, landing and flight except for firefighting operations.

b. The smoke barrier must be secured (i.e., the door or curtain must be closed), except when entering or leaving the cargo compartment during firefighting operations.

c. Firefighting equipment, including a portable breathing supply, must be worn prior to entering the cargo compartment.

d. Smoking is not allowed within the cargo compartment.

8. Alerting Requirements:

   a. Alerts must be distinctive and effective.

   b. Visual alerts must be visible from all occupant locations and orientations, during all expected firefighting conditions.

   c. Aural alerts must be loud enough to be heard during all expected firefighting conditions.

9. Public-Address System:

   a. A standard airplane public-address (PA) system must be installed, to be activated from the flight deck.

   b. The PA system must be audible throughout the supernumeraries' seating area, the galley, the lavatory, and the Class E cargo compartment.

10. Flight Tests:

    Flight tests must be conducted in accordance with § 25.855(h) to show compliance with the provisions of § 25.857 concerning the entry of hazardous quantities of smoke into compartments occupied by the crew or passengers. The amount of time that the smoke barrier is open, as a result of the supernumeraries entering and evacuating the main-deck cargo compartment, must be accounted for in the testing.

Note: Based on the results of these tests, the occupancy of the main-deck Class E cargo compartment may be limited to less than the maximum allowed in Condition 2, above.

11. This exemption is limited for use for an airborne eye hospital only, and is not transferable to any other mode of cargo or passenger operation.

Issued in Renton, Washington, on April 9, 2013.

/s/ Jeffrey Duven

Jeffrey Duven
Acting Manager, Transport Airplane Directorate
Aircraft Certification Service