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## **Title 14—AERONAUTICS AND SPACE**

### **Chapter I—Federal Aviation Agency**

[Docket No. 2083; Amdts. 25-1; 91-13; 121-2]

#### **✓ PART 25—AIRWORTHINESS STAND- ARDS: TRANSPORT CATEGORY AIRPLANES**

#### **PART 91—GENERAL OPERATING AND FLIGHT RULES**

#### **PART 121—CERTIFICATION AND OP- ERATIONS: DOMESTIC, FLAG, AND SUPPLEMENTAL AIR CARRIERS AND COMMERCIAL OPERATORS OF LARGE AIRCRAFT**

#### **Regulations, Procedures, and Equip- ment for Passenger Emergency Evacuation; Flight Attendants; and Assignment of Emergency Evacua- tion Functions for Crewmembers**

The purpose of these amendments is to provide for improved emergency evacuation procedures and equipment for passenger-carrying aircraft. These actions were proposed in Notice 63-42 (28 F.R. 11507) issued October 23, 1963, and they were the subject of a Public Hearing held June 25, 1964, pursuant to Notice published April 28, 1964 (29 F.R. 5640), after postponement from May 26, 1964.

The proposals concerned amendments to the following Civil Air Regulations: Part 4b—Airplane Airworthiness: Transport Categories; Part 40—Scheduled Interstate Air Carrier Certification and Operations Rules; Part 41—Certification and Operations Rules for Certificated Route Air Carriers Engaging in Overseas and Foreign Air Transportation and Air Transportation within Hawaii and Alaska; and Revised Part 42—Aircraft Certification and Operation Rules for Supplemental Air Carriers, Commercial Operators Using Large Aircraft, and Certificated Route Air Carriers Engaging in Charter Flights or Other Special Services.

The proposals as discussed at the Public Hearing were changed in some de-

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tails from those published in Notice 63-42, after study of the comments received in response to that Notice, and further analysis of the problems involved. They also were changed in some minor details after study of the presentations made at the Public Hearing.

The amendments do the following:

(1) Require air carriers and commercial operators using large aircraft to physically demonstrate the adequacy of procedures established for passenger emergency evacuation on each type and model of airplane used in passenger-carrying operations that has a seating capacity of over 44 passengers.

(2) Require one portable battery-powered megaphone as emergency equipment on each passenger-carrying airplane with a seating capacity of more than 60 passengers (two megaphones if the seating capacity is more than 99 passengers).

(3) Make uniform the provisions for briefing of passengers, for flight attendants, and for assignment of emergency evacuation functions for categories of crewmembers, with respect to rules formerly in Parts 40 and 41, and Revised Part 42.

(4) Introduce required oral briefing of passengers on the location and operation of emergency exits, on passenger-carrying airplanes.

(5) Require flight attendants, on passenger-carrying airplanes with seating capacity of more than nine, varied in number up to at least four for airplanes with seating capacity of more than 149.

(6) Revise provisions on assignment of emergency evacuation functions for crewmembers.

(7) Prescribe revised and new standards for emergency exit locating signs and exit-opening instructions, exterior marking of these exits, emergency cabin illumination in a crash landing or upon interruption of the airplane's normal electrical power, strength requirements for latches designed to keep certain doors open during takeoffs and landings, and the fitting of ropes at Type III and Type IV exits to facilitate emergency egress from landplanes.

As part of the Agency recodification program, the relevant portions of Part 4b have been incorporated into Part 25 [New] of the Federal Aviation Regulations, and Parts 40 and 41, and Revised 42 of the Civil Air Regulations have been consolidated into Part 121 [New] of the Federal Aviation Regulations. Therefore, the amendments proposed for §§ 4b-362 now are made to §§ 25.809, 25.811, and 25.813, respectively covering emergency exit arrangement, marking, and access. Likewise, the amendments proposed for §§ 40.40, 40.173, 40.178, 40.265, 40.267, and 40.370 of Part 40, and the similar amendments proposed for Parts 41 and Revised 42, now are made by adding a new § 121.291 and Appendix D covering demonstration of and criteria for emergency evacuation procedures; by amending paragraphs (f), (g), and (h) of § 121.309 to make them effective only until July 1, 1966, and adding a new § 121.310 covering the emergency equipment items from that date; and by striking out §§ 121.393 and 121.395, and amending §§ 121.391, 121.397, 121.571,

and 121.573, covering flight attendants, emergency and emergency evacuation duties, and briefing of passengers before takeoff. In addition, the term "certificate holder" will be applied to operators under Part 121 [New], in conformity with the recodification style.

In general, the comments received, both before and at the Public Hearing, indicated agreement with the intent of the Agency to improve safety in case of emergency evacuation. A number of comments were directed at individual, others at many, items covered by these amendments. These are discussed in the order of the categories listed above.

(1) Comments were made that the proposed rule for demonstration of emergency evacuation was unnecessary and would not materially assist in crewmember training and proficiency, or that if required at all it should be conducted by manufacturers. The Agency does not agree with these comments. It believes that demonstration for passenger-carrying airplanes, conducted by the operator, is in keeping with the public interest and will result in the saving of lives that otherwise might be lost in the absence of showing of ability to evacuate airplanes and the correction of faults in designs and procedures revealed by the tests.

Review of CAB accident report data showed that a large number of passengers involved in survivable accidents survived the crash impact but died as a result of asphyxiation because they were unable to evacuate the airplane.

During the period 1960-1963 there were four survivable air carrier accidents with 106 fatalities and 137 survivors. The record indicates that additional people could have survived if the passengers had been properly briefed or directed in the emergency evacuation of the airplane.

Evacuation tests conducted before the Public Hearing disclosed deficiencies in equipment, procedures, and training. The Agency believes that the tests required by these amendments will continue to contribute improvements in these areas.

As proposed in the Notice of Public Hearing, in order to make the tests as realistic as possible but without endangering the participants, these amendments require demonstration in both simulated aborted takeoff and gear-up crash landing. In addition, a separate demonstration for ditching is required for certificate holders conducting or proposing to conduct extended overwater operations, but without a maximum time period. Alternate methods are provided for the ditching demonstration, as requested by one air carrier, namely use of mockups or simulated floating devices.

Notice 63-42 and the Notice of Public Hearing proposed that a new demonstration be required upon any increase in passenger seating capacity. This has been changed to require the new demonstration only when the increase in capacity is five percent or greater, thus allowing some latitude.

Also, the Notices would require demonstrations for airplanes of all sizes. These amendments require demonstrations only for airplanes with seating capacity of more than 44 passengers. After

consideration of the relatively small size of the passenger cabin, close proximity of crewmembers, and past experience showing comparatively little difficulty in emergency evacuation, the Agency believes demonstrations need not be conducted for these smaller airplanes.

In line with one air carrier's comment, the criteria for conducting the demonstrations are spelled out in detail and set forth in Appendix D to Part 121 [New]. Several minor changes suggested by comments have been made, such as designating the certificate holder as the one to clutter aisles with blankets and other articles that normally would be in the passenger compartments; requiring a more representative passenger load; requiring either the blacking out of windows or the outside placing of mats, ramps or stands; forbidding rehearsals of demonstrations; and making clear that one demonstration must be conducted with outside darkness. Some suggestions were not adopted. For instance, it was suggested that smoke should be used during a demonstration. However, the Agency feels that this would tend to excite the passengers used, and create a hazardous condition. Similarly, a suggestion that "trained passengers" should be used, was not adopted.

One air carrier proposed a 90-second maximum time period for the demonstration of emergency evacuation of passengers in a survivable accident. The Agency has considered the relative speed in which fires have developed in accidents, and the practical limitations imposed by existing aircraft configurations, and has concluded that the two-minute maximum time period is reasonable for the aborted takeoff and gear-up crash landing evacuation demonstration. No maximum time period has been provided for the ditching demonstration, since experience shows that passengers generally are alerted prior to, and fire rarely occurs in, actual ditching.

These amendments provide that emergency evacuation demonstration must be conducted within 30 days after their effective date (120 days after issuance). This time period has been fixed after consideration of all relevant factors including the fact that in many cases satisfactory demonstrations for aborted takeoff already have been shown. Since these were conducted and approved under the criteria of the Agency's Order PS-8400.4 issued September 16, 1963, that are now placed in Appendix D with minor changes, a certificate holder who has conducted this particular demonstration need not again show it.

(2) Some comment urged that battery-powered megaphones would be of no assistance in evacuation and would create a hazard by the user's getting in the way of evacuees; that interior acoustical material would absorb a large proportion of megaphone output, and the high energy level required to overcome this absorption would result in "feedback" on the megaphone; that a megaphone would require two hands for use by most persons to hold it steady and guard against feedback; that the use of two megaphones would result in conflicting instructions; and that mega-

phones would not be advantageous in emergencies because of their location. The Agency believes megaphones will be of assistance in communications, as stated in Notice 63-42. As to the claim that megaphone users would impede evacuees, the Agency believes that such a person would not have received proper training with the equipment. As to absorption of megaphone output by interior acoustical material, the Agency believes this would not exceed the absorption of verbal instructions, and that there would not be inordinate feed-back from the output needed to overcome absorption. Also, it appears that one manufacturer has solved the absorption problem satisfactorily with its design of megaphone. As to the claimed need to use both hands to handle a megaphone, this is not necessarily so, since the design of the megaphone would be a controlling factor. The Agency does not believe that the requirement of two megaphones, where there is a seating capacity of more than 99, will result in conflicting instructions if proper training is given to their users. Finally, the Agency believes the location of a megaphone in the rearward end of the passenger cabin, plus a second one in the forward end in a larger airplane, each in a place readily accessible to crewmembers assigned to emergency evacuation, will provide advantageous opportunity for the use of this equipment.

(3) The items are discussed separately below.

(4) Some comments objected to oral briefing of passengers on the location of emergency exits, urging that it would be sufficient to call their attention to safety cards. The Agency considers oral briefing prior to each takeoff necessary in the interest of safety. It believes that passengers so alerted are better prepared to cope with evacuation of the airplane under emergency conditions. Passengers do not always familiarize themselves with briefing cards after boarding the airplane and before takeoff, since they may be primarily concerned with securing desirable seats, making themselves comfortable, and observing fellow passengers. The Agency has concurred with the recommendation that oral briefing should be supplemented by printed cards. Accordingly, these amendments require the carrying, aboard passenger-carrying airplanes, of cards with diagrams of the emergency exits and details of the oral emergency instructions. The Notice proposed that for extended overwater operations passengers should be briefed as to both location and operation of life rafts. Briefing or operation of life rafts literally would require their removal from storage receptacles and physical demonstration of their activation. This is impractical, and has been omitted in these amendments.

One comment recommended that the passengers be required to keep their seat belts fastened during flight. This was not within the scope of the published Notices. However, the Agency has directed letters to all airlines suggesting that in the preflight briefing the passengers, for their comfort and convenience, should be advised to keep their seat belts

loosely fastened in flight except when leaving their seats.

(5) With respect to flight attendants on passenger-carrying airplanes, Notice 63-42 proposed that one flight attendant be required on each airplane with a capacity of more than nine passengers, as in Part 40, plus additional flight attendants as determined necessary to comply with the provisions for assignment of emergency evacuation functions for crewmembers. The Notice of Public Hearing, however, applied the type of rule used in Parts 41 and Revised 42, with an additional fourth flight attendant on airplanes with a passenger seating capacity of more than 149, and with provision for approval of fewer flight attendants in certain circumstances.

Comments were made both for and against each approach. In the light of these comments and further study, the Agency has decided to adopt the latter approach. When the rule for three flight attendants was first instituted for airplanes with a seating capacity of more than 99, some airplanes had a seating capacity up to 135 passengers. Now some airplanes are equipped to carry up to 189 passengers. This highlights the need for expeditious performance of emergency functions by crewmembers, and the handling of passengers in survivable accidents. The successful emergency evacuation of these passengers will depend to a large extent upon the number of attendants, their training, and the evacuation procedures used by the operator. Some comments urged that in determining the number of flight attendants, consideration should be given to what services are rendered, such as food, or to what may be indicated by a demonstration. However, after consideration of all relevant factors, the Agency believes that the number of passenger seats on the particular airplane should be the basic minimum standard upon which to determine the number of flight attendants, as has previously been done in Parts 41 and 42 of the Civil Air Regulations. One comment suggested the use of one flight attendant for each Type I emergency exit. However, the Agency, after study, has concluded that this is not essential, since in survivable accidents one or more flight crewmembers likely would be available to assist in the emergency evacuation of occupants.

(6) A comment has been adopted that assignment of emergency evacuation functions should be made to categories of crewmembers rather than to individual crewmembers. However, the Agency has not considered necessary the certification of flight attendants, as recommended by several comments. The Agency believes that the conduct of emergency procedures primarily is a problem of adequate crew training, currently provided for and proposed in the regulations, and that this training can be accomplished without certification.

(7) As to emergency exit arrangement, it was urged that the use of ropes to assist passengers to the ground from over-the-wing emergency exits would be of little value, obstruct exits, slow down descent, or create opportunities for injuries from flap edges or from the cross-

ing of ropes at leading and trailing edges of wings. It also was urged that tapes should be permitted as an alternate means, and by one comment that details of design of the assist should be omitted. One comment suggested that rope strength should be for at least 1000 pounds. Upon re-examination, the Agency has decided to retain the proposal, changed (as proposed in the Notice of Public Hearing, pursuant to comment and study) to require ropes with a minimum diameter of  $\frac{3}{8}$  inch, or approved equivalent devices, in order to provide the handling characteristics necessary for passenger evacuation. The Agency's investigation of ordinary tapes showed that in general they do not provide sufficient diameter or area for a person to grasp in order to regulate his descent without burning the hands or incurring other injury. However, some tapes impregnated with latex appear to be satisfactory and in fact have been approved. Comment also was made that, in the case of crew exits, visibility in flight might be seriously reduced by the presence of the assist device stowed at or above the exit. Responsive to this comment, the amendments permit attachment to the fuselage structure at another approved location, in such a case.

In new § 121.310 of Part 121 [New], DC-3 airplanes operated with no more than 35 occupants including crewmembers and no more than 4 exits authorized for passenger use, will be exempted from the over-the-wing and cabin window emergency exit requirements. Section 121.309(f) already does not require an assist device at rear window emergency exits on these airplanes. The Agency agrees with the comment that for all cabin window emergency exits and additionally for over-the-wing emergency exits, on these airplanes, which require no special means to assist descent, the installation of descent ropes is unnecessary.

As to emergency exit marking, it was urged that it would be too restrictive to require a locating sign on each bulkhead or divider preventing fore and aft vision, to indicate emergency exits beyond and obscured by it. This provision has been changed to allow location of such a sign elsewhere when it is impossible to place it on the bulkhead or divider. Similarly, under the amendments one locating sign now may serve two floor level emergency exits if they both can be seen readily from the sign. Also, some ceilings above the main aisle are too low to accommodate locating signs near over-the-wing emergency exits. These amendments therefore permit another location if it is more practical because of low headroom. Comments also suggested exterior lighting for evacuation, and emergency lights in cockpits, as part of the independent lighting system, and red lights between window panes in emergency exits. The Agency believes these suggestions may have merit, but further evaluation is needed before proceeding with rule making in this area. Similarly, recommendations were made that signs be luminous or have luminous paint, and that exits openable from the outside be

identified by the single word "EXIT" in letters at least one inch high and visible from 50 feet. These are not within the scope of the Notices. Comment further was made that instead of two-inch bands around emergency exits openable from the outside, provision should be made, conforming with SAE ARP 577, that these exits should be identified by the single word "EXIT" colored to contrast with the background, or colored red. The Agency believes the two-inch color band is the superior method of marking these exits, and that any color contrast (not necessarily involving red bands, as suggested by one comment) will adequately serve to mark the exit location and operating instructions.

It was urged by one comment that exit identity and locating provisions should not apply to piston-powered airplanes certificated years ago and under rules different from those under which jet aircraft have been certificated. These provisions, it was claimed, would result in confusion because of the small size of the airplanes and large number of small exits. The Agency does not concur with this suggestion, since a number of these airplanes are currently in use in coach service, with increased passenger capacity that increases the need for emergency identity and location signs.

Comment was made that to require the illumination to be 0.05 foot-candles on the surface of each seat armrest along the main passenger aisle would be too restrictive. This provision has been changed to require the equivalent average illumination. Spelled out also is the provision on automatic functioning of lights, to make clear that this will apply to any interruption of normal electrical power, and that the independent lighting system must be armed, if necessary for operation, before each takeoff and landing and during taxiing. One comment urged that arming should continue from takeoff through landing. The Agency does not consider this essential.

As to emergency exit access, it was claimed that doors with positive holding devices between passenger compartments are as safe as, or even safer than, curtains if they are properly latched during takeoffs and landings. It was further asserted that persons evacuating an airplane might easily become tangled up in curtains, particularly when unusual aircraft altitudes are involved. The Agency does not agree that doors should be used instead of curtains, especially since it is possible that doors may become jammed in crash landings.

Comment also was made that the provision on emergency exit access would be too restrictive for the Boeing 727 airplane, that is equipped with a ventral stairway as an exit requiring passage through a door in the pressurized bulkhead to reach it. In most 727 airplanes the ventral stairway is not a required exit, therefore the door in the pressure bulkhead need not be latched open for takeoff and landing. Furthermore, even where the stairway might be proposed as an emergency exit, the door would be a part of the exit and not a door leading to the exit, therefore these amendments are not too restrictive for these airplanes.

It was urged that since not all piston airplanes have crewmember standing room alongside each Type I and Type II exit and window exits not over-the-wing, the Administrator should permit exemptions (meaning deviations) where justified. The Agency concurs with this comment. Section 4b.362 of Part 4b of the Civil Air Regulations has had the requirement for crewmember standing room since December 20, 1951, but some airplanes certificated under the provisions of Part 4b in effect before that date were not required to have this space. However, in some cases this space can not be provided because of the location of primary aircraft structure in the area. Therefore, these amendments permit a deviation for an airplane certificated under those provisions of Part 4b if the Administrator finds that special circumstances exist that provide an equivalent level of safety.

Certain other comments recommended the withholding of action with respect to these amendments. However, effective dates have been fixed after consideration of any problems encountered in meeting those dates. The effective date for the amendments to Part 25 (New) and the related amendments to Part 121 (New) have been set 90 days after issuance. The equipment provisions of these Amendments to Part 121 (New) actually become requirements on July 1, 1966. Thus, ample time is allowed for whatever changes are needed for operating purposes.

It was urged that airplane operators that are not air carriers or commercial operators should not be required to comply with the proposed requirements for all Part 25 (4b) airplanes. With respect to these operators, the Agency has not considered retroactive requirements, and no proposal has been made to change Part 91 (New) of the Federal Aviation Regulations.

It was urged that there should be a clear understanding that work completed on a voluntary basis on turbo-jet airplanes, relative to emergency exit identity signs and interior cabin illumination, accomplished as recommended by the FAA-Industry Task Force, would meet the intent of the amendments on these items. These amendments incorporate changes in requirements on interior cabin illumination and locating signs for emergency exits that relax the proposals made in the Notice of Public Hearing. The Agency can not state categorically that work accomplished as recommended by the FAA-Industry Task Force will in every case comply with these rules. However, information available to the Agency indicates that the relevant modifications voluntarily made on turbo-jet airplanes, as indicated, will be in compliance.

It also was urged that air carriers be relieved from these amendments with respect to piston-powered airplanes. The Agency does not agree that retrofitting of piston-powered airplanes is unnecessary. The need for improvements in cabin interiors and emergency equipment is the same for piston-powered as for turbine-powered airplanes, high density seating is installed in the former as well as in the latter, and the emergency

evacuation standards should be the same for all types of airplanes used by air carriers in their operations.

It was suggested that the emergency evacuation equipment and procedures should be made applicable to cargo airplanes. The Agency has this subject under consideration as a separate study.

Section 91.47 of Part 91 of the Federal Aviation Regulations, a recodification of Special Civil Air Regulations 389B, effective April 1, 1965 (29 F.R. 19096), prohibits, in certain cases, the operation of large airplanes in passenger-carrying operations for hire with more than the number of occupants allowed under § 4b.362 (a), (b), and (c) of Part 4b of the Civil Air Regulations. Certain listed types may be operated with up to designated numbers of occupants and corresponding numbers of approved passenger emergency exits. These rules are provided "notwithstanding any other provisions of this chapter." Paragraph (b) of § 91.47 provides that additional occupants may be carried if there are additional exits comparable to at least a Type II or Type IV exit, but not more than eight occupants may be carried for each additional exit. New § 121.291 will require new demonstrations of emergency evacuation procedures upon a five percent or greater increase in seating capacity over that previously approved for a certificate holder operating, under that Part, a type and model of airplane with a seating capacity of more than 44 passengers in its passenger-carrying operations. In order to make clear that a Part 121 operator may not increase occupancy under § 91.47 without complying with the redemonstration requirement of Part 121, these amendments add to § 91.47 a provision to this effect.

Interested persons have been afforded an opportunity to participate in the making of these amendments, and due consideration has been given to all matter presented.

In consideration of the foregoing, Parts 25, 91, and 121 of the Federal Aviation Regulations are amended as follows, effective June 7, 1965.

1. Paragraph (f) of § 25.809 is amended to read as follows:

§ 25.809 Emergency exit arrangement.

(f) Each landplane emergency exit more than six feet from the ground with the airplane on the ground and the landing gear extended and each over-the-wing emergency exit must have an approved means to assist the occupants in descending to the ground. The assisting means for a floor level passenger emergency exit must be a slide, or an equivalent approved device. The assisting means for any other emergency exit must be a rope at least 5/8 inch in diameter, or an equivalent approved device. If the assisting means is a rope or an approved device equivalent to a rope, it must be—

(1) Attached to the fuselage structure at or above the top of the emergency exit opening, or, for a device at a pilot's emergency exit window, at another approved location if the stowed device, or its attachment, would reduce the pilot's view in flight;

(2) Able (with its attachment) to withstand a 400-pound static load; and  
(3) For an over-the-wing emergency exit, long enough to allow descent over the leading or trailing edge of the wing, whichever distance is longer.

2. Section 25.811 is amended to read as follows:

**§ 25.811 Emergency exit marking.**

(a) Each passenger emergency exit, its means of access, and its means of opening must be conspicuously marked.

(b) The identity and location of each passenger emergency exit must be recognizable from a distance equal to the width of the cabin.

(c) The location of each passenger emergency exit must be indicated by a sign visible to occupants approaching along the main passenger aisle. There must be a locating sign—

(1) Above the aisle near each over-the-wing passenger emergency exit, or at another ceiling location if it is more practical because of low headroom;

(2) Next to each floor level passenger emergency exit, except that one sign may serve two such exits if they both can be seen readily from that sign; and

(3) On each bulkhead or divider that prevents fore and aft vision along the passenger cabin, to indicate emergency exits beyond and obscured by it, except that if this is not possible the sign may be placed at another appropriate location.

(d) Each passenger emergency exit marking and each locating sign must have white letters one inch high on a red background two inches high, be self or electrically illuminated, and have a minimum luminescence (brightness) of at least 160 microlamberts. The colors may be reversed if this will increase the emergency illumination of the passenger compartment.

(e) The location of each passenger emergency exit operating handle and instructions for opening must be shown:

(1) For each emergency exit, by a marking on or near the exit that is readable from a distance of 30 inches.

(2) In addition, for each Type I or Type II emergency exit with a locking mechanism released by rotary motion of the handle, by—

(i) A red arrow, with a shaft at least  $\frac{3}{4}$  inch wide and a head twice the width of the shaft, extending along at least 70 degrees of arc at a radius approximately equal to  $\frac{3}{4}$  of the handle length; and

(ii) The word "open" in red letters one inch high, placed horizontally near the head of the arrow.

(f) A source of light, independent of the main lighting system, must be installed to—

(1) Illuminate each passenger emergency exit marking and locating sign; and

(2) Provide enough general lighting in the passenger cabin so that the average illumination, when measured at 40-inch intervals at seat armrest height on the center line of the main passenger aisle, is at least 0.05 foot-candles.

(g) Each light required by paragraph (f) of this section must be designed to be

operable manually, and to operate automatically, when armed if necessary, from the independent lighting system required by paragraph (f) of this section in a crash landing or whenever the airplane's normal electrical power to the light is interrupted.

(h) Each emergency exit that is required to be openable from the outside, and its means of opening, must be marked on the outside of the airplane. In addition, the following apply:

(1) There must be a two-inch colored band outlining the exit.

(2) Each outside marking, including the band, must differ in color from the surrounding fuselage surface so that the reflectance of the lighter color exceeds the reflectance of the darker color by a factor of at least three. "Reflectance" is the ratio of the luminous flux reflected by a body to the luminous flux it receives.

(i) Exits marked as emergency exits, though in excess of the required number of emergency exits, must meet the requirements for emergency exits of the particular type. Emergency exits customarily used in entering or leaving the airplane need only be marked with the word "Exit."

3. Section 25.813 is amended to read as follows:

**§ 25.813 Emergency exit access.**

(a) Each passageway between individual passenger areas, or leading to a Type I or Type II emergency exit, must be unobstructed and at least 20 inches wide.

(b) There must be enough space next to each Type I or Type II emergency exit to allow a crewmember to assist in the evacuation of passengers without reducing the unobstructed width of the passageway to the exit below that required by paragraph (a) of this section.

(c) There must be access from the main aisle to each Type III or Type IV exit. The access may not be obstructed by seats, berths, or other protrusions to an extent that would reduce the effectiveness of the exit. However, there may be minor obstructions if there are compensatory factors to maintain the effectiveness of the exit.

(d) If it is necessary to pass through a passageway between passenger compartments to reach any required emergency exit from any seat in the passenger cabin, the passageway must be unobstructed. However, curtains may be used if they allow free entry through the passageway.

(e) No door may be installed in any partition between passenger compartments.

(f) If it is necessary to pass through a doorway separating the passenger cabin from other areas to reach any required emergency exit from any passenger seat, the door must have a means to latch it in open position. The latching means must be able to withstand the loads imposed upon it when the door is subjected to the ultimate inertia forces, relative to the surrounding structure, listed in § 25.561(b).

4. Paragraph (c) of § 25.803 is stricken out.

**§ 25.803 Emergency evacuation.**

(c) [Revoked]

5. A new paragraph (e) is added to § 91.47 to read as follows:

§ 91.47 Emergency exits for airplanes carrying passengers for hire.

(e) This section does not relieve any person operating under Part 121 of this chapter from complying with § 121.291.

6. A new § 121.291 is added to read as follows:

**§ 121.291 Demonstration of emergency evacuation procedures.**

(a) Each certificate holder shall show by actual demonstration that the emergency evacuation procedures for each type and model of airplane with a seating capacity of more than 44 passengers, used in its passenger-carrying operations, allow the evacuation of its full seating capacity in 2 minutes or less, and through not more than 50 percent of its emergency exits. The demonstrations must be conducted according to the criteria provided in paragraphs (a) Aborted takeoff demonstration, and (b) Gear-up crash landing demonstration, of Appendix D of this Part, before July 6, 1965, for each type and model of airplane used currently in passenger-carrying operations, and thereafter—

(1) Upon the initial introduction of a type and model of airplane into passenger-carrying operations;

(2) Upon a 5 percent or greater increase in passenger seating capacity over that previously approved; or

(3) Upon a major change in the passenger cabin interior configuration that will affect the emergency evacuation of passengers.

However, each certificate holder who before June 7, 1965, has shown the aborted takeoff demonstration for a type and model of airplane, with a particular cabin interior configuration and passenger seating capacity, used currently in passenger-carrying operations, need not repeat that demonstration.

(b) In addition to the demonstrations required by paragraph (a), each certificate holder operating or proposing to operate one or more landplanes in extended overwater operations, or otherwise required to have certain equipment under § 121.339, must demonstrate ability to efficiently carry out its ditching procedures by a simulated ditching according to the criteria provided in paragraph (c) Ditching demonstration, of Appendix D of this part.

7. Paragraphs (f), (g), and (h) of § 121.309 are amended by striking out the word "Each" at the beginning and inserting the words "Until July 1, 1966, each" in place thereof. As amended, § 121.309 (f), (g), and (h) read as follows:

**§ 121.309 Emergency equipment.**

(f) Means for emergency evacuation. Until July 1, 1966, each passenger-carrying airplane must have a means to

help occupants descend from the airplane through each emergency exit that is more than six feet from the ground with the landing gear extended. At approved floor level emergency exits, this means must be a chute or equivalent device suitable for rapid evacuation of passengers and must be in position during flight time for immediate installation and ready use. This paragraph does not apply if the emergency exit is over a wing and the distance from the lower sill of the exit to the surface of the wing is 36 inches or less. However, this paragraph does not require a means to help the occupants of a passenger-carrying DC-3 airplane in descending from the airplane by way of the rear window emergency exit, unless that airplane is operated with more occupants than are specified in § 121.291 for DC-3 airplanes with four exits authorized for passenger use.

(g) *Interior emergency exit markings.* Until July 1, 1966, each passenger-carrying airplane emergency exit, its means of access, and its means of opening, must be conspicuously marked. The identity and location of each emergency exit must be recognizable from a distance equal to the width of the cabin. The location of the emergency exit operating handle and the instructions for opening must be marked on or adjacent to the emergency exit and must be readable from at least 30 inches by a person with normal eyesight.

(h) *Lighting for interior emergency exit markings.* Until July 1, 1966, each passenger-carrying airplane must have a source or sources of light with an energy supply that is independent of the main lighting system for passenger emergency exit markings. Each light must be designed to—

- (1) Function automatically in a crash landing, to continue functioning thereafter, and to be manually operable; or
- (2) Be manually operable only and to continue functioning after a crash landing.

If a light requires manual operation, it must be turned on before each takeoff and landing. If a light requires arming of the system to function automatically, the system must be armed before each takeoff and landing.

8. The following new section is added after § 121.309:

**§ 121.310 Additional emergency equipment.**

(a) *Emergency exit arrangement.* After June 30, 1966, on each passenger-carrying landplane, each emergency exit more than six feet from the ground with the airplane on the ground and the landing gear extended and each over-the-wing emergency exit must have an approved means to assist the occupants in descending to the ground. The assisting means for a floor level passenger exit must be a slide, or an equivalent approved device. The assisting means for any other emergency exit must be a rope at least  $\frac{1}{2}$  inch in diameter, or an equivalent approved device. During flight a slide, or equivalent approved device, must be kept readily accessible for immediate installation and use. If the as-

isting means is a rope or an approved device equivalent to a rope, it must be—

- (1) Attached to the fuselage structure at or above the top of the emergency exit opening, or, for a device at a pilot's emergency exit window, at another approved location if the stowed device, or its attachment, would reduce the pilot's view in flight;
- (2) Able (with its attachment) to withstand a 400-pound static load; and
- (3) For an over-the-wing emergency exit, long enough to allow descent over the leading or trailing edge of the wing, whichever distance is longer.

However, this paragraph (a) does not apply to over-the-wing or cabin window emergency exits of DC-3 airplanes operated with no more than 35 occupants including crewmembers, and no more than 4 exits authorized for passenger use.

(b) *Interior emergency exit marking.* After June 30, 1966, the following must be complied with for each passenger-carrying airplane:

(1) Each passenger emergency exit, its means of access, and its means of opening must be conspicuously marked. The identity and location of each passenger emergency exit must be recognizable from a distance equal to the width of the cabin. The location of each passenger emergency exit must be indicated by a sign visible to occupants approaching along the main passenger aisle. There must be a locating sign—

- (i) Above the aisle near each over-the-wing passenger emergency exit, or at another ceiling location if it is more practical because of low headroom;
- (ii) Next to each floor level passenger emergency exit, except that one sign may serve two such exits if they both can be seen readily from that sign; and
- (iii) On each bulkhead or divider that prevents fore and aft vision along the passenger cabin, to indicate emergency exits beyond and obscured by it, except that if this is not possible the sign may be placed at another appropriate location.

(2) Each passenger emergency exit marking and each locating sign must have white letters one inch high on a red background two inches high, be self or electrically illuminated, and have a minimum luminescence (brightness) of at least 160 microlamberts. The colors may be reversed if this will increase the emergency illumination of the passenger compartment.

(c) *Lighting for interior emergency exit markings.* After June 30, 1966, each passenger-carrying airplane must have a source of light, independent of the main lighting system, to—

- (1) Illuminate each passenger emergency exit marking and locating sign; and
- (2) Provide enough general lighting in the passenger cabin so that the average illumination, when measured at 40-inch intervals at seat armrest height on the center line of the main passenger aisle, is at least 0.05 foot-candles.

(d) *Interior emergency light operation.* After June 30, 1966, each light on each passenger-carrying airplane required by paragraph (c) of this section

must be designed to be operable manually, and to operate automatically from the independent lighting system required by paragraph (c) of this section in a crash landing or whenever the airplane's normal electrical power to the light is interrupted. If a light requires arming of the system to function automatically, the system must be armed before each takeoff and landing and during taxiing.

(e) *Emergency exit operating handles.* After June 30, 1966, the location of each passenger emergency exit operating handle on each passenger-carrying airplane, and instructions for opening, must be shown:

(1) For each emergency exit, by a marking on or near the exit that is readable from a distance of 30 inches.

(2) In addition, for each Type I or Type II emergency exit with a locking mechanism released by rotary motion of the handle, by—

(i) A red arrow with a shaft at least  $\frac{1}{4}$  inch wide and a head twice the width of the shaft, extending along at least 70 degrees of arc at a radius approximately equal to  $\frac{1}{4}$  of the handle length; and

(ii) The word "open" in red letters one inch high, placed horizontally near the head of the arrow.

(f) *Emergency exit access.* After June 30, 1966, access to emergency exits must be provided as follows for each passenger-carrying airplane:

(1) Each passageway between individual passenger areas, or leading to a Type I or Type II emergency exit, must be unobstructed and at least 20 inches wide.

(2) There must be enough space next to each Type I or Type II emergency exit to allow a crewmember to assist in the evacuation of passengers without reducing the unobstructed width of the passageway below that required in subparagraph (1) of this paragraph. However, the Administrator may authorize deviation from this requirement for an airplane certificated under the provisions of Part 4b of the Civil Air Regulations in effect before December 20, 1951, if he finds that special circumstances exist that provide an equivalent level of safety.

(3) There must be access from the main aisle to each Type III or Type IV exit. The access may not be obstructed by seats, berths, or other protrusions to an extent that would reduce the effectiveness of the exit. However, there may be minor obstructions if there are compensatory factors to maintain the effectiveness of the exit.

(4) If it is necessary to pass through a passageway between passenger compartments to reach any required emergency exit from any seat in the passenger cabin, the passageway must not be obstructed. However, curtains may be used if they allow free entry through the passageway.

(5) No door may be installed in any partition between passenger compartments.

(6) If it is necessary to pass through a doorway separating the passenger cabin from other areas to reach required emergency exit from any passenger seat, the door must have a means to latch it in open position, and the door must be latched open during each takeoff and

landing. The latching means must be able to withstand the loads imposed upon it when the door is subjected to the ultimate inertia forces, relative to the surrounding structure, listed in § 25.561(b) of this chapter.

(g) *Exterior exit markings.* After June 30, 1966, each emergency exit that is required to be openable from the outside, and its means of opening, must be marked on the outside of the airplane. In addition, the following apply:

(1) There must be a two-inch colored band outlining the exit.

(2) Each outside marking, including the band, must differ in color from the surrounding fuselage surface so that the reflectance of the lighter color exceeds the reflectance of the darker color by a factor of at least three. "Reflectance" is the ratio of the luminous flux reflected by a body to the luminous flux it receives.

(h) *Megaphones.* After June 30, 1966, each passenger-carrying airplane must have a portable battery-powered megaphone or megaphones readily accessible to the crewmembers assigned to direct emergency evacuation, installed as follows:

(1) One megaphone on each airplane with a seating capacity of more than 60 and less than 100 passengers, at the rearward end of the passenger cabin.

(2) Two megaphones on each airplane with a seating capacity of more than 99 passengers, one installed at the forward end and the other at the rearward end of the passenger cabin. However, if the interior configuration of the passenger cabin makes either location impracticable, another approved location may be used.

9. Section 121.391 is amended to read as follows:

**§ 121.391 Flight attendants.**

(a) Except as authorized in paragraph (b) of this section, each certificate holder shall provide at least the following flight attendants on each passenger-carrying airplane used:

(1) For airplanes having a seating capacity of more than 9 but less than 45 passengers—one flight attendant.

(2) For airplanes having a seating capacity of more than 44 but less than 100 passengers—two flight attendants.

(3) For airplanes having a seating capacity of more than 99 but less than 150 passengers—three flight attendants.

(4) For airplanes having a seating capacity of more than 149 passengers—four flight attendants.

(b) Upon application by the certificate holder, the Administrator may approve the use of an airplane in a particular operation with less than the number of flight attendants required by paragraph (a) of this section, if the certificate holder shows that, based on the following, safety and emergency procedures and functions established under § 121.397 for the particular type of airplane and operations can be adequately performed by fewer flight attendants:

- (1) Kind of operation.
- (2) The number of passenger seats.
- (3) The number of compartments.
- (4) The number of emergency exits.
- (5) Emergency equipment.

(6) The presence of other trained flight crewmembers, not on flight deck duty, whose services may be used in emergencies.

(c) Upon approval of an application under paragraph (b) of this section, the number of flight attendants and the particular operation for which it is approved are set forth in the certificate holder's operations specifications.

10. Sections 121.393 and 121.396 are stricken out.

**§ 121.393 [Revoked]**

**§ 121.396 [Revoked]**

11. Section 121.397 is amended to read as follows:

**§ 121.397 Emergency and emergency evacuation duties.**

(a) Each certificate holder shall, for each type and model of airplane, assign to each category of required crewmember, as appropriate, the necessary functions to be performed in an emergency or a situation requiring emergency evacuation. The certificate holder shall show those functions are realistic, can be practically accomplished, and will meet any reasonably anticipated emergency including the possible incapacitation of individual crewmembers or their inability to reach the passenger cabin because of shifting cargo in combination cargo-passenger airplanes.

(b) The certificate holder shall describe in its manual the functions of each category of required crewmembers under paragraph (a) of this section.

(c) The certificate holder shall train each required crewmember in his functions under paragraph (a) of this section during the emergency training part of the approved training program prescribed in § 121.411.

12. Sections 121.571 and 121.573 are amended to read as follows:

**§ 121.571 Briefing passengers before takeoff.**

(a) Before each takeoff, each certificate holder operating a passenger-carrying airplane shall ensure that all passengers are orally briefed by the appropriate crewmember on—

- (1) Smoking;
- (2) The use of seat belts; and
- (3) The location of emergency exits.

(b) Each certificate holder shall carry on each passenger-carrying airplane, in convenient locations for use of each passenger, printed cards supplementing the oral briefing and containing—

- (1) Diagrams of, and methods of operating, the emergency exits; and
- (2) Other instructions necessary for use of emergency equipment.

(c) The certificate holder shall describe in its manual the procedure to be followed in the briefing required by paragraph (a) of this section.

**§ 121.573 Briefing passengers: extended overwater operations.**

(a) In addition to the oral briefing required by § 121.571(a), each certificate holder operating an airplane in extended overwater operations shall ensure that all passengers are orally briefed by the appropriate crewmember on the location

and operation of the life preservers and location of the life rafts, including a demonstration of the method of donning and inflating a life preserver.

(b) The certificate holder shall describe in its manual the procedure to be followed in the briefing required by paragraph (a) of this section.

(c) If the airplane proceeds directly over water after takeoff, the briefing required by paragraph (a) of this section must be done before takeoff.

(d) If the airplane does not proceed directly over water after takeoff, no part of the briefing required by paragraph (a) of this section has to be given before takeoff but the entire briefing must be given before reaching the overwater part of the flight.

13. A new Appendix D is added to Part 121 [New] to read as follows:

**Appendix D—Criteria for Demonstration of Emergency Evacuation Procedures Under § 121.291**

**(a) Aborted takeoff demonstration.**

(1) The demonstration must be conducted either during the dark of the night or during daylight with the dark of the night simulated. The demonstration must be conducted without any overall exterior illumination. Illumination on the floor or ground may be used, but it must be kept low and shielded against shining into the airplane's windows or doors. If the demonstration is conducted in a hangar, the hangar lights must be turned off, and each window or door of the hangar must be covered or closed to minimize the daylight effect.

(2) The airplane must be in a normal ground attitude with landing gear extended.

(3) The airplane's normal electrical power sources must be de-energized.

(4) All emergency equipment must be installed in accordance with specified limitations of the equipment.

(5) Each external door and exit, and each internal door or curtain, must be in a position to simulate a normal flight.

(6) Each crewmember must be in his seat normally assigned for takeoff and landing. No other employee of the certificate holder may be seated next to any emergency exit. No passenger may be assigned to a specified seat.

(7) Seat belts and shoulder harness (as required) must be fastened.

(8) A representative passenger load of persons in normal health, none of them crewmembers, must be used. At least 80 percent must be females. Approximately 5 percent must be over 60 years of age, with a proportionate number of females. At least 5 percent but no more than 10 percent must be children under 12 years of age, prorated through that age group. Three life-size dolls, not included as part of the total passenger load, must be carried by passengers to simulate live infants 2 years old or younger.

(9) After seating of the passengers and before the start of the demonstration, the certificate holder shall distribute carry-on baggage, blankets, pillows, and similar articles along the aisle at several locations to create minor obstructions. The Administrator may request the certificate holder to assign the passengers to different seats.

(10) The seating density and arrangement of the airplane must be representative of the highest passenger version of that airplane the certificate holder operates or proposes to operate.

(11) Each crewmember must be a member of a regularly scheduled line crew, and must remain in his assigned seat for takeoff and landing until he receives the signal for commencement of the demonstration.



(12) No crewmember or passenger may be given prior knowledge of the emergency exits available for the demonstration.

(13) The certificate holder may not rehearse the demonstration for the participants. Only the before-takeoff passenger briefing required by § 121.571 and given in accordance with the certificate holder's manual may be made before the demonstration.

(14) To prevent disclosure of the emergency exits to be used, either all passenger and cockpit windows must be blacked out, or mats on the ground or the wings, or ramps or stands with stairs (or similar devices) at the wings, must be placed at emergency exit positions in equal number on each side of the airplane.

(15) Not more than 50 percent of the airplane's emergency exits may be used for the demonstration. Exits not used in the demonstration must be so indicated by red flash lights, red tape, or other acceptable means, placed outside the exits to indicate fire or other reason that the exits are unusable. The exits to be used may not be disclosed to the crewmembers until the demonstration starts and they are opened. They must be designated by the certificate holder, and they must be representative of all the emergency exits on the airplane. At least one exit used must be a floor level exit.

(16) A stand or ramp, with or without steps, may be placed at the trailing edge of each wing for descent from the wing to the ground. No stand, or other equipment not part of the airplane's emergency evacuation gear, may be used at any other exit.

(17) All evacuees other than those using an over-the-wing exit must leave the airplane by the means provided as part of the airplane's equipment.

(18) During the demonstration, full use must be made of all approved procedures and emergency equipment normally available, in-

cluding doors, slides, ropes, megaphones, and lights.

(b) *Gear-up crash landing demonstration.* The demonstration must assume the following conditions:

(1) Daylight hours exist outside the airplane.

(2) The airplane was involved in a gear-up crash landing.

(3) All required flight crewmembers are incapacitated.

(4) All regularly assigned flight attendants are available to conduct the evacuation.

Under these conditions, the evacuation demonstration must be conducted under criteria Nos. (8)-(15) and (17)-(18) of the aborted takeoff demonstration, except that a stand must be placed at each emergency exit or wing with the top platform of the stand at a height that simulates ground level following a gear-up landing.

(c) *Ditching demonstration.* The demonstration must assume that daylight hours exist outside the airplane, and that all required crewmembers are available for the demonstration.

(1) If the certificate holder's manual requires the use of passengers to assist in the launching of liferafts, the needed passengers must be aboard the airplane and participate in the demonstration according to the manual.

(2) A stand must be placed at each emergency exit and wing, with the top of the platform at a height simulating the water level of the airplane following a ditching.

(3) After the ditching signal has been received, each evacuee must don a life vest according to the certificate holder's manual.

(4) Each liferaft must be launched and inflated, according to the certificate holder's manual, and all other required emergency equipment must be placed in rafts.

(5) Each evacuee must enter a liferaft, and the crewmembers assigned to each liferaft must indicate the location of emergency equipment aboard the raft and describe its use.

(6) Either the airplane, a mockup of the airplane or a floating device simulating a passenger compartment must be used.

(1) If a mockup of the airplane is used, it must be a life-size mockup of the interior and representative of the airplane currently used by or proposed to be used by the certificate holder, and must contain adequate seats for use of the evacuees. Operation of the emergency exits and the doors must closely simulate those on the airplane. Sufficient wing area must be installed outside the over-the-wing exits to demonstrate the evacuation.

(2) If a floating device simulating a passenger compartment is used, it must be representative, to the extent possible, of the passenger compartment of the airplane used in operations. Operation of the emergency exits and the doors must closely simulate operation on that airplane. Sufficient wing area must be installed outside the over-the-wing exits to demonstrate the evacuation. The device must be equipped with the same survival equipment as is installed on the airplane, to accommodate all persons participating in the demonstration.

(Secs. 219(a), 301, 303, and 304 of the Federal Aviation Act of 1958 (49 U.S.C. 1354, 1421, 1423, 1434))

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N. E. HALASY,  
Administrator.

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