

Advance copy pending issuance
of Changes to FAR Parts 21, 25,
37, and 121

Effective Oct., 1968

Title 14—AERONAUTICS AND SPACE

Chapter I—Federal Aviation Administration, Department of Transportation

[Docket No. 7522; Amdt. 21-16, 25-15, 37-14, 121-30]

PART 21—CERTIFICATION PROCEDURES FOR PRODUCTS AND PARTS

PART 25—AIRWORTHINESS STANDARDS: TRANSPORT CATEGORY AIRPLANES

PART 37—TECHNICAL STANDARD ORDER AUTHORIZATIONS

PART 121—CERTIFICATION AND OPERATIONS: DOMESTIC, FLAG, SUPPLEMENTARY AIR CARRIERS AND COMMERCIAL OPERATORS OF LARGE AIRCRAFT

Crashworthiness and Passenger Evacuation Standards; Transport Category Airplanes

The purpose of these amendments is to improve the emergency evacuation equipment requirements and operating procedures for transport category airplanes.

These amendments are based on a notice of proposed rule making (31 F.R. 10275, July 29, 1966), circulated as Notice No. 66-25 dated July 25, 1966, and on a supplement to notice of proposed rule making (31 F.R. 11725, Sept. 7, 1966), circulated as Notice No. 66-26A dated September 2, 1966.

Numerous comments were received in response to Notice 66-26 and supplemental Notice 66-26A. Based upon these comments and upon review within the FAA,

a number of changes have been made to the proposed rule. Most of these changes involve rewording and reorganization for greater clarity and consistency. However, certain substantive changes have been made to the proposed regulation that do not require compliance for periods of from 1 to 2 years. While all but a few of these changes fall within the scope of Notices 66-26 and 66-26A, interested persons have not been given the opportunity to comment on the details of the requirements. The issuance of a supplemental notice of proposed rule making to solicit comments upon these was considered. However, comments from the public on the original notices and from within the FAA indicated that the further delays attendant to this course of action would not be in the best interest of those concerned. Consequently, the FAA is issuing a final rule to allow the persons affected by these regulations to proceed with the certification or retrofitting of their airplanes without further delay. Thereafter, the FAA will consider comments on the changes referred to above received from interested persons on or before October 24, 1967, and may further amend the regulations in the light of these comments. The FAA believes that this course of action is justified and is in the best interest of the public.

The amendments incorporated herein are aimed at increasing substantially the probability of occupant survival in an aircraft accident. The FAA will consider additional revisions of the regulations, as advances in the state-of-the-art allow, in order to further increase that probability of survival. To this end, Government and industry development programs have been established to devise new techniques, designs, and equipment. In progress now are developments on: More effective self-extinguishing characteristics

for aircraft interior materials; cabin fire suppressant systems; protection from smoke and fumes; gelled fuels; improved emergency lighting and exit conspicuity; and improved evacuation facilities and techniques.

The final amendments and the more pertinent of the comments received in response to the notices are set forth hereinafter.

PART 21

Sections 21.17 and 21.101 are amended as proposed to accommodate the special retroactive requirements incorporated by new § 25.2.

PART 25

Section 25.2. Of key importance in the notice was the provision relating to retroactivity. Proposed § 25.2 covered special requirements applicable to type certificates and to supplemental type certificates (or amended type certificates) involving increases in passenger seating capacity. There were numerous comments received with respect to this section as proposed and certain of the recommended changes have been adopted.

We agree with one recommendation that § 25.2 be changed to clarify the intent that insofar as supplemental type certificates and amendments to type certificates are concerned, the special requirements are applicable only when there is an increase in passenger seating capacity beyond that already approved under the terms of the basic type certificate. Section 25.2 has been amended accordingly.

The preamble to Notice 66-26 explained the intent to make all the proposed regulatory items applicable to airplanes for which an application for a type certificate is made after the effective date of the amendments and to airplanes for which type certificates are issued after

(As published in the Federal Register 32 F.R. 13255 on Sept. 20, 1967)

the effective date irrespective of the date of application. The same considerations would apply to supplemental type certificates, and amendments to type certificates, involving increases in passenger seating capacity and § 25.2 has been amended to make it clear that the provisions of this section will apply to any such certificate issued after the effective date of this amendment irrespective of the date of application.

It was suggested that because of necessary delays incidental to production engineering and tooling, certain of the regulations not become applicable until 18 months after the effective date of the amendment. The FAA agrees that there is a basis for an 18-month delay with respect to certain of the proposals in the notice. In this connection, we have determined that manufacturers who now have airplane type certification programs underway would be unreasonably burdened if certain of these rules (i.e., those which necessarily involve considerable engineering development and extensive changes in the type design) were to be made effective on the date of amendment as a condition for obtaining a type certificate, and that delaying their effectivity for 18 months would provide a measure of relief not inconsistent with the safety objectives of this rule-making action. Section 25.2 has accordingly been revised to segregate those regulations with which an applicant need not show compliance until 18 months after the effective date of the amendment.

Section 25.721(d). Several commentators recommended clarification of proposed § 25.721(d) with respect to the overloads and to the parts of the fuel system requiring protection. It is the intent of the section to ensure that no part of the fuel system, lines and tanks, located in the fuselage is likely to be damaged by failure of the landing gear due to overload in the vertical plane parallel to the longitudinal axis of the airplane. The proposal has been changed to reflect this intent. For the reasons set forth above, the effective date of this amendment has been postponed for 18 months.

Section 25.783. The purpose of the proposed changes to § 25.783 was to require that all passenger entrance doors in the side of the fuselage qualify as Type I or Type II passenger emergency exits. Two commentators read the proposed section as introducing substantive changes in the requirements for exits which are covered elsewhere in the regulations and stated that no explanation was given for amending the entire section. We agree with these comments to the extent that the present section should be retained with the addition of a new paragraph covering door requirements as necessary to make them emergency exits.

In connection with the foregoing, the substance of proposed § 25.783(a) has been added to presently effective § 25.783 as new paragraph (g). Moreover, in response to a recommendation, the doors to which the paragraph is applicable have been defined as "entry" doors. With reference to the integral stair, objections were made to the prohibition of any interference with emergency egress after

failure of the landing gear. We agree that the emphasis should be placed on ensuring egress. Interference to a degree that will not reduce the effectiveness of emergency egress should not prevent approval of the integral stair, and the paragraph has been so revised. Finally, the proposal has been revised to state that the entry door may also qualify as a Type A emergency exit. The introduction of the Type A exit in this amendment is discussed below in connection with § 25.807.

Section 25.785(c). Various comments on the proposed requirements applicable to sideward facing seats in § 25.785(c) indicated general belief that they were overly strict inasmuch as provision for only one method of compliance was made. The FAA agrees with the comments and has provided an alternative in the form of a safety belt and shoulder harness combination. The FAA also finds merit in a further suggestion that suitable protection may be afforded by energy-absorbing material such as honeycomb, even though it is noncushioned. Section 25.785(c) has been amended to allow the use of such material.

Section 25.803. The purpose of the proposed regulation is to provide for the emergency evacuation of every occupant of an airplane, whether crewmember or passenger. To clarify this aspect of the requirement proposed in § 25.803(c) and to make it consistent with the intent as expressed in the preamble to Notice 68-26 and with § 121.291, § 25.803(c) is amended to require demonstration of evacuation of the maximum number of airplane occupants, including crewmembers, within the given time limit. Since the number of crewmembers may vary, it is reasonably set for purposes of the test at the number required by the applicable operating rules.

In response to a recommendation that the rule state when the demonstration is considered completed, the first sentence of § 25.803(c) has been amended to state that the demonstration is complete when the occupants have been evacuated from the airplane to the ground. The regulation also makes it clear that evacuees using stands or ramps allowed at the wings are considered to be on the ground when they are on the stand or ramp, provided that the acceptance rate of the stand or ramp is no greater than the acceptance rate of the means available on the airplane for descent from the wing during an actual crash situation.

One commentator pointed out that although ventral and tail cone exits are proposed as passenger emergency exits in § 25.807, they are excluded in the evacuation demonstration required in proposed § 25.803(c). Ventral and tail cone exits were excluded purposely because there is insufficient service experience in the use of these exits as emergency exits. Until more data and experience are accumulated on the effectiveness of these new exit types, the FAA has determined it advisable to preclude their use in the evacuation demonstration. In addition, the FAA cannot accept a recommendation that a new evacuation demonstration be required for passenger

seating increases of 15 percent or more, rather than 5 percent as stated in the notice. The 5-percent variation will permit some flexibility, whereas any greater seating increase could reasonably be expected to involve additional exits and equipment, and changes in interior arrangement and should, therefore, require a new evacuation demonstration.

While there is no intent to require a manufacturer to simulate actual crash conditions as a part of his demonstration, nevertheless, a crash condition will be assumed to occur during takeoff. Section 25.803(c) (3) has, therefore, been changed to require that internal doors and curtains be in the configuration simulating normal takeoff. Also, § 25.803(c) (7) has been further amended to make it clear that it is the passengers rather than the crewmembers who may not have the benefit of prior practice or rehearsal in fulfilling the evacuation demonstration requirements.

In addition, some question has been raised as to whether the term "previously approved" referred to approval based on the actual demonstration. Since the proposal was concerned with the need for repeating the demonstration, it should be made clear that by "previously approved" the FAA meant by actual demonstration.

The FAA does not agree with the suggestions that emergency evacuation demonstrations be the sole responsibility of the air carriers or that the manufacturer be required to demonstrate evacuation under the same conditions now imposed on the operators under Part 121. The FAA believes that since the evacuation capability of an airplane, as defined in this regulation, depends to a large degree on the design of that airplane, it is fundamental to the type certification process to ensure that the airplane has the necessary evacuation capability for the maximum passenger capacity for which certification is sought. Furthermore, for the reasons set forth in the preamble to Notice 68-26, since a manufacturer will be demonstrating the basic capability of a new airplane type, it is not necessary that the demonstration be conducted under the detailed conditions regarding crewmember training, operating procedures and similar items that are of concern to an operator. Nor do we find any justification for a recommendation that evacuation times should vary depending on airplane ground attitude since there is no apparent correlation between the degree of evacuation urgency and airplane ground attitude. Likewise, as to the same commentator's recommendation that the manufacturer be permitted to use 50 percent of the exits rather than those on one side of the fuselage, the FAA believes that the language proposed is more appropriate for type certification since it would ensure evaluation of all the required type exits and emergency evacuation installations incorporated in the type design.

Various commentators objected to the proposed 90-second evacuation time. Some indicated it was too long, others that it was not long enough, while still

others took exception to any evacuation time requirement. In this matter, the basis for proposing a 90-second limit was covered in the preamble to Notice 66-26, and nothing has been presented in the comments that is persuasive of change. Numerous demonstrations by manufacturers and air carriers have indicated that the 90-second criterion is reasonable at the present, and 90-seconds as proposed is being retained. As evacuation system component and equipment advances permit reductions in evacuation time, the FAA will consider appropriate changes in the requirements.

The requirement for the designation of an escape route by a slip resistant surface as proposed in § 25.812 does not specify an emergency lighting requirement. Therefore, it is considered appropriate to transfer that requirement to § 25.803. In response to comments, the white color proposed for the slip resistant surface has been deleted since other colors can serve the purpose. Further, the rule has been amended to exclude flaps used as slides from the slip resistant surface requirement.

A recommendation that cabin inerting system requirements be added to § 25.803 in order to allow an increase in the evacuation time has not been adopted. Although such a system may have merit, studies, tests and evaluations will be necessary before such standards could be proposed.

Section 25.807. Although there was some concurrence, a majority of the comments received opposed the increase in Type I passenger emergency exit minimum height from 48 to 60 inches as proposed in § 25.807(a) (1). It was the position of those not favoring the change that evacuation effectiveness is not improved with the increased height. In this connection, recent FAA test data likewise indicates that the 60-inch door permits no material improvement in evacuation flow rates. Therefore, since the higher door has not been shown to improve the flow rate of the Type I exit and would cause an increased installation burden on the manufacturers, we believe it advisable to retain the 48-inch minimum Type I exit height currently specified in the regulations.

Section 25.807(a) (5) has been amended, in response to a recommendation for clarification of ventral exit definition, by stating that the "same rate of egress as a Type I exit" refers to a Type I exit with the airplane in the normal ground altitude with the landing gear extended. Likewise, following another recommendation, the definition of tail cone in § 25.807(a) (6) has been broadened to permit "openable" designs rather than "detachable" as proposed.

A number of commentators objected to the emergency exit distribution requirements proposed in § 25.807(c). The FAA agrees that the notice stated an unnecessarily inflexible requirement for multiple floor level exit locations at each end of the cabin and this has been relaxed to allow locations near each end of the cabin. Moreover, when a design incorporates more than one floor level exit on each side of the fuselage, there

is some ambiguity as between proposed paragraph (c) and paragraphs (a) (1) and (2) of current § 25.807. We have, therefore, deleted the location requirement for the first Type I or Type II exit as stated in current § 25.807(a) (1) and (2) and substituted a similar requirement for the first floor level exit in § 25.807(c). Finally, as pointed out in the comments, the proposal did not provide for variations made necessary by cargo/passenger configurations and an exception to take care of such situations has been written into the regulation.

For the period of time since Notice 66-26 was published (over 1 year), the design-development of several large transport airplanes had indicated the desirability if not the necessity of incorporating doors whose width permits two-abreast evacuation. Under current regulations, a Type I exit need be only 24 inches wide. However, limited tests to date on an exit, designated the "Type A" emergency exit, measuring 42 by 76 inches, tend to establish that, subject to certain conditions, its evacuation rate materially exceeds the combined rate of two standard Type I exits. In connection with the foregoing, there is an industry recommendation that the rule being promulgated make provision for the "Type A" emergency exit under § 25.807(a).

In the light of recent developments relating to large airplanes, the FAA agrees that passenger emergency exit requirements should contain a standard for an exit larger than Type I. Accordingly, § 25.807 is amended to include a new standard for a "Type A" emergency exit. Although the tests previously mentioned were conducted with exits measuring 42 inches wide by 76 inches high, the FAA believes that a reduction in height from 76 to 72 inches would not have a significant effect on emergency evacuation rate. Any proposal to reduce further the exit opening size, however, would necessitate additional test data.

Section 25.807(c) (1) of the notice proposed the number and type of passenger emergency exits for passenger seating capacities up to 339. Industry response was to the effect that the combination of exit types was arbitrary and inconsistent with evacuation capabilities of the larger aircraft; that inadequate credit was allowed for Types II and IV exits, thereby tending to minimize the number of exits; and that the nonlinear assignment of exit credit versus the number of passengers was, without sufficient justification. A major objection voiced was that for the new emergency exits being developed in connection with new transports, no credit was available for exits larger than Type I. One commentator recommended that the proposed table of passenger seating capacity versus required number and types of exits be deleted and that the table showing increases in passenger capacity for each type exit be amended to allow credit for Types A, III, and IV and increases for Types I and II from that proposed in the notice. Another commentator recommended retention of the present table of § 25.803(c) (1) as adequate for pres-

ent size aircraft and pointed out that the proposed table did not reflect proper credit for new double size exits being designed for new large aircraft.

The FAA does not agree that the table in current § 25.807(c) (1) should be deleted in its entirety inasmuch as the current version represents many years experience with passenger configurations up to the 179-passenger limit. However, it has subsequently been determined that there is not sufficient justification for extending the table to 339 passengers. Accordingly, the current table in § 25.807(c) (1) is being retained for seating capacities up through 179 passengers. In addition, the provision set forth in current § 25.807(c) (4) is being retained to permit the passenger emergency exit relationship to be increased by not more than 10 passengers for slides, but has been restricted to airplanes having a passenger seating capacity of 189 or less.

In order to meet the industry request for more flexible and realistic standards for the individual exit types, we have amended the table in § 25.807(c) (4) to credit evacuation capability of 100 passengers for each pair of Type A exits, to increase to 45 and 40 passengers, respectively, the credit for Types I and II exits, and to give a credit of 35 passengers for Type III exits. Furthermore, in keeping with the intent of the notice that airplanes having passenger seating capacities more than 299 use only the two largest size exits, we have included the requirement that emergency exits be either Type A or Type I on airplanes having passenger capacities in excess of 299. The proposal would have permitted the use of Type I and Type II combination exit arrangement for passenger capacities between 309 and 339. This was based on the fact that the Type II exit required in the notice had to be both floor level and overwing. Since the final rule retains the current requirements for Type II, which are less severe in these respects, the passenger credit for Type II exits above a passenger capacity of 299 has been deleted.

The 100-passenger increase in seating capacity allowed per pair of Type A exits is based on tests conducted to date using both overwing and non-overwing exits. The value of 100 is conservatively set at 85 percent of the test evacuation capacity of the non-overwing type and is considered acceptable for all Type A exits inasmuch as the rate of evacuation of the overwing type exit, established by tests, exceeds that of the non-overwing exit. In connection with the overwing exit, however, the tests were conducted using self-supporting and automatically deployed devices to assist evacuees in reaching the wing surface. Therefore, to ensure that overwing exits having step-down distances are as effective as non-overwing exits, standards have been added relating to assist devices at such overwing exits.

The significant factor in achieving the Type A egress rate, is an adequate flow of passengers to the exit. Certain design features, other than the mere size of the exit, must, therefore, be incorporated in order to realize the effectiveness of the

exit. In concept, the Type A exit is a system rather than a mere opening. Configuration requirements are therefore set forth, as part of the Type A exit system, concerning, among other things, number, location and size of aisles, and passageways, and exterior slides.

Questions on proposed § 25.807(c) (3) (now § 25.807(c) (6)) indicated that it was unclear as to what was meant by the phrase "usable following the collapse of one or more legs of the landing gear". The intent of the requirement was to cover the situation of reduced exit effectiveness due to some restriction that would affect egress after the gear failure. The key condition for which usability is required is the critical fuselage attitude after gear failure. The paragraph has been amended, therefore, to make it clear that usability must relate to the airplane in the most adverse exit opening condition following collapse of one or more legs of the landing gear. Our further evaluation indicates that in going from gear normal attitude to critical gear failure attitude, it would be reasonable to specify, as the criterion of usability, that the tail cone or ventral exit must have a rate of egress at least equivalent to that of a Type III exit.

The passenger credit in proposed § 25.807(c) (3) (II) (now § 25.807(c) (6) (II)) was predicated on a tail cone exit incorporating, among other things, a Type I size opening 60 inches in height. As discussed previously, however, the Type I height is being retained at 42 inches. Since it is necessary to maintain a walkthrough from the pressure shell to the emergency exit, the 60-inch height must be retained. Section 25.807(c) (6) (II), therefore, contains the actual dimensions of the required opening in the pressure shell rather than specifying a Type I size opening. A similar situation exists in connection with the proposed requirements for a tail cone exit incorporating a Type III size opening. Again, the intent is that an evacuee be forced to bend over the least to get through the opening so that there is minimum impedance to flow. Accordingly, to preclude floor level Type III size openings and to assure a minimum height, § 25.807(c) (6) (III) requires that the top of the opening be not less than 56 inches from the passenger compartment floor.

Pointing out that for a tail cone exit incorporating a Type I opening, the rate of egress is at least equivalent to a side mounted Type I exit and that a passenger's ability to mount the slide is enhanced because he doesn't have to clear the exit at the same time, one commentator expressed the belief that the 20-passenger credit in proposed § 25.807(c) (3) was unduly restrictive and unrealistic. Inasmuch as recent tests have substantiated higher egress rates and studies have indicated the reduced vulnerability of the tail cone to obstructions resulting from crash damage or hazards due to wing tank fuel fires, the FAA agrees that the 20-passenger credit is conservative. We believe that the reduced vulnerability of the tail cone exit offsets the fact that there is no requirement for

a "back-up" exit and that the passenger credit factor may be approximately the same as for the Type I side mounted exit. Based on the foregoing considerations, the FAA believes it appropriate to increase the passenger credit of proposed § 25.807(c) (3) (II) (now § 25.807(c) (6) (II)) from 20 to 25. Likewise, in connection with ventral exits, a credit for 10 passengers appears conservative. Since the FAA has previously allowed credit for 12 passengers by way of exemption, proposed § 25.807(c) (3) (I) (now § 25.807(c) (6) (I)) is relaxed to allow that higher number.

The FAA agrees with comments as to the impracticability of attempting to regulate, in general, those situations in which the location of the wing does not allow the installation of overwing exits. Each case must be governed by its own special considerations. It would appear that proposed § 25.807(c) (5) could be unnecessarily burdensome if not impossible of accomplishment where the smaller transports are involved. Therefore, the current requirement of § 25.807(c) (5) has been retained and designated as § 25.807(c) (7).

The proposed requirement in § 25.807(c) (4) (now § 25.807(c) (8)) concerning emergency exits in excess of the minimum number of required emergency exits, has been retained. The comments did not present sufficient supporting data to justify deleting this requirement.

As proposed, § 25.807(d) (1) (II) retained the ditching exit requirements of the like-numbered present regulation governing the minimum size opening for airplanes with a passenger seating capacity of 11 or more. The proposal, furthermore, deleted the § 25.807(d) (3) equivalency provision that permitted substitution of two Type IV exits for each Type III exit. Objections were stated to both the foregoing provisions in that they did not give credit for the new larger Type A exits while at the other extreme, small diameter fuselages may not accommodate openings as large as Type III. While we do not agree that there is sufficient basis to establish a specific passenger ditching credit for the new Type A exit, the FAA believes the regulation as proposed may be broadened to make provision for credit in excess of 35 passengers in a case where the large exits and other improved designs are shown to have better capabilities. However, in view of the changes being made to § 25.807(c), there is no longer any basis for prohibiting the Type IV as a ditching exit.

One commentator suggested that in a case where a high wing airplane sinks to wing level, egress through a Type III size overhead hatch is much more difficult than through a Type I or Type II size opening. In this connection, however, the FAA is not aware of any unsatisfactory service experience with the present requirements. Furthermore, it would appear that requirements for overhead Type I or Type II size hatches would impose difficult if not impossible design limitations in small airplanes. Although the FAA finds no basis for amending requirements as to the size of overhead hatches,

the FAA believes that in the light of increasing fuselage sizes, the implicit requirement of accessibility should be clarified. Section 25.807(d) is, therefore, amended to require readily accessible overhead hatches.

Section 25.809. In accordance with recommendations received in response to the notice, proposed § 25.809(f) has been revised to provide for assist means that are erected by means other than by inflation. However, for lack of supporting data to justify such a change, the requirement that the assisting means must be automatically erected has not been deleted as requested by some commentators. The proposal set forth in § 25.809(h) has been changed to make it clear that an assist means must be provided if the trailing edge of the flaps is more than 6 feet above the ground or if the wing is more than 6 feet above the ground and the flaps are unsuitable as a slide. A suggestion was made that the slide specified in § 25.809 should be referred to as "rigid type" slide. This suggestion has not been adopted since requiring a "rigid type" slide could be construed as requiring a device that is not collapsible.

Section 25.811. With respect to requirements of § 25.811 concerning emergency exit markings, some comments indicated that strobe lights should be installed to assist in locating exits. Other comments pointed out the disadvantages associated with the use of strobe lights and suggested a thorough check of such lights prior to any implementation for use with emergency exits. The FAA believes that a mandatory requirement for strobe lights would be premature. However, the FAA believes that perhaps strobe light designs could be devised for complying with the requirement in § 25.811(c) under conditions of dense smoke. Each such design would have to be thoroughly evaluated during the type certification of the airplane.

Comments were also received suggesting the use of signs incorporating arrows as emergency exit markings, and suggesting that exit signs at overwing exits should not be located at that portion of the window that would be removed in the case of an emergency. In this connection, it should be noted that both the current regulations and those set forth in his regulation permit the use of signs incorporating arrows. Moreover, § 25.811 as amended herein requires that exit signs be next to or above each passenger emergency exit. A suggested change to require that emergency exit instructions be painted on a transparent panel or glass panel backed by a panel illuminated to a brightness level of 3 to 4 foot-lamberts, has not been adopted. While this suggestion could be incorporated by any manufacturer, the commentator has presented no supporting data to justify such a change in the regulations and the FAA does not consider that such a requirement is necessary as a minimum standard.

Objections were received concerning the proposed change to the color contrast requirements of current § 25.811

(h). In this regard, the comments suggested that the time between the effective date of the current rule and Notice 66-26 was not sufficient to permit the necessary evaluation of the effectiveness of the current requirement. The FAA does not agree with this comment. Experience has shown that when the color reflectance is of a low value, it is possible to get a 3 to 1 ratio as currently prescribed and still not have adequate visual contrast between the colors.

Section 25.812. With respect to the requirements of proposed § 25.812, paragraph (b) has been revised in response to a comment, to make it clear that exit locating signs that are self-illuminated by other than electrical means as well as signs that are internally electrically illuminated may be used in meeting the requirements of that paragraph.

A suggestion was made that the emergency lighting requirements are unrealistic for small business jet aircraft and that aircraft certificated to carry 10 passengers or less should be exempt from certain requirements of § 25.812. The FAA does not agree with this comment. The emergency exit location and identification requirements are particularly important for the small business jets used as executive airplanes since the applicable operating rules do not require crew training in emergency evacuation procedures or a flight attendant or passenger briefing to assist in the evacuation of the passengers of such an airplane.

In response to comments objecting to the requirement for a brightness of at least 50 foot-lamberts, the FAA has decided to retain the current requirement for a brightness of 160 microlamberts. The FAA agrees that the matter of the brightness level for emergency exits requires further investigation before attempting to revise the present requirement.

In addition to the foregoing, the requirements set forth in proposed paragraphs (c) and (d) of § 25.812, have, for purposes of clarification, been incorporated into paragraph (b) of § 25.812.

Proposed paragraph (e) of § 25.812 has been redesignated as paragraph (c) and revised to read substantially the same as the present requirement in § 25.811(f), the only change being a definition of the main passenger aisle.

In response to comments, the requirement for at least 2 foot-candles illumination in proposed paragraph (f) (now paragraph (d)) has been deleted.

With respect to the proposed paragraph (g) of § 25.812 (now paragraph (e)), comments objected to the requirement for a cabin switch for the emergency lighting system as being unnecessary. In addition, it was believed that under such a proposal, inadvertent operation of the switch is possible and might be unavoidable. The FAA believes that for airplanes having flight attendants, the switch in the passenger cabin serves a necessary function in the event that the flight crew forgot to arm, or inadvertently disarmed, the emergency lighting system. The possibility that the passenger cabin switch might be misused is

minimized by the requirement for a means to prevent inadvertent operation of the manual controls. The proposal has been changed to require a switch in the passenger cabin where such a switch is required by the operating rules. The rule has been clarified to provide for arming or turning on rather than switching on.

In paragraph (h) of § 25.812, the FAA proposed to require that exterior emergency lighting be provided at each overwing exit to illuminate the adjacent wing surface and the escape route from that exit. In addition, under paragraph (i), the FAA proposed to require that the means used to assist the occupants of an airplane in descending to the ground from overwing and non-overwing exits must be illuminated. Several commentators objected on the grounds that there was no indication as to the illumination level that would be required to meet these rules. Subsequent to the issuance of Notice 66-26, however, the SAE Committee A-20 conducted a series of lighting tests on the basis of which they recommended various emergency lighting intensities wherever exterior emergency lighting is required. These recommended illumination values have been generally accepted by the various segments of the industry and the FAA finds that the recommended illumination intensities provide an adequate level of illumination for the purpose of proposed paragraphs (h) and (i). For these reasons, and since the incorporation of the various levels of illumination into the regulation serves to clarify the requirement, the FAA considers it appropriate to change the proposal accordingly. In addition, the requirement that the escape route must be indicated by a white slip resistant surface has been changed to delete the color requirement and as revised, relocated in § 25.803(c). The requirement for automatic operation of the lights when the exit is opened has also been deleted. The proposed paragraphs (h) and (i) have been redesignated as paragraphs (f) and (g), respectively.

For the reasons set forth earlier in this preamble, the effective date of the requirements of paragraphs (f) and (g) of § 25.812, have been postponed for 18 months.

Numerous comments were received requesting clarification of the requirement proposed in § 25.812(i) for illumination of the means used to assist occupants in descending to the ground. In this connection, it was pointed out that the rule should permit the use of self-illuminated slides and should specify the amount of tape or ropes used as assist means that must be actually illuminated. The FAA agrees with the need for clarification and has changed the proposal to prescribe that the assist means must be externally illuminated or self-illuminated so that the deployed assist means is visible from the airplane. However, the FAA does not consider that it is necessary to require a specific light intensity on the assist means as long as it is visible from the airplane.

The requirements set forth in proposed paragraph (j) of § 25.812 (now paragraph (h)) have been revised to state a more realistic power requirement for emergency lights. In this connection, in response to various comments, the proposal has been amended to require that the energy supply provide the required level of illumination for at least 10 minutes at the critical ambient conditions after emergency landing.

Finally, there were various objections to the proposed paragraph (m) of § 25.812 (now paragraph (k)). The comments contend that as proposed, each light would require a separate power source and would impose penalties in terms of weight, cost, and complexity that would overshadow the benefits. The comments stated that a zone concept is employed in aircraft which should assure that a portion of the cabin lighting will remain operative following fuselage breakup. Moreover, they state that for larger airplanes it may be desirable if not imperative to have one battery serve a number of lights which are located in the general area of the battery and suggest the number of lights which might be lost due to crash damage should be in the order of 25 percent.

Upon reconsideration the FAA agrees that insofar as the proposal would have required that only those lights directly damaged by the fuselage breakup could be inoperative following the breakup, it stated an unnecessarily burdensome requirement. The FAA has subsequently determined through analysis that the zone concept for emergency lighting design is acceptable. However, the FAA recognized that in the case of aircraft utilizing the zone concept, lights in addition to those damaged by the fuselage breakup would be rendered inoperative by that breakup. On this basis, the FAA has revised the proposal to allow a lighting system in which up to 25 percent of the emergency lights, in addition to those directly damaged by the fuselage breakup, could be rendered inoperative after any single vertical separation of the fuselage. However, the revised requirement now states that the system must be so designed that certain important interior lights and certain exterior lights will remain operative after fuselage breakup.

Section 25.813. The FAA does not agree with the recommendation that the width of the passageway to Type II exits should be reduced or that the rule should permit certain obstructions. The current rules prescribe a 20-inch passageway and numerous evacuation demonstrations indicate that with all factors taken into consideration the 20-inch width is the minimum that can be accepted.

Comments took exception to the proposed § 25.813(c), contending that only the outboard seat need be limited as to seatback position insofar as obstruction to exits is concerned. Other comments stressed the increased accessibility of exits in smaller transports having a single seat on both sides of one aisle, and suggested that a different standard be made applicable to these. In the light

of these comments, the FAA has reconsidered § 25.813(c) and agrees that the proposal should be revised to require that the projected exit opening not be obstructed by the seatback of the seat in the outboard position. The "projected exit opening" referred to above and in the notice is the actual, rather than the minimum required opening and the paragraph has been further amended to make this clear. Moreover, the FAA agrees that less stringent requirements are appropriate for the smaller transport category airplanes and the proposal has been changed to retain the language of the current rule for airplanes having a maximum passenger seating capacity of 19 or less, to allow minor obstructions if compensatory factors are available to maintain the effectiveness of the exit.

No comments were received with respect to proposed § 25.815 and that section is adopted as proposed in the notice.

Several comments pointed out an ambiguity in proposed § 25.817 governing the number of seats abreast in airplanes having a single passenger aisle. It was the intent of the section to limit to three the number of seats in any one row on each side of the aisle. The section has been amended to make this clear.

Section 25.853. The notice proposed to require that all compartment interior materials under § 25.853, without exception, meet certain self-extinguishing criteria, involving short flame times and burn lengths after removal of the ignition source. Many comments from industry have shown that materials that will meet these criteria are not commercially available at present in quantities suitable for aircraft production or with characteristics compatible with the production of aircraft. These comments have shown that the best available materials for interior wall panels, interior ceiling panels, structural flooring, baggage racks, partitions, draperies, thermal insulation, and coated fabric insulation covering can be made self-extinguishing within average char lengths of 8 inches when tested vertically and 4 inches when tested horizontally, under established test conditions. These comments also have shown that "flame resistance" is an adequate standard for other materials, such as floor coverings, upholstery and its covering, webbing, transparencies, window shades, thermoplastic trim, seat cushion foam, furnishing, and seats. The proposed standards have been amended accordingly in § 25.853 (a) and (b).

One commentator noted that the proposed test procedures of § 25.853 were appropriate only for cloth materials and asked for clarification with respect to glazing materials. Another commentator submitted an alternate test procedure as equivalent to the procedure proposed. In the light of these comments the FAA has reviewed the proposal and agrees that the test criteria should extend to other materials. Furthermore, with some modification, the recommended test procedure is suitable for all materials. Accordingly, Part 25 has been amended by adding a new Appendix F containing an acceptable test procedure for showing

compliance with section 25.853. Section 25.853 has been amended to allow the use of this test procedure as an alternative to that proposed in the notice.

Several comments urged upgrading of the standards, maximum use of materials such as glass fiber products, and development of materials that minimize the production of noxious smoke and gas when burned. The FAA agrees that continual upgrading of the standards for fire protection of compartment interior is necessary to make the maximum possible use of the best interior materials as they become commercially available and to encourage the development of such materials. To this end, the standards in amended § 25.853 (a) and (b) are believed to represent the most advanced technology now available in this design area.

Section 25.855. The notice proposed to amend § 25.855(a) to require that all cargo and baggage compartment materials must meet the test criteria in proposed § 25.853(a). As discussed above, those proposed test criteria have been altered to reflect the current state of the art in interior materials design. As further stated above, "flame resistant" is the standard now commercially feasible for the materials used in certain applications as covered in § 25.853(b). Therefore, § 25.855(a) as amended requires that the materials used in the baggage and cargo compartments at least meet the requirement of either paragraph (a) or (b) of § 25.853, depending upon the application of the materials.

Section 25.993. The notice proposed to add a new § 25.993(f) providing that each fuel line within the fuselage must be designed and installed to allow a reasonable degree of deformation and stretching without failure or leakage, and must be enclosed in a shroud.

Several comments concerned the requirement for a shroud. However, this amendment omits such a requirement since a shroud is a device that protects against the effects of leakage rather than a device that prevents leakage. Leakage prevention is the object of this amendment. The need for a shroud should be determined, in each case, under the flammable fluid fire protection requirements of § 25.863.

One comment suggested that the proposal should be applied only to fuel lines within occupied and cargo compartments. Another comment suggested that the proposal should apply only to lines within the pressurized section of the fuselage. These comments are not accepted since fuel lines passing from the fuel tanks through any portion of the fuselage to the engines should be evaluated for leakage security.

This amendment specifies only "leakage" rather than "failure or leakage". Failures other than those that cause leakage, such as those that cause fuel stoppage only, are not the subject of this amendment.

Section 25.1359. The notice proposed to add a new § 25.1359(c) to require that electrical cables must be isolated from flammable fluid lines and must be

shrouded in insulated, flexible conduit to allow a reasonable degree of deformation and stretching without failure.

One comment suggested further limitation of the proposal to main power leads only, stating that the shroud should be separate from the usual insulating cover, and stating that the proposal should apply only to cables in the vicinity of flammable fluid lines. Limitation to main power cables, including generator cables, expresses the intent of the notice and is adopted. Limitation to cables in the vicinity of flammable fluid lines is not necessary in addition to the isolation requirement since a cable not in the vicinity of a fuel line would meet the isolation condition.

One comment suggested that the cable shrouds should be in addition to the normal insulation cover and separate from the cable itself. This characteristic is a part of any main cable now used in aircraft, and was within the intent of the notice. However, this suggestion may result in clarification and is therefore accepted.

PART 37

The notice proposed to amend § 37.132, Safety Belts, TSO-C22a, § 37.135, Aircraft Seats, and Berths, TSO-C39, and § 37.178, Individual Floatation Devices, TSO-C72a to require compliance with test criteria in proposed § 25.853(a). All of the articles covered in these TSO's incorporate materials now covered by § 25.853(b). Since the standard and test procedure now applicable to materials covered by § 25.853(b) are the same as that currently applicable to the materials used in the manufacture of the articles under the referenced TSO's, it is not necessary to cross reference § 25.853 in the TSO's and the proposal is withdrawn.

Section 37.175. The notice proposed to amend § 37.175, Emergency Evacuation Slides, TSO-C69, to require that new models of such equipment must be able to be fully inflated in not more than 10 seconds after activation of the inflation means. One comment suggested that full inflation within the prescribed time limit is not essential if the slide can serve its evacuation function when less than fully inflated and suggested that the regulation should not require full inflation. While the FAA is aware that a slide may be capable of receiving an evacuee prior to the 10 seconds time limit specified in the proposal, the requirement for full inflation in 10 seconds is a design requirement considered by the FAA as necessary to ensure that the slide will provide its maximum support capability within an established period. Moreover, this regulation would not prohibit the use of a slide prior to the time it became fully inflated. The proposal has not, therefore, been changed as suggested.

In accordance with the proposal, the applicability provision in § 37.175 has been amended to state that new models of slides manufactured after the effective date of this amendment must be designed so as to be fully inflated in not more than 10 seconds after activation of the inflation means.

PART 121

General. As discussed in the beginning of this preamble, substantive changes have been made in some amendments which, for the most part, have a postponed applicability date. As previously indicated, interested persons may submit comments on these changes.

Due to the length of time that will be necessary for the extensive retrofitting required by these amendments and the time that has passed since publication of the notice, most of the applicable dates of the new equipment provisions have been extended to October 1, 1969.

Certain existing provisions in Part 121 have been deleted since they are no longer applicable. These are §§ 121.309 (f), (g), and (h) and § 121.319. In addition, the provisions of § 121.310(h) have been transferred to § 121.309(f). Appendix D to Part 121 has been reorganized and clarified in line with existing FAA interpretations. The applicability dates in the various paragraphs of § 121.310 have been deleted and, where appropriate under these amendments, new dates have been added.

Section 121.291. Demonstration of emergency evacuation procedures: The comments generally agreed with the proposed reduction of time to 90 seconds that will be possible with the new equipment required by these amendments. As provided in the notice, this section will not require redemonstration, except under the stated conditions, by operators who have already met the 2-minute minimum. Due to some confusion over the meaning of the term "previously approved" in § 121.291(a)(2), this section has been changed to make it clear that the 5-percent increase is determined from the passenger seating capacity for which a successful demonstration has been conducted.

The preamble to the notice stated that demonstrations to meet the 90-second maximum would not be required except in one of the three situations set forth in this section. However, the notice did propose to require a demonstration meeting the 90-second maximum in those three situations even though the new equipment upon which the reduction was predicated was not required to be installed for 2 years. The FAA has determined that this demonstration requirement could prove to be an undue burden on a certificate holder initially introducing an airplane type certificated under rules that did not prescribe this new equipment. Consequently, until the new equipment is required, the 2-minute maximum is retained for airplanes that are being initially introduced without such equipment.

Section 121.310(a). Means for emergency evacuation. The comments on this section suggested that "inflatable" slides may not be feasible on some airplanes. Therefore, § 25.809(f)(1) has been changed to require that the slides be "erectable" rather than "inflatable". Since it was also indicated that it would take several years to install these slides and that the automatic deployment feature has not been developed for some

types of floor level exits, the applicable date of this paragraph has been extended to October 1, 1969.

Section 121.310(d). Interior emergency light operation. It was not intended that the interior emergency lights be actually turned on during taxiing, takeoff, and landing, but only that they be activated to the extent that they will become lighted as soon as the airplane's normal electrical power is interrupted. The requirement has been clarified in this respect and has otherwise been modified as previously discussed under § 25.812(e).

Section 121.310(f)(3). Emergency exit access. As proposed in the notice, the provisions allowing minor obstructions have been deleted except (as discussed under § 25.813(c) above) with respect to certain smaller airplanes. In addition, for the reasons also discussed under § 25.813(c) above, a provision has been added to prohibit obstruction of the projected exit opening by outboard seat backs adjacent to Type III and Type IV exits. Although this latter requirement was not specifically detailed in the notice, the FAA believes that it is in the interest of safety that it be adopted now. Since a compliance date has been established 1 year after the effective date of this amendment, interested persons may (as indicated previously in this preamble) submit comments on these provisions to the FAA.

Section 121.310(g). Exterior exit markings. The change in this paragraph was proposed because the present requirement for a reflectance ratio of 3:1 has not proven practical, particularly with respect to colors of very low reflectance. Two comments noted that the present regulation has been effective for only a short time and questioned the propriety of changes at this time. However, the necessity for the proposed revisions is readily apparent. A darker color with a reflectance of 5 percent required a lighter color with a reflectance of only 15 percent. This 10 percent difference does not provide adequate visual contrast. However, at a reflectance of 30 percent for the darker color, the lighter color is required to have a reflectance of 90 percent, which is more than is necessary for adequate visual contrast. For these reasons, the proposal is adopted without substantive change. Since this requirement need only be complied with by October 1, 1969, or when the markings are repainted, whichever occurs first, it does not present an unreasonable burden.

Section 121.310(h). Exterior emergency lighting and escape routes. This section incorporates § 25.812(f) which has been rewritten from the proposal in the notice. A discussion of the changes is contained in the portion of the preamble on this section. Since the provisions on the slip resistant escape route have been transferred to § 25.803(e), this section is also incorporated.

Section 121.310(i). Other floor level exits. This paragraph was presented as paragraph (k) in the notice and is adopted without substantive change.

Section 121.310(j). Additional emergency exits. The objective of this provision was to assure that all installed and

approved emergency exits, irrespective of whether they were in excess of the required number, would be fully equipped and available for use in an emergency evacuation. However, it was pointed out in the comments that this would tend to penalize operators who provided extra exits since it could cause removal of some passenger seats. To avoid this problem while still maintaining the efficacy of these exits, it has been decided that instead of meeting the specific access requirements of § 121.310(f)(1), (2), and (3), they must be readily accessible to the passengers in addition to meeting the other provisions of this section.

Section 121.311 (c) and (d). Sideward facing seats and placing of seat backs in the upright position. The proposal relating to sideward facing seats is adopted with two minor changes in the Part 25 provisions that is incorporated by reference in this paragraph. The alternative of a shoulder harness is added and the term "cushioned" is changed to "energy-absorbing" to allow more flexibility in the type of protection that must be provided.

As proposed in the notice, the requirement that during taxiing, takeoff, and landing each seatback must be in the upright position was addressed to seatbacks affecting access to Type III and Type IV exits. The FAA now believes that notwithstanding the limited scope of the proposal in the notice, it is essential for the safety of passengers in a crash situation that during taxiing, takeoff, and landing, each passenger seatback in the airplane must be in the upright position. In adopting this requirement a provision specifically requiring passengers to comply with appropriate crewmember instructions has been included.

Section 121.312. Materials for compartment interiors. The notice proposed to add a new requirement that after June 30, 1968, all replacement materials used in passenger or crew compartments would have to meet the new requirements proposed for § 25.853. As discussed above, the proposed requirements for § 25.853 have been revised in this amendment. In addition, several comments pointed out that the replacement requirement as proposed for Part 121 could necessitate impractical and sometimes useless patching with new materials when making small repairs to existing cabin interiors. Since FAA's intent was to require the complete upgrading of existing cabin interiors, the rule as adopted (§ 121.312) requires that after October 24, 1968, upon the first major overhaul of an aircraft cabin or refurbishing of the cabin interior there must be a complete replacement of all material with materials that meet § 25.853. In addition, the FAA will survey certificate holders to determine when the requirements of § 25.853 would be met for each airplane in their fleets. If the results of this survey indicate that this phased replacement program will not accomplish the desired upgrading of cabin interiors within a reasonable period of time, the FAA will consider separate rule making action to establish a specific cutoff date for accomplishing such replacement.

Section 121.391. *Flight attendants.* After considering all of the comments submitted the FAA has decided to retain the limited deviation authority presently in § 121.391(b) rather than the one proposed in the notice. However, the additional limitation proposed in the notice prohibiting any operation with fewer flight attendants than the number used in emergency evacuation demonstrations under § 121.291 is being retained.

Section 121.571(b). *Passenger briefing cards.* Several comments were of the opinion that distributing cards to each passenger was impractical and would add very little to the oral briefing. There is also an FAA study in progress to determine better methods of informing passengers on emergency exists. In view of these facts, the requirement for distributing the briefing cards has been deleted from this amendment.

Section 121.589. *Carry-on baggage.* The provisions of this new section have been revised and clarified to permit more effective enforcement. The prohibition against carrying articles of baggage aboard that could slide out from under seats in the event of a crash has been postponed in order to allow installation of a means of securing them. One comment indicated that it would take several years to equip all existing seats in this manner. However, the FAA believes that such an installation will be relatively simple and can be accomplished in a much shorter period of time.

Appendix D. The changes proposed in the notice and other existing FAA interpretations (see for example item 20) are incorporated in paragraph (a) and, in addition, the paragraph is reorganized and reworded for greater clarity.

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

(Secs. 313(a), 601, 603, and 604 of the Federal Aviation Act of 1958 (49 U.S.C. 1354(a), 1421, 1423, and 1424))

In consideration of the foregoing, Parts 21, 25, 37, and 121 of the Federal Aviation Regulations are amended effective October 24, 1967, as follows:

1. Section 21.17(a) is amended to read as follows:

§ 21.17 Designation of applicable regulations.

(a) Except as provided in § 25.2 of this chapter, an applicant for a type certificate (other than for restricted category, import, or surplus military aircraft) must show that the aircraft, aircraft engine, or propeller concerned meets the applicable requirements of this subchapter that are effective on the date of application for that certificate, unless—

(1) Otherwise specified by the Administrator; or

(2) Compliance with later effective amendments is elected or required under this section.

2. The introductory statement in § 21.101(a) is amended to read as follows:

§ 21.101 Designation of applicable regulations.

(a) Except as provided in § 25.2 of this chapter, an applicant for a change to type certificate must comply with either—

(1) The regulations incorporated by reference in the type certificate; or

(2) The applicable regulations in effect on the date of the application, plus any other amendments the Administrator finds to be directly related.

3. A new § 25.2 is added after § 25.1 to read as follows:

§ 25.2 Special retroactive requirements.

Notwithstanding §§ 21.17 and 21.101 of this chapter and irrespective of the date of applicant, each applicant for a type certificate and each applicant for a supplemental-type certificate (or an amendment to a type certificate) involving an increase in passenger seating capacity to a total greater than that for which the airplane has been type certificated, must show:

(a) After October 23, 1967, that the airplane concerned meets the requirements of §§ 25.783(g), 25.785(c), 25.803(b), (c), and (d), 25.807(a), 25.807(c), 25.807(d), 25.809 (f) and (h), 25.811 (a), (b), (d), (e), (f), and (g), 25.812 (a) (1), (b), (c), (d), (e), (h), (i), (j), (k) (1), (k) (2), 25.813 (a), (b), and (c), 25.815, 25.817, 25.853 (a) and (b), 25.855(a), 25.893(f), 25.1359(c), in effect on October 24, 1967; and

(b) After April 24, 1969, that the airplane concerned meets the requirements of §§ 25.721(d), 25.803(e), 25.811(c), 25.812 (a) (2), (b), (g), and (k) (3) in effect on October 24, 1967.

4. Section 25.721 is amended by adding a new paragraph (d) to read as follows:

§ 25.721 General.

(d) The main landing gear system must be designed so that if it fails due to overloads during takeoff and landing (assuming the overloads are in the vertical plane parallel to the longitudinal axis of the airplane), the failure mode is not likely to puncture any part of the fuel system in the fuselage.

5. Section 25.783 is amended by adding a new paragraph (g) to read as follows:

§ 25.783 Doors.

(g) Each passenger entry door in the side of the fuselage must qualify as a Type A, Type I, or Type II passenger emergency exit and must meet the requirements of §§ 25.807 through 25.813 that apply to that type of passenger emergency exit. If an integral stair is installed at such a passenger entry door, the stair must be designed so that when subjected to the inertia forces specified in § 25.561, and following the collapse of one or more legs of the landing gear, it will not interfere to an extent that will

reduce the effectiveness of emergency egress through the passenger entry door.

6. Section 25.785(c) is amended to read as follows:

§ 25.785 Seats, berths, safety belts, and harnesses.

(c) Each occupant of a sideward facing seat must be protected from head injury by a safety belt and an energy absorbing rest that will support the arms, shoulders, head, and spine, or by a safety belt and a shoulder harness that will prevent the head from contacting any injurious object. Each occupant of any other seat must be protected from head injury by—

(1) A safety belt and shoulder harness that will prevent the head from contacting any injurious object;

(2) A safety belt plus the elimination of any injurious object within striking radius of the head; or

(3) A safety belt and an energy absorbing rest that will support the arms, shoulders, head, and spine.

7. Section 25.803 is amended by amending paragraph (b) and by adding new paragraphs (c), (d), and (e) as follows:

§ 25.803 Emergency evacuation.

(b) Passenger ventral and tail cone, crew access, and service doors may be considered as emergency exits if they meet the applicable requirements of this section and §§ 25.805 through 25.813.

(c) Except as provided in paragraph (d) of this section, on airplanes having a seating capacity of more than 44 passengers, it must be shown by actual demonstration that the maximum seating capacity, including the number of crewmembers required by the operating rules, for which certification is requested can be evacuated from the airplane to the ground within 90 seconds. Evacuees using stands or ramps allowed by subparagraph (8) of this paragraph are considered to be on the ground when they are on the stand or ramp, provided that the acceptance rate of the stand or ramp is no greater than the acceptance rate of the means available on the airplane for descent from the wing during an actual crash situation. The demonstration must be conducted under the following conditions:

(1) It must be conducted either during the dark of the night or during daylight with the dark of the night simulated, utilizing only the emergency lighting system and utilizing only the emergency exits and emergency evacuation equipment on one side of the fuselage, with the airplane in the normal ground attitude, with landing gear extended.

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

(3) Each external door and exit, and each internal door and curtain must be in a configuration to simulate a normal takeoff.

(4) Seat belts and shoulder harnesses (as required) must be fastened.

(5) A representative passenger load of persons in normal health must be used as follows:

(i) At least 30 percent must be female.
 (ii) Approximately 5 percent must be over 60 years of age, with a proportionate number of females.

(iii) At least 5 percent but no more than 10 percent must be children under 12 years of age, prorated through that age group.

(6) Persons who have knowledge of the operation of the exits and emergency equipment may be used to represent an air carrier crew. Such representative crewmembers must be in their seats assigned for takeoff and landing and none may be seated next to an emergency exit unless that seat is his assigned seat for takeoff. They must remain in their assigned seats until receiving the signal for the beginning of the demonstration.

(7) There can be no practice or rehearsal of the demonstration for the passengers except that they may be briefed as to the location of all emergency exits before the demonstration. However, no indication may be given of the particular exits to be used in the demonstration.

(8) Stands or ramps may be used for descent from the wing to the ground.

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

(d) The emergency evacuation demonstration need not be repeated after a change in the interior arrangement of the airplane or an increase of not more than 5 percent in passenger seating capacity over that previously approved by actual demonstration, or both, if it can be substantiated by analysis, taking due account of the differences, that all the passengers for which the airplane is certificated can evacuate within 90 seconds.

(e) An escape route must be established from each overwing emergency exit, marked and (except for flap surfaces suitable as slides) covered with a slip resistant surface.

8. Section 25.807(a) is amended to read as follows:

§ 25.807 Passenger emergency exits.

(a) *Type and location.* For the purpose of this part, the types and locations of exits are as follows:

(1) *Type I.* This type must have a rectangular opening of not less than 24 inches wide by 48 inches high, with corner radii not greater than one-third the width of the exit. Type I exits must be floor level exits.

(2) *Type II.* This type must have a rectangular opening of not less than 20 inches wide by 44 inches high, with corner radii not greater than one-third the width of the exit. Type II exits must be floor level exits unless located over the wing, in which case they may not have a step-up inside the airplane of more than 10 inches nor a stepdown outside the airplane of more than 17 inches.

(3) *Type III.* This type must have a rectangular opening of not less than 20 inches wide by 36 inches high, with

corner radii not greater than one-third the width of the exit, located over the wing, with a step-up inside the airplane of not more than 20 inches and a stepdown outside the airplane of not more than 27 inches.

(4) *Type IV.* This type must have a rectangular opening of not less than 19 inches wide by 26 inches high, with corner radii not greater than one-third the width of the exit, located over the wing, with a step-up inside the airplane of not more than 29 inches and a stepdown outside the airplane of not more than 36 inches.

(5) *Ventral.* This type is an exit from the passenger compartment through the pressure shell and the bottom fuselage skin. The dimensions and physical configuration of this type of exit must allow at least the same rate of egress as a Type I with the airplane in the normal ground attitude, with landing gear extended.

(6) *Tail cone.* This type is an aft exit from the passenger compartment through the pressure shell and through an openable cone of the fuselage aft of the pressure shell. The means of opening the tail cone must be simple and obvious, and must employ a single operation.

(7) *Type A.* An emergency exit may be designated as a Type A exit if the following criteria are met:

(i) There must be a rectangular opening not less than 42 inches wide by 72 inches high, with corner radii not greater than one-sixth of the width of the exit.
 (ii) It must be a floor level exit.
 (iii) Unless there are two or more main (fore and aft) aisles, the exit must be located so that there is passenger flow along the main aisle to that exit from both the forward and aft direction.

(iv) There must be an unobstructed passageway at least 36 inches wide leading from each exit to the nearest main aisle.
 (v) If two or more main aisles are provided, there must be unobstructed cross aisles at least 20 inches wide between main aisles. There must be a cross aisle leading directly to each passageway between the exit and the nearest main aisle.

(vi) There must be a least one seat adjacent to each such exit that could be occupied by a flight attendant.
 (vii) Adequate assist space next to each Type A exit must be provided at each side of the passageway, to allow the crewmember(s) to assist in the evacuation of passengers without reducing the unobstructed width of the passageway below that required by subdivision (iv) of this subparagraph.
 (viii) At each non-over-wing exit there must be installed a slide capable of carrying simultaneously two parallel lines of evacuees.

(ix) Each overwing exit having a stepdown must have an assist means unless the exit without an assist means can be shown to have a rate of passenger egress at least equal to that of the same type of non-over-wing exit. If an assist means is required it must be automatically deployed, and automatically erected, concurrent with the opening of the exit and self-supporting within 10 seconds.

Stepdown distance as used in this section means the actual distance between the bottom of the required opening and a usable foothold, extending out from the fuselage, that is large enough to be effective without searching by sight or feel.

9. Section 25.807(c) is amended to read as follows:

(c) *Passenger emergency exits.* The prescribed exits need not be diametrically opposite each other nor identical in size and location on both sides. They must be distributed as uniformly as practicable taking into account passenger distribution. The first floor level exit on each side of the fuselage must be in the rearward part of the passenger compartment unless another location affords a more effective means of passenger evacuation. Where more than one floor level exit per side is prescribed, at least one floor level exit per side must be located near each end of the cabin, except that this provision does not apply to combination cargo/passenger configurations. Exits must be provided as follows:

(1) Except as provided in subparagraphs (2) through (8) of this paragraph, the number and type of passenger emergency exits must be in accordance with the following table:

Passenger seating capacity (cabin attendants not included)	Emergency exits for each side of the fuselage			
	Type I	Type II	Type III	Type IV
1 through 10.....				1
11 through 19.....			1	1
20 through 29.....		1		1
30 through 39.....	1			1
40 through 49.....	1		1	1
50 through 59.....	1		1	1
60 through 69.....	1		1	1
70 through 79.....	2		1	1
80 through 89.....	2		2	1
90 through 99.....	2		2	2

(2) Two Type IV exits may be installed instead of each Type III exit prescribed in subparagraph (1) of this paragraph.

(3) If slides meeting the requirements of § 25.809(f) (1) are installed at floor level exits (other than overwing exits), the passenger/emergency exit relationship specified in subparagraph (1) of this paragraph may be increased by—

(i) Not more than five passengers on airplanes with at least two of these exits; and

(ii) Not more than 10 passengers on airplanes with at least four of these exits.

However, no increase in passenger seating capacity is allowed under this subparagraph if an increase in passenger seating capacity is obtained under subparagraph (4) of this paragraph.

(4) An increase in passenger seating capacity above the maximum permitted under subparagraph (1) of this paragraph but not to exceed a total of 299 may be allowed in accordance with the following table for each additional pair of emergency exits in excess of the minimum number prescribed in subparagraph (1) of this paragraph for 179 passengers:

Additional emergency exits (each side of fuselage)	Increase in passenger seating capacity allowed
Type A.....	100
Type I.....	45
Type II.....	60
Type III.....	35

(5) For passenger capacities in excess of 299, each emergency exit in the side of the fuselage must be either a Type A or a Type I. A passenger seating capacity of 100 is allowed for each pair of Type A exits and a passenger seating capacity of 45 is allowed for each pair of Type I exits.

(6) If a passenger ventral or tail cone exit is installed and can be shown to allow a rate of egress at least equivalent to that of Type III exit with the airplane in the most adverse exit opening condition because of the collapse of one or more legs of the landing gear, an increase in passenger seating capacity beyond the limits specified in subparagraph (1), (4), or (5) of this paragraph may be allowed as follows:

(i) For a ventral exit, 12 additional passengers.

(ii) For a tail cone exit incorporating a floor level opening of not less than 20 inches wide by 60 inches high, with corner radii not greater than one-third the width of the exit, in the pressure shell and incorporating an approved assist means in accordance with § 25.809(f) (1), 25 additional passengers; or

(iii) For a tail cone exit incorporating an opening in the pressure shell which is at least equivalent to a Type III emergency exit with respect to dimensions, step-up and step-down distance, and with the top of the opening not less than 56 inches from the passenger compartment floor, 15 additional passengers.

(7) For airplanes on which the vertical location of the wing does not allow the installation of overwing exits, an exit of at least the dimensions of a Type III must be installed instead of each Type III and each Type IV exit required by subparagraph (1) of this paragraph.

(8) Each emergency exit in the passenger compartment in excess of the minimum number of required emergency exits must meet the applicable requirements of §§ 25.809 through 25.812, and must be readily accessible.

10. Section 25.807(d) is amended to read as follows:

(d) *Ditching emergency exits for passengers.* If the emergency exits required by paragraph (c) of this section do not meet subparagraphs (1) and (2) of this paragraph, exits must be added to meet them:

(1) A Type IV exit on each side of the airplane, both above the waterline, with a passenger seating capacity of 10 or less.

(2) A Type III exit for airplanes with a passenger seating capacity of 11 or more, with at least one emergency exit above the waterline for each unit (or part of a unit) of 35 passengers, but no less than two such exits, with one on each side of the airplane. However, where it has been shown through analysis, ditching demonstrations, or any other tests found necessary by the Administrator,

that the evacuation capability of the airplane during ditching is improved by the use of larger exits or by other means, the passenger/exit ratio may be increased.

(3) If side exits cannot be above the waterline, the side exits must be replaced by an equal number of readily accessible overhead hatches of not less than the dimensions of a Type III exit except that, for airplanes with a passenger capacity of 35 or less, the two required Type III side exits need be replaced by only one overhead hatch.

(4) Two Type IV exits may be installed instead of each required Type III exit.

11. Section 25.809 is amended by amending paragraph (f) and by adding a new paragraph (h) as follows:

§ 25.809 Emergency exit arrangement.

(f) Each airplane emergency exit (other than exits located over the wing) more than 6 feet from the ground with the airplane on the ground and the landing gear extended must have an approved means to assist the occupants in descending to the ground as follows:

(1) The assisting means for each passenger emergency exit must be a self-supporting slide or equivalent, and must be designed so that it is—

(i) Automatically deployed, and automatically erected, concurrent with the opening of the exit except that the assisting means may be erected in a different manner when installed at service doors that qualify as emergency exits, and at passenger doors; and

(ii) Erectable within 10 seconds and of such length that the lower end is self-supporting on the ground after collapse of any one or more landing gear legs.

(2) The assisting means for flight crew emergency exits may be a rope or any other means demonstrated to be suitable for the purpose. If the assisting means is a rope, or an approved device equivalent to a rope, it must be—

(i) 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;

(ii) Able (with its attachment) to withstand a 400-pound static load.

(h) If the trailing edge of the flaps in the landing position is more than 6 feet above the ground with the airplane on the ground and the landing gear extended, or if the wing is more than 6 feet above the ground with the landing gear extended and the flaps are unsuitable as a slide, means must be provided to assist evacuees (who have used the overwing exits) to reach the ground.

12. 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) Means must be provided to assist the occupants in locating the exits in conditions of dense smoke.

(d) 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 the 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.

(e) The location of the operating handle and instructions for opening must be shown—

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

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

(i) A red arrow, with a shaft at least three-fourths inch wide and a head twice the width of the shaft, extending along at least 70° of arc at a radius approximately equal to three-fourths of the handle length; and

(ii) The word "open" in red letters 1 inch high, placed horizontally near the head of the arrow.

(f) 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) The outside marking for each passenger emergency exit in the side of the fuselage must include a 2-inch colored band outlining the exit.

(2) Each outside marking including the band, must have color contrast to be readily distinguishable from the surrounding fuselage surface. The contrast must be such that if the reflectance of the darker color is 15 percent or less, the reflectance of the lighter color must be at least 45 percent. "Reflectance" is the ratio of the luminous flux reflected by a body to the luminous flux it receives. When the reflectance of the darker color is greater than 15 percent, at least a 30-percent difference between its reflectance and the reflectance of the lighter color must be provided.

(3) In the case of exits other than those in the side of the fuselage, such as ventral or tail cone exits, the external means of opening, including instructions if applicable, must be conspicuously marked in red, or bright chrome yellow if the background color is such that red is

inconspicuous. When the opening means is located on only one side of the fuselage, a conspicuous marking to that effect must be provided on the other side.

(g) Emergency exits need only be marked with the word "Exit."

13. A new § 25.812 is added to read as follows:

§ 25.812 Emergency lighting.

(a) An emergency lighting system, independent of the main lighting system, must be installed which includes:

(1) Illuminated emergency exit marking and locating signs, sources of general cabin illumination, and interior lighting in emergency exit areas.

(2) Exterior emergency lighting.

(b) Each passenger exit sign and each exit locating sign must have white letters at least 1 inch high on a red background at least 2 inches high. These signs may be internally electrically illuminated, or self-illuminated by other than electrical means, with an initial brightness of at least 160 microlamberts. The colors may be reversed in the case of internally electrically illuminated signs if this will increase the illumination of the exit.

(c) General illumination in the passenger cabin must be provided so that when measured along the centerline of main passenger aisles at seat armrest height and at 40-inch intervals, the average illumination is not less than 0.05 foot-candle. A main passenger aisle is considered to extend along the fuselage from the most forward passenger emergency exit or cabin occupant seat, whichever is farther forward, to the most rearward passenger emergency exit or cabin occupant seat, whichever is farther aft.

(d) The floor of the passageway leading to each floor-level passenger emergency exit, between the main aisles and the exit openings, must be provided with illumination.

(e) The emergency lighting system must be designed as follows:

(1) The lights must be operable manually from the flight crew station and (if required by the operating rules of this chapter) from a point in the passenger compartment that is readily accessible to a normal flight attendant seat. Means must be provided to safeguard against inadvertent operation of the manual controls.

(2) When armed or turned on, the lights must remain lighted or become lighted upon interruption (except an interruption caused by a vertical separation of the fuselage during crash landing) of the airplane's normal electric power.

(f) Exterior emergency lighting must be provided at each overwing exit so that the illumination is—

(1) Not less than 0.02 foot-candle (measured on a plane parallel to the surface) on a 2-square-foot area where an evacuee is likely to make his first step outside the cabin;

(2) Not less than 0.05 foot-candle (measured normal to the direction of the incident light) for a minimum width of 2 feet along the 30 percent of the slip-resistant escape route required in

§ 25.803(e) that is farthest from the exit; and

(3) Not less than 0.02 foot-candle on the ground surface with the landing gear extended (measured on a horizontal plane) where an evacuee using the established escape route would normally make first contact with the ground.

(g) The means required in § 25.809 (f) (1) and (h) to assist the occupants in descending to the ground must be illuminated so that the deployed assist means is visible from the airplane.

(1) If the assist means is illuminated by exterior emergency lighting, it must provide—

(i) Illumination at each overwing emergency exit of not less than 0.02 foot-candle on the ground surface with the landing gear extended (measured in a horizontal plane) where an evacuee using the established escape route would normally make first contact with the ground; and

(ii) Illumination at each non-overwing emergency exit, of not less than 0.03 foot-candle (measured normal to the direction of the incident light) at the ground end of the assist means and, for each non-overwing exit in the side of the fuselage, over a spherical surface 10° to either side of the center of the assist means and from 30° above to 5° below the 45° position of the assist means.

(2) If the assist means is self-illuminated, the lighting provisions—

(i) May not be adversely affected by stowage; and

(ii) Must provide sufficient ground surface illumination so that obstacles at the end of the assist means are clearly visible to evacuees.

(h) The energy supply to each emergency lighting unit must provide the required level of illumination for at least 10 minutes at the critical ambient conditions after emergency landing.

(i) If storage batteries are used as the energy supply for the emergency lighting system, they may be recharged from the airplane's main electric power system: *Provided*, That, the charging circuit is designed to preclude inadvertent battery discharge into charging circuit faults.

(j) Components of the emergency lighting system, including batteries, wiring relays, lamps, and switches must be capable of normal operation after having been subjected to the inertia forces listed in § 25.561(b).

(k) The emergency lighting system must be designed so that after any single vertical separation of the fuselage during crash landing—

(1) Not more than 25 percent of all electrically illuminated emergency lights required by this section are rendered inoperative, in addition to the lights that are directly damaged by the separation;

(2) Each electrically illuminated exit sign required under § 25.811(d)(2) remains operative exclusive of those that are directly damaged by the separation; and

(3) At least one required exterior emergency exit light for each side of the airplane remains operative exclusive of

those that are directly damaged by the separation.

14. Section 25.813 is amended by amending paragraphs (a), (b), and (c) to read as follows:

§ 25.813 Emergency exit access.

(a) There must be a passageway between individual passenger areas, and leading from each aisle to each Type I and Type II emergency exit. These passageways must be unobstructed and at least 20 inches wide.

(b) For each passenger emergency exit covered by § 25.809(d), there must be enough space next to the exit to allow a crewmember to assist in the evacuation of passengers without reducing the unobstructed width of the passageway below that required for the exit.

(c) There must be access from each aisle to each Type III or Type IV exit. The access must not be obstructed by seats, berths, or other protrusions which would reduce the effectiveness of the exit. However, for airplanes having a maximum passenger seating capacity not exceeding 19, there may be minor obstructions if there are compensatory factors to maintain the effectiveness of the exit. For airplanes having a maximum seating capacity of 20 or more, the projected opening of the exit provided must not be obstructed by a seatback in any position at the outboard seat locations.

15. Section 25.815 is amended to read as follows:

§ 25.815 Width of aisle.

The passenger aisle width at any point between seats must equal or exceed the values in the following table:

Passenger seating capacity	Minimum passenger aisle width (inches)	
	Less than 25 inches from floor	25 inches and more from floor
10 or less	12	15
11 through 19	12	20
20 or more	15	20

16. A new § 25.817 is added to read as follows:

§ 25.817 Maximum number of seats abreast.

On airplanes having only one passenger aisle, no more than 3 seats abreast may be placed on each side of the aisle in any one row.

17. Paragraphs (a) and (b) of § 25.853 are amended to read as follows:

§ 25.853 Compartment interiors.

Materials (including finishes, if applied) used in each compartment occupied by the crew or passengers, must meet the following test criteria, as applicable:

(a) When tested in accordance with the applicable portions of Appendix F of this part or the applicable portions of methods 5902 and 5906, dated May 15, 1951, of Federal Specification CCC-T-191b (which is available from the General Services Administration, Business

Service Center, Region 3, Seventh and D Streets S.W., Washington, D.C. 20107), or other approved equivalent method, the interior wall panels, interior ceiling panels, draperies, structural flooring, baggage racks, partitions, thermal insulation, and coated fabric insulation covering must be self-extinguishing after flame removal. All materials used in these applications must be tested vertically. If the material is tested vertically as a fabricated unit, a section of that fabricated unit must also be tested horizontally. The average char length may not exceed 8 inches when the material is tested vertically, and may not exceed 4 inches when the material is tested horizontally. Layered materials may not be separated for the purpose of this test.

(b) When tested horizontally under the applicable portions of Appendix F of this part, or the applicable portions of method 5906, dated May 15, 1951 of Federal Specification CCC-T-191b, or other approved equivalent method, interior materials not specified in paragraph (a) of this section must be at least flame resistant. Layered materials may not be separated for the purpose of this test.

18. Paragraph (a) of § 25.855 is amended to read as follows:

§ 25.855 Cargo and baggage compartments.

(a) Each cargo and baggage compartment (including tie down equipment) must be constructed of materials that at least meet the requirements set forth in § 25.853.

19. A new paragraph (f) is added to § 25.993 to read as follows:

§ 25.993 Fuel system lines and fittings.

(f) Each fuel line within the fuselage must be designed and installed to allow a reasonable degree of deformation and stretching without leakage.

20. A new paragraph (c) is added to § 25.1359 to read as follows:

§ 25.1359 Electrical system fire and smoke protection.

(c) Main power cables (including generator cables) must—

(1) Be isolated from flammable fluid lines in the fuselage;

(2) Be shrouded by means of electrically insulated flexible conduit, or equivalent, which is in addition to the normal cable insulation; and

(3) Be designed to allow a reasonable degree of deformation and stretching without failure.

21. Part 25 is amended by adding a new Appendix F to read as follows:

APPENDIX F

AN ACCEPTABLE TEST PROCEDURE FOR SHOWING COMPLIANCE WITH SECTION 25.853

(a) *Conditioning.* Specimens must be conditioned at 70° F. plus or minus 5° and at 50 percent plus or minus 5 percent relative humidity—until moisture equilibrium is reached. Only one specimen at a time may be

removed from the conditioned environment immediately before subjecting it to the flame.

(b) *Specimen configuration.* The specimens must be no thicker than the minimum thickness to be qualified for use in the airplane. Rigid and flexible specimens, 4½ inches by 12½ inches, or the actual size used in the airplane must be clamped in a metal frame so that the two long edges and one end are held securely. The frame must be such that the exposed area is at least 2 inches wide and 11½ inches long unless the actual size used in the airplane is smaller. In the case of fabrics, the direction of the weave corresponding to the most critical burn rate must be parallel to the longest dimension.

(c) *Apparatus.* The tests must be conducted in a sheet metal cabinet of appropriate size provided with a door containing a glass insert for observing the burning specimen. The cabinet top must contain a baffled vent. There must be baffled holes or similar means of ventilation near the bottom of the cabinet. Larger panels need not be tested in this apparatus but must be tested in similar draft-free conditions.

(d) *Horizontal test.* A minimum of three specimens must be tested and the results averaged. Each specimen must be supported horizontally. The surface exposed to the air when installed in the aircraft must be face down for the test. The specimen must be ignited by a Eunsen burner or Tirrill burner with a nominal three-eighths inch I.D. tube adjusted to give a flame of 1½ inches in height with the air completely shut off. The specimen must be positioned so that the edge being tested is three-fourths of an inch above the top of, and on the center line of, the burner. The flame must be applied for 15 seconds and then removed. Char length must be noted when testing for compliance with § 25.853(a). To determine burn rate for compliance with § 25.853(b), a minimum of 10 inches of the specimen must be used for timing purposes, approximately 1½ inches must burn before the burning front reaches the timing zone, and the average burn rate must not exceed 4 inches per minute. If, in testing for compliance with § 25.853(b), the specimens do not support combustion after the ignition flame is applied for 15 seconds, or if the flame extinguishes itself and subsequent burning without a flame does not extend into the undamaged areas, the material is also acceptable.

(e) *Vertical test.* A minimum of three specimens must be tested and the results averaged. Each specimen must be supported vertically. Ceiling or floor panels may be tested with any edge down. Rigid specimens of materials mounted vertically in the airplane must be oriented for the test in the same manner as oriented in the airplane. The specimen must be ignited by a Eunsen or Tirrill burner with a nominal three-eighths inch I.D. tube adjusted to give a flame of 1½ inches in height with the air completely shut off. The center line of the burner must be in line with a surface of the material being tested or, in the case of fabricated units, must be in line with the surface exposed to the air in the airplane. The lower edge of the specimen being tested must be three-fourths inch above the top of the burner. The flame must be applied for 12 seconds and then removed. Char length must be noted.

(f) *Char length.* Char length for fabrics and coated fabrics is the distance from the specimen end that was exposed to the flame to the end of a tear made lengthwise on the specimen through the center of the charred area. The tear must be made as follows: A hook must be inserted in the specimen at one side of the charred areas one-fourth inch from the adjacent outside edge and one-fourth inch in from the charred end of the specimen. A weight of sufficient size

such that the weight and hook together equal the total tearing load specified below must be applied gently to the specimen by grasping the corner of the cloth at the opposite edge of the char from the load and raising the specimen and weight clear of the support. The total tearing load for various weights per square yard of test cloth is as follows:

Weight per square yard of test cloth (ounces)	Total tearing load (pounds)
2 to 6.....	0.25
Over 6 to 15.....	0.5
Over 15 to 23.....	0.75
Over 23.....	1.0

On materials other than fabrics, the char length is the total length of the specimen consumed or charred by burning. The length is measured from the ignition edge to a point that is not punctured by a ballpoint pen (or equivalent) when progressively moved from unburned to burned areas.

§ 37.175 [Amended]

22. Paragraph (a)(1) of § 37.175 is amended by adding a new sentence before the last sentence to read as follows: "However, new models manufactured on or after October 24, 1967, are required to be designed so as to be fully inflated in not more than 10 seconds after actuation of the inflation means."

23. Section 121.291 is amended to read as follows:

§ 121.291 Demonstration of emergency evacuation procedures.

(a) Each certificate holder must show, by actual demonstrations conducted in accordance with paragraphs (a) and (b) of Appendix D to this part, that the emergency evacuation procedures for each type and model of airplane with a seating capacity of more than 44 passengers, that is used in its passenger-carrying operations, allow the evacuation of the full seating capacity, including crewmembers, in 90 seconds or less—

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

(2) Upon increasing by 5 percent or more the passenger seating capacity for which a successful demonstration has been conducted; or

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

However, until October 1, 1969, a certificate holder who is initially introducing a type and model aircraft that does not meet the requirements of § 25.809

(f)(1) of this chapter need only accomplish the required demonstrations in 2 minutes or less.

(b) 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 show, by a simulated ditching conducted in accordance with paragraph (c) of Appendix D to this part, that it has the ability to efficiently carry out its ditching procedures.

24. Section 121.309 is amended by deleting paragraphs (f), (g), and (h) and

DEPARTMENT OF
TRANSPORTATION

Federal Aviation Administration

[14 CFR Parts 21, 25, 37, 121]

[Docket No. 9605; Notice 89-33]

TRANSPORT CATEGORY AIRPLANES;
CRASHWORTHINESS AND PASSENGER
EVACUATION

Notice of Proposed Rule Making

* The Federal Aviation Administration is considering amending the emergency evacuation requirements and operating procedures for transport category airplanes.

Interested persons are invited to participate in the making of the proposed rule by submitting such written data, views, or arguments as they may desire. Communications should identify the regulatory docket or notice number and be submitted in duplicate to: Federal Aviation Administration, Office of the General Counsel, Attention: Rules Docket, GC-24, 800 Independence Avenue SW., Washington, D.C. 20590. All communications received on or before October 13, 1969, will be considered by the Administrator, before taking action on the proposed rule. The proposal contained in this notice may be changed in the light of comments received. All comments submitted will be available, both before and after the closing date for comments, in the Rules Docket for examination by interested persons.

In Amendment 25-15, adopted on September 15, 1967, which established detailed emergency evacuation equipment and operating requirements for transport category airplanes, the FAA advised that it would consider additional revisions to the regulations as advances in the state-of-the-art allowed in order to further increase the probability of occupant survival in an airplane accident. To this end, Government and industry development programs were established to find ways to increase passenger and crew survivability through improvements in interior materials, fire suppression systems, emergency lighting and exit awareness, and evacuation systems.

This notice reflects the recommendations of the Aerospace Industries Association (AIA) as set forth in their Petition for Rulemaking filed April 30, 1969, and the recommendation of the National Electrical Manufacturers' Association (NEMA) as set forth in their Petition for Rulemaking filed July 25, 1968. It also contains various additional proposals which the FAA considers appropriate.

The following discussion concerns the more significant proposals presented in this notice. For convenience the matters will be considered in the order of their appearance in the Federal Aviation Regulations.

Part 25. It is proposed to increase the ultimate inertia forces currently prescribed in § 25.561(b) (3) for upward and sideward loads, and to specify an ultimate inertia force for aft loads, for transport category airplanes. The FAA has found that seats and seat attachments in airplanes designed to the current standards generally meet the higher ultimate inertia forces proposed herein. It is proposed to amend the regulations accordingly.

The FAA proposes to add a new § 25.562 that is designed to reduce the occurrence of fuel fires in and around an airplane following the initial crash impact. The FAA is particularly concerned with crash landings in which one or more landing gear legs do not remain extended and the airplane consequently slides to a stop. However, the FAA is also concerned with those crash landings that are the result of an excessive sink rate at impact, even though the landing gear remain properly extended. It is therefore proposed to require that the airplane be designed so that it can be landing under these conditions without sustaining a structural component failure that would result in the spillage of enough fuel to constitute a fire hazard, or that would cause serious injury to any occupant.

Current § 25.721 is designed to insure that if the landing gear falls, no part of the fuel system in the fuselage of the airplane will be punctured. It is proposed to extend this protection to the entire fuel system of the airplane. However, since not all punctures of the fuel system would result in a fire hazard, the proposal would protect against those punctures only that would result in the spillage of enough fuel to cause a fire.

The purpose of the proposed change to paragraph (c) of § 25.785 is to make it clear that the applicant for a type certificate may select any one of the three methods prescribed in providing protection for an occupant of other than a sideward facing seat.

It is proposed to amend § 25.787 to make it applicable to all stowage compartments. In addition to cargo and baggage, the regulation would specifically refer to the stowage of carry-on baggage and the stowage of equipment, such as life rafts. It is also proposed to require that each stowage compartment in the passenger cabin, except for underseat and overhead compartments for passenger convenience, be completely enclosed.

A new § 25.789 is proposed, containing substantially the same requirements as are now contained in §§ 25.561(c) and 25.787(c). The purpose of this change is to make the requirement applicable to all items of mass in the airplane (in passenger, crew, and cargo compartments) whether attached to the structure or not.

Section 121.317 of Part 121 requires passenger information signs to notify passengers and cabin attendants when smoking is prohibited and when safety belts should be fastened. These signs are often installed in transport category airplanes at the time of manufacture. However, there are at present no standards for such signs in Part 25 and it is proposed to add a new § 25.791 containing passenger information requirements consistent with Part 121.

The current regulations require that the escape route from each overwing emergency exit must be marked but do not provide a standard for the marking. In its petition, the AIA proposed that the escape route have a reflectance of 80 percent, that the escape route surface be defined by marking with a route surface-to-marking contrast ratio of at least 5:1, and that those markings be extended over the normal flap area or escape assist means or descent route. The FAA agrees with these recommendations. However, the FAA also considers that the size of the escape route marking should be specified and it is proposed to require that the surface of the escape route be at least 4 feet wide at Type A exits and at least 2 feet wide at all other overwing passenger emergency exits.

Under the current regulations a Type III exit must, in addition to other things, be located over the wing. Since the regulations also require that all emergency exits be distributed as uniformly as practicable, there is an advantage in allowing flexibility in the location of the Type III exits and it is proposed to delete the requirements that the Type III exit be located over the wing. It should be noted, however, that any Type III exit not over a wing and more than 6 feet from the ground with the landing gear extended must meet additional requirements not applicable to such exits when located over the wing.

It appears to the FAA that because of the relatively little difference in size between the Type III and Type IV exits and the significant improvement in egress rate afforded by the Type III exit, there is very little justification for continuing to provide for the Type IV exit. It is, therefore, proposed to amend the regulations to delete the requirement providing for Type IV exits and to require Type III exits instead. This change would not result in a reduction in the number of required emergency exits.

(As published in the Federal Register /34 F.R.13036/ on August 12, 1969)

Section 25.807(c) (3) currently permits an increase in the passenger/emergency exit relationship if slides meeting the requirements of § 25.809(f)(1) are installed. Since all slides, when prescribed, must now meet the requirements of § 25.809(f)(1) requiring automatic deployment and erection concurrent with the opening of the exit, there appears to be no rational basis for the current rule. It is, therefore, proposed to improve the exit-to-occupant ratio of the current regulations by striking out paragraph (c) (3) of § 25.807.

With the advent of the large capacity aircraft and the large, heavy Type A size emergency exit, the means of opening the emergency exit by a cabin attendant or passenger in an emergency takes on added importance. To insure that these and other emergency exits do not incorporate design features that might adversely affect their operational performance and reliability, it is proposed to require that each emergency exit must be designed so that it can be opened within 10 seconds with the airplane in each of the attitudes corresponding to a collapse of one or more of the landing gear legs. If a power-boost or power-operated system is used to operate the exit, an alternate means must be available for opening the exit in the event of failure of the primary system.

In accordance with the recommendation made by the AIA, it is proposed to change § 25.809(f)(1) to require that the assisting means for each passenger emergency exit be automatically erected within 10 seconds after its deployment is begun. In addition, the FAA agrees with AIA's recommendation that the regulation should be further amended to require that passenger entrance doors and service doors be provided with means to prevent deployment of the assisting means when there is no emergency and the door is opened for normal use.

In the area of emergency exit markings, various changes are proposed in line with the recommendations of the AIA. At the present time, the regulations require that signs be above the aisle near each over-the-wing exit and that signs be placed next to each floor level exit. To provide for a more uniform application of the requirement, it is proposed to require that there must be a passenger emergency exit locator sign above the aisle near each emergency exit and that there must also be an emergency exit marking sign next to each such exit. However, the proposal would permit one sign to serve more than one exit if each exit can be readily seen from the sign. In addition, the current rules do not provide adequate illumination for the operating handles on Type III exits. To this end the proposal would require that the operating handle on Type III exits be self-illuminated with initial brightness of at least 160 microlamberts.

Various changes have been proposed to § 25.812 dealing with emergency lighting. In this connection, detailed changes to the requirements governing the exit locator and marking signs have been proposed substantially along the lines

recommended by the AIA. The exceptions being that while the AIA recommended that the lettering be 1 inch high, the proposal requires lettering of 1½ inches. The FAA believes that this increase in size is necessary to make the signs sufficiently conspicuous. In addition, the AIA recommended that the bulkhead and divider signs be exempt from the emergency lighting requirement of § 25.812. However, the FAA considers that while these signs need not have the same level of illumination as the other signs, a minimum level of illumination should be specified.

Since the regulations will no longer provide for nonautomatic assisting means in meeting the emergency evacuation requirements, the AIA's recommendation for emergency lighting requirements for such means has not been incorporated into this proposal.

The AIA recommended that § 25.812 (k) be amended to provide that not more than 25 percent of all required electrically illuminated locator and marking signs may be rendered inoperative during any single vertical separation of the fuselage during crash landing. While the regulations currently permit an emergency lighting system in which 25 percent of the exit locator signs may be rendered inoperative during any single vertical separation of the fuselage, the rule presently requires that all required exit marking signs must remain operative. The FAA does not consider that it would be in the interest of safety to require an emergency lighting system in which 25 percent of the exits would not remain identified by exit markings in the event of an emergency and AIA's proposal has not been incorporated into this notice.

At the present time, § 25.813, prohibits the obstruction of the projected emergency exit opening by outboard seat backs in any position but allows obstruction of the projected opening by other objects (such as arm rests) if they do not reduce the effectiveness of the exit. The FAA now considers that it is necessary in the interest of safety to apply this prohibition to any form of obstruction, not just seat backs. This would leave the projected exit opening completely clear for at least the width of a passenger seat.

As indicated in the petition for rule making filed by the AIA, materials suitable for use in passenger and crew compartments are now available which resist fire more effectively. In accordance with the recommendation made by the AIA and based on its findings under its development program, it is proposed to amend § 25.853 to require, among other things, that specified materials used in passenger and crew compartments be self-extinguishing when tested vertically, meet a more severe burn length requirement, and have an average flame time after removal of the flame source not to exceed 15 seconds. A companion change would be made to Appendix F of Part 25 to establish an acceptable test procedure for these new requirements. Among other things, the new procedure

would require a minimum flame temperature of 1,550° F. in all tests and would contain a new 45° test for cargo compartment liners.

In response to the petition from NEMA, the notice proposes to add a new requirement in § 25.1359 setting forth improved flammability standards for wire and cable insulation. In addition, new test procedures for electrical wire and cable substantially as recommended by the NEMA are set forth in the proposed change to Appendix F. The NEMA recommendations concerning smoke emission from electrical wire and cable have not been incorporated in this notice since the smoke emission issue, in broad aspect, is the subject of a separate rule-making action. (Notice 69-30, Docket No. 9611.)

The requirements for cargo and baggage compartments in § 25.855 would be changed to now require that the liners and the thermal and acoustic insulation used in such compartments must meet the fire protection requirements of § 25.853. In addition, it would require that all liners be separate from the airplane structure even though it permits the liner to be attached to the structure.

As has been the case in the previous crashworthiness and passenger evacuation rule-making actions, it is proposed to make certain of the new requirements applicable to airplanes for which type certificates are issued after the effective date of these proposed amendments. However, unlike the previous rule-making actions, it is not proposed to make these new requirements applicable to all applicants for supplemental type certificates or amendments to type certificates; only to those applicants for STCs or amendments related to the type certificates issued after the effective date of these proposed amendments. To this end a new § 25.3 is proposed containing the special retroactive requirements of this notice.

Part 37. In addition to the foregoing, appropriate changes are proposed to the Technical Standard Order (TSOs) covering Safety Belts, Aircraft Seats and Berths, and Individual Rotation Devices, consistent with the improved fire protection requirements for compartment interiors.

Part 121. With the exception of the requirement for ash trays in compartments where smoking is to be allowed, all the other fire protection requirements currently contained in § 121.215 concerning cabin interiors are now covered under other provisions in Part 121. It is, therefore, proposed to amend § 121.215 to cover only the requirement for ash trays and to require placarding when smoking is not allowed.

It is proposed to amend § 121.285 to strike out the term flame resistant as it relates to materials in cargo bins in passenger compartments and to require that such materials at least meet the existing requirements of § 25.853(b). It is not proposed to require that materials in cargo bins in passenger compartments meet the changes to the requirements of § 25.853 (b) proposed in this notice.

Section 121.310(a)(2) now requires that after September 30, 1969, the assist means for a floor level emergency exit on passenger-carrying landplanes must meet the requirements of § 25.809(f)(1). Section 25.809(f)(1) is being amended in this rule-making action to require that each passenger entrance and service door must be provided with a means to prevent deployment of the assisting means when it is opened under nonemergency conditions. This new requirement would present a prohibitive installation problem for aircraft already certificated and the FAA considers that for those airplanes the current requirement is adequate. It is therefore proposed to amend § 121.310(a)(2) to require that only airplanes type certificated after September 30, 1969, need meet this new requirement.

Paragraph (b) of § 121.310 now requires that each passenger emergency exit marking and each locating sign must, among other things, be manufactured to meet the requirement of § 25.812(b). Section 25.812(b) is being amended in this rule-making action and the FAA does not consider it necessary to require existing airplanes to comply with this new requirement. It is therefore proposed to amend § 121.310(b) to require that only airplanes type certificated after the effective date of the amended § 25.812(b) proposed herein need meet the new requirement.

Consistent with the change proposed for Part 25, it is proposed to amend paragraph (c) of § 121.310 to provide that sources of general cabin illumination need not be independent of the main lighting system if the emergency power supply for general cabin illumination is independent of the power supply for the main lighting system.

It is proposed to add a new subparagraph (3) to paragraph (d) of § 121.310 to require that a flight crew warning light be installed that illuminates whenever electric power is on in the airplane and the emergency system is not armed or turned on. This is consistent with the change proposed in § 25.812(e)(2).

It is further proposed to amend paragraph (e) of § 121.310 to make it clear that on airplanes type certificated after the effective date of this amendment, the location of each passenger emergency exit operating handle and the instructions for opening the exit must continue to be provided in accordance with the applicable requirements of Part 25 proposed in this notice.

Paragraphs (f) and (h) of § 121.310, and § 121.312 contain references to requirements of Part 25 that are being changed in this proposal. It is therefore proposed to amend §§ 121.310 and 121.312 to make it clear that the older airplanes need not comply with the amendments to the Part 25 requirements proposed in this notice. No other changes to these regulations are proposed.

It is proposed to amend § 121.311 to require that occupants of seats equipped with a shoulder harness must fasten that shoulder harness during takeoff and landing. An exception would be made

for crewmembers who cannot perform their duties with the harness fastened.

Paragraph (a) of § 121.317 would be amended consistent with the new proposal in Part 25 to require that passenger information signs regarding smoking and seat belts must be legible to all persons seated in the passenger cabin under all conditions of cabin illumination.

Paragraph (c) of § 121.391 presently contains a reference to paragraph (b) that is no longer necessary or appropriate. In addition to making this correction, it is proposed to make it clear that the number of flight attendants approved under either paragraph (a) or (b) of § 121.391 are set forth in the certificate holder's operations specifications.

It is proposed to amend § 121.571 to require that each certificate holder make an announcement, when the seat belt sign is first turned off after takeoff, that all passengers should, for their safety, keep their seat belts loosely or comfortably fastened while seated. This requirement recognizes the possibility that turbulence may be encountered unexpectedly. The seat belt sign would be turned on when turbulence is expected or when landing is imminent and would notify the passengers that the fastening of seat belts is mandatory. The passenger information requirement of § 121.317(a) would be amended to implement this proposal.

A new § 121.576 is proposed to require that a means be provided to prevent galley equipment, serving carts and crew baggage from becoming a hazard by shifting under specified load conditions. Operators would be given 2 years in which to meet this requirement.

Section 121.589 would be amended to require that the certificate holder ensure that all carry-on baggage has been stowed before each takeoff and each landing. In addition, it would require each passenger to comply with instructions given by any crewmember concerning the stowage of carry-on baggage.

The FAA believes that it is essential for the safety of passengers in a crash situation to require that no food, beverage, tableware, or trays be in position in front of passengers during takeoff or landing. Impact with trays, dishes, cups, glasses, and silverware can cause serious head and face injuries. Furthermore, in the event of an emergency evacuation, the trays, food, and tableware could obstruct and slow movement to the exits and the slippery food litter could cause needless injury. It should also be noted that the cabin attendants, who prepare and serve food and beverages, are responsible for many duties connected with passenger safety which must be performed before takeoff and landing. The preparation and serving of food and beverages before takeoff can interfere with the crewmember's performance of these duties. It is, therefore, proposed to add a new § 121.577 prohibiting a certificate holder from taking off or landing an airplane (1) when any food, beverage, or tableware furnished by the

certificate holder is located at any pas-

senger seat, and (2) unless each passenger's food and beverage tray and each serving cart is in the stowed position. Each passenger would be required to comply with instructions given by a crewmember concerning the foregoing requirements.

In consideration of the foregoing, it is proposed to amend Parts 21, 25, 37, and 121 as follows:

PART 21

§ 21.17 [Amended]

1. By amending § 21.17(a) by striking out the reference to "§ 25.2" and inserting the reference to "§§ 25.2 and 25.3" in place thereof.

PART 25

1. By adding a new § 25.3 to read as follows:

§ 25.3 Additional special retroactive requirements.

(a) Notwithstanding §§ 21.17 and 21.101 of this chapter and § 25.2, and irrespective of the date of application—

(1) Each applicant for a type certificate must show after (the effective date of this amendment), that the airplane concerned meets the requirements listed in paragraph (b) of this section in effect on (the date of this amendment); and

(2) Each applicant for a Supplemental Type Certificate (or an amendment to the type certificate) for an airplane type certificated on or after (the effective date of this amendment) must show that the airplane concerned meets the requirements listed in paragraph (b) of this section in effect on (the effective date of this amendment).

(b) Sections 25.561(b), 25.562(a), 25.721(d), 25.785(c), 25.787(a), 25.789, 25.803(e), 25.807(a), (c), and (d), 25.809(b), (f), (g), (h), and (i), 25.811(d), (e), and (g), 25.812(a), (b), (c), (d), (e), (f), (g), and (k), 25.813(c), 25.853, 25.855, 25.1359(d), 25.1557(a), and Appendix F of this part.

2. By amending § 25.561 by striking out paragraph (c) and by amending subparagraph (3) of paragraph (b) to read as follows:

§ 25.561 General:

(b)
(3) The occupant experiences the following ultimate inertia forces relative to the surrounding structure:

- (i) Upward—4.5 g.
- (ii) Forward—9.0 g.
- (iii) Sideward—3.0 g.
- (iv) Downward—4.5 g. or any lesser force that will not be exceeded when the airplane absorbs the landing loads resulting from impact with an ultimate descent velocity of 5 f.p.s. at design landing weight.
- (v) Aft—1.5 g.

(c) [Deleted]

3. By adding a new § 25.562 to read as follows:

§ 25.562 Fuel containment.

(a) The airplane must be designed so that it can be landed on a paved runway,

with any one or more landing gear legs not extended, without sustaining a structural component failure that would result in the spillage of enough fuel to constitute a fire hazard, or that would result in serious injury to any occupant, under the following conditions:

(1) Airplane weight—design landing weight;

(2) Touchdown velocity=1.05 V_{LO} ;

(3) Rate of sink=3 f.p.s.; and

(4) Coefficient of friction (μ)=0.4

(b) The airplane must be designed so that it can be landed on a paved runway, with the airplane in the normal landing configuration, without sustaining a structural component failure that would result in the spillage of enough fuel to constitute a fire hazard, or that would result in serious injury to any occupant, under the following conditions:

(1) Airplane weight—design landing weight;

(2) Rate of sink=24 f.p.s.; and

(3) Airplane pitch attitude=7° above, and below, the pitch attitude for a normal landing.

4. By amending paragraph (d) of § 25.721 to read as follows:

§ 25.721 General.

(d) The main landing gear system must be designed so that if it fails due to overloads during takeoff and landing (assuming the overloads are in the vertical plane parallel to the longitudinal axis of the airplane), the failure mode is not likely to cause the spillage of enough fuel from any part of the fuel system to constitute a fire hazard. This may be shown by analysis or test, or both.

5. By amending § 25.785(e) by amending the second sentence of the lead-in paragraph and subparagraphs (1), (2), and (3) as follows:

§ 25.785 Seats, berths, safety belts, and harnesses.

(c) . . . Each occupant of any other seat must be protected from head injury by a safety belt and, as appropriate to the type, location, and angle of facing of each seat, by one or more of the following:

(1) A shoulder harness that will prevent the head from contacting any injurious object.

(2) The elimination of any injurious object within striking radius of the head.

(3) An energy absorbing rest that will support the arms, shoulders, head, and spine.

6. By amending § 25.787 by striking out paragraph (c) and by changing the title of the section and amending paragraph (a) as follows:

§ 25.787 Stowage compartments.

(a) Each compartment for the stowage of cargo, baggage, carry-on articles, and equipment (such as life rafts), and any other stowage compartment must be designed for its placarded maximum weight of contents and for the critical

load distributions at the appropriate maximum load factors corresponding to the specified flight and ground load conditions, and to the emergency landing conditions of § 25.561(b), except that the forces specified in the emergency landing conditions need not be applied to compartments located below, or forward, of all occupants in the airplane. Each stowage compartment in the passenger cabin except for underseat and overhead compartments for passenger convenience must be completely enclosed.

(c) [Deleted]

7. By adding new § 25.789 to read as follows:

§ 25.789 Retention of items of mass in passenger and crew compartments.

Means must be provided to prevent each item of mass in a passenger or crew compartment from becoming a hazard by shifting under the appropriate maximum load factors corresponding to the specified flight and ground load conditions, and to the emergency landing conditions of § 25.561(b).

8. By adding a new § 25.791 to read as follows:

§ 25.791 Passenger information signs.

When installed, passenger information signs must be legible to all persons seated in the passenger cabin under all conditions of cabin illumination. Signs which notify when seat belts should be fastened and when smoking is prohibited must be so constructed that the crew can turn them on and off.

9. By amending paragraph (e) of § 25.803 to read as follows:

§ 25.803 Emergency evacuation.

(e) An escape route must be established from each overwing emergency exit, and (except for flap surfaces suitable as slides) covered with a slip resistant surface. The escape route surface must have a reflectance of at least 80 percent, must be defined by markings with a surface-to-marking contrast ratio of at least 5:1, must be at least 4 feet wide at Type A passenger emergency exits, and must be at least 2 feet wide at all other passenger emergency exits.

§ 25.807 [Amended]

10. By amending § 25.807 Passenger emergency exits as follows:

A. By amending paragraph (2)(3) to read as follows:

(3) Type III. This type must have a rectangular opening of not less than 20 inches wide by 36 inches high, with corner radii not greater than one-third the width of the exit, and with a step-up inside the airplane of not more than 20 inches. If the exit is located over the wing the step-down outside the airplane must not exceed 27 inches.

B. By striking out paragraph (2)(4).

C. By amending paragraphs (c) and (d) to read as follows:

(c) Passenger emergency exits. The prescribed exits need not be diagonally

opposite each other nor identical in size and location on both sides. They must be distributed as uniformly as practicable taking into account passenger distribution. If only one floor level exit per side is prescribed, and the airplane does not have a tail cone or ventral emergency exit, 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. Where more than one floor level exit per side is prescribed, at least one floor level exit per side must be located near each end of the cabin, except that this provision does not apply to combination cargo/passenger configurations. Exits must be provided as follows:

(1) Except as provided in subparagraphs (2) through (5) of this paragraph, the number and type of passenger emergency exits must be in accordance with the following table:

Passenger seating capacity (cabin attendants not included)	Emergency exits for each side of the fuselage		
	Type I	Type II	Type III
1 through 19			1
20 through 29		1	1
30 through 39	1		1
40 through 109	1	1	2
110 through 139	1	1	1
140 through 179	2		2

(2) An increase in passenger seating capacity above the maximum permitted under subparagraph (1) of this paragraph but not to exceed a total of 299 may be allowed in accordance with the following table for each additional pair of emergency exits in excess of the minimum number prescribed in subparagraph (1) of this paragraph for 179 passengers:

Additional emergency exits (each side of fuselage)	Increase in passenger seating capacity allowed
Type A	100
Type I	45
Type II	40
Type III	35

(3) For passenger capacities in excess of 299, each emergency exit in the side of the fuselage must be either a Type A or Type I. A passenger seating capacity of 100 is allowed for each pair of Type A exits and a passenger seating capacity of 45 is allowed for each pair of Type I exits.

(4) If a passenger ventral or tail cone exit is installed and can be shown to allow a rate of egress at least equivalent to that of a Type III exit with the airplane in the most adverse exit opening condition because of the collapse of one or more legs of the landing gear, an increase in passenger seating capacity beyond the limits specified in subparagraph (1), (2), or (3) of this paragraph may be allowed as follows:

(i) For a ventral exit, 12 additional passengers.

(ii) For a tail cone exit incorporating a floor level opening of not less than 20 inches wide by 60 inches high, with corner radii not greater than one-third

the width of the exit, in the pressure shell and incorporating an approved assist means in accordance with § 25.802(f) (1), 25 additional passengers.

(iii) For a tall cone exit incorporating an opening in the pressure shell which is at least equivalent to a Type III emergency exit with respect to dimensions, step-up and step-down distance, and with the top of the opening not less than 56 inches from the passenger compartment floor, 15 additional passengers.

(5) Each emergency exit in the passenger compartment in excess of the minimum number of required emergency exits must meet the applicable requirements of §§ 25.809 through 25.812, and must be readily accessible.

(d) Ditching emergency exits for passengers. If the emergency exits required by paragraph (c) of this section do not meet subparagraph (1) of this paragraph, exits must be added to meet them:

(1) One exit above the waterline in a side of the airplane, meeting at least the dimensions of a Type III exit, for each unit (or part of a unit) of 35 passengers, but no less than two such exits in the passenger cabin with one on each side of the airplane. However, where it has been shown through analysis, ditching demonstrations, or any other tests found necessary by the Administrator, that the evacuation capability of the airplane during ditching is improved by the use of larger exits or by other means, the passenger/exit ratio may be increased.

(2) If side exits cannot be above the waterline, the side exits must be replaced by an equal number of readily accessible overhead hatches of not less than the dimensions of a Type III exit except that, for airplanes with a passenger capacity of 35 or less, the two required Type III side exits need be replaced by only one overhead hatch.

§ 25.809 [Amended]

11. By amending § 25.809 as follows:

A. By amending paragraph (b) by adding the following at the end thereof:

(b) * * * Each exit must be capable of being opened—

(1) With the airplane in each of the attitude corresponding to collapse of one or more legs of the landing gear; and

(2) Within 10 seconds measured from the time when the opening means is actuated to the time when the exit is fully opened.

B. By amending paragraph (f) (1) to read as follows:

(1) The assisting means for each passenger emergency exit must be a self-supporting slide or equivalent, and must be designed to meet the following requirements:

(i) It must be automatically deployed concurrent with the opening of the exit from the inside of the airplane. However, each passenger emergency exit which is also a passenger entrance door or a service door must be provided with means to prevent deployment of the assisting means when it is opened from either the inside or the outside under nonemergency conditions for normal use.

(ii) It must be automatically erected within 10 seconds after deployment is begun.

(iii) It must be of such length that the lower end is self supporting on the ground after collapse of one or more legs of the landing gear.

C. By amending paragraph (g) to read as follows:

(g) Each emergency exit must be shown by tests to meet the requirements of paragraphs (b) and (c) of this section.

D. By striking out present paragraph (h) and by adding new paragraphs (h) and (i) to read as follows:

(h) If the place on the airplane structure at which the escape route required in § 25.803(e) terminates is more than 6 feet from the ground with the airplane on the ground and the landing gear extended, means must be provided to assist evacuees (who have used the overwing exits) to reach the ground. If the escape route is over a flap, the height of the terminal edge must be measured with the flap in the takeoff or landing position, whichever is higher from the ground. The assisting means must be of such length that the lower end is self-supporting on the ground after collapse of any one or more landing gear legs.

(i) If a power-boost or power-operated system is the primary system for operating the exit, the exit must be capable of meeting paragraph (b) (1) of this section in the event of failure of the primary system. Manual operation of the exit (after failure of the primary system) is acceptable. If a secondary power-boost or power-operated system is provided to operate the exit in the event of failure of the primary system, it must be independent of the airplane's main systems and main energy sources.

§ 25.811 [Amended]

12. By amending § 25.811 as follows:

A. By amending paragraph (d) to read as follows:

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

(1) A passenger-emergency exit locator sign above the aisle (or aisles) near each passenger emergency exit, or at another overhead location if it is more practical because of low headroom, except that one sign may serve more than one exit if each exit can be seen readily from the sign;

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

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

B. By amending subparagraph (1) of paragraph (e) to read as follows:

(e) The location of the operating handle and instructions for opening the exit must be shown as follows:

(1) For each passenger emergency exit, by a marking on or near the exit that is readable from a distance of 30 inches. In addition, the operating handle for each Type III passenger emergency exit must be self-illuminated with an initial brightness of at least 160 microlamberts. If the operating handle is covered, self-illuminated cover removal instructions having an initial brightness of at least 160 microlamberts must also be provided.

C. By amending subparagraph (2) of paragraph (c) by inserting the words "Type A" between the word "each" and the word "Type I."

D. By amending paragraph (g) to read as follows:

(g) Each sign required by paragraph (d) of this section may use the word "exit" in its legend in place of the term "emergency exit."

§ 25.812 [Amended]

13. By amending § 25.812 Emergency lighting as follows:

A. By amending the lead-in statement of paragraph (a) to read as follows:

(a) An emergency lighting system, independent of the main lighting system, must be installed except that sources of general cabin illumination need not be independent of the main lighting system if the emergency power supply for general cabin illumination is independent of the power supply for the main lighting system. The emergency lighting system must include:

B. By amending paragraphs (b), (c), (d), (e), (f), and (g) to read as follows:

(b) Emergency exit signs must meet the following requirements:

(1) Each passenger emergency exit locator sign required by § 25.811(d) (1) and each passenger emergency exit marking sign required by § 25.811(d) (2) must have red letters at least 1½ inches high on an illuminated white background, and must have an area of at least 21 square inches excluding the letters. The lighted background-to-letter contrast must be at least 10:1. The stroke height-to-width ratio must be 7:1. These signs must be internally electrically illuminated with a background brightness of at least 25 foot-lamberts and a high-to-low background contrast no greater than 3:1.

(2) Each passenger emergency exit sign required by § 25.811(d) (3) must have red letters at least 1½ inches high on a white background having an area of at least 21 square inches excluding the letters. These signs must be internally electrically illuminated or self-illuminated by other than electrical means and must have an initial brightness of at least 400 microlamberts. The colors may be reversed in the case of a self-illuminated sign if this will make the sign more conspicuous.

(c) General illumination in the passenger cabin must be provided so that when measured along the centerline of

main passenger aisle(s), and cross aisle(s) between main aisles, at seat armrest height and at 40-inch intervals, the average illumination is not less than 0.05 foot-candle and the illumination at each 40-inch interval is not less than 0.01 foot-candle. A main passenger aisle(s) is considered to extend along the fuselage from the most forward passenger emergency exit or cabin occupant seat, whichever is farther forward, to the most rearward passenger emergency exit or cabin occupant seat, whichever is farther aft.

(d) The floor of the passageway leading to each floor-level passenger emergency exit, between the main aisles and the exit openings, must be provided with illumination that is not less than 0.02 foot-candle measured along a line that is within 6 inches of and parallel to the floor and is centered on the passenger evacuation path.

(e) The emergency lighting system must be designed as follows:

(1) The lights must be operable manually from the flight crew station and (if required by the operating rules of this chapter) from a point in the passenger compartment that is readily accessible to a normal flight attendant seat.

(2) There must be a flight crew warning light which illuminates when power is on in the airplane and the emergency lighting control device is not armed or turned on.

(3) When armed or turned on, the lights must remain lighted or become lighted upon interruption (except an interruption caused by a transverse vertical separation of the fuselage during crash landing) of the airplane's normal electric power. There must be means to safeguard against inadvertent operation of the control device from the "armed" or "on" position.

(f) Exterior emergency lighting must be provided as follows:

(1) At each overwing emergency exit the illumination must be—

(i) Not less than 0.03 foot-candle (measured normal to the direction of the incident light) on a 2-square-foot area where an evacuee is likely to make his first step outside the cabin;

(ii) Not less than 0.05 foot-candle (measured normal to the direction of the incident light) for a minimum width of 4 feet for a Type A overwing emergency exit and 2 feet for all other overwing emergency exits along the 30 percent of the slip-resistant portion of the escape route required in § 25.803(e) that is farthest from the exit; and

(iii) Not less than 0.03 foot-candle on the ground surface with the landing gear extended (measure normal to the direction of the incident light) where an evacuee using the established escape route would normally make first contact with the ground.

(2) At each nonoverwing emergency exit not required by § 25.809(f) to have descent assist means the illumination must be not less than 0.03 foot-candle (measured normal to the direction of the incident light) on the ground surface with the landing gear extended where

an evacuee is likely to make his first contact with the ground outside the cabin.

(g) The means required in § 25.809 (f) (1) and (h) to assist the occupants in descending to the ground must be illuminated so that the deployed assist means is visible from the airplane.

(1) If the assist means is illuminated by exterior emergency lighting, it must provide illumination of not less than 0.03 foot-candle (measured normal to the direction of the incident light) at the ground end of the deployed assist means where an evacuee using the established escape route would normally make first contact with the ground, with the airplane in each of the attitudes corresponding to the collapse of one or more legs of the landing gear.

(2) If the assist means is self-illuminated, the lighting provisions—

(i) May not be adversely affected by stowage; and

(ii) Must provide illumination of not less than 0.03 foot-candle (measured normal to the direction of incident light) at the ground end of the deployed assist means where an evacuee would normally make first contact with the ground, with the airplane in each of the attitudes corresponding to the collapse of one or more legs of the landing gear.

C. By amending paragraph (k) by inserting the word "transverse" between the words "single" and "vertical" in the lead-in statement and by striking out the word "exit" in subparagraph (3).

14. By amending § 25.813(c) to read as follows:

§ 25.813 Emergency exit access.

(c) There must be access from each aisle to each Type III exit. For airplanes having a maximum seating capacity of 20 or more, the projected opening of the exit provided must not be obstructed by seats, berths, or other protrusions (including seatbacks in any position) for a distance from that exit not less than the width of the narrowest passenger seat installed in the airplane.

15. By amending § 25.853 by redesignating present paragraphs (c) through (f) as paragraphs (e) through (h), respectively, and by amending the lead-in statement and paragraphs (a) and (b) and by adding new paragraphs (c) and (d) to read as follows:

§ 25.853 Compartment interiors.

Materials, including finishes or decorative surfaces applied to the materials, used in each compartment occupied by the crew or passengers must meet the following test criteria, as applicable:

(a) Interior ceiling panels, interior wall panels, partitions, galley structure, large cabinet walls, structural flooring, and materials used in the construction of stowage compartments (other than underseat) must be self-extinguishing when tested vertically in accordance with the applicable portions of Appendix F of this part, or other approved equivalent methods. The average burn length may

not exceed 6 inches and the average flame time after removal of the flame source may not exceed 15 seconds. Drippings from the test specimen may not continue to flame for more than 3 seconds after falling.

(b) Floor covering, textiles (including draperies, upholstery, and the covering of upholstery), seat cushions, padding, decorative and nondecorative coated fabrics, leather, trays and galley furnishings, transparencies not covered in paragraph (c) of this section, electrical conduit, molded and thermoformed parts, thermal and acoustical insulation and insulation covering, air ducting, joint and edge covering, trim strips (decorative and chafing), cargo compartment liners, insulation blankets, and cargo covers, must be self-extinguishing when tested vertically in accordance with the applicable portions of Appendix F of this part, or other approved equivalent methods. The average burn length may not exceed 8 inches and the average flame time after removal of the flame source may not exceed 15 seconds. Drippings from the test specimen may not continue to flame for more than 5 seconds after falling.

(c) Acrylic windows, edge lighted instrument assemblies, seat belts, shoulder harnesses, and cargo and baggage tie-down equipment including containers, bins, pallets, etc., used in passenger or crew compartments, may not have a burn rate greater than 2.5 inches per minute when tested horizontally in accordance with the applicable portions of Appendix F of this part, or other approved equivalent methods.

(d) Except for electrical wire and cable insulation, materials in items not specified in paragraph (a), (b), or (c), of this section may not have a burn rate greater than 4 inches per minute when tested horizontally in accordance with the applicable portions of Appendix F of this part or other approved equivalent methods.

16. By amending § 25.855 by amending paragraph (a); by redesignating present paragraphs (b) through (e) as paragraphs (c) through (f) and by adding new paragraph (b) to read as follows:

§ 25.855 Cargo and baggage compartments.

(a) Liners and thermal and acoustic insulation used in each cargo and baggage compartment, including convertible passenger-cargo compartments, must be constructed of materials that at least meet the requirements set forth in § 25.853(b). In addition, the liners must be separate from (but may be attached to) the airplane structure and must be tested at a 45° angle in accordance with the applicable portions of Appendix F of this part or other approved equivalent methods. The flame may not cause a hole to appear in the material during application of the flame or subsequent to its removal. The average flame time after removal of the flame source may not exceed 15 seconds and the average glow time may not exceed 10 seconds.

(b) Insulation blankets and covering used to protect cargo must be constructed of materials that at least meet the requirements of § 25.853(b) and tie-down equipment must be constructed of materials that at least meet the requirements set forth in § 25.853(c).

§ 25.857 [Amended]

17. By amending § 25.857 by striking out subparagraph (4) of paragraph (b), and subparagraph (5) of paragraph (c), subparagraph (4) of paragraph (d), and subparagraph (1) of paragraph (e).

18. By amending § 25.1359 by adding a new paragraph (d) to read as follows:

§ 25.1359 Electrical system fire and smoke protection.

(d) Electrical wire and cable insulation installed in any area of the fuselage must be self-extinguishing when tested in accordance with the applicable portions of Appendix F of this part, or other approved equivalent methods. The average flame time after removal of the flame source may not exceed 30 seconds. Drippings from the test specimen may not continue to flame for more than 3 seconds after falling.

§ 25.1411 [Amended]

19. By amending § 25.1411(c) by striking out the reference to "§ 25.807(c)(4)" and inserting reference to "§ 25.809(f)" in place thereof.

20. By amending paragraph (a) of § 25.1657 to read as follows:

§ 25.1657 Miscellaneous markings and placards.

(a) *Stowage compartments and ballast location.* Each stowage compartment and each ballast location must have a placard stating any limitations on contents, including weight, that are necessary under the loading requirements.

21. By amending Appendix F to read as follows:

Appendix F

AN ACCEPTABLE TEST PROCEDURE FOR SHOWING COMPLIANCE WITH §§ 25.853, 25.855, AND 25.1359

(a) *Conditioning.* Specimens must be conditioned at 70° F., plus or minus 5° and at 60 percent plus or minus 5 percent relative humidity until moisture equilibrium is reached. Only one specimen at a time may be removed from the conditional environment immediately before subjecting it to the flame.

(b) *Specimen configuration.* Except as provided for materials used in electrical wire and cable insulation and in small items, materials must be tested either as a section cut from a fabricated part as installed in the airplane or as a specimen simulating a cut section, such as: A specimen cut from a flat sheet of the material or a model of the fabricated part. The specimen may be cut from any location in a fabricated part; however, fabricated units, such as sandwich panels, may not be separated for test. The specimen thickness must be no thicker than the minimum thickness to be qualified for use in the airplane, except that: (1) Thick

foam parts, such as seat cushions, must be tested in $\frac{1}{2}$ -inch thickness; (2) when showing compliance with § 25.853(d) for materials used in small items the materials must be tested in no more than $\frac{1}{4}$ -inch thickness; (3) when showing compliance with § 25.1359 (d) for materials used in electrical wire and cable insulation the wire and cable specimens must be the same size as used in the airplane. In the case of fabrics, both the warp and fill direction of the weave must be tested to determine the most critical flammability conditions. When performing the tests prescribed in paragraphs (d) through (e) of this appendix, the specimen must be mounted in a metal frame so that (1) in the vertical tests of paragraphs (d) and (e) the two long edges are held securely, (2) in the horizontal test of paragraph (f) the two long edges and one end are held securely, (3) the exposed area of the specimen is at least 2 inches wide and 12 inches long, and (4) the edge to which the burner flame is applied must not consist of the finished or protected edge of the specimen but must be representative of the actual cross-section of the material or part installed in the airplane. When performing the test prescribed in paragraph (f) of this appendix, the specimen must be mounted in a metal frame so that all four edges are held securely and the exposed area of the specimen is at least 8 inches by 8 inches.

(c) *Apparatus.* Except as provided in paragraph (h) of this appendix, tests must be conducted in a draft-free cabinet in accordance with Federal Specification CCC-1-191b Method 5993T (revised Method 5902) for the vertical test, or Method 5906 for the horizontal test (available from the General Services Administration, Business Service Center, Region 3, Seventh and D Streets SW., Washington, D.C. 20507) or other approved equivalent methods. Specimens which are too large for the cabinet must be tested in similar draft-free conditions.

(d) *Vertical test, in compliance with § 25.853 (a) and (b).* A minimum of three specimens must be tested and the results averaged. For fabrics, the direction of weave corresponding to the most critical flammability conditions must be parallel to the longest dimension. Each specimen must be supported vertically. The specimen must be exposed to a Bunsen or Tirrill burner with a nominal $\frac{1}{2}$ -inch I.D. tube adjusted to give a flame of $1\frac{1}{2}$ inches in height. The minimum flame temperature measured by a calibrated thermocouple pyrometer in the center of the flame must be 1,550° F. The lower edge of the specimen must be three-fourths inch above the top edge of the burner. The flame must be applied to the centerline of the lower edge of the specimen. For materials covered by § 25.853(a), the flame must be applied for 60 seconds and then removed. For materials covered by § 25.853(b), the flame must be applied for 12 seconds and then removed. Flame time, burn length, and flaming time of drippings, if any, must be recorded. The burn length determined in accordance with paragraph (g) of this appendix must be measured to the nearest one-tenth inch.

(e) *Horizontal test in compliance with § 25.853 (c) and (d).* A minimum of three specimens must be tested and the results averaged. Each specimen must be supported horizontally. The exposed surface when installed in the aircraft must be face up for the test. The specimen must be exposed to a Bunsen burner or Tirrill burner, with a nominal $\frac{1}{2}$ -inch I.D. tube adjusted to give a flame of $1\frac{1}{2}$ inches in height. The minimum flame temperature measured by a calibrated thermocouple pyrometer in the center of the flame must be 1,550° F. The speci-

men must be positioned so that the edge being tested is three-fourths of an inch above the top of, and on the center line of the burner. The flame must be applied for 15 seconds and then removed. A minimum of 10 inches of the specimen must be used for timing purposes, approximately $1\frac{1}{2}$ inches must burn before the burning front reaches the timing zone, and the average burn rate must be recorded.

(f) *Forty-five degree test, in compliance with § 25.853(a).* A minimum of three specimens must be tested and the results averaged. The specimens must be supported at an angle of 45° to a horizontal surface. The exposed surface when installed in the aircraft must be face down for the test. The specimens must be exposed to a Bunsen or Tirrill burner with a nominal $\frac{1}{2}$ -inch I.D. tube adjusted to give a flame of $1\frac{1}{2}$ inches in height. The minimum flame temperature measured by a calibrated thermocouple pyrometer in the center of the flame must be 1,550° F. Suitable precautions must be taken to avoid drafts. One-third of the flame must be applied for 30 seconds and then removed. Flame time, glow time, and whether a hole appears through the specimen must be recorded.

(g) *Burn length.* Burn length is the distance from the original edge to the farthest evidence of damage to the test specimen due to flame impingement, including areas of partial or complete consumption, charring, or embrittlement, but not including areas sooted, stained, warped, or discolored, nor areas where material has shrunk away from the heat source.

(h) *Sixty degree test in compliance with § 25.1359.* The specimen of wire or cable (including insulation) must be placed at an angle of 60° with the horizontal within a chamber approximately 2 feet high x 1 foot x 1 foot, open at the top and at one vertical side (front), and which allows sufficient flow of air for complete combustion, but which is free from drafts. The specimen must be parallel to and approximately 6 inches from the front of the chamber. The lower end of the specimen must be held rigidly clamped. The upper end of the specimen must pass over a pulley and must have an appropriate weight attached to it so that the specimen is held tautly throughout the flammability test. The test specimen span between lower clamp and upper pulley must be 24 inches and must be marked 8 inches from the lower end to indicate the central point for flame application. A flame from a Bunsen burner must be applied for 30 seconds at the test mark. The Bunsen burner must be mounted underneath the test mark on the specimen, and at an angle of 30° to the vertical plane of the specimen. The Bunsen burner must have a $\frac{1}{4}$ -inch inlet, a nominal bore of three-eighths inch, and a length of approximately 4 inches from top to primary inlets. The burner must be adjusted to produce a 3-inch high flame with an inner cone approximately one-third of the flame height. The temperature of the hottest portion of the flame, as measured with a calibrated thermocouple pyrometer, may not be less than 954° C. (1,750° F.). The burner must be positioned so that the hottest portion of the flame is applied to the test mark on the wire. The distance of flame travel upward along the wire from the test mark and the time of burning after removal of the flame must be recorded. The time of burning of any dripping particles must be recorded. Breaking of the wire specimens is not considered a failure. The results of this compliance testing must indicate that, based on a statistical determination, not less than 83 percent of the wire of each specification installed in the airplane must equal or exceed the requirements of § 25.1359(d).

PART 37

§§ 37.132, 37.136 [Amended]

22. By amending § 37.132 *Safety belts, TSO-C22c* to require that new models of such equipment must meet the test criteria set forth in proposed § 25.853(c) and by amending § 37.136 *Aircraft seats and berths, TSO-C.9*, to require that new models of such equipment must meet the test criteria set forth in proposed § 25.853(b).

§ 37.178 [Amended]

23. By amending § 37.178 *Individual flotation devices, TSO-C72a*, by amending paragraphs 4.0.4 and 7.0.3 of the FAA Standard to read as follows:

4.0.4 *Fire protection.* If the device is not used as part of a seat or berth, materials used in the device, including any covering, must meet paragraph 6.0.2 of this standard. If the device is to be used as part of a seat or berth, all materials used in the device must meet paragraph 7.0.3 of this standard.

7.0.3 *Test for fire protection of materials.* Materials used in flotation devices that are to be used as part of an aircraft seat or berth must comply with the self-extinguishing fire protection provisions of § 25.853(b) of Part 25 of this chapter. In all other applications, the materials in the flotation devices must be tested in accordance with paragraph 6.0.2 of this standard to substantiate adequate flame resistant properties.

PART 121

24. By amending § 121.215 to read as follows:

§ 121.215 *Compartments where smoking is allowed.*

Each compartment used by the crew or passenger where smoking is allowed must be equipped with self-contained ash trays that are completely removable. Other compartments used by the crew or passengers must be placarded against smoking.

25. By amending § 121.285 by amending paragraph (b) (6) to read as follows:

§ 121.285 *Carriage of cargo in passenger compartments.*

(b)

(6) The bin must be fully enclosed and made of materials that at least meet § 25.853(b) of this chapter in effect on the day prior to the effective date of this amendment.

§ 121.310 [Amended]

26. By amending paragraph (a) of § 121.310 by amending the first sentence of subparagraph (2) to read as follows:

(2) After September 30, 1969, it must meet the requirements of § 25.839(f) (1) of this chapter in effect on that date, except that, on any airplane type certificated after September 30, 1968, it must meet the assist means requirements under which the airplane was type certificated.

27. By amending paragraph (b) (2) of § 121.310 to read as follows:

(2) Each passenger emergency exit marking and each locating sign must

have white letters 1 inch high on a red background 2 inches high, be self or electrically illuminated, and must meet the following:

(i) For airplanes type certificated prior to (the effective date of this amendment) each passenger emergency exit marking and each locating sign must be manufactured to meet the requirements of § 25.812(b) of this chapter in effect on (the day prior to the effective date of this amendment). On these airplanes, no sign may continue to be used if its luminance (brightness) decreases to below 100 microlamberts.

(ii) For airplanes type certificated after (the effective date of this amendment) each passenger emergency exit marking and each locating sign must be manufactured to meet the interior emergency exit marking requirements under which the airplane was type certificated. On these airplanes, no sign may continue to be used if its luminance (brightness) decreases to below 250 microlamberts.

(iii) The colors may be reversed if it increases the emergency illumination of the passenger compartment. However, the Administrator may authorize deviation from the 2-inch background requirements if he finds that special circumstances exist that make compliance impractical and that the proposed deviation provides an equivalent level of safety.

28. By amending paragraph (c) of § 121.310 to read as follows:

(c) *Lighting for interior emergency exit markings.* Each passenger-carrying airplane must have an emergency lighting system, independent of the main lighting system, except that sources of general cabin illumination need not be independent of the main lighting system if the emergency power supply for general cabin illumination is independent of the power supply for the main lighting system. The emergency lighting system must—

(1) illuminate each passenger 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 centerline of the main passenger aisle, is at least 0.05 foot-candles.

29. By amending paragraph (d) of § 121.310 by amending the flush paragraph at the end by inserting the word "transverse" between the word "a" and the word "vertical," by amending subparagraph (2) (iii) and by adding a new subparagraph (3) to read as follows:

(d) *Emergency light operation.*

(i) When armed or turned on at either station, remain lighted or become lighted upon interruption of the airplane's normal electric power and provide the required level of illumination for at least 10 minutes at the critical ambient conditions after emergency landing.

(3) After (2 years after the effective date of this amendment) a flight crew warning light must be provided which

illuminates when electric power is on in the airplane and the flight crew manual control device used to meet subparagraph (2) of this paragraph is not armed or turned on.

30. By amending paragraph (e) of § 121.310 to read as follows:

(e) *Emergency exit operating handles.*

(1) For passenger-carrying airplanes type certificated prior to (the effective date of this amendment), the location of each passenger emergency exit operating handle, and instructions for opening the exit, must be shown by a marking on or near the exit that is readable from a distance of 30 inches. In addition, for each Type I and Type II emergency exit with a locking mechanism released by rotary motion of the handle, the instructions for opening must be shown by—

(i) A red arrow with a shaft at least 3/4-inch wide and a head twice the width of the shaft, extending along at least 70° of arc at a radius approximately equal to three-fourths of the handle length; and

(ii) The word "open" in red letters 1 inch high, placed horizontally near the head of the arrow.

(2) For passenger-carrying airplanes type certificated on or after (the effective date of this amendment), the location of each passenger emergency exit operating handle and instructions for opening the exit must be shown in accordance with § 25.811(e) of this chapter. On these airplanes, no operating handle or operating-handle cover may continue to be used if its luminance (brightness) decreases to below 100 microlamberts.

31. By amending paragraph (f) of § 121.310 by amending the last sentence of subparagraphs (3) and (6) to read as follows:

(f) *Emergency exit access.*

(3) In addition—

(i) For airplanes type certificated prior to (the effective date of this amendment), the access must meet the requirements of § 25.813(c) of this chapter in effect on (the day prior to the effective date of this amendment); and

(ii) For airplanes type certificated after (the effective date of this amendment), the access must meet the emergency exit access requirements under which the airplane was type certificated.

(6) 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—

(i) For airplanes type certificated prior to (the effective date of this amendment), in § 25.561(b) of this chapter in effect on (the day prior to the effective date of this amendment); and

(ii) For airplanes type certificated after (the effective date of this amendment), in the emergency landing conditions regulations under which the airplane was type certificated.

32. By amending paragraph (h) of § 121.310 by amending subparagraph

(1) and the first sentence of subparagraph (2) to read as follows:

(h) *Exterior emergency lighting and escape route.* (1) After June 30, 1971, each passenger-carrying airplane must be equipped with exterior lighting that meets the following requirements:

(i) For airplanes type certificated prior to September 30, 1969, the requirements of § 25.812 (f) and (g) of this chapter in effect on that date; and

(ii) For airplanes type certificated on or after September 30, 1969, the exterior emergency lighting requirements under which the airplane was type certificated.

(2) After September 30, 1969, each passenger-carrying airplane type certificated on or before that date must be equipped with a slip-resistant escape route that meets the requirements of § 25.803(e) of this chapter in effect on September 30, 1969, and each passenger-carrying airplane type certificated after September 30, 1969, must have a slip-resistant escape route that meets the requirements under which the airplane was type certificated.

33. By amending § 121.311 by adding a new paragraph (e) to read as follows:
§ 121.311 *Seat and safety belts.*

(e) Each occupant of a seat equipped with a shoulder harness must fasten the shoulder harness during takeoff and landing, except that, in the case of crewmembers, the shoulder harness need not be fastened if the crewmember cannot perform his required duties with the shoulder harness fastened.

34. By amending § 121.312 to read as follows:

§ 121.312 *Materials for compartment interiors.*

After October 24, 1968, upon the first major overhaul of an aircraft cabin or refurbishing of the cabin interior all materials in each compartment used by the crew or passengers that do not meet the following requirements must be replaced with materials that meet these requirements:

(a) For airplanes type certificated prior to (the effective date of this amendment), § 25.853 of this chapter in effect on (the day prior to the effective date of this amendment); and

(b) For airplanes type certificated after (the effective date of this amendment) § 25.853 of this chapter in effect

on (the effective date of this amendment).

35. By amending the first sentence of § 121.317(a) to read as follows:

§ 121.317 *Passenger information.*

(a) No person may operate an airplane unless it is equipped with signs that are legible under all conditions of cabin illumination to all persons seated in the passenger cabin to notify them when smoking is prohibited and when safety belts must be fastened.

36. By amending paragraph (c) of § 121.391 to read as follows:

§ 121.391 *Flight attendants.*

(c) The number of flight attendants approved under paragraphs (a) and (b) of this section are set forth in the certificate holder's operations specifications.

37. By amending paragraph (a) of § 121.571 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 each of the following:

(1) Smoking.

(2) The location of emergency exits.

(3) The use of seat belts. This briefing must include an announcement that even when the seat belt sign is off, passengers should keep their seat belts loosely or comfortably fastened while seated.

38. By adding a new § 121.576 to read as follows:

§ 121.576 *Retention of items of mass in passenger and crew compartments.*

After (2 years after the effective date of this amendment), means must be provided to prevent each item of galley equipment and each serving cart, when not in use, and each item of crew baggage, which is carried in a passenger or crew compartment from becoming a hazard by shifting under the appropriate load factors corresponding to the emergency landing conditions under which the airplane was type certificated.

39. By adding the following new § 121.577 preceding § 121.579:

§ 121.577 *Food and beverage service equipment during takeoff and landing.*

(a) No certificate holder may take off or land an airplane when any food, beverage, or tableware, furnished by the certificate holder is located at any passenger seat.

(b) No certificate holder may take off or land an airplane unless each passenger's food and beverage tray is in the stowed position or removed from the passenger's seat and stowed.

(c) Each passenger shall comply with instructions given by a crewmember in compliance with this section.

40. By amending § 121.589 to read as follows:

§ 121.589 *Carry-on baggage.*

(a) No certificate holder may permit an airplane to take off or land unless each article of baggage carried aboard by passengers is stowed—

(1) In a suitable baggage or cargo stowage compartment;

(2) As provided in paragraph (c) of § 121.285; or

(3) Under a passenger seat.

(b) Each passenger shall comply with instructions given by crewmembers regarding compliance with paragraph (a) of this section.

(c) After August 24, 1969, each passenger seat shall be fitted with a means to prevent articles of baggage stowed under it from sliding forward under crash impacts severe enough to induce the ultimate inertia forces specified in § 25.561(b)(3) of this chapter or in the emergency landing condition regulations under which the aircraft was type certificated. A certificate holder may obtain an additional extension of the compliance date, but not beyond October 24, 1969, from the air carrier district office charged with the overall supervision of its operation by showing that good cause exists for the extension.

These amendments are proposed under the authority of sections 313(a) 601, 603, and 604 of the Federal Aviation Act of 1958 (49 U.S.C. 1354(a) 1421, 1423, and 1424, and of section 6(c) of the Department of Transportation Act (49 U.S.C. 1655(c)).

Issued in Washington, D.C., on August 6, 1969.

JAMES F. RUDOLPH,
Director, Flight Standards Service.

DEPARTMENT OF
TRANSPORTATION

Federal Aviation Administration

114 CFR Part 25

[Docket No. 9611; Notice 69-30]

COMPARTMENT INTERIOR
MATERIALS

Smoke Emission; Advance Notice

The Federal Aviation Administration is considering rule making to establish standards governing the smoke-emission characteristics of aircraft interior materials. The need for a smoke-emission standard for aircraft interior materials was discussed in Notice 66-26 (31 F.R. 10275, July 29, 1966). However, the FAA determined that it could not propose standards at that time because not enough was known about the smoke-emission characteristics of then-available materials to form a basis for rule making. The FAA now believes that the state-of-the-art may have developed to the point that smoke-emission standards can be established.

This advance notice of proposed rule making is being issued in accordance with the FAA's policy for early institution of public proceedings in actions related to rule making. An "advance" notice is issued when it is found that the resources of the FAA and reasonable inquiry outside the FAA do not yield a sufficient basis to identify and select tentative or alternate courses of action upon which a rule-making procedure might be undertaken, or when it would otherwise be helpful to invite early public participation in the identification and selection of such tentative or alternate courses of action. The subject matter of this advance notice has been found to involve the situation contemplated by this policy.

Interested persons are invited to participate in the making of the proposed rules by submitting such written data, views, or arguments as they may desire.

Communications should identify the notice or docket number, and be submitted in duplicate to the Federal Aviation Administration, Office of the General Counsel, Attention: Rules Docket, GC-24, 800 Independence Avenue SW., Washington, D.C. 20590. Communications should be received on or before October 28, 1969, to assure proper consideration. All comments submitted will be available in the Rules Docket, both before and after the closing date for comments, for examination by interested persons. If it is determined to proceed further, after consideration in the light of the available data and the comments received in response to this notice, a notice of proposed rule making will be issued.

Subsequent to the issuance of Notice 66-26, the FAA has conducted extensive research in an effort to determine the full extent to which available aircraft interior materials produce smoke when burning. In addition, as noted in the preamble to Amendment 25-15 (32 F.R. 13255, Sept. 20, 1967), industry development programs were established. The E. I. du Pont de Nemours & Co. (du Pont), in a petition for rule making dated June 26, 1968, stated that its research and evaluation of the smoke emission characteristics of currently-available materials established that certain of these materials, if used in aircraft interiors, would significantly advance aircraft crashworthiness. Du Pont recommended the adoption of a standard which would use the National Bureau of Standards nonflaming and flaming smoke generation tests (set forth in ASTM STP422, 1967: "Method for Measuring Smoke from Burning Materials," by D. Gross, J. J. Loftus, and A. F. Robertson) with a minimum of 2 minutes to reach the critical visibility level D₁₆.

Aircraft crashworthiness would be significantly upgraded if smoke emission from burning interior materials could be reduced in sufficient measure. The FAA recognizes that there are no industry-wide standards, test equipment, and test methods in common use by aircraft manufacturers, and that the current

nonstandardized test practices may not yield consistent results. However, valuable technical information concerning the smoke emission characteristics of materials has been collected as a result of the FAA and industry research programs. The FAA believes that additional information may be available from other interested persons, and desires to review the entire technical situation prior to proposing the establishment of practical maximum smoke emission levels for aircraft interior materials, or the adoption of a test method or methods for evaluating the smoke emission characteristics of these materials. To this end, the FAA welcomes the participation of aircraft manufacturers, material producers, Government agencies and other interested persons and, by means of this advance notice of proposed rule making, solicits the views of all interested persons on the following questions:

1. Are there aircraft interior materials now available that, in like circumstances, emit appreciably less smoke than currently used materials, but that still meet the flame resistance standards prescribed in § 25.853 of the Federal Aviation Regulations?

2. Are there test methods that can correctly and consistently measure the smoke emission characteristics of aircraft interior materials?

3. Would it be feasible to standardize on one of these test methods to determine compliance with a specified smoke emission standard?

4. Using this standard test method, what level of smoke emission performance should be specified?

This advance notice of proposed rule making is issued under the authority of sections 313(a), 601, and 603 of the Federal Aviation Act of 1958 (49 U.S.C. 1354 (a), 1421, and 1423), and section 6(c) of the Department of Transportation Act (49 U.S.C. 1655(c)).

Issued in Washington, D.C. on July 23, 1969.

R. S. SLIFF,
Acting Director,
Flight Standards Service.

(As published in the Federal Register [34 F.R. 12450] on July 30, 1969)