

## DEPARTMENT OF TRANSPORTATION

### Federal Aviation Administration

#### 14 CFR Part 25

[Docket No.: FAA–2026–0430; Notice No. 26–09]

RIN 2120–AL42

#### Transport Airplane and Propulsion Certification Modernization

**AGENCY:** Federal Aviation Administration (FAA), DOT.

**ACTION:** Notice of proposed rulemaking (NPRM).

**SUMMARY:** FAA proposes to amend various airworthiness regulations to modernize certain certification standards for transport category airplanes and propulsion systems. This rule would be both deregulatory and relieving by reducing the number of exemptions, special conditions, and equivalent level of safety findings required during the certification process. FAA expects that this proposal would reduce certification costs and time to certify new and changed products for both industry and FAA while maintaining or increasing the level of safety provided by the current regulations. FAA proposes to remove Special Federal Aviation Regulation (SFAR) No. 109 from part 25 and relocate certain of its requirements. Finally, this action would address industry and National Transportation Safety Board recommendations while also harmonizing FAA’s regulations with international standards.

**DATES:** Send comments on or before August 25, 2026.

**ADDRESSES:** Send comments identified by docket number FAA–2026–0430 using any of the following methods:

- *Federal eRulemaking Portal:* Go to [www.regulations.gov](http://www.regulations.gov) and follow the online instructions for sending your comments electronically.
  - *Mail:* Send comments to Docket Operations; U.S. Department of Transportation (DOT), 1200 New Jersey Avenue SE, West Building, 5th Floor (W58–213), Washington, DC 20590–0001.
  - *Hand Delivery or Courier:* Take comments to Docket Operations in Room W58–213 of the West Building 5th Floor at 1200 New Jersey Avenue SE, Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.
  - *Fax:* Fax comments to Docket Operations at (202) 493–2251.
- Docket:* Background documents or comments received may be read at

[www.regulations.gov](http://www.regulations.gov) at any time. Follow the online instructions for accessing the docket or go to the Docket Operations in Room W58–213 of the West Building 5th Floor at 1200 New Jersey Avenue SE, Washington, DC 20590 between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

**FOR FURTHER INFORMATION CONTACT:** James Wilborn, AIR–62A, Product Policy Management: Transport Airplanes & Engines Section, Policy and Standards Division, Aircraft Certification Service, Federal Aviation Administration, 2200 South 216th Street, Des Moines, WA 98198; (206) 231–3237; [James.Wilborn@faa.gov](mailto:James.Wilborn@faa.gov).

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## I. Executive Summary

### A. Overview of the Proposed Rule

FAA proposes to amend various airworthiness regulations in title 14, Code of Federal Regulations (14 CFR) to modernize certain certification standards for transport category airplanes and propulsion systems. By codifying frequently issued exemptions and special conditions (SC or SCs) and reducing the need for equivalent level of

safety (ELOS) findings, this proposal would reduce certification costs and time to certify new and changed products<sup>1</sup> for both industry and FAA while maintaining or improving the level of safety provided by the current regulations. This proposal would address Aviation Rulemaking Advisory Committee (ARAC)<sup>2</sup> recommendations, which advocated for these changes. In addition, it would address certain National Transportation Safety Board (NTSB) recommendations while also harmonizing with European Union Aviation Safety Agency (EASA) certification specifications (CS) to the extent practical.

### B. Background

Part 25 prescribes airworthiness standards for type certification of transport category airplanes. Some of these airworthiness standards may not adequately address a current certification project for many reasons, including prior safety-related incidents, new technology, and evolving industry needs. When such a gap is identified during the certification process, FAA addresses it by using a variety of design-specific tools, including, exemptions, SCs, and ELOS findings. FAA uses these tools to set requirements for a safe design for the product. However, these tools are labor intensive and costly for both the applicant seeking type certification<sup>3</sup> and FAA. When a gap is identified, the applicant seeking type certification must submit project-specific data to support FAA's development of each exemption, SC, and ELOS finding. Upon receipt of data, FAA must analyze it to determine if it does in fact support the need for an exemption, SC, or ELOS finding and to ensure the level of safety is acceptable. In many cases, FAA will seek clarification or additional data from the applicant before making a determination. During this time-consuming process, the project may be delayed as the applicant and FAA collaborate on the issuance of these documents to be certain what requirements will be imposed on the proposed design. These project-specific tools add more flow-time and cost to each type certification project for both the applicant and FAA than would be needed if the published general airworthiness standards were written to better accommodate a wider range of designs.

#### 1. Exemptions

As defined in § 11.15, a “petition for exemption” is a request to FAA by an individual or entity asking for relief from the requirements of a current

regulation. After receiving the petition, FAA publishes a summary of it in the **Federal Register**, inviting the public to comment, unless FAA finds reasons per § 11.87 to not request public comment. FAA has statutory authority to grant an exemption that is in the public interest.<sup>4</sup> Some considerations that aid the public interest determination are whether the exemption benefits the public as a whole, and why granting the exemption would not adversely affect safety or would at least provide a level of safety equal to that provided by the rule from which relief is sought.

#### 2. Special Conditions

As defined in § 11.19, an SC is a rule that applies to a particular proposed design. Per § 21.16, FAA issues SCs if the airworthiness regulations do not contain adequate or appropriate safety standards for an aircraft, aircraft engine, or propeller because of a novel or unusual design feature. The phrase “novel or unusual” applies to design features of the product to be certificated when compared to the current airworthiness standards.

FAA uses the issue paper (IP) process described in FAA Order 8110.112A, “Standardized Procedures for Usage of Issue Papers and Development of Equivalent Levels of Safety Memorandums,” dated October 3, 2014, to develop the SCs.<sup>5</sup> FAA then issues the SCs after engaging in the public comment procedures of § 11.38. The SCs contain additional airworthiness standards FAA finds necessary to establish a level of safety equivalent to that established in the existing regulations.

#### 3. Equivalent Level of Safety (ELOS) Findings

FAA makes an ELOS finding when literal compliance with an airworthiness standard cannot be shown and, per § 21.21(b)(1), compensating factors can be shown to provide a level of safety equivalent to that established by the airworthiness standards. An ELOS finding may document compliance criteria different from what is stated in the rule, but is judged as acceptable by FAA.<sup>6</sup>

A difference between SCs and ELOS findings is SCs focus on direct compliance with specific requirements for new and novel designs, while ELOS findings allow a non-compliant design to meet the same level of safety as existing airworthiness standards due to compensating factors. SCs are only used for aircraft with novel or unusual design features.

Unlike exemptions and SCs, an ELOS finding is not developed through a

public comment process. Like an SC, though, FAA and the applicant use the IP process described in FAA Order 8110.112A to develop the proposed ELOS finding. The IP documents the evolution and conclusion of the applicant's request for an ELOS finding.

FAA posts online an ELOS memorandum for each ELOS finding, to communicate the rationale to the public. The ELOS memorandum is a publicly releasable document that is a part of the project's certification basis. The ELOS memorandum explains the basis for FAA's finding that the applicant's proposal provides an ELOS to the airworthiness standards and documents those critical aspects of the ELOS finding that must be maintained for continued airworthiness.

### *C. Regulatory Reform of Aviation Regulations*

When Executive Order (E.O.) 13777, "Enforcing the Regulatory Reform Agenda," was signed on February 24, 2017, it required each Federal agency to establish a Regulatory Reform Task Force (RRTF) to evaluate current regulations and make recommendations for their repeal, replacement, or modification. As part of this process, the E.O. required the RRTF to seek input and assistance from entities significantly affected by its regulations. Because the ARAC's membership represents a broad spectrum of entities significantly affected by FAA's regulations, DOT, through FAA, tasked ARAC to consider (1) recommendations on existing regulations that are good candidates for repeal, replacement, or modification; and (2) recommendations on regulatory action identified in FAA's regulatory agenda.<sup>7</sup> ARAC submitted its initial recommendation report to FAA on June 8, 2017,<sup>8</sup> and an addendum to the report on September 12, 2017.<sup>9</sup> ARAC recommended several changes to parts of 14 CFR, which included recommendations to codify the terms of frequently issued exemptions, SCs, and ELOS findings used in the certification process while also harmonizing FAA's regulations with the airworthiness standards in EASA CS-25.

### *D. Section 312 of FAA Reauthorization Act of 2024*

Section 312 of FAA Reauthorization Act of 2024 titled "Transport airplane and propulsion certification modernization" requires FAA to publish a draft rule on this subject. The agency added this item to its regulatory agenda in 2022.

### *E. National Transportation Safety Board (NTSB) Recommendations*

The NTSB is an independent U.S. government agency that investigates civil transportation accidents and makes recommendations to prevent future accidents. This proposed rule would address certain NTSB Safety Recommendations issued following accidents involving turboprop-powered transport category airplanes.<sup>10</sup> For details on these accidents and the resulting recommendations, see the discussion in section III.G.2. of this NPRM.

### *F. Proposed Regulatory Relief Resulting From ARAC and NTSB Recommendations*

In response to ARAC and NTSB recommendations, FAA is proposing the following ten deregulatory actions to reduce certification costs and the time to certify new products for both industry and FAA, while maintaining or increasing the level of safety compared to the existing regulations:

1. Remove Special Federal Aviation Regulation (SFAR) No. 109 from part 25 and relocate certain parts or portions of its requirements to new §§ 25.821, 25.823, 25.825, 25.827, 25.829, and 25.830 to harmonize with the corresponding EASA airworthiness standards. FAA would also incorporate definitions of "low occupancy" and "non-commercially operated" airplanes in new § 25.4(d) to reduce the need for exemptions and ELOS findings for cabin interior designs of transport category airplanes operated for private use. For details, see the discussion under section III.A of this NPRM.

2. Revise § 25.251(b) to allow use of an acceptable means, other than flight test, for speeds above  $V_{MO}/M_{MO}$ ,<sup>11</sup> to demonstrate the effects from external modifications<sup>12</sup> to an existing type design. This would eliminate the need for ELOS findings. For details, see the discussion under section III.B of this NPRM.

3. Revise § 25.349(a) to prescribe the design rolling maneuver requirement in terms of flightdeck roll control movement, rather than aileron deflection, to ensure that the rolling maneuver loads used in the structural design of the airplane are adequate. This would eliminate the need for SCs. For details, see the discussion under section III.C of this NPRM.

4. Revise § 25.809(a) to remove the requirement to be able to view the evacuee landing point from flightcrew and overwing exits because the structure of the wing under the overwing exits and curvature of the

fuselage under the flightcrew exit obstructs the view of the evacuee landing point. This would eliminate the need for exemptions and would harmonize with EASA CS 25.809(a). For details, see the discussion under section III.D of this NPRM.

5. Revise §§ 25.811 and 25.812 to permit alternative exit sign configurations. This would eliminate the need for ELOS findings and harmonize with the corresponding EASA airworthiness standards within CS 25.811 and CS 25.812. For details, see the discussion under sections III.A.2.k and III.E of this NPRM.

6. Revise § 25.853(g) to replace the requirement to have self-contained removable ashtrays installed in lavatories with a requirement lavatories have a means to safely dispose of lit combustible material. This would provide operators with more design options and potentially eliminate excessive maintenance. For details, see the discussion under section III.F of this NPRM.

7. Revise § 25.1155 to require a means to prevent the flightcrew on propeller-powered airplanes from inadvertently or intentionally placing the power lever below flight idle while in flight, unless the airplane has been certified for that type of operation, and to require a similar provision for turbojet-powered airplanes with thrust reverser systems intended for use only on the ground. This would address NTSB safety recommendations and harmonize with EASA CS 25.1155. For details, see the discussion under section III.G of this NPRM.

8. Revise § 25.1193(e)(3) to maintain the existing fireproof requirement for cowlings and nacelle skin for in-flight operations while providing an alternative requirement for ground operation. This would eliminate the need for ELOS findings and harmonize with EASA CS 25.1193(e)(3). For details, see the discussion under section III.H of this NPRM.

9. Revise § 25.1549 to allow manufacturers flexibility to (1) provide awareness of only those powerplant and auxiliary power unit (APU) operating conditions that require flightcrew action necessary to maintain continued safe operation, (2) use colors other than green to denote normal operating conditions, and (3) provide any additional information needed by maintenance personnel when following the instructions for continued airworthiness. This would eliminate the need for ELOS findings. For details, see the discussion under section III.I of this NPRM.

10. Revise § 25.1555(d)(1) to require each emergency control either be colored red or illuminate red when a condition necessitates its use, and have appropriate safeguards to allow its intended use while preventing unintentional actuation and not restricting its use when needed. This would eliminate the need for ELOS findings. For details, see the discussion under section III.J of this NPRM.<sup>13</sup>

#### *G. Additional Proposed Regulatory Relief*

FAA reviewed its certification process to find other areas not identified by ARAC or NTSB where the certification standards for transport category airplanes and propulsion systems could be modernized. FAA identified several exemptions, SCs, and ELOS findings FAA frequently grants or issues during the certification process. Based on this review, FAA identified fourteen additional deregulatory actions to reduce certification costs and the time to certify new products for both industry and FAA, while maintaining or improving the level of safety in the existing regulations.

1. Add new § 25.797 for carriage of authorized persons,<sup>14</sup> and add a provision to § 25.857(e) allowing authorized persons to be carried in airplanes with Class E cargo compartments provided the requirements of § 25.797 are met. This would eliminate the need for exemptions commonly granted by FAA for carriage of authorized persons. For details, see the discussion under section III.K of this NPRM.

2. Revise §§ 25.5 and 25.981 and appendix N to part 25 to require a new Fuel Tank Flammability Assessment Method (FTFAM). This would eliminate the need for applicants to submit additional paperwork requesting use of the new FTFAM. For details, see the discussion under section III.L of this NPRM.

3. Revise § 25.773(a)(2) to allow use of ground tests in lieu of night flight tests to show the flightdeck is free of glare and reflection. The proposed allowance for ground tests would eliminate the need for ELOS findings. For details, see the discussion under section III.M of this NPRM.

4. Revise § 25.773(b)(1) to require the means to maintain a clear portion of the windshield function in light precipitation conditions at speeds normally encountered during ground operations. Proposed § 25.773(b)(1) would eliminate SCs commonly granted for use of hydrophobic coatings in lieu of windshield wipers. For details, see

the discussion under section III.M of this NPRM.

5. Revise § 25.785(b) to except berths intended for carriage of medical patients (e.g., medical stretchers) from the requirements of § 25.562 for emergency landing dynamic conditions. This would eliminate the need for exemptions commonly granted for the transportation of persons on medical stretchers. For details, see the discussion under section III.N of this NPRM.

6. Add new § 25.788 to require safety standards for installation of showers, large display panels, and large, nonstructural glass panels. The proposed requirements for shower and large display panels would harmonize with the corresponding EASA airworthiness standards in EASA CS 25.788. The proposed requirements for large, nonstructural glass panels would eliminate the need for commonly issued SCs. For details, see the discussion under section III.O of this NPRM.

7. Revise § 25.801(a) to change the citation referenced from § 25.807(e) to § 25.807(i). This would correct an error introduced with amendment 25–88 when FAA moved its “ditching emergency exits for passengers” requirements from paragraph (e) to (i). It also would harmonize with EASA CS 25.801(a). For details, see the discussion under section III.P of this NPRM.

8. Revise § 25.810(a)(1)(ii) to provide an option allowing 10 seconds to automatically erect assisting means from the time the opening means of the exit is actuated for non-Type C exits. This would harmonize the proposed requirement with the corresponding EASA CS 25.810(a)(1)(ii). For details, see the discussion under section III.Q of this NPRM.

9. Revise § 25.813 to incorporate improvements for Type III and IV emergency exit access and ease of operation. This would harmonize the proposed requirements with the corresponding EASA airworthiness standards in CS 25.813. For details, see the discussion under section III.R of this NPRM.

10. Revise § 25.841(a) regarding the exposure of occupants to certain cabin pressure altitudes due to cabin decompression caused by structural, system, or engine failures. This would eliminate the need for commonly granted exemptions. In addition, revise § 25.841(d)(1) regarding the cabin pressure high altitude warning alert during high elevation airport operations. This would correct the current description. For details, see the discussion under section III.S of this NPRM.

11. Revise § 25.854 to add cabin length to the applicability of lavatory fire protection. This would harmonize the proposed requirements with the corresponding EASA airworthiness standards. For details, see the discussion under section III.T of this NPRM.

12. Move the requirements for operation without normal electrical power for airplanes that use mechanical flight controls from § 25.1351(d) into new § 25.1352 and add similar requirements for airplanes that use electrical and electronic systems to perform critical functions. In addition, revise § 25.1705 to reference the § 25.1352 requirements. This would eliminate the need for commonly issued SCs. For details, see the discussion under section III.U of this NPRM.

13. Revise § 25.1365(b) to require that installations of galleys and cooking appliances minimize the hazards, such as burns and spilled liquids, to the airplane, passengers, and crew. This would harmonize the proposed requirements with the corresponding EASA airworthiness standards. For details, see the discussion under section III.A.2(l) of this NPRM.

14. Add § 25.1447(c)(6) to require sufficient oxygen outlets in areas of the cabin, other than those addressed by § 25.1447(c)(1), that may be occupied by passengers or crew. This would harmonize proposed § 25.1447(c)(6) with EASA CS 25.1447(c)(3). For details, see the discussion under section III.V of this NPRM.<sup>15</sup>

#### *H. Harmonization With EASA Certification Specifications*

EASA CS–25 prescribes the airworthiness standards corresponding to 14 CFR part 25 for products certified by the European Union. Applicants for FAA type certification of transport category airplanes also seek EASA validation of the type certificate, for which the applicant must show compliance with EASA CS–25. Though part 25 and CS–25 are similar, they differ in several respects. Where part 25 and CS–25 differ, an applicant must meet both airworthiness standards to obtain a U.S. type certificate and validation of the type certificate by EASA, or obtain exemptions, SCs, or ELOS findings or the foreign authority’s equivalent to those, as necessary to meet one standard in lieu of the other.<sup>16</sup> Harmonizing FAA’s requirements with those of EASA would benefit manufacturers and modifiers by providing them requirements consistent between both authorities with which they must show compliance, thereby reducing the cost and complexity of

certification and codifying a consistent level of safety between authorities. To improve certification efficiency, this proposed rule would eliminate 27 differences between U.S. and European airworthiness standards in CS–25 amendment 28, while maintaining or improving the level of safety provided by the current regulations.

FAA is not aware of any aircraft manufacturers who sell only to the U.S. market. As such, these manufacturers design their aircraft to meet both FAA and EASA regulations. Therefore, any proposal below to match EASA regulations would result in no new requirements for applicants.

FAA's draft guidance material associated with this proposed rule would also provide harmonized compliance approaches with EASA's Acceptable Means of Compliance (AMC) in CS–25 amendment 28.

### *I. Costs and Benefits of the Proposed Rule*

FAA expects modernization of airworthiness standards for type certification of transport category airplanes would reduce time to certify and certification costs for manufacturers, modifiers, and FAA while maintaining or increasing safety. FAA expects this reduction in costs and time to certify would also promote innovation by reducing (1) the time and costs for manufacturers and modifiers to obtain type certification for new or changed products and (2) disincentives to design changes and improvements.

This proposed rule would also eliminate certain differences between U.S. and European airworthiness standards. Because U.S. manufacturers and modifiers of transport category airplanes typically sell their products domestically and internationally, harmonizing FAA's requirements with those of EASA would reduce the cost and complexity of certification by eliminating the necessity of establishing the aircraft design meets different requirements.

### **II. Authority for This Rulemaking**

FAA's authority to issue rules on aviation safety is found in title 49 of the United States Code. Subtitle I, Section 106 describes the authority of the FAA Administrator. Subtitle VII, Aviation Programs, describes in more detail the scope of FAA's authority.

This rulemaking is issued under the authority described in Subtitle VII, Part A, Subpart III, Section 44701, "General Requirements." Under that section, FAA is charged with prescribing regulations that promote safe flight of civil aircraft in air commerce by prescribing

regulations and minimum standards for the design and performance of aircraft the Administrator finds necessary for safety in air commerce. This regulation is within the scope of that authority as it prescribes new safety standards for the design and performance of transport category airplanes.

In addition, Section 312, "Transport airplane and propulsion certification modernization," of the FAA Reauthorization Act of 2024 (Pub. L. 118–63) requires FAA to publish a notice of proposed rulemaking on this subject.

### **III. Discussion of the Proposed Rule**

*A. Executive Interiors—SFAR No. 109 and Proposed §§ 25.4(d), 25.821, 25.823, 25.825, 25.827, 25.829, 25.830, 25.812(e)(3), 25.812(l)(1), 25.1365, and 25.1583(j)*

1. Overview of Proposed §§ 25.4(d), 25.821, 25.823, 25.825, 25.827, 25.829, 25.830, 25.812(e)(3), 25.812(l)(1), 25.1365, and 25.1583(j)

FAA issued SFAR No. 109 on May 8, 2009 (74 FR 21533). SFAR No. 109 amended the airworthiness standards for transport category airplanes by adding new cabin interior criteria for operators of private use, not for hire, not for common carriage airplanes. The standards in SFAR No. 109 provide alternative criteria for transport category airplanes that are operated for private use while continuing to provide an acceptable level of safety for those operations. The applicability of SFAR No. 109 is limited to airplanes with 60 or fewer passengers (SFAR No. 109 paragraph 2(a)).

Currently, proposed designs for transport category airplanes must comply with the standards of part 25 to be eligible for a type certificate in this category, with exceptions provided in SFAR No. 109 for airplanes meeting the applicability of that SFAR. Because most transport category airplanes are used by airlines, the requirements of part 25 are largely developed for cabin interiors equipped for the commercial carriage of relatively high numbers of passengers. Part 25, therefore, is not fully adapted to cabin interiors of executive interiors, *i.e.*, those that are arranged with a much lower number of passenger seats relative to the size of the airplane, offer a greater level of comfort and amenities, and are often not operated commercially or for profit. FAA intended SFAR No. 109 to provide time and cost savings for the cabin certification process for private use airplanes;<sup>17</sup> however, applicants have rarely chosen to use the SFAR since issuance, and FAA has continued to

issue many exemptions and make ELOS findings for the interior designs of these private use airplanes.<sup>18</sup>

Furthermore, ARAC recommended that FAA repeal SFAR No. 109 and harmonize several related regulations with the corresponding airworthiness standards in EASA CS–25, amendment 19.<sup>19</sup> The proposed §§ 25.4(d), 25.821, 25.823, 25.825, 25.827, 25.829, 25.830, 25.812(e)(3), 25.812(l)(1), 25.1365, and 25.1583(j) would replace SFAR No. 109, harmonize to the extent practical with EASA CS–25 at amendment 19, and eliminate the necessity for most exemptions and ELOS findings FAA commonly issues for low occupancy executive interiors.

2. Discussion of Proposed §§ 25.4(d), 25.821, 25.823, 25.825, 25.827, 25.829, 25.830, 25.812(e)(3), 25.812(l)(1), 25.1365, and 25.1583(j)

Three limitations of SFAR No. 109 that continue to drive applicants to choose not to use it are (1) it is limited to only private use airplanes, so it provides no relief for chartered jets operated under part 135; (2) applicants must limit occupancy to 60 passengers; and (3) applicants must meet all applicable provisions of SFAR No. 109 if seeking certification under its provisions and thus cannot choose to use alternative standards for any part of the interior. The capacity of some proposed larger airplanes with executive interiors has exceeded 60 passengers, and FAA has granted exemptions for these configurations with the same limitations as SFAR No. 109. FAA has also granted exemptions for certain executive interior features, such as interior doors, in chartered jets operated under part 135.

EASA initiated a rulemaking committee in 2012<sup>20</sup> to develop new standards for executive interiors. FAA, other aviation authorities, and industry representatives participated in that rulemaking committee. EASA issued Notice of Proposed Amendment (NPA) 2015–19, "Executive interior accommodation," on December 17, 2015, followed by amendment 19<sup>21</sup> of EASA CS–25 on May 12, 2017, incorporating the recommendations of the committee. The requirements adopted by EASA in this amendment have some differences from the provisions currently in part 25, including SFAR No. 109, the most significant being inclusion of standards for low occupancy, commercially operated airplanes.

Subsequently, EASA issued NPA 2017–12 on July 24, 2017, followed by amendment 21 on March 27, 2018, to amend appendix S of CS–25 by creating

paragraph S25.60 on security requirements, which set design standards regarding limiting effects of incendiary devices, ensuring survivability of systems, deterring concealment of weapons and explosives, and other similar security related considerations, to exempt non-commercially operated airplanes certified in accordance with appendix S from the CS 25.795(b), (c), and (d) requirements. EASA based this amendment on SFAR No. 109 paragraph 16, which provided relief from § 25.795. The limitations of SFAR No. 109 and these differences between part 25 and CS-25 result in FAA's frequent issuance of various exemptions and ELOS findings, which increases the risk of application of different levels of safety, excess certification costs, and a lack of standardization with the regulations of other airworthiness authorities.

FAA proposes to remove SFAR No. 109 and add many of its requirements into new §§ 25.4(d), 25.821, 25.823, 25.825, 25.827, 25.829, and 25.830. Though some of the proposals linked to this change would reduce the need for exemptions and ELOS findings in the future, other changes would harmonize requirements applicable to low occupancy airplanes and non-commercially operated airplanes with the corresponding sections of EASA CS to the extent consistent with FAA's statutory safety mission. This would serve to eliminate the costs and resource allocation required for an applicant to meet two differing certification standards.

EASA incorporated requirements for low occupancy airplanes and non-commercially operated airplanes in the form of an appendix to CS-25. The U.S. regulatory structure does not permit issuance of requirements in the form of appendices;<sup>22</sup> therefore, FAA proposes the numbering structure presented in the following table:

**TABLE 1—PROPOSED FAA REGULATIONS CORRESPONDING TO EASA C-25 REGULATIONS**

| Proposed FAA regulation | Corresponding EASA CS-25 regulation |
|-------------------------|-------------------------------------|
| § 25.4(d) .....         | Appendix S, S25.1.                  |
| § 25.821 .....          | Appendix S, S25.10.                 |
| § 25.823 .....          | Appendix S, S25.20.                 |
| § 25.825 .....          | Appendix S, S25.30.                 |
| § 25.827 .....          | Appendix S, S25.40.                 |
| § 25.829 .....          | Appendix S, S25.50.                 |
| § 25.830 .....          | Appendix S, S25.60.                 |

These EASA appendix S regulations are applicable only to low occupancy airplanes or non-commercially operated airplanes, as specified in each

regulation. EASA also incorporated certain provisions, historically addressed by FAA using SFAR No. 109, exemptions and ELOS findings, into CS 25.812(e)(3), 25.812(l)(1), and 25.1365 to make them applicable to any transport category airplane, as discussed below in this preamble. FAA is also proposing to add new § 25.1583(j) to ensure non-commercially operated airplanes have the appropriate limitations in their airplane flight manuals (AFM).

**a. Proposed § 25.4(d), Non-Commercially Operated Airplanes and Low Occupancy Airplanes Defined**

FAA proposes to incorporate definitions of “low occupancy airplanes” and “non-commercially operated airplanes” in new § 25.4(d), in order to clarify the application of this proposed rule and expand the applicability of relief from certain part 25 regulations beyond that provided currently by SFAR No. 109. These proposed definitions align with the definitions in CS 25, appendix S.1(a).

SFAR No. 109 applies to airplanes not “offered for common carriage or operated for hire” for which passenger capacity may not exceed 60 (SFAR No. 109 paragraph 2(a) and (d)). In addition, paragraph 7(c) of SFAR No. 109, for airplanes with more than one exit pair (which is required for passenger seating configurations of 20 or more per § 25.807(g) in which an exit is deactivated to result in an exit distance greater than 60 feet, limits the total number of passenger seats in the airplane to 33 percent of the maximum seating capacity for the airplane model using the exit ratings listed in § 25.807(g) for the original certified exits or the maximum allowable after modification when exits are deactivated, whichever is less. The proposed definition for “non-commercially operated” airplanes would align with CS-25 appendix S.1 and change the upper limit on the total number of passenger seats, for passenger seating configurations of 20 or more, to 50 percent of the maximum passenger seating capacity on the type certificate data sheet (TCDS). The proposed definition would also apply an upper limit of 150 passengers per deck or one-half of the maximum passenger seating capacity for that deck as indicated in the airplane TCDS, whichever is less.

As part of its certification of transport category airplanes proposed to be configured with executive interiors and operated under part 135, the SFAR 109 final rule has a table identifying which paragraphs could also be accepted in part 135 operation, and FAA has granted exemptions<sup>23</sup> more recently for

interior doors to be deployed in part 135 operation provided additional limitations and conditions, such as low occupancy, additional alerting, or additional crew procedures, are part of the proposed design. These additional requirements align with CS-25 appendix S. For these airplanes with executive interiors and operated under part 135, FAA has not granted the same extent of relief as for non-commercially operated airplanes, in recognition of 49 U.S.C. 44701(d), which requires FAA to consider the differences between air transportation and other air commerce. The EASA rulemaking committee worked on standards for executive interiors considered commercially operated as well as non-commercially operated executive interior configurations and developed recommendations for both types of operation. This rulemaking committee analyzed more than 60 cabin floor plans, provided by the large airplane manufacturers and modifiers represented within the committee, of large airplanes certified over the last 10–15 years with executive interiors and a maximum passenger seating configuration of 20 or more. The committee analysis results<sup>24</sup> showed the evacuation and aisle characteristics of the executive interiors were in general very favorable compared to arrangements composed of conventional seat rows cabin floor layout and a much lower evacuation time than with the current requirement (§ 25.803(c) and CS 25.803(c)) could be expected. The committee determined certain provisions appropriate for executive interiors could be applied to both commercially operated and non-commercially operated airplanes due to the low occupancy. The committee analysis showed these airplanes have mostly a passenger seating capacity that does not exceed one-third of the maximum passenger seating capacity allowed by the TCDS.

Based on the committee analysis, EASA incorporated a new definition of “low occupancy” airplane that encompasses those airplanes that have a passenger seating capacity limited to 19 (per the TCDS), as well as larger airplanes configured for operating with no more than one-third of the approved passenger seating capacity on the TCDS (both in total capacity and per zone),<sup>25</sup> but not to exceed 100 passenger seats per deck. The limits for both non-commercial and low occupancy are consistent with a number of designs approved by EASA over the past 10–15 years for these operations.<sup>26</sup>

FAA has carefully reviewed the EASA committee analysis and rationale and

has determined additional analysis or studies are not required. FAA's proposed definitions would be identical to the EASA CS-25 definitions, except that FAA would add "not offered for common carriage and not operated for hire" to the definition of non-commercially operated airplanes. FAA uses the phrase "not for hire, not for compensation" in SFAR No. 109 and in its exemptions and ELOS findings on executive interiors. This difference is for clarity in the U.S. aviation system, and FAA proposes it would not result in a substantively different definition than EASA S25.1(a)(1).

**b. Proposed § 25.1583(j), Limitation For Non-Commercially Operated Airplanes**

As discussed, FAA applies different design standards to commercially operated airplanes as compared to non-commercially operated airplanes. The proposed § 25.1583(j) would require applicants to include limitations in the limitations section of the airplane flight manual for proposed airplane designs that would incorporate interior features permitted only in non-commercially operated airplanes. This limitation would ensure those airplanes are not offered for hire or common carriage.

**c. Proposed § 25.821, General Cabin Arrangement**

SFAR No. 109 paragraph 10 provides requirements applicable to the proposed installation of interior doors between passenger seats and exits on non-commercially operated airplanes in lieu of the requirements of § 25.813(e), which prohibits such doors. Prior to SFAR 109, FAA had granted several exemptions from § 25.813(e) for installation of interior doors; these exemptions included conditions and limitations consistent with SFAR No. 109 paragraph 10. EASA's amendment 19 to CS-25 expanded the allowance for installation of interior doors to commercially operated airplanes having a passenger seating configuration of 19 or less, but with additional safety requirements as compared to non-commercially operated airplanes. After EASA issued amendment 19 to CS-25, FAA reviewed the EASA rule, analysis, and rationale and has determined additional analysis or studies are not required, and as such began issuing exemptions<sup>27</sup> from § 25.813(e), for the installation of interior doors, that used the same conditions and limitations as CS-25 sections S25.10(a) and (b). These conditions and limitations provide layers of protection against the possibility of a passenger being trapped in a compartment in the event of an emergency landing or evacuation, by

imposing restrictions on when the door may be closed. As such, FAA has determined these sections provide a functional equivalent to SFAR 109 paragraph 10. Section S25.10(a)(3) requires in the event of probable failures or jamming of the door, an occupant can restore, in an "easy and simple manner," a sufficient opening to get through to the compartment on the other side of the door. The term "easy and simple manner" means an applicant should demonstrate that an occupant who is not familiar with the specific cabin features of the airplane can understand and easily achieve the manner in which to evacuate based on the information provided to a typical passenger. This performance-based language addresses the same safety concern as the SFAR 109 paragraph 10(e) requirement for frangibility. To eliminate the need for these exemptions in the future, FAA proposes to adopt the requirements of CS-25 section S25.10(a) and (b) as new § 25.821(a) and (b).

SFAR No. 109 paragraph 13 provides requirements for fire detection in isolated compartments for airplanes with a type certificated passenger capacity of 20 or more. EASA S25.10(c) aligns with these requirements, but adds applicability to airplanes with a cabin length of more than 60 feet, to ensure an adequate level of safety for airplanes of that size configured with low occupancy. EASA S25.10(c) also includes an option for a visual indication or audible warning in the passenger cabin that would be readily detected by a cabin crew member instead of the SFAR 109 requirement to signal the flightcrew. This paragraph provides a further option: if it can be demonstrated that a fire would be directly and quickly detected because the compartment is likely to be occupied for the majority of the flight time, a smoke detection system is not required. These options are not in SFAR No. 109 paragraph 13; however, FAA proposes to add these options because if the compartment is occupied for the majority of the flight time it would not be considered isolated (smoke would be detected by the occupants making the need for a detection system unnecessary) and the system can warn the cabin crew directly of the threat instead of waiting for the flightcrew to communicate the warning to the cabin crew. Therefore, FAA proposes to adopt the requirements of CS-25 section S25.10(c) as new § 25.821(c).

SFAR No. 109 paragraph 7 allows the deactivation of exits to create a distance of greater than 60 feet between exits and provides conditions a proposed design must meet if the distance between

emergency exits exceeds that required by § 25.807(f)(4). EASA provided conditions in CS S25.10(d) and (e) similar to those of SFAR No. 109 paragraph 7, but with certain differences described below.

SFAR No. 109 paragraph 7(a) requires each passenger seat be located within 30 feet of the nearest exit on each side of the fuselage. EASA incorporated this condition as CS S25.10(d)(3) but used performance-based language in the requirement and provided an AMC to CS 25.10 different from SFAR No. 109 paragraph 7(a). EASA CS S25.10(d)(3) states the distance from each passenger seat to at least one remaining emergency exit, on each side of the fuselage, remains "compatible with easy egress" from the airplane. EASA's AMC to CS 25.10 provides a method of compliance for "compatible with easy egress" as meeting two conditions: (1) within 30 feet from the nearest emergency exit on one side of the fuselage on the same deck and within 45 feet from the nearest emergency exit on the other side of the fuselage on the same deck, and (2) the occupant of the seat has the possibility to move to an emergency exit, on the left side or the right side of the fuselage, while at all points along the way remaining within 30 feet of an emergency exit on one side of the fuselage on the same deck and within 45 feet of an emergency exit on the other side of the fuselage on the same deck. FAA has evaluated this difference and determined it fulfills the same intent as SFAR No. 109 paragraph 7(a) while providing applicants with flexibility in how compliance is shown for non-commercially operated airplanes only because passengers on commercial low occupancy airplanes would not have the familiarity of the cabin configuration as those passengers carried in private operations. FAA proposes to adopt the requirements of CS-25 section S25.10(d)(3) as new § 25.821(e)(3).

SFAR No. 109 paragraph 7(b) limits the number of passenger seats in passenger zones.<sup>28</sup> For zones between two pairs of exits, SFAR No. 109 paragraph 7(b)(1) limits the number of passenger seats to 50 percent of the combined rated capacity of the two pairs of emergency exits. EASA incorporated this condition as CS S25.10(d)(1), with the same limit as SFAR No. 109 paragraph 7(b)(1). For zones between one pair of exits and a bulkhead, SFAR No. 109 paragraph 7(b)(2) limits the number of passenger seats to 40 percent of the rated capacity of the pair of emergency exits. EASA incorporated this condition as CS S25.10(d)(2) but set the limit at one-half (50 percent) of the rated capacity of the

pair of emergency exits. FAA has evaluated this difference and determined it is minor and provides an acceptable level of safety for low occupancy and non-commercially operated airplanes. FAA proposes to adopt the requirements of CS-25 section S25.10(d)(1) as new § 25.821(e)(1) and section S25.10(d)(2) as new § 25.821(e)(2).

SFAR No. 109 paragraph 7(c) provides the condition that the total number of passenger seats in the airplane may not exceed 33 percent of the maximum seating capacity for the airplane model using the exit ratings listed in § 25.807(g) for the original certified exits or the maximum allowable after modification when exits are deactivated, whichever is less. This requirement is no longer limited to exit deactivation and is instead replaced by the seating capacity limitations in the definitions of non-commercially operated airplanes and low occupancy airplanes as adopted from EASA CS S25.1(a) and now defined in § 25.4(d) as discussed above. Passenger seating limits are further limited when exits are deactivated through adoption of EASA CS S25.10(d)(1) and (d)(2) as new § 25.821(e)(1) and (e)(2).

SFAR No. 109 paragraph 7(d) provides the condition that a distance of more than 60 feet between adjacent passenger emergency exits on the same side of the same deck of the fuselage is allowed only once on each side of the fuselage. EASA incorporated this condition as CS S25.10(e)(2). FAA proposes to move the requirements of SFAR No. 109 paragraph 7(d) to new § 25.821(e)(4).

Paragraph CS-25 S25.10(d), “Deactivation of existing emergency exits,” specifies that deactivation of one or more emergency exits that results in non-compliance with CS 25.807(e)<sup>29</sup> is acceptable, provided the applicant shows compliance with S25.10(d)(1) through S25.10(d)(3). These paragraphs place limitations of one-half the rated passenger capacity in the cabin zone of the exit pairs and require the distance from each passenger seat to at least one remaining exit on each side of the fuselage remain compatible with easy egress from the airplane. FAA finds compliance with the substance of the requirements of the equivalent proposed regulations § 25.821(e)(1) through (3) would result in compliance with § 25.807(e) because compliance with § 25.807(e) is not determined solely by exit location, but also by passenger seat distribution. The requirements of § 25.821(e)(1) through (3) ensure appropriate seat distribution. Therefore, FAA does not consider it possible to

have a proposed configuration that meets the requirements of § 25.821(e)(1) through (3) and is simultaneously non-compliant with § 25.807(e). FAA provides guidance for this requirement in advisory circular (AC) 25.807-1, “Uniform Distribution of Exits.”<sup>30</sup> As such, FAA does not propose to include a separate set of requirements to address exit uniformity when exits are deactivated. Both non-commercially operated and low occupancy airplanes can continue to show compliance to § 25.807(e) when exits are deactivated as described in the EASA CS S25.10(d).

Paragraph CS-25 S25.10(e) permits deactivation of emergency exits that results in non-compliance with CS 25.807(f)(4) on non-commercially operated airplanes only, provided the requirements of S25.10(d)(1) through S25.10(d)(3) are met. CS 25.807(f)(4) requires passenger seats be no more than 60 feet from the adjacent emergency exit on the same side of the fuselage. FAA concurs with EASA that these restrictions are necessary where an applicant’s proposed design would not comply with § 25.807(f)(4), and allowing such a noncompliance is only appropriate, from a safety perspective, for non-commercially operated airplanes. FAA proposes to adopt the substance of CS-25 sections S25.10(d)(1) through S25.10(d)(3) as § 25.821(e)(1) through § 25.821(e)(3), and S25.10(e)(2) as § 25.821(e)(4) as discussed previously.

#### d. Proposed § 25.823, Emergency Evacuation and Flammability

SFAR No. 109 paragraph 12, Materials for Compartment Interiors, provides a condition under which an applicant need not demonstrate its proposed design’s compliance with certain flammability requirements of § 25.853 if it can be shown the maximum time for evacuation of the occupants does not exceed 45 seconds. Also, in the course of approving the designs of non-SFAR 109 transport category airplanes, FAA granted several exemptions<sup>31</sup> for executive interiors with this same condition. EASA incorporated this condition as CS S25.20(a)(2).

In addition, EASA provided a condition under which mattresses of permanent bed installations located in compartments isolated from the main passenger cabin by doors or equivalent means that would normally be closed during taxiing, takeoff, and landing need not meet the seat cushion flammability requirements of CS 25.853(c).<sup>32</sup> Though FAA has not issued exemptions with a corresponding condition, FAA agrees with EASA the flammability requirement applied to

passenger seat cushions need not be applied to mattresses of permanent bed installations located in compartments isolated from the main passenger cabin by doors or equivalent means that would normally be closed during taxiing, takeoff, and landing. Mattresses of permanent bed installations are very few in quantity and are not occupied for taxiing, takeoff, and landing, so their location in isolated compartments would not pose a significant contribution to occupant survivability during a post-crash fire. Mattresses of beds that are convertible to and from seats, regardless of their location in the airplane, and irrespective of whether the seat configuration is approved for occupancy during taxiing, takeoff, and landing, should meet the criteria of part 25, appendix F, part II. Accordingly, and to ensure harmonization with CS-25, FAA proposes to adopt the requirements of CS-25 section S25.20(a) as new § 25.823(a).

FAA has issued ELOS findings to § 25.813(c)(2)<sup>33</sup> for proposed airplane designs with 19 or fewer passengers to allow items that can encroach into the projected exit opening of a Type III exit to create more than a minor obstruction.<sup>34</sup> EASA incorporated an allowance in paragraph CS-25 S25.20(b), “Access to Type III and IV Emergency Exits,” for low occupancy airplanes with a passenger seating configuration of 19 or less, and non-commercially operated airplanes. This paragraph, like FAA ELOS findings, permits certain airplanes to have an item deployable into the region defined by CS 25.813(c)(4)(i) or CS 25.813(c)(1), (c)(2), or (c)(3) for Type III and IV<sup>35</sup> emergency exits that creates an obstruction as long as at least one of three requirements, S25.20(b)(1), (2), or (3), are met. The deployable items are mostly interior type design features such as reclining, tracking, swiveling seats, adjustable tables, and deployable video monitors. S25.20(b)(1) requires a position monitoring and alerting system, and the exit opening remaining with the item in its most adverse position be at least as effective as a Type IV emergency exit or restorable to that level of effectiveness by simple and obvious means after any single failure. S25.20(b)(3) requires a cabin crew member to have a direct view of the deployable item and ability to confirm it is correctly stowed and secured, while seated during taxiing, takeoff, and landing. The conditions in S25.20(b)(1) and S25.20(b)(3) have been accepted by FAA as compensating features in previous ELOS findings; however, S25.20(b)(2) permits such obstruction if

the approved number of passengers can be evacuated through the exit in question, with the obstruction in its most adverse position and under the conditions of appendix J, at least as quickly as the maximum number of passengers allowed by CS 25.807(g) without the obstruction, and demonstration that with the obstruction in place, the remaining exit is at least as effective as a Type IV emergency exit.

FAA does not adopt the terms of this provision (EASA S25.20(b)(2)) for this proposed rule. FAA considers EASA S25.20(b)(2) insufficient for two main reasons. First, the conditions for a demonstration are necessarily non-hazardous. Under actual emergency conditions (such as smoke in the cabin, adverse airplane attitude, or fuselage disruption), unobstructed access can be much more important than in a demonstration. Second, the Type IV exit is only permitted for airplanes with 9 or fewer passengers.<sup>36</sup> Thus, though a Type IV exit does provide some evacuation capability, that capability is not sufficient for airplanes of the size addressed by the rule, thus is not an adequate lower bound on exit effectiveness. Conversely, the use of crew alerts and mandatory procedures, as in S25.20(b)(1) and S25.20(b)(3), are well-established practices for safety critical actions. FAA proposes to adopt the requirements of CS-25 section S25.20(b) as new § 25.823(b), except FAA does not adopt the terms of S25.20(b)(2). The proposed § 25.823(b) refers to the proposed §§ 25.813(c)(1), (c)(2), (c)(3), and (c)(4)(i), discussed in section III.R of this preamble. This proposal would eliminate the need for ELOS findings.

#### e. Proposed § 25.825, Movement Inside Cabin During Flight

SFAR No. 109 paragraph 11, Width of Aisle, allows aisle width to be reduced to zero inches between passenger seats in-flight if:

- The applicant demonstrates that all areas of the cabin are easily accessible by a crew member in the event of an emergency.
- Instructions are provided at each passenger seat for restoring the aisle width required by § 25.815.
- Procedures are established and documented in the AFM to ensure the required aisle widths are provided during taxiing, takeoff, and landing.

EASA incorporated the same allowance and conditions in CS S25.30(a).

SFAR No. 109 paragraph 4(a) provides an alternate requirement to the handhold requirement of § 25.785(j) to allow a means to enable persons to

steady themselves in moderately rough air. EASA incorporated the same alternate requirement in CS S25.30(b) adding language that the means must be an “acceptable means.”

FAA proposes to adopt the requirements of CS-25 section S25.30 as new § 25.825 with the “acceptable means” language. An acceptable means of compliance with this section has been defined in a proposed Change 2 to AC 25-17A, “Transport Airplane Cabin Interiors Crashworthiness Handbook,” which is available in the docket. The AC refers to the conditions for compliance for firm handholds in EASA AMC to appendix S, S25.30(b) amendment 28.

#### f. Proposed § 25.827, Markings and Placards

SFAR No. 109 paragraph 6, Passenger Information Signs, provides, in lieu of the “no smoking” placard requirements of § 25.791(a),<sup>37</sup> notification to the passengers may be provided by a single placard in the immediate vicinity of each passenger entry door. EASA incorporated this alternative requirement in CS S25.40(a), with three differences: (1) EASA expanded the applicability to also include low occupancy airplanes, (2) EASA added the lavatory “no smoking” placard requirements of CS 25.791(d) to the exclusion, and (3) EASA added an allowance to not comply with the lavatory ashtray requirements of CS 25.853(g). In addition, S25.40(a) explicitly requires the indication that smoking is prohibited to be the subject of a passenger briefing, where SFAR No. 109 has more general briefing requirements.

FAA proposes to adopt the requirements of CS-25 section S25.40(a) as new § 25.827(a), with one substantive difference. Paragraph CS-25 S25.40(a) permits relief from CS 25.791(a), CS 25.791(d), and CS 25.853(g) for both low occupancy and non-commercially operated airplanes. FAA finds such relief appropriate for non-commercially operated airplanes, but not for commercially operated, low occupancy airplanes. FAA is proposing alternate, more performance-based language for § 25.853(g), as discussed in section III.F of this preamble. The reasons FAA is maintaining requirements for disposal means for lit cigarettes in § 25.853(g) are discussed in that section. FAA has provided exclusions to this requirement for non-commercially operated airplanes because persons flying on non-commercially operated airplanes typically have more knowledge and familiarity in doing so. FAA is not aware of a persuasive reason to expand this exclusion to commercially operated

airplanes of any size or occupancy. FAA proposes to apply the corresponding § 25.827(a) only to airplanes operated non-commercially.

CS-25 S25.40(b) provides an allowance for non-commercially operated airplanes to reduce the number of markings and placards required by CS 25.1541 by providing briefing cards that are part of the type design, referenced in the limitations section of the AFM, and are easily accessible from each passenger seat. Owners of non-commercially operated airplanes typically prefer, for aesthetic reasons, fewer placards on interior furnishings; however, FAA has not previously granted relief from § 25.1541. The proposed requirements will allow the briefing card to replace multiple placards throughout the cabin because the briefing cards would convey the necessary information. FAA agrees with EASA that providing briefing cards under the conditions stipulated in CS-25 S25.40(b) (that the cards are referenced in the limitations section of the AFM and are easily accessible from each passenger seat) provides an acceptable level of safety for non-commercially operated airplanes. FAA proposes to adopt the requirements of CS-25 S25.40(b) as § 25.827(b).

SFAR No. 109 paragraph 2(a)(1) requires each seat not suitable for occupancy during taxiing, takeoff, and landing be marked as such. EASA incorporated this requirement as S25.40(c)(2), with the additional constraint the placard be legible to the seated occupant. SFAR No. 109 paragraph 2(a)(2) requires, if more than 60 passenger seats (the passenger capacity limit of SFAR No. 109) are installed, the AFM and a placard adjacent to each passenger boarding door state the maximum passenger capacity. EASA incorporated this requirement as paragraph CS-25 S25.40(c)(1), except the upper limit is the approved passenger seating configuration rather than a limit of 60 passengers. Paragraph CS-25 S25.40(c)(1) defines “seats in excess” as the difference between the total number of seats approved for occupancy during taxiing, takeoff, and landing and the approved passenger seating configuration.

Though EASA defines the “approved passenger seating configuration” as the maximum number of passengers that may be carried on the airplane, FAA finds this could create some confusion and proposes to clarify the issue. FAA considers the approved passenger seating configuration to be the type design definition of the seat installation (which includes the seats in excess);

this is not the same as the maximum passenger capacity occupancy limitation (which does not include the seats in excess). The reason for this requirement is to ensure only the approved number of passengers will be carried as opposed to the number of passengers that would fill every seat on the airplane. FAA proposes to adopt the substance of the requirements of CS-25 S25.40(c) as § 25.827(c); however, FAA uses the term “maximum passenger seating capacity” in § 25.827(c).

g. Proposed § 25.829, Cabin Crew Direct View

SFAR No. 109 paragraph 5, Direct View, provides an alternative requirement to § 25.785(h)(2) for non-commercially operated airplanes that a majority of the installed crew member seats must face the passenger cabin. EASA incorporated the same alternative requirement in S25.50(a) for non-commercially operated airplanes. In S25.50(b), EASA restated the content of CS 25.785(h)(2) as applicable to low occupancy airplanes. Because there is no difference between S25.50(b) and § 25.785(h)(2), a separate requirement to address cabin attendant direct view for low occupancy airplanes is not needed. FAA clarifies the AMC material referenced in EASA S25.50(b) is not an acceptable means of compliance to § 25.785(h)(2) as FAA and EASA have a long-standing difference in interpretation regarding what needs to be viewed when it comes to showing compliance with the direct view requirement. Existing FAA accepted means of compliance to § 25.785(h)(2)<sup>38</sup> should be used when showing compliance to this rule for low occupancy airplanes. FAA proposes to move the substance of the requirements of SFAR No. 109 paragraph 5 as new § 25.829(a). FAA proposes to mark § 25.829(b) “Reserved.” to maintain a similar paragraph structure as EASA S25.50.

h. Proposed § 25.830, Security Considerations For Non-Commercially Operated Airplanes

SFAR No. 109 paragraph 16, Security, states the requirements of § 25.795 are not applicable to airplanes approved in accordance with SFAR 109. In the NPRM that proposed § 25.795,<sup>39</sup> FAA noted airplanes used for private use generally are carrying individuals such as heads of state, business leaders, or other people who are guests of the airplane owner. FAA stated non-commercially operated airplanes are typically not targets of onboard terrorists because access is limited to these individuals and requiring the

same security requirements as commercial airplanes would not provide a safety improvement.

FAA specifically sought input on this subject in the NPRM, but FAA received no comments. Because FAA did not receive further input on this topic and EASA harmonized with SFAR No. 109 in CS-25 section S25.60 at amendment 21, FAA proposes to incorporate this language as § 25.830, with applicability to airplanes operated non-commercially.

i. Injury Criteria For Multiple-Occupancy Side-Facing Seats

SFAR No. 109, paragraph 4(b) provides injury criteria for multiple-occupancy side-facing seats. This proposed rule would remove SFAR No. 109 but not replace its injury criteria for multiple-occupancy side-facing seats in the proposed updates to part 25. FAA issued Policy Statement PS-ANM-25-03-R1, “Technical Criteria for Approving Side-Facing Seats,” dated November 5, 2012,<sup>40</sup> to provide updated injury criteria for side-facing seats, based on FAA research, that FAA has been applying via SCs to projects with this design feature. These updated test methods address potential neck and leg injuries not addressed by SFAR No. 109. In that policy statement, FAA stated it is considering whether rulemaking should be initiated to revise SFAR No. 109 to adopt the new criteria. Based on the need to update the test criteria, FAA funded additional research into injury mechanisms associated with different seat orientations. Until that information is complete, FAA does not plan to initiate rulemaking to mandate new seat test criteria. However, SFAR No. 109 requirements do not address all known injury mechanisms. Therefore, instead of continuing to allow usage of injury criteria that may be inadequate, FAA proposes to remove the requirements for multiple-occupancy side-facing seats currently in SFAR No. 109 and apply updated seat test criteria on a project-specific basis using SCs.

j. Emergency Exit Signs

Section 25.811(d)(1) contains requirements for emergency exit locator signs, and § 25.811(d)(2) contains requirements for emergency exit marking signs. SFAR No. 109, paragraph 8 provides conditions under which a single sign can be installed at each exit to serve both the marking and locator sign function. FAA also provides guidance in AC 25-17A, applicable to all proposed transport category airplanes, to permit a single sign to serve both the locator and marker sign functions of paragraphs (d)(1) and (d)(2). Therefore, because the use of a single

sign to serve both functions is already allowed under part 25, FAA has determined retaining paragraph 8 of SFAR 109 would be superfluous and thus proposes to not carry it over into this rulemaking.

k. Emergency Lighting—§ 25.812

SFAR No. 109 paragraph 9(a) provides alternate size and brightness requirements for emergency exit signs in lieu of the requirements of § 25.812(b)(1). FAA is incorporating these alternate requirements into § 25.812(b)(2), along with other updates to incorporate the terms of commonly issued ELOS findings as discussed in section III.E. of this NPRM.

SFAR No. 109 paragraph 9(b) provides alternate requirements for floor proximity escape path markings in lieu of the requirements of § 25.812(e)(1). For cabin seating compartments that do not have the main cabin aisle entering and exiting the compartment, paragraph 9(b) requires markings and visual features not more than 4 feet above the cabin floor in lieu of the requirements of § 25.812(e)(1) to guide occupants to the exit. EASA incorporated this requirement as CS 25.812(e)(3), which is applicable to all airplanes, not just those that are non-commercially operated. FAA agrees with EASA that, for compartments that do not have the main cabin aisle incorporated in the compartment, this is an appropriate requirement regardless of type of operation. FAA proposes to incorporate the language in SFAR No. 109 paragraph 9(b) as new § 25.812(e)(3), which would also harmonize this requirement with CS 25.812(e)(3).

SFAR No. 109 paragraph 9(c) provides alternate requirements to § 25.812(l) for emergency lights in the event of a transverse separation of the fuselage. Paragraph 9(c)(1) allows, for airplanes with a maximum passenger seating capacity of 9 or less, that not more than 50 percent of all electrically illuminated emergency lights required by § 25.812 may be rendered inoperative in addition to the lights directly damaged by the separation. Paragraph 9(c)(2) allows, for airplanes with a maximum passenger seating capacity of 10 to 19, that not more than 33 percent of all electrically illuminated emergency lights required by § 25.812 may be rendered inoperative in addition to the lights directly damaged by the separation. EASA incorporated these provisions into CS 25.812(l)(1), which is applicable to all airplanes proposed for EASA's approval, not just those that would be non-commercially operated. FAA agrees with EASA that this allowance for remaining lights following a transverse

separation should be applied to all airplanes of the specified passenger capacity, regardless of type of operation. A more stringent requirement based on the type of operation does not add appreciably to safety as the primary factor is the distance to any one exit and not the familiarity a private use passenger has of the airplane. FAA proposes to incorporate the provisions of SFAR No. 109 paragraph 9(c) into § 25.812(l)(1), which would also harmonize this requirement with EASA CS 25.812(l)(1).

#### l. Electrical Appliances, Motors, and Transformers—§ 25.1365

Currently, § 25.1365(b) requires overheating or fire protection for installations of galleys and cooking appliances but does not address hazards to occupants other than overheating and fire. SFAR No. 109, paragraph 14 includes requirements for installation of cooktops that are prescriptive rather than performance-based, such as specifying several design details about the cookware restraint system. These prescriptive requirements in SFAR No. 109 address hazards to occupants and the aircraft, but with this rulemaking FAA is proposing to remove SFAR No. 109 in its entirety. FAA proposes to add a performance-based requirement to proposed § 25.1365 to require the design minimize the risk of overheating, fire, smoke, burns, or spilled liquids to occupants and to the airplane due to any cooking appliance. The proposed performance-based requirement would provide increased flexibility for applicants and encourage innovation because performance-based requirements focus on achieving a desired outcome without prescribing a specific approach an applicant must use to achieve that outcome. The prescriptive design details of SFAR No. 109, paragraph 14 would remain available as one acceptable means of compliance and are incorporated in the draft of Change 2 to AC 25–17A, as discussed below. Proposed § 25.1365 would apply to commercial airplanes as well as low occupancy and non-commercial airplanes because the safety requirements for the installation of a cooktop should be the same for all transport category airplanes.

Furthermore, this proposed rule would harmonize with EASA CS 25.1365(b), with the following difference. Where CS 25.1365(b) lists “overheat, fire, burns, or spilled liquids,” proposed § 25.1365(b) lists “overheat, fire, smoke, burns, or spilled liquids.” This proposed list would explicitly include both fire and smoke to address existing SFAR No. 109

requirements related to fire detection, fire suppression, material flammability, and ventilation; however, there is no difference in the intent of the rule due to this difference. The EASA CS–25 AMC 25.1365(b) includes guidance on fire detection, fire suppression, material flammability, and ventilation that is consistent with the existing SFAR No. 109 requirements to address those hazards.

EASA CS–25 AMC 25.1365(b) guidance incorporates the design standards currently required by SFAR No. 109 paragraph 14 as acceptable means of compliance to the performance-based requirement in CS 25.1365(b). FAA would consider EASA CS–25 AMC 25.1365(b) amendment 28<sup>41</sup> as an acceptable means of compliance with proposed § 25.1365(b), in addition to guidance provided in AC 25.1365–1, “Electrical Appliances, Motors, and Transformers,” dated November 27, 2007. FAA has drafted Change 2 to AC 25–17A to refer to the EASA AMC and AC 25.1365–1 for guidance. Comments to the revised ACs associated with this rulemaking may be submitted to the docket or via the “Aviation Safety Draft Documents Open for Comment” web page at [http://www.faa.gov/aircraft/draft\\_docs/](http://www.faa.gov/aircraft/draft_docs/).

#### m. Hand-Held Fire Extinguishers

SFAR No. 109, paragraph 15 requires, for airplanes that were originally type certificated with more than 60 passengers, the number of hand-held fire extinguishers to be the greater of that provided in accordance with the requirements of § 25.851 or a number equal to the number of originally type certificated exit pairs. FAA has not included this requirement as a condition for recent exemptions for non-commercially operated airplanes of this size.<sup>42</sup> FAA determined compliance with the requirements of § 25.851 is sufficient to maintain an appropriate level of safety in those exemptions and is not proposing to carry the terms of paragraph 15 of SFAR No. 109 into this NPRM.

#### 3. Advisory Material for Proposed §§ 25.4(d), 25.821, 25.823, 25.825, 25.827, 25.829, 25.830, and 25.1583(j)

FAA considers the majority of the sections in EASA CS–25 AMC to appendix S amendment 28<sup>43</sup> are applicable and would be an acceptable means of compliance with FAA’s proposed regulations for low occupancy airplanes and non-commercially operated airplanes. FAA has drafted Change 2 to AC 25–17A, “Transport Airplane Cabin Interiors Crashworthiness Handbook,” to refer to

the EASA AMC for guidance and identify differences where appropriate. The EASA AMC and draft AC are available in the docket. Comments to the proposed AC may be submitted via the instructions on the “Aviation Safety Draft Documents Open for Comment” web page at [http://www.faa.gov/aircraft/draft\\_docs/](http://www.faa.gov/aircraft/draft_docs/).

#### B. Vibration and Buffeting—§ 25.251(b)

##### 1. Overview of Proposed § 25.251(b)

Currently, paragraph (b) of § 25.251, “Vibration and buffeting,” at amendment 25–77, requires that an applicant show, by flight test, that each part of the airplane is free from excessive vibration under any appropriate speed and power conditions up to  $V_{DF}/M_{DF}$ .<sup>44</sup> FAA proposes to revise § 25.251(b) to allow applicants to use an acceptable means, other than flight test, for speeds above  $V_{MO}/M_{MO}$ <sup>45</sup> up to  $V_{DF}/M_{DF}$ , to demonstrate the effects from external modifications<sup>46</sup> to an existing type design.

FAA has issued several ELOS findings<sup>47</sup> that allow flight test to  $V_{MO}/M_{MO}$  and the use of acceptable means to extend to  $V_{DF}/M_{DF}$ . As described in section 10.1 of AC 25–7D change 2, a copy of which is included in the docket, computational fluid dynamics (CFD) analysis is one acceptable means. Proposed § 25.251(b) is consistent with these ELOS findings and adopting it would simplify FAA’s approval of similar design changes in the future by eliminating the need to develop an IP and make an ELOS finding. Proposed § 25.251(b) is intended to relieve an applicant’s burden of showing compliance by flight test at speeds above  $V_{MO}/M_{MO}$  for external modifications because the rule can be met through analytical means as a result of advances in technology.

##### 2. Discussion of Proposed § 25.251(b)

When an applicant proposes an external modification to an existing type design, it must address compliance with § 25.251(b), which requires, in summary, that each part of the airplane be demonstrated in flight to be free from excessive vibration. As part of previous airplane certification programs, FAA has granted ELOS findings if an applicant can show that the airplane is free from excessive vibration and buffeting through an acceptable means other than flight testing. FAA considers the extent of the external airplane modification, particularly the size, shape, and location of the modification with respect to the unmodified airplane, may cause significant changes in the aerodynamic flow field around the

airplane at high speeds, which may lead to excessive vibration. Potential vibration sources include unsteady flow conditions on the modification, fuselage, tail assembly, or control surfaces. Due to these potential effects, FAA considers the original airplane-level demonstration of compliance for § 25.251(b) may not be valid for proposed external modifications. Therefore, unless the applicant can show the modification would not invalidate the original § 25.251(b) compliance demonstration, under the current regulation, the applicant must re-demonstrate compliance by flight test at speeds up to  $V_{DF}/M_{DF}$ .

Until recently, there were no valid analytical methods to substantiate there is no excessive vibration at  $V_{DF}/M_{DF}$  other than flight test. However, given advances in aerodynamic analysis and computer modeling, an applicant may use analysis tools to determine whether the external modification may be reliably evaluated as an alternative to flight testing at speeds above  $V_{MO}/M_{MO}$ . Under the proposed amendment to § 25.251(b), an applicant may use an aerodynamic analysis, such as validated CFD, to show compliance with § 25.251(b) will be reliable as an alternative to flight testing at speeds above  $V_{MO}/M_{MO}$ . It is not necessary for the aerodynamic analysis to cover all flight conditions. The applicant should identify the critical flight conditions and select those flight conditions that require in-depth analysis. The applicant should document how these critical flight conditions have been identified.

After FAA acceptance of both the validated CFD and the results of the aerodynamic analysis, the applicant would not be required to perform a flight test to  $V_{DF}/M_{DF}$  to show the modification complies with § 25.251(b). However, the applicant would still be required to perform a flight test to  $V_{MO}/M_{MO}$  with a qualitative assessment that no buffeting condition exists up to that speed to show compliance with § 25.251(d).

ARAC recommended FAA modify § 25.251(a) and (b) by removing the words “demonstrated in flight to be” from each paragraph.<sup>48</sup> Two members of ARAC, the Air Line Pilots Association International (ALPA) and Flyer’s Rights, dissented from the ARAC recommendation.<sup>49</sup> FAA agreed with ALPA and Flyer’s Rights and determined it is necessary to maintain the flight test requirement to show freedom from excessive vibration up to  $V_{DF}/M_{DF}$  for new designs, while providing some relief for modified designs as described above.

### 3. Advisory Material for Proposed § 25.251(b)

FAA has proposed Change 2 to AC 25–7D, “Flight Test Guide for Certification of Transport Category Airplanes,” to describe acceptable means, but not the only means, of showing compliance with proposed § 25.251(b). In order to assess whether the external modification could be reliably evaluated, proposed AC 25–7D Change 2 would provide for any suitable combination of using information from similar approved designs, flight test, and an aerodynamic analysis. This document is available in the docket. Comments to the proposed AC may be submitted via the instructions on the “Aviation Safety Draft Documents Open for Comment” web page at [http://www.faa.gov/aircraft/draft\\_docs/](http://www.faa.gov/aircraft/draft_docs/).

### C. Rolling Conditions—§ 25.349(a)

#### 1. Overview of Proposed § 25.349(a)

Currently, § 25.349, “Rolling conditions,” at amendment 25–94, specifies various rolling maneuver load conditions for which the airplane must be designed and prescribes the rolling maneuvers in terms of aileron deflection.<sup>50</sup> FAA has issued SCs in past airplane certification programs to address the effects of electronic flight control systems on the design roll maneuver loads. ARAC recommended FAA incorporate this SC content into the rule to eliminate the need for recurring development of new SCs and provided recommended edits to § 25.349(a).<sup>51</sup> Adopting proposed § 25.349(a) would eliminate the need to develop an IP and issue SCs for roll maneuver during the certification process.

FAA proposes to revise § 25.349(a) to prescribe the design rolling maneuver requirement in terms of flightdeck roll control movement, rather than aileron deflection. This would ensure the rolling maneuver loads used in the structural design of the airplane are adequate. FAA is also proposing other related changes described under paragraph III.C.2.

#### 2. Discussion of Proposed § 25.349(a)

By prescribing the rolling maneuvers in terms of aileron deflection only, § 25.349 does not consider the potential effects of airplane systems. Most modern transport category airplanes are equipped with electronic flight control systems, which can affect the behavior of the airplane during a rolling maneuver. Section 25.349 also assumes just a single aileron is deflected on each wing. In fact, most modern airplanes are equipped with multiple control surfaces

(such as flaperons or spoilers) that may be used in performing the rolling maneuver.

To ensure the effects of the electronic flight control system and the appropriate deflection of any flight control surface are considered, proposed § 25.349(a) would prescribe the rolling maneuvers in terms of flightdeck roll control movement, rather than aileron deflection.

In addition to this change, FAA proposes the following related changes. For the rolling conditions specified by § 25.349(a)(2) and § 25.349(a)(3), at airspeeds  $V_A$  and  $V_C$  respectively, FAA proposes to add an additional load maneuver requirement. Following the initial movement of the flightdeck roll control, the proposed requirement for the rolling conditions would include a sudden return of the roll control to neutral. This proposed change is necessary to ensure the effects of the flight control system would be considered during this kind of maneuver, thereby ensuring adequate design loads. ARAC recommended this requirement be added for rolling conditions at  $V_A$ , and FAA currently includes this additional requirement in SCs for electronic flight controls for design roll maneuver at  $V_A$ .<sup>52</sup> FAA is proposing the addition of this requirement for  $V_C$  to ensure applicants consider these design loads and to also harmonize with EASA CS 25.349(a)(5)(ii).

Currently, § 25.349(a)(1) specifies the applicant investigate angular acceleration for airplanes with proposed engines or other weight concentrations outboard of the fuselage. FAA proposes to remove this qualification and require applicants to investigate angular acceleration on all proposed transport category airplanes, regardless of their configuration, to ensure the design rolling maneuver loads are adequate. ARAC recommended this change to § 25.349(a)(1).<sup>53</sup>

Currently, § 25.349(a) specifies the prescribed rolling maneuvers be combined with two separate airplane load factor conditions: load factors of zero and two-thirds of the positive maneuvering load factor used in the design. FAA proposes to revise § 25.349(a) to require applicants to evaluate additional load factors between these two load factor values. Though ARAC did not recommend this change, requiring applicants to evaluate a range of load factors would address potentially higher loads that could occur at load factors between zero and two-thirds. This would also harmonize with CS 25.349(a) requirements for

airplanes equipped with electronic flight controls.

### 3. Differences With EASA CS 25.349(a)

In June 2013, EASA revised CS 25.349(a) at amendment 13<sup>54</sup> to address the effects of electronic flight controls on design maneuver requirements. The EASA CS specifies differing requirements for airplanes with mechanical systems and for those with electronic flight controls. FAA's proposed § 25.349(a) specifies only one set of requirements would apply to all proposed transport category airplanes regardless of the type of control system used. FAA proposes that by prescribing the rolling maneuver in terms of flightdeck roll control movement rather than aileron deflection, and by making the other related changes, only one set of requirements will be necessary.

EASA CS 25.349 requires applicants to investigate the specified rolling maneuvers without any corrective yaw control action to maximize sideslip (evaluated as a failure condition), and, as a separate condition, with corrective yaw control action to reduce sideslip as far as possible. The proposed FAA rule would require only that applicants investigate the rolling maneuvers assuming rational or conservative yaw control input. This is consistent with past FAA certification practice. That is, current § 25.349 and related SCs do not require applicants to investigate rolling maneuvers assuming no corrective yaw control action or that this be evaluated as a failure condition.

### 4. Advisory Material for Proposed § 25.349(a)

EASA provides the following advisory material in CS-25 AMC 25.349(a): "The physical limitations of the aircraft from the cockpit roll control device to the control surface deflection, such as control stops position, maximum power and displacement rate of the servo controls, and control law limiters, may be taken into account."

FAA does not plan to issue an AC in conjunction with proposed § 25.349. However, FAA agrees with the EASA AMC. FAA agrees applicants would be able to use CS-25 AMC 25.349(a) amendment 28<sup>55</sup> when showing compliance to FAA's proposed § 25.349(a).

### *D. Outside View for Flightcrew and Overwing Emergency Exits—§ 25.809(a)*

#### 1. Overview of Proposed § 25.809(a)

Currently, § 25.809(a), at amendment 25-116, requires, for all exits, the ability to view likely areas of evacuee ground contact from inside the airplane with

the exit closed. Some applicants have been unable to meet this requirement for flightcrew and overwing exits when it is not possible to see the ground contact point from inside the airplane due to the curvature of the fuselage, the distance to the ground contact point, or the wing itself blocking the view. As a result, these applicants have petitioned for an exemption from § 25.809(a). FAA has found it in the public interest to grant exemptions from the requirements of this rule for flightdeck and overwing exits when compliance with the rule is not practical.<sup>56</sup> This proposed rule would remove the requirement to see the evacuee ground landing point for these exits, eliminate the need for exemptions, and harmonize with the current EASA airworthiness standard, CS 25.809(a).

#### 2. Discussion of Proposed § 25.809(a)

As outlined in the overview section above, currently § 25.809(a) at amendment 25-116 requires, for all exits, (1) the ability to view likely areas of evacuee ground contact from inside the airplane with the exit closed and (2) the likely areas of evacuee ground contact be viewable during all lighting conditions with the landing gear extended as well as in all conditions of landing gear collapse. When FAA wrote the NPRM and final rule for amendment 25-116,<sup>57</sup> the agency's primary focus was on passenger exits, though FAA intended to have consistency between passenger and crew exits as well. Thus, the current requirements are identical for the two exit categories. However, flightcrew and overwing exits have characteristics that justify a different approach.

Flightcrew exits are used generally when the passenger exits are not available to the crew, or the situation demands more rapid egress than is possible by leaving the flightdeck and moving to a passenger exit. In those cases, outside viewing of the specific ground-contact point is largely moot because there is no alternative to using the flightcrew exit(s). Flightcrew should have a means to see outside the airplane to assess conditions generally, even if the specific point of ground contact is not visible. Flightdeck windows typically satisfy this need.

On many overwing exits, the location where the evacuee makes first contact on the ground is a considerable distance from the point from which they exit the passenger cabin. The distance the evacuee moves either forward or aft on the wing upper surface, and then down to the ground—by escape slide, jumping off of the wing, or sliding down the leading or trailing edge of the wing—

makes it impossible to see the ground-contact point from inside the airplane because of the distance from the viewing point inside the airplane to the ground, given fuselage curvature or the wing itself blocking the view.

FAA and EASA collaborated to improve the CS-25 rule language based on experience applying this rule. EASA incorporated the improved language in CS-25 at amendment 12, dated July 13, 2012, to allow situations where viewing the ground contact point was not practical and to update the requirement for all emergency exits to have means to permit viewing of the conditions outside the exit when the exit is closed, in all ambient lighting conditions with the landing gears extended or in any condition of collapse. Emergency evacuations are sometimes combined with a hazard, such as a fire outside the airplane. As the hazard may pose an immediate threat, it is often necessary to avoid opening certain emergency exits in order to prevent injuries to evacuees. Thus, requiring a means to permit viewing the conditions outside the exit, such as a viewing window, allows the crew and passengers to assess the outside conditions generally and determine whether it is safe for evacuees to use a particular exit. In addition, all ambient lighting conditions must be considered because evacuations can take place during the day or night. This CS 25.809(a) requirement is consistent with the conditions imposed by FAA when granting exemptions from the ground contact point viewing requirement of § 25.809(a).<sup>58</sup>

In addition, ARAC recommended FAA harmonize § 25.809(a) with EASA CS 25.809(a) at amendment 12.<sup>59</sup> ARAC later recommended additional minor changes to § 25.809(a) in the ARAC "Transport Aircraft Crashworthiness and Ditching Working Group Report to FAA," Revision B, dated September 20, 2018.<sup>60</sup> FAA proposes to harmonize § 25.809(a) with CS 25.809(a), with minor changes to paragraph numbering, as recommended by ARAC.

### 3. Advisory Material for Proposed § 25.809(a)

FAA considers the provisions of amendment 28 of EASA CS-25 AMC 25.809(a) and AMC 25.809(a)(3)<sup>61</sup> would be an acceptable means of compliance with FAA's proposed § 25.809(a). FAA has drafted Change 2 to AC 25-17A to refer to the EASA AMC for guidance. The EASA AMC and draft AC are available in the docket. Comments to the proposed AC may be submitted via the instructions on the "Aviation Safety Draft Documents Open

for Comment” web page at [http://www.faa.gov/aircraft/draft\\_docs/](http://www.faa.gov/aircraft/draft_docs/).

*E. Emergency Exit Marking and Lighting—§§ 25.811(e) and (g) and 25.812(b)*

1. Overview of Proposed §§ 25.811(e) and (g) and 25.812(b)

Currently, § 25.811(e) requires operating handles for Type I and larger passenger emergency exits to be self-illuminated and, for Type II and larger, requires passenger emergency exits have red arrows with prescriptive dimensions. Sections 25.811(g) and 25.812(b) currently require passenger emergency exit signs use letters only. In addition, §§ 25.811(g) and 25.812(b) do not allow the universal exit symbol of the green running man through a door opening that is found worldwide in buildings and in various other forms of transportation.

FAA has made ELOS findings in several applications to permit proposed variations in size of exit signs and allow the use of FAA-approved universal symbols rather than the word “exit.” Previous ELOS findings allowed the installation of smaller exit signs for specific airplanes based on their passenger cabin aisle lengths and fuselage diameters. The reduced sized signs were found acceptable for specific airplanes based on their small passenger cabin, aisle length, and fuselage diameters. FAA determined reduced size exit signs provide an acceptable level of safety for a cabin of this size.

In the findings for allowance of a symbol, FAA intended “universal” to mean it is understandable by any non-English speaker as applicants’ designs have incorporated pictorial representations rather than language. As discussed below, this proposal would replace prescriptive requirements with performance-based requirements, respond to ARAC recommendations, and harmonize §§ 25.811(e) and (g) and 25.812(b) with EASA CS-25 25.811(e) and (g) and 25.812(b) to permit alternate emergency exit sign markings and lighting configurations.

2. Discussion of Proposed §§ 25.811 and 25.812

Currently, §§ 25.811(e) and (g) and 25.812(b) contain prescriptive requirements for emergency exit marking and lighting and are not harmonized with EASA CS 25.811(e) and (g) and 25.812(b). FAA has made ELOS findings to permit variations in size of exit signs and to allow the use of FAA-approved universal symbols, rather than the word “exit.”<sup>62</sup> Furthermore, ARAC recommended FAA

harmonize §§ 25.811(e) and (g) and 25.812(b) with EASA CS 25.811(e) and (g) and 25.812(b) to permit alternate emergency exit sign and lighting configurations.<sup>63</sup>

Proposed § 25.811(e)(2) would require each Type A, Type B, Type C, or Type I passenger emergency exit operating handles, and the cover removal instructions if the operating handle is covered, to be self-illuminated, and proposed § 25.811(e)(4) would replace prescriptive arrow requirements with more flexible language. The proposed § 25.811(g) would allow the use of an FAA-approved universal symbolic exit sign and require the design of exit signs be chosen to provide a consistent set throughout the cabin. This change would harmonize the rule language with EASA for FAA-approved universal symbol acceptance but would add requirements for AFM operating limitations that passenger information cards and special emphasis briefings be given by the cabin crew before takeoff and landing to advise passengers the meaning of the symbol is for an emergency exit. The special emphasis briefing and information cards have been conditions of FAA’s ELOS findings permitting use of FAA-approved universal symbolic exit signs because the U.S. public is generally accustomed to text-based exit signs rather than symbolic exit signs. FAA expects these measures will educate the flying public on the proposed FAA-approved universal symbolic exit signs over time. FAA intends to reevaluate the need for these additional measures when symbolic exit signs become more prevalent in the U.S.

Proposed § 25.812(b) includes performance-based size, brightness, and contrast requirements for letter-based emergency exit signs and universal symbolic exit signs and harmonizes the language with EASA for sign brightness and contrast.

3. Advisory Material for Proposed §§ 25.811(e) and (g) and 25.812(b)

FAA considers amendment 28 of EASA AMC 25.811(e)(4) and AMC 25.812(b)(1) and AMC 25.812(b)(2)<sup>64</sup> guidance for emergency exit marking and lighting would be acceptable means of compliance with proposed §§ 25.811(e) and (g) and 25.812(b). However, FAA guidance discusses FAA’s additional § 25.811(g) proposed requirements for a special emphasis briefing<sup>65</sup> on the meaning of the symbolic exit signs in crew procedures and the incorporation of appropriate symbolic exit sign information in standard passenger information cards. FAA already accepts the symbolic green

running man standard in GAMA Publication No. 15, “Symbolic Messages,” dated March 1, 2014, as an acceptable symbol for the exit sign, as well as the EASA-accepted standard in AMC 25.812, when meeting FAA’s ELOS findings permitting use of a symbol. These standards are proposed in Change 2 to AC 25–17A.

FAA has drafted Change 2 to AC 25–17A to refer to the EASA AMC and include additional guidance on these differences in expectations between FAA and EASA. The EASA AMC and draft AC are available in the docket. Comments to the proposed AC may be submitted via the instructions on the “Aviation Safety Draft Documents Open for Comment” web page at [http://www.faa.gov/aircraft/draft\\_docs/](http://www.faa.gov/aircraft/draft_docs/).

*F. Disposal of Combustible Materials—§ 25.853(g)*

1. Overview of Proposed § 25.853(g)

Currently, § 25.853(g) requires self-contained, removable ashtrays on or near the entry side of lavatory doors. ARAC and industry recommended FAA repeal § 25.853(g) due to the prescriptive nature of the rule, the prohibition of smoking in lavatories (§ 91.519), the ban on smoking on air carrier flights (part 252), and the requirement for smoke detectors and built-in fire extinguishers in lavatories (§ 25.854).

FAA does not agree that a repeal of the rule would be in the public interest. However, proposed § 25.853(g) would replace the prescriptive requirement for self-contained removable ashtrays with a performance-based requirement that lavatories must have an approved means to dispose of lit combustible material safely located conspicuously on or near the entry side of each lavatory door, except that one means may serve more than one lavatory door if the means can be seen readily from the cabin side of each lavatory served.

2. Discussion of Proposed § 25.853(g)

After multiple fires in the 1970s started in lavatory waste receptacles, FAA issued Airworthiness Directive (AD) 74–08–09<sup>66</sup> requiring all transport category airplanes, certificated in any category that have one or more lavatories equipped with paper or linen waste receptacles to prohibit smoking in lavatories via placards and pre-flight briefings and to install self-contained, removable ashtrays on or near the entry side of lavatory doors. The AD also required repetitive inspection of waste receptacle enclosure doors for proper operation to maintain their fire containment properties. FAA revised

this AD in June 1996<sup>67</sup> to allow airplanes to be temporarily operated in the event a lavatory door ashtray is missing and revised the AD again in January 2012<sup>68</sup> to extend the time allowed for operators to replace missing ashtrays as long as 50 percent of the required ashtrays are present.

In 1980, FAA revised the design requirements for placarding and installation of ashtrays outside of lavatories, with amendment 25–51<sup>69</sup> to part 25, implementing the design portions of AD 74–08–09. However, for safety reasons, AD 74–08–09 remains in effect.

ARAC recommended FAA repeal § 25.853(g), which requires self-contained, removable ashtrays on or near the entry side of lavatory doors.<sup>70</sup> Also, Airlines for America (A4A) submitted a comment in response to the Department of Transportation Notification of Regulatory Review, dated October 2, 2017,<sup>71</sup> requesting elimination of this rule. As justification for elimination of this requirement, ARAC cited the prohibition of smoking in lavatories (§ 91.519), the ban on smoking on air carrier flights (part 252), and the requirement for smoke detectors and built-in fire extinguishers in lavatories (§ 25.854).

FAA does not agree that a repeal of the rule would be in the public interest. Smoking is prohibited onboard airplanes operated under part 121 and is prohibited in all lavatories. Data shows, however, that despite the placards and pre-flight briefings, passengers still light cigarettes in lavatories and in the passenger cabin. FAA records show that FAA initiated at least 345 enforcement actions during a 5-year period (2019 to 2024) for violations of the smoking prohibitions onboard U.S.-based carriers.

The requirement for waste receptacles to be fire resistant and contain fires has existed since 1964,<sup>72</sup> yet multiple lavatory waste bin fires occurred in the 1970s, and at least one was not contained.<sup>73</sup> Even when waste bin fires are contained properly, a fire onboard during flight presents other safety risks, including an emergency landing and “emergency evacuation.”

The justification proposed by ARAC regarding the need for a requirement for smoke detectors in lavatories did not account for the fact detectors are not installed to detect cigarette smoke, though this is a common misconception. Detection might not occur until paper is smoldering or a fire is developing.

The ARAC proposal to remove the requirements for ashtrays entirely would result in manufacturing and maintenance cost savings but could

result in fires leading to incidents and accidents because there would be no method of safe disposal of lit cigarettes. There are potential cost savings if industry develops safe methods of lit cigarette disposal that are easier to maintain than removable ashtrays and less likely to be missing or stolen.

Proposed § 25.853(g) would replace the prescriptive requirement for self-contained removable ashtrays with a performance-based requirement that lavatories must have an approved means to dispose of lit combustible material safely located conspicuously on or near the entry side of each lavatory door, except that one means may serve more than one lavatory door if the means can be seen readily from the cabin side of each lavatory served.

### 3. Advisory Material for Proposed § 25.853(g)

FAA has drafted Change 2 to AC 25–17A to include guidance that a self-contained removable ashtray is an approved means of compliance to § 25.853(g). This document is available in the docket. Comments to the proposed AC may be submitted via the instructions on the “Aviation Safety Draft Documents Open for Comment” web page at [http://www.faa.gov/aircraft/draft\\_docs/](http://www.faa.gov/aircraft/draft_docs/).

### G. Reverse Thrust and Propeller Pitch Settings Below the Flight Regime—§ 25.1155

#### 1. Overview of Proposed § 25.1155

Currently, § 25.1155, “Reverse thrust and propeller pitch settings below the flight regime,” at amendment 25–11 requires each control for reverse thrust and for propeller pitch settings below the flight regime to have a means to prevent inadvertent operation. These means include a positive lock or stop at the flight idle position and require a separate and distinct operation by the flightcrew to displace the control out of the flight regime for propeller-powered airplanes, or out of forward thrust regime for turbojet-powered airplanes. Certificated designs to meet § 25.1155 have included latches intended to prevent inadvertent movement of the power levers below the flight idle stop and a mechanical detent, which requires a significant increase in force to lift and pull the power levers below flight idle. Other certificated designs included the “piggyback” type, with dual engine throttle and dual thrust reverser levers that are linked and provide a hard stop for the engine throttle lever at forward idle. Mechanical interlock systems prevent the flightcrew from moving the engine throttles past the reverse idle

position until thrust reversers are deployed.

However, § 25.1155 does not contain adequate requirements to prevent selection or activation (whether intentional or inadvertent) of propeller pitch settings below the flight regime, or reverse thrust regime for turbojet-powered airplanes, when the airplane is outside of the approved in-flight operating envelope for that function.

FAA proposes to revise § 25.1155 to require a means to prevent the flightcrew on propeller-powered airplanes from inadvertently or intentionally placing the power lever below flight idle while in flight unless the airplane has been certified for that type of operation. FAA also proposes to include a similar requirement for turbojet-powered airplanes with thrust reverser systems intended for use only on the ground.

Proposed § 25.1155 stems from ARAC recommendations<sup>74</sup> to update the rule to improve the level of safety by eliminating the possibility of a flightcrew selection error that can lead to a hazardous situation in flight and to harmonize § 25.1155 with EASA CS 25.1155.<sup>75</sup>

### 2. Background of Proposed § 25.1155

#### a. Accident History

A number of accidents involving turboprop-powered transport category airplanes have been caused by a movement of the power lever to a position below the flight idle regime when the airplane was in flight. Investigation of these accidents<sup>76</sup> revealed they were caused by both deliberate and unintentional movements of the power lever to a position below the flight idle regime.

As a result of these accidents, FAA has applied § 21.21(b)(2) to certification projects for new turboprop-powered airplane designs to incorporate a means to prevent movement of the power levers below the flight idle stop when the airplane is in flight. Section 21.21(b)(2) requires no feature or characteristic make the aircraft unsafe. In addition, FAA has issued ADs<sup>77</sup> to require many existing turboprop-powered airplanes to install a means to prevent in-flight selection of propeller pitch settings below the flight regime.

Unfortunately, though these mitigations improved the situation, they did not prevent the recurrence of all such events. Follow-on accidents<sup>78</sup> convinced FAA the integration of lockout features in the thrust reverser or propeller control system design, such as those required by this proposal, is necessary to prevent any in-flight

selection of power settings below the flight idle regime, regardless of whether the selection is inadvertent or intentional.

Though the accident history associated with a pilot-initiated in-flight thrust reversal on turbojet-powered airplanes is more limited than that of turboprop-powered airplanes, turbojet-powered airplane accidents have occurred due to in-flight thrust reverser deployment.<sup>79</sup> Following the Boeing 767–300ER Lauda AIR accident after an uncommanded deployment of the thrust reverser during flight, FAA chartered a joint FAA/Aerospace Industries Association task force to examine the effects of a thrust reverser deployment on airplane controllability and the reliability aspects of the thrust reverser system for transport aircraft. The task force released their report on June 1, 1994.<sup>80</sup> This report was a reference document used by the ARAC Powerplant Installation Harmonization Working Group to develop recommendations for changes to § 25.933(a). There have also been reported cases where the thrust reversers were selected just prior to touchdown in order to minimize the landing roll.<sup>81</sup> In these cases, the provision of a weight-on-wheels interlock as part of the thrust reverser design prevented the deployment of the reverser. However, the need to avoid a reversing condition when the airplane is outside any approved operating regime for such operations is the same for thrust reverser equipped airplanes as it is for propeller-powered airplanes (*i.e.*, the prevention of a hazardous or catastrophic condition).

#### b. NTSB Safety Recommendations

In response to two turboprop-powered airplane accidents,<sup>82</sup> the NTSB issued two safety recommendations<sup>83</sup> requesting FAA require a positive means to prevent operation of the propeller below the flight regime while in flight, unless the airplane is certificated for such use. Proposed § 25.1155 would address these NTSB safety recommendations.

#### c. ARAC Recommendations

In 1998, FAA tasked ARAC<sup>84</sup> to recommend harmonized changes to § 25.1155 and the corresponding European rule (Joint Aviation Requirement 25.1155) to require a means to prevent the flightcrew of turbine powered airplanes from inadvertently or intentionally placing the propellers into beta (reverse thrust), deploying the thrust reverser while inflight, or otherwise commanding reverse thrust, unless the airplane has

been certified for such operation. ARAC submitted recommendations responsive to this tasking on June 1, 2000.<sup>85</sup> EASA incorporated these ARAC recommendations in the initial issue of CS–25, in CS 25.1155, and accompanying guidance material.<sup>86</sup> ARAC subsequently recommended FAA harmonize § 25.1155 with CS 25.1155.<sup>87</sup>

#### 3. Discussion of Proposed § 25.1155

Current § 25.1155 requires a positive lock or stop at the flight idle position and a separate and distinct operation by the flightcrew whenever they displace the reverse thrust control from the forward thrust regime and the control for propeller pitch settings below the flight regime. However, for the majority of transport category airplanes, displacement of these controls during flight could lead to a hazardous or catastrophic situation.

Proposed § 25.1155 is intended to prevent (1) the loss of airplane controllability or (2) engine overspeed and consequent loss of engine power, caused by the power levers being positioned below the flight idle stop while the airplane is in flight. The proposed § 25.1155(a) would retain the intent of current § 25.1155 while making it less prescriptive by requiring a positive lock or stop, to accomplish the objective of requiring a separate and distinct operation by the flightcrew to displace the control from the flight regime. This is a difference from EASA CS 25.1155(a), which specifies only a positive lock or stop.

The proposed § 25.1155(b) would add a requirement for additional means to prevent the flightcrew on propeller-powered airplanes from inadvertently or intentionally placing the power lever below flight idle while in flight unless the airplane has been certified for that type of operation. In addition, proposed § 25.1155 would include a similar requirement for turbojet-powered airplanes with thrust reverser systems intended for use only on the ground.

The proposed § 25.1155(c) would also require the reliability of the means of preventing the flightcrew from inadvertently or intentionally placing the power lever below flight idle while in flight be high enough that loss of such means is remote. Further, proposed § 25.1155(d) would require a flightdeck alert be provided to the flightcrew if the means are lost.

Proposed § 25.1155(e) would also require a flightdeck alert be provided to the flightcrew whenever the flightdeck control for propeller pitch setting is displaced below the flight regime, or for turbojet-powered airplanes, the flightdeck control is displaced from the

forward thrust regime to the reverse thrust regime and the airplane is operating outside the approved in-flight operating envelope for such settings. This alert would not need to be provided if the means to prevent the flightcrew from placing the power lever below flight idle while in flight is a means, such as a mechanical balk, that prevents movement of the control.

#### 4. Advisory Material for Proposed § 25.1155

FAA has drafted AC 25.1155–X, “Reverse Thrust and Propeller Pitch Settings Below the Flight Regime,” to provide guidance material on one acceptable means, but not the only means, of showing compliance with proposed § 25.1155. This document is available in the docket. Comments to the proposed AC may be submitted via the instructions on the “Aviation Safety Draft Documents Open for Comment” web page at [http://www.faa.gov/aircraft/draft\\_docs/](http://www.faa.gov/aircraft/draft_docs/).

#### H. Cowling and Nacelle Skin—§ 25.1193(e)(3)

##### 1. Overview of Proposed § 25.1193(e)(3)

Currently, paragraph (e)(1) of § 25.1193, “Cowling and nacelle skin,” requires that each airplane be designed and constructed so that no fire originating in any fire zone can enter, either through openings or by burning through external skin, any other zone or region where it would create additional hazards. Section 25.1193(e)(2) requires each airplane meet § 25.1193(e)(1) with the landing gear retracted (if applicable). Section 25.1193(e)(3) states each airplane must have fireproof skin in areas subject to flame if a fire starts in the engine power or accessory sections.

FAA proposes to revise § 25.1193(e)(3) to maintain the existing fireproof requirement for cowling and nacelle skin for in-flight operations and for ground operations where not containing the effects of a fire could result in serious hazards. Proposed § 25.1193(e)(3) would provide a less stringent requirement for ground operations where not containing the effects of a fire is found not to create any additional hazards.

The proposed revision of § 25.1193(e)(3) would eliminate the need for FAA to continue to make an ELOS finding during the certification process of a new airplane design to address this situation and would adopt ARAC recommendations<sup>88</sup> to harmonize with the corresponding EASA CS.

## 2. Background of Proposed § 25.1193(e)(3)

Section 25.1193(e)(3) currently requires the cowl and nacelle skin surrounding engine fire zones,<sup>89</sup> and any other airplane skin areas subject to flame during engine fire conditions, to be fireproof regardless of the level of hazard created by burning through those areas. The purpose of § 25.1193(e)(3) is to prevent a fire from exiting the engine or APU fire zones except through ventilation openings designed for this purpose. This requirement allows the behavior of the fire control features (including fire containment, detection, and extinguishing) to be reliably predicted based on the assumption that the engine cowls will remain intact and will not burn through. This serves to protect other parts of the airplane from unanticipated impingement of flames and hot gases, and to ensure the fire detection and extinguishing systems will function as designed so fire can be detected and controlled.

FAA has allowed, via ELOS findings,<sup>90</sup> some wing strut mounted and fuselage tail mounted turbofan engine nacelles to be fireproof for only a defined sector of, rather than the entire, engine fire zone or nacelle surface. In making these ELOS findings, FAA has determined the required size of the fireproof sector based on airflow characteristics data generated by the airframe manufacturer during flight and ground tests of the proposed design. The airflow data validates, for the anticipated airplane angles of attack, speeds, and configurations, that an engine fire penetrating the other areas of the nacelle would not impinge upon the wing, tail, or other critical systems or structure. Conditions for such approvals address in-flight safety of the airplane, including maintaining the functionality of the fire detection and control features during a fire event, as well as safety during ground operations, including emergency evacuation.

Per FAA policy,<sup>91</sup> an applicant may request an ELOS finding justified by compensating factors that provide an equivalent or higher level of safety by complying with draft ARAC recommended revisions to § 25.1193(e). The § 25.1193(e) ARAC recommendations retain § 25.1193(e)(1) and (2) as they currently exist, and revise § 25.1193(e)(3) to provide a less stringent requirement for ground operations. An attachment to the June 14, 2005, FAA letter to ARAC allows applicants to use the ARAC report titled “§ 25.1193(e) Cowl Skin Fire Protection,” dated July 7, 2000, in their

request for an ELOS finding in lieu of direct compliance with § 25.1193(e)(3).

## 3. Discussion of Proposed § 25.1193(e)(3)

The proposed revision of § 25.1193(e)(3) would require cowl and nacelle skin to be fireproof in only critical areas of the airplane during ground operation. As described in AC 25.1193–X paragraph 6.3.1, a copy of which is included in the docket, critical areas would be those areas where not containing the effects of a fire could result in serious hazards to the aircraft and injuries to crew, passengers, or ground personnel. For areas of the cowl and nacelle skin that are not critical for containing the effects of a fire during ground operation, the proposed rule would allow those areas to be either fire resistant or compliant with the current requirements of § 25.1193(e)(1). The proposed rule would retain the current § 25.1193(e)(3) “fireproof” requirement for cowl and nacelle skin during in-flight operations because not containing the effects of a fire in flight could have the greatest hazard potential to the airplane or prevent continued safe flight and landing.

## 4. Advisory Material for Proposed § 25.1193(e)(3)

FAA has drafted AC 25.1193–X, “Cowling and Nacelle Skin,” to provide guidance material on one acceptable means, but not the only means, of showing compliance with proposed § 25.1193. This document is available in the docket. Comments to the proposed AC may be submitted via the instructions on the “Aviation Safety Draft Documents Open for Comment” web page at [http://www.faa.gov/aircraft/draft\\_docs/](http://www.faa.gov/aircraft/draft_docs/).

### I. Powerplant and Auxiliary Power Unit (APU) Instruments—§ 25.1549

#### 1. Overview of Proposed § 25.1549

Currently, § 25.1549<sup>92</sup> provides the flightcrew awareness of powerplant and APU operating conditions by requiring a visual reference of applicable limits directly on the instruments. The requirements of § 25.1549 also associate the colors green, yellow, and red with specific types of conditions.

FAA proposes to revise § 25.1549 to provide awareness of powerplant and APU operating conditions that are within normal limits, within precautionary limits, and outside of normal limits, as applicable. The proposed § 25.1549 would allow flexibility for manufacturers to provide awareness of powerplant and APU operating conditions based on required

flightcrew action necessary to maintain continued safe operation by reference to § 25.1322. Proposed § 25.1549 would also allow manufacturers flexibility to use colors other than green to denote normal operating conditions. Lastly, proposed § 25.1549 would require manufacturers to provide any additional information needed by maintenance personnel when following the instructions for continued airworthiness required by § 25.1529, “Instructions for Continued Airworthiness” and § 25.1729 “Instructions for Continued Airworthiness: EWIS.”

FAA has been accepting compensating factors through ELOS findings<sup>93</sup> under § 21.21 on numerous certification projects that allow for modern electronic displays of certain powerplant and APU parameters that incorporate a digital-only presentation, the use of a color other than the required color green, or both. Adopting proposed § 25.1549 would simplify the certification process for applicants and FAA by eliminating the need to make an ELOS finding.

## 2. Background of Proposed § 25.1549

The requirements of § 25.1549 were originally developed based on earlier technology using analog radial dial or linear gauge instruments to display powerplant and APU parameters on the flightdeck. Section 25.1549 currently requires certain markings on the instruments in order to provide flightcrew awareness of powerplant and APU operation. The reliance on automated control systems in modern turbine engines and APUs decreases the need for flightcrew awareness of some powerplant and APU operating conditions. For these conditions, it may not be necessary to provide the flightcrew with all of the information in the instrument marking requirements of § 25.1549. The current requirements of § 25.1549 for powerplant and APU instruments are prescriptive and do not allow airplane manufacturers flexibility to innovate powerplant and APU instrument displays. Airplane manufacturers have requested an ELOS finding under § 21.21 for modern electronic displays in designs that did not directly comply with the requirements of § 25.1549.

ARAC proposed an alternative recommendation to § 25.1549(b) that would require each normal operating range to be readily indicated to the flightcrew by use of markings, colors, color changes, or other means.<sup>94</sup> The ARAC recommendation does not fully account for past ELOS findings to § 25.1549 and does not provide enough flexibility for applicants because it only

addresses markings for normal operating conditions under § 25.1549(b). The ARAC recommendation also does not provide a clear objective requirement.

The Aerospace Industries Association (AIA) Powerplant Indications Task Team (PITT) was formed July 2001 in response to an FAA task raised at the ARAC Powerplant Installation Harmonization Working Group in October 2000 to investigate a number of concerns related to powerplant indications. The AIA PITT issued a report<sup>95</sup> in 2014 in response to the tasking that included recommendations to revise § 25.1549 to align with ELOS findings and to allow for alignment with the requirements of § 25.1322, “Flightcrew alerting.” The AIA PITT Report also discussed the inadequacy of the current prescriptive § 25.1549 and undue burden of routine ELOS findings.

FAA has received a number of industry requests for ELOS findings,<sup>96</sup> under § 21.21(b)(1), to incorporate a digital-only presentation of certain powerplant and APU parameters, to use a color other than the color green, or both. This has led FAA to conclude § 25.1549 may be outdated. In addition, processing numerous IPs and ELOS findings to certify current airplane designs is a burden on both industry and FAA.

### 3. Discussion of Proposed § 25.1549

FAA proposes to revise § 25.1549 to allow applicants flexibility in design, while still providing flightcrews with the necessary awareness of powerplant and APU operating conditions. The proposal would include the considerations recommended by the AIA PITT Report to increase flexibility, align with § 25.1322, and eliminate the need for ELOS findings. The proposal would address the ARAC recommendation to eliminate the need for ELOS findings, though the proposal differs from the ARAC recommended language, as previously discussed.

This proposal maintains the original intent of § 25.1549 by requiring the airplane design to provide flightcrew awareness of any propulsion and APU operating condition with operating limits requiring flightcrew action necessary to maintain continued safe operation. This includes awareness of applicable normal operating conditions and operating outside of applicable normal limits.

Proposed § 25.1549 would allow the continued use of the color green for displaying normal operating conditions, as well as the use of other colors when the design consistently uses the same colors for displaying normal operating conditions. FAA’s proposal does not

specify a specific color, only that the design displays colors are consistent with colors used for normal operation for other airplane systems.

Proposed § 25.1549(b) would require the design to provide any additional information on powerplant and APU operating conditions needed for maintenance personnel to evaluate each powerplant and APU installation according to the ICA required by §§ 25.1529 and 25.1729. The removal of prescriptive powerplant and APU instrument marking requirements may make information unavailable to maintenance personnel needed to support powerplant and APU maintenance. The proposed rule is intended to ensure the design provides any information on powerplant and APU operating conditions needed by maintenance personnel when following the ICA, even if the flightcrew does not need to be aware of the same information to maintain safe flight.

The proposed rule is also intended to align powerplant and APU operating awareness with the flightcrew alerting requirements of § 25.1322. Any information the design provides to comply with § 25.1549 would also be required to meet § 25.1322.

An important difference between the existing § 25.1549 and the proposed § 25.1549 is how the requirements would be grouped. The existing § 25.1549 has marking requirements for each powerplant and APU instrument in four paragraphs: (1) each maximum and minimum safe operating limit, (2) each normal operating range, (3) each takeoff and precautionary range, and (4) each speed range that is restricted because of excessive vibration stresses. The proposed § 25.1549 for powerplant and APU operating awareness would have three paragraphs: (1) information needed for the flightcrew to identify operating limits and take necessary action, (2) any additional information needed for maintenance personnel to identify normal operation according to the ICA required by §§ 25.1529 and 25.1729, and (3) displaying flightdeck information.

The proposed § 25.1549 would maintain grouping requirements based on normal limits for each powerplant and APU installation but differ by grouping remaining requirements for all other operating conditions using the phrase “outside of normal limits.” Therefore, the current requirements of § 25.1549(c) for each takeoff and precautionary range and of § 25.1549(d) for each engine, APU, or propeller speed range that is restricted because of excessive vibration stresses would be considered outside of normal limits

under the proposed § 25.1549; it is unnecessary to explicitly state these conditions in the regulation.

Furthermore, FAA considers the takeoff range separate from the normal operating range in the current § 25.1549(b) and would consider the takeoff range as outside of normal limits under the proposed § 25.1549(a)(2), (a)(3), and (c)(2), if applicable to the design. FAA considers the precautionary range separate from the normal operating range in the current § 25.1549(b) and would consider the precautionary range as outside of normal limits under the proposed § 25.1549(a)(2), (a)(3), and (c)(2), if applicable to the design. The proposed change to effectively include any applicable takeoff range, precautionary range, and each engine, APU, or propeller speed range that is restricted because of excessive vibration stresses as outside of normal operating limits would modernize the requirements of § 25.1549 and make them more consistent with the flightcrew alerting requirements of § 25.1322.

The proposed § 25.1549(c) would also allow manufacturers flexibility for the design to use colors that are consistent with colors used for normal operation of other airplane systems when operating within normal limits. The proposed § 25.1549(c) would also require the flightdeck information displayed outside of normal limits to meet § 25.1322.

In addition, proposed § 25.1549 would alleviate the need for ELOS findings to § 25.1549 for APU installations that allow unattended operation while the airplane is on the ground or limited flightcrew monitoring of APU installation parameters while in flight. The proposed APU installations where FAA has made ELOS findings related to unattended operation on the ground or limited flightcrew monitoring in flight have all incorporated features that automatically monitor APU operating conditions. These features either automatically shut down the APU when an operating parameter is exceeded or APU system fault is detected or alert the flightcrew to conditions requiring the flightcrew to shut down the APU while in flight. Because the only flightcrew actions are to shut down the APU and activate APU compartment fire extinguishing, for these designs FAA has found associated flightcrew alerting sufficient in lieu of the design providing more detailed information to the flightcrew for certain APU parameter exceedances. Proposed § 25.1549 would require the design to provide flightcrew awareness of any propulsion and APU operating

condition with operating limits requiring any flightcrew action necessary to maintain continued safe operation. Therefore, for APU installations with a high level of automatic control and monitoring, appropriate flightcrew alerting may provide sufficient information to the flightcrew to meet the requirements of the proposed § 25.1549.

#### *J. Control Markings—§ 25.1555(d)(1)*

##### 1. Overview of Proposed § 25.1555(d)(1)

Currently, paragraph (d)(1) of § 25.1555, “Control markings,” requires for accessory, auxiliary, and emergency controls that each emergency control, including each fuel jettisoning and fluid shutoff control, be colored red. FAA proposes to revise § 25.1555(d)(1) by allowing the emergency controls to either be colored red or illuminate red when a condition necessitates its use, if it has appropriate safeguards to prevent unintentional actuation while allowing its intended use and not restricting its use when needed.

Proposed § 25.1555(d)(1) is intended to allow applicants flexibility in the design of the emergency controls consistent with the agency’s flightdeck alerting philosophy and requirements and eliminate the need for FAA to make continued ELOS findings to address this topic.

##### 2. Background of Proposed § 25.1555(d)(1)

Section 25.1555(d)(1) currently requires emergency controls to be colored red. The purpose of the current requirement is twofold: (1) to reinforce flightcrew awareness that actuating emergency controls may have a permanent effect on the airplane systems and (2) to denote that failure to actuate emergency controls in accordance with a prescribed emergency procedure may jeopardize continued safe flight and landing.

The § 25.1555 requirements were originally developed for traditional flightdeck designs with mechanical controls that did not present as much information to the flightcrew as a modern flightdeck. For these traditional designs, flightcrews were expected to extract, or pull, information from all indications available. As more information and automation were added to flightdecks, flightcrew capability to process information presented to them became more challenging. Flightdecks evolved to “push” information to the flightcrew, leading to the so-called “quiet and dark flightdeck” design philosophy. Under this philosophy, indications and controls in the

flightdeck are subdued or consistently dark unless flightcrew awareness and subsequent action become necessary. The purpose is to provide the flightcrew with the correct balance of information necessary to appropriately manage the airplane by providing an enhanced interface through reduced workload and greater awareness.

FAA has made ELOS findings<sup>97</sup> in several past airplane certification programs that allow the emergency controls to illuminate red during emergency conditions, in lieu of being colored red, when the control also has means to prevent inadvertent operation. ARAC recommended<sup>98</sup> an alternative to § 25.1555(d)(1) that would require emergency controls be red under all conditions where the control is intended to be used; however, the ARAC recommendation does not fully account for designs meeting past ELOS findings. The ARAC recommendation does not address the potential for inadvertent operation of a control when it is not red.

##### 3. Discussion of Proposed § 25.1555(d)(1)

FAA has received a number of industry requests for ELOS findings to incorporate emergency controls that illuminate red during emergency conditions, in lieu of the § 25.1555(d)(1) requirement emergency controls be colored red. FAA has determined such designs provide an ELOS to § 25.1555(d)(1) and has issued an ELOS finding for several certification projects under § 21.21(b)(1). The current regulation is inconsistent with the “quiet and dark” flightdeck design philosophy. In addition, processing repetitive ELOS findings for the same general issue involving a single regulation imposes a burden on both FAA and industry.

This proposal would maintain the original intent of § 25.1555(d)(1) by requiring the airplane design to provide flightcrew awareness of any emergency conditions requiring flightcrew action necessary to maintain continued safe operation. The proposal would also require, if the applicant chooses to incorporate emergency controls that illuminate red rather than are always colored red, the emergency controls employ an appropriate means to inhibit or prevent operation if the emergency control is unintentionally manipulated, but not completely restrict its use if needed. This condition is necessary because during the times the control is not illuminated red, the flightcrew has less obvious indication it is an emergency control. The design means to inhibit or prevent operation in non-

emergency situations would prevent accidental selection or improper operation by flightcrew.

##### 4. Advisory Material for § 25.1555(d)(1)

FAA has drafted AC 20–175A, “Controls for Flightdeck Systems,” to provide guidance material on one acceptable means, but not the only means, of showing compliance with proposed § 25.1555(d)(1). This document is available in the docket. Comments to the proposed AC may be submitted via the instructions on the “Aviation Safety Draft Documents Open for Comment” web page at [http://www.faa.gov/aircraft/draft\\_docs/](http://www.faa.gov/aircraft/draft_docs/).

#### *K. Carriage of Authorized Persons on All-Cargo Airplanes—§§ 25.797 and 25.857(e)*

##### 1. Overview of Proposed §§ 25.797 and 25.857(e)

Part 25 currently has no regulations for carriage of authorized persons<sup>99</sup> on all-cargo airplanes. Paragraph (e) of § 25.857 states that a Class E cargo compartment is one on airplanes used only for the carriage of cargo. Paragraph § 25.857(e) excludes aircraft that carry persons other than crew. FAA proposes to add a new § 25.797 to provide safety requirements for carriage of persons other than crew on all-cargo airplanes, in lieu of multiple passenger-safety requirements. FAA also proposes to revise paragraph § 25.857(e) to allow certain authorized persons to be carried on airplanes with Class E cargo compartments if the requirements of the new § 25.797 are met.

In past airplane certification programs, FAA granted exemptions<sup>100</sup> from § 25.857(e) and other passenger-safety requirements to permit carriage of certain authorized persons on all-cargo airplanes. In the majority of approved configurations, the authorized persons are seated in a compartment located just behind the flight deck and forward of the Class E cargo compartment. In rare circumstances, an applicant petitions for an exemption to seek approval of a configuration that allows the authorized persons to be seated within the Class E cargo compartment, usually for the purpose of handling live animal cargo. The proposed rules would be consistent with the typical limitations and conditions FAA has required in these exemptions with the exception of this rare circumstance. FAA has determined permitting authorized persons to be seated within the Class E cargo compartment is not warranted and would still require an applicant to petition for an exemption.

## 2. Background of Proposed §§ 25.797 and 25.857(e)

Part 25 certification regulations identify occupant safety requirements for “flightcrew,” “crew,” “flight attendants,” and “passengers.”<sup>101</sup> Therefore, FAA applies the passenger safety provisions in part 25 for non-crew members on all-cargo airplanes because they do not meet the definition of “flightcrew,” “crew,” or “flight attendants.” All-cargo airplanes, including those with Class E cargo compartments, do not include a passenger cabin, and thus do not include many of the safety systems FAA regulations require for passengers such as: the aisle, passageway, emergency exit markings and doors and assist means (escape slides), emergency lighting, and supplemental oxygen equipment. The all-cargo airplanes typically include a seating area located just aft of the flight deck and forward of the Class E cargo compartment. In the majority of cases, the occupancy of this compartment is for a small number of people.

The current requirements of § 25.857(e), amendment 25–142, permit only the carriage of cargo, and no passengers, when a Class E cargo compartment is installed on the airplane. Class E cargo compartments are separate from the flightdeck and encompass most of the interior of the airplane. In the case of a fire that might occur in a Class E cargo compartment, the primary means of control is to starve the fire of oxygen and is accomplished by shutting off ventilating airflow. Additional operational mitigations include depressurizing the airplane and maintaining an altitude that does not support combustion. Due to this emergency depressurization procedure, § 25.857(e) does not permit passengers on airplanes with Class E cargo compartments.

Section 121.583 permits the certificate holder to authorize carriage of certain persons (authorized persons) without compliance to the passenger-carrying requirements of part 121. However, § 121.583 does not address various passenger safety features absent in all-cargo airplanes. This leaves a gap between the type certification requirements of part 25 and the operational rules of part 121. In order to bridge that gap, FAA has been providing relief from various part 25 passenger safety requirements through the issuance of exemptions<sup>102</sup> that become part of the certification basis of the airplane type design.

Cargo operators have identified the need, at times, to carry a small number

of certain authorized persons on cargo flights. Allowing the carriage of certain authorized persons aboard cargo flights enables the cargo operator to optimize the utility of its airplanes at some airports because authorized persons are familiar with specific cargo and aware of potential safety issues inherent to the carriage or the loading and off-loading of that cargo. For example, when live animals such as horses are carried as cargo, animal handlers seated forward of the Class E cargo compartment need to be able to access the Class E cargo compartment to care for the animals in-flight to maintain the animals’ health and comfort. Therefore, certain authorized persons are seen by FAA and industry as a benefit to the safety and efficiency of air cargo operations.

As previously noted, FAA has granted several exemptions to the part 25 requirement for “cargo only,” to allow the carriage of a small number of authorized persons if certain conditions and limitations are followed. These conditions and limitations are intended to make it safe to carry authorized persons on all-cargo flights. These exemptions require changes to the airplane flight manual to limit the occupancy of the airplane and require specific training and briefings for authorized persons. The exemptions limit the persons carried to those persons authorized by § 121.583(a). The exemptions have typically required the airplanes to include specific emergency equipment, warning systems to alert authorized persons of hazards including in-flight fire, decompression and turbulence, an acceptable escape system such as ropes or inertia escape reels or slides, and the authorized persons to be physically able to use the escape systems.

## 3. Discussion of Proposed §§ 25.797 and 25.857(e)

This proposal would reduce the need for FAA to grant exemptions to permit authorized persons aboard all-cargo airplanes with Class E cargo compartments. This would provide a benefit to applicants and FAA by reducing certification project hours. Several proposed type design requirements and associated operational procedures and limitations together would provide an acceptable level of safety for authorized persons onboard all-cargo airplanes. This proposed rule would improve FAA and industry standardization and will better align FAA’s certification rules with its operating rules. This proposed rule would retain the design features and operational procedures and limitations of previously issued exemptions to

ensure the safety of authorized persons onboard all-cargo airplanes in the event of an emergency, such as a cargo fire or decompression.

### a. Operational Considerations and Airplane Flight Manual Limitations

For operation under part 121, § 121.583 provides operational requirements for carriage of persons authorized by the certificate holder without complying with certain passenger-carrying airplane requirements. Section 121.583(a) lists categories of persons that can be authorized. Section 121.583(c) requires all such authorized persons have been orally briefed before each takeoff. Section 121.583(d) requires each certificate holder operating an airplane carrying persons covered by § 121.583(a) to incorporate procedures for the safe carriage of such authorized persons into the certificate holder’s operations manual. Similarly, for operations under parts 125 and 135, §§ 125.331 and 135.85 provide for carriage of authorized persons without complying with certain passenger-carrying aircraft requirements.

As mentioned in the background and discussion above, a gap currently exists between the part 25 airworthiness certification requirements and any required specific procedures, instructions, and briefings not contained in the applicable guidance pertaining to the safe carriage of authorized persons. Currently, these requirements are only found within the conditions and limitations contained within a grant of exemption. Applicable guidance for §§ 121.583, 125.331, and 135.85 is in FAA Order 8900.1 and AC 120–85, “Air Cargo Operations,” which include additional information specifically for all-cargo operational procedures, instruction, or briefings for safe carriage of non-crew persons where certain passenger-carrying airplane requirements are not met. The guidance includes items such as specifying physical capabilities, instructions, and a provision for aircraft familiarization to allow compliance with applicable part 25 airworthiness certification requirements. For example, the procedures would include providing the authorized persons instruction in the use of the emergency equipment, including evacuation assist means. These procedures would be contained in FAA-approved or accepted operators manuals required by the operating rules.

The proposed § 25.797(a) would require the applicant to specify limitations in the airplane flight manual for the type and the maximum number of authorized persons that can be

carried aboard the all-cargo flight. Though FAA does not specify a maximum number of authorized persons, the primary intent is to support an all-cargo operation and not to transport people. Applicants would be expected to limit occupancy of authorized persons in order to minimize the risk exposure.

To ensure the safety of the authorized persons, the proposed text would also require the airplane flight manual to prohibit occupancy of the cargo compartment during taxiing, takeoff, and landing and include operating procedures for briefing the occupants on appropriate emergency procedures, the meaning of all required alerts, and the limitation that access to the Class E cargo compartment is prohibited during taxiing, takeoff, and landing.

#### b. Passenger Information Signs

Section 25.791(b), amendment 25–153, requires lighted passenger information “fasten seat belts” signs, operable by the flightcrew and visible to seated passengers, to inform seated passengers when corresponding actions are required. The seating locations for authorized persons on all-cargo airplanes are not typical passenger cabins and may not have a practical means to provide lighted “fasten seat belts” signs. The proposed § 25.797(b) would require a flightcrew-operated alert system in lieu of § 25.791(b), allowing the crew, when necessary, to inform authorized persons to return to their seats and fasten their seat belts. The authorized persons would receive instructions and briefings on these alert systems in accordance with §§ 121.583, 125.331, and 135.85.

#### c. Emergency Exits

Section 25.807(g)(1), amendment 25–114, requires at least one Type IV or larger overwing exit in each side of the fuselage or, if overwing exits are not provided, at least one exit in each side that meets the minimum dimensions of a Type III exit. In addition, § 25.807(i)(1), amendment 25–114, requires for airplanes with a passenger seating configuration of nine or fewer seats, a ditching exit meet the minimum size for a Type IV exit. Some cargo airplane configurations are equipped with a crew entry door that meets the requirement of a Type III exit on the left-hand side of the airplane. However, in many cases, the right-hand side of the all-cargo airplane does not have a Type III exit. FAA has accepted the right-hand flight deck window to serve as this right-hand emergency exit, provided the opening mechanism is modified to be openable from the outside and a

demonstration is required to show the flightdeck window is a usable exit. The proposed § 25.797(c) would allow relief from § 25.807(g)(1) and (i)(1) if the flightcrew exits designated for use by authorized persons are openable from the inside and the outside, and the exits be demonstrated as a useable exit by test. If configurations are requested for more than 9 authorized persons, the applicant would be required to meet the applicable emergency exit requirements of § 25.807 or could petition for an exemption from the applicable paragraphs of § 25.807.

If an applicant requests certification of the aircraft for ditching, § 25.1411(d)(2) requires life rafts be stowed near exits through which the rafts can be launched. In some past design projects, applicants have proposed designs for life rafts that do not fit through the flightdeck window proposed as an exit. If life rafts must be installed for flights over water, they must be of a design that can be launched out any one of the exits, including the right-hand flightdeck window if proposed as an exit, to meet § 25.1411(d)(2). In the past, FAA typically has included this as a condition in grants of exemption to accommodate authorized persons, to ensure applicants appropriately have complied, even though this is a requirement of the current regulations that were not exempted. FAA is not proposing any change to the regulations as compliance with § 25.1411(d)(2) is sufficient to ensure a functional life raft design.

#### d. Emergency Exit Arrangement

Section 25.809(a), amendment 25–116, requires means be provided at each emergency exit to permit viewing of the likely areas of evacuee ground contact. This requirement is intended to ensure evacuees can make good decisions about the safest exit to use, in the event of hazards on the ground, prior to evacuation. The type of assist means (e.g., slide, rope, inertia reel) determines the evacuee ground contact area. The emergency evacuation assist means for authorized persons and crew on all-cargo airplanes frequently includes escape ropes and inertia reels, for which the ground contact area is directly below the exit. Viewing of evacuee ground contact area directly below the exit is often blocked by the curvature of the fuselage.

As discussed in section III.D. of this NPRM, FAA proposes to revise § 25.809(a) to remove the requirement to permit viewing of the likely areas of evacuee ground contact for flightcrew exits. For all-cargo airplanes with

carriage of a small number of authorized persons, FAA has determined, in the course of its analysis of previous petitions for exemption,<sup>103</sup> a fuselage-mounted emergency egress light should be installed to light the ground contact area, which provides an acceptable level of safety in lieu of the § 25.809(a) requirement to see the likely area of ground contact area from the emergency exit. To provide the illumination required in the area on the ground, the proposed § 25.797(d) would require a means such as a fuselage-mounted emergency egress light be installed to light the ground contact area. Existing § 25.812(g) provides requirements for illumination levels for exterior emergency lighting.

#### e. Assist Means

Section 25.810(a)(1), amendment 25–114, requires the passenger emergency exits be equipped with a self-supporting slide or equivalent assist means. All-cargo airplanes are often designed with only one emergency exit door on the left-hand side of the airplane, and a hatch or window exit located in the flightdeck to provide egress on the right-hand side. Flightcrew exits that are hatches or windows often have ropes or inertia reels with harnesses as the egress means rather than escape slides. The carriage of non-crew persons on these airplanes means the non-crew persons must be able to use these egress means normally used only by flightcrew. In order to establish an acceptable level of safety, the proposed § 25.797(e) would require FAA-approved evacuation means to be provided for each occupant, and proposed § 25.797(c) would require the applicant demonstrate the proposed left-hand and the right-hand emergency exits provide an acceptable means to allow rapid evacuation, using the assist means proposed for authorized persons, in addition to the flightcrew. These demonstrations would include the harnesses (if used with the inertia reels) and the range of occupants intended to use the assist means.

#### f. Authorized Persons Seats Located Near Emergency Exits

Section 25.812(e), amendment 25–128, requires floor proximity emergency escape path marking in the passenger areas of the airplane. The purpose of § 25.812(e) is to ensure passengers can make their way to exits when visibility in the cabin above the floor is obscured, whether by smoke or loss of normal airplane lighting in the cabin. Because of the limited area of the seating area and the short distance(s) to the emergency exits, the lack of the floor proximity emergency escape path

marking would not adversely impact the safety of authorized persons. Section 25.812(l)(1), amendment 25–128, requires after any single transverse separation of the fuselage during crash landing, not more than 25 percent of all electrically illuminated emergency lights are rendered inoperative, in addition to the lights that are directly damaged by the separation. The purpose of § 25.812(l) is to maintain a largely functional emergency lighting system after any single transverse separation of the fuselage during crash landing.

In the proposed § 25.797(f), FAA would allow relief from § 25.812(e) and § 25.812(l) if the seats for authorized persons are near the emergency exits.<sup>104</sup> For authorized person seats in all-cargo airplanes, FAA would accept seats within three rows longitudinal distance from a required floor level emergency exit as being ‘near’ the exit. This is the same as what FAA accepts for a flight attendant seat being ‘near’ a floor level exit. Because of the limited area of the seating area and the short distance(s) to the emergency exits, this lack of floor proximity emergency escape path marking and requirements from the emergency lighting system noted above, would not adversely affect the safety of authorized persons. Therefore, the lighting to guide occupants to an exit would not be necessary. This topic is currently captured in the exemption process<sup>105</sup> and this proposed change would eliminate the recurring need to address this topic.

Section § 25.813(b), amendment 25–128, requires adequate space for certain exit types to allow crewmember(s) to assist in the evacuation of passengers. The proposed § 25.797(a)(4) would require authorized persons be instructed and briefed on how to operate the emergency exits and the assist means. FAA has determined that considering the small number of authorized persons, the size of the seating area for authorized persons, and the proximity of authorized persons to the emergency exits, the flightcrew can also provide instructions and some physical assistance to authorized persons, if needed, in lieu of a dedicated assist space. Therefore, in the proposed § 25.797(f)(3), in lieu of the assist space requirements of § 25.813(b), assist space requirements need not be met if all seats for authorized persons are near the emergency exits. This topic is currently captured in the exemption process<sup>106</sup> and this proposed change would eliminate the recurring need to address this topic.

#### g. Supplemental Oxygen and Protective Breathing Equipment

Section 25.1447(c)(1) contains several requirements for oxygen dispensing units, including automatic presentation of the oxygen dispensing units if certification for operation above 30,000 feet is requested by the applicant. For seated passengers in typical passenger airplanes, the automatic presentation of masks throughout the cabin indicates the need to don an oxygen mask. However, in seating areas for authorized persons on all-cargo airplanes, the typical features of passenger cabins are not installed, so there is often not a practical means of providing automatic presentation of masks. FAA proposes new § 25.797(g), to allow manual activation of supplemental oxygen dispensing units located within reach of the seated occupant for authorized persons, with an automatically activated aural alert, in case of a decompression, that notifies occupants of the need to don oxygen masks and initiate oxygen flow.

The proposed § 25.797(g)(1) would require the portable oxygen units be sized adequately for continuous and uninterrupted use during unpressurized flight with cabin pressure altitudes that require the use of supplemental oxygen (*i.e.*, worst-case flight duration following decompression).

To ensure adequate hypoxia protection during non-sedentary use, the proposed § 25.797(g)(2) would require portable oxygen units meet the requirements for flightcrew oxygen equipment in § 25.1443(a) or (b), or the portable oxygen units be shown to protect authorized persons from hypoxia at an activity level required to return to his or her seat following a rapid decompression to 25,000 feet cabin altitude.

Section 25.1449 states there must be a means for the crew to determine whether oxygen is being delivered to the dispensing units. However, under proposed § 25.797(g)(3), the equipment design would provide a means for authorized persons to determine that oxygen is flowing to their dispensing equipment. The design in combination with training of the authorized person would allow them to make the determination whether oxygen is being delivered to the portable oxygen dispensing equipment.

Section 25.1447(c)(1) requires an “immediately available” supply of oxygen for each person when the airplane is operating above 25,000 feet. For those designs in which persons are permitted to enter the Class E cargo compartment during flight, it is not

feasible to install the typical passenger oxygen masks. Therefore, a portable oxygen unit must be available for each person. Because the portable oxygen units may also be used for protection from smoke in the event of a fire in the cargo compartment, the proposed § 25.797(i)(2) would require the portable oxygen units also meet the protective breathing equipment requirements in § 25.1439(b)(1), (2), and (4).

To provide persons with an acceptable level of safety while they are in the Class E cargo compartment, the proposed § 25.797(k)(3) would require a placard notifying authorized persons they must carry a portable oxygen unit with a full-face oxygen mask when entering the cargo compartment. A portable oxygen dispensing unit with a full-face oxygen mask also provides a reasonable level of protection from smoke inhalation.

Section 25.1447(c)(1) requires 10 percent more oxygen masks than occupant seats. The purpose is so oxygen masks are available for children sitting on passengers’ laps and for flight attendants moving about the cabin.<sup>107</sup> Because neither children nor flight attendants will be onboard an all-cargo airplane, installing 10 percent more oxygen masks is not necessary. Therefore, proposed § 25.797(g) would not require more oxygen masks than occupants.

#### h. Communication Means

Section 25.1423(c), amendment 25–115, requires a public address (PA) system to be intelligible at all passenger seats, lavatories, and flight attendant seats and work stations. In addition, the operating rules for commercially operated airplanes in §§ 121.319 and 135.150 require PA and crewmember interphone systems for seating capacities of more than 19 passengers. These existing certification and operational rules do not address the case of an all-cargo airplane with carriage of authorized persons because a cargo compartment is not also a passenger compartment to which those requirements apply. Section 25.797(h) of the proposed rule would require applicants to install this same PA and a two-way communication means to allow for the necessary communication between the flightcrew and the authorized persons.

The proposed § 25.797(h)(1) would require a PA system to be audible for configurations that carry authorized persons in occupied compartments such as the seating area and the Class E cargo compartment. The proposed § 25.797(h)(2) would require a two-way communication means, such as an

interphone system, be installed in the seating area for the authorized persons that must be within reach of their seat.

Two-way communication means is necessary to communicate from the flight deck to the seating area, and the PA system is necessary so the flightcrew can announce necessary safety information to any location throughout the cargo airplane including the Class E cargo compartment if access is permitted during flight. The two-way communication system would be required under this proposal to be independent of the PA system, except for handsets, headsets, microphones, selector switches, and signal devices, which can be shared. The proposed requirements within § 25.797(h) for communication means are consistent with conditions that FAA has often required in part 25 exemptions<sup>108</sup> for carriage of authorized persons on all-cargo airplanes.

#### i. Access to Class E Cargo Compartments

FAA has previously granted exemptions for authorized persons to access a Class E cargo compartment in flight, provided certain conditions are met.<sup>109</sup> These conditions have varied depending on the proposed design, the number of authorized persons involved, the type of cargo proposed to be transported in the main deck Class E cargo compartment, and the number of authorized persons needed in the cargo compartment for the type of operations.

In order to be consistent with previously granted relief, minimize the exposure risk to authorized persons while in the Class E cargo compartment, and eliminate the need for future exemptions to address this situation, the proposed § 25.797(i)(1) would require in-flight access to the Class E cargo compartment be limited to a maximum of three authorized persons for the handling of hazardous or perishable cargo. For the care and handling of animals including additional cargo, in-flight access to the Class E cargo compartment would be limited to a maximum of one authorized person for every four animals. Currently, the upper limit of the number of authorized persons is determined by the design (provisions for occupant safety) and the quantity of animals carried and is not capped in the regulation. The intent of the proposed § 25.797(i)(1) is to limit the occupancy of authorized persons in order to minimize the risk exposure.

#### j. Alert Systems for Decompression, Smoke, and Turbulence

As discussed in section III.K.3.g of this NPRM, supplemental oxygen and protective breathing equipment, the

proposed § 25.797(j)(1) would require an automatic aural decompression to alert authorized persons to don their oxygen masks and initiate oxygen flow.

To ensure authorized persons with access to the Class E cargo compartment know to leave the cargo compartment in the event smoke or fire is detected in the compartment, the proposed § 25.797(j)(2) would require the installation of a visual alert that is recognizable in the Class E cargo compartment. The alert would notify authorized persons of the smoke or fire in the compartment. The alert would indicate all personnel must don their oxygen mask (and initiate flow), return to their seats, and secure the smoke barrier (*i.e.*, close the door or curtain) in the event of a fire.

To address hazards caused by moving about the airplane in turbulence, the proposed § 25.797(j)(3) would require a flightcrew-operated alert system in lieu of § 25.785(j). Section 25.785(j), amendment 25–88, requires handholds along each aisle, which could be seat backs, a handgrip, or a rail. The purpose of the requirement for handholds is to ensure that occupants have a means to steady themselves in moderate turbulence while traversing the aisles of typical passenger airplanes. An all-cargo airplane does not have aisles, and it is not feasible to require handholds in a cargo compartment as that would interfere with loading of cargo. The alert system required in proposed § 25.797(j)(3) would allow the crew to indicate, at the onset of turbulence, to persons not in their seats in such locations as the lavatory or in the cargo compartment that they must return to their seats.

The alert systems would be required to be recognized in the accessible areas such as the lavatory, the flight deck, any occupied compartment forward of the Class E cargo compartment, and the Class E cargo compartment. This topic is currently captured in the exemption process<sup>110</sup> and this proposed change would eliminate the recurring need to address this topic.

#### k. Placards

Section 25.1541 requires placards be installed for the safe operation of the airplane. The proposed § 25.797(k) would require placards be installed in a conspicuous location in the seating area for the authorized persons on or adjacent to the access means to the cargo compartment. These placards would convey the safety information listed in proposed § 25.797(k) to persons onboard the airplane regarding access to the cargo compartment and appropriate safety precautions to mitigate safety

hazards due to turbulence, smoke, and fire. The requirement for these placards are currently captured in the exemption process<sup>111</sup> and this proposed change would eliminate the recurring need to address this topic.

#### 1. Smoke Penetration

Section 25.857(e)(4) requires, for class E cargo compartments, the design to provide means to exclude hazardous quantities of smoke, flames, or noxious gases from the flightcrew compartment. Section 25.855(h)(2) requires flight tests to show § 25.857(e)(4) is met. To address the hazard for non-crew persons, FAA would propose § 25.797(l) to extend this exclusion requirement to all seating areas, not just the flightcrew compartment. The means by which applicants typically already provide such exclusion is a smoke barrier between the Class E cargo compartment and the occupied compartments. However, if an applicant requests approval for authorized persons to enter the Class E cargo compartment, authorized persons would open this means to gain access to the compartment. To provide an appropriate level of safety, the proposed § 25.797(k)(6) would require the applicant to install a placard indicating that the smoke barrier must be secured, (*e.g.*, the door must be closed) except when entering or exiting the cargo compartment. The proposed § 25.797(k) would require the placard be located in a conspicuous place, either on or next to the access means of the cargo compartment.

FAA is concerned about the potential for hazardous quantities of smoke, flames, and noxious gases entering the seating areas in the event of a fire on the main deck cargo compartment. The amount of smoke that would enter these areas when the smoke barrier is open while authorized persons are leaving the cargo compartment, pursuant to § 25.855, must not create a hazard to the occupants.<sup>112</sup> The sources of smoke, flames, and noxious gases must be accounted for when demonstrating compliance with § 25.855(h)(2).<sup>113</sup>

#### 4. Advisory Material for Proposed § 25.797

FAA Order 8900.1 volume 3 chapter 48, “Flight Standards Information Management System,” and AC 120–85, “Air Cargo Operations,” include guidance on the operational procedures, instruction, and briefings necessary for safe carriage of non-crew authorized persons where certain passenger-carrying airplane requirements are not met.

*L. Fuel Tank Flammability Assessment Method (FTFAM)—§§ 25.5 and 25.981 and Section N25.3 of Appendix N to Part 25*

1. Overview of Proposed FTFAM Proposed Rules

Currently, §§ 25.5, “Incorporations by reference,” 25.981, “Fuel tank explosion prevention,” and N25.3, “Fuel tank flammability exposure analysis,” of appendix N to part 25 in part, require applicants to use Report No. DOT/FAA/AR05/08, “Fuel Tank Flammability Assessment Method User’s Manual,” dated May 2008 to conduct a fuel tank flammability exposure analysis. FAA proposes to revise §§ 25.5(b)(1) and 25.981(b)(1) and section N25.3(a), (b)(5), and (d)(5) of appendix N to part 25 to instead require the use of Report No. DOT/FAA/TC–21/3, “Fuel Tank Flammability Assessment Method User’s Manual—Updated for Version 11,” dated January 2021.<sup>114</sup> The later report corrects several errors discovered in version 10 of the FTFAM.<sup>115</sup> These proposed revisions would standardize the use of the latest flammability assessment method among similar design changes in the future and eliminate the need for applicants to submit additional paperwork requesting FAA approval to use the corrected FTFAM.

2. Discussion of FTFAM Proposed Rules

The “Reduction of Fuel Tank Flammability in Transport Category Airplanes” final rule in 2008<sup>116</sup> requires, in part, the use of Report No. DOT/FAA/AR05/08. This report serves as a user’s manual for the FTFAM. The FTFAM is an FAA-developed computer model designed as a comparative analysis tool to determine airplane fuel tank flammability. Report No. DOT/FAA/AR05/08 assists the user in operation of the FTFAM and provides the permissible changes that may be made to the computer model specific to a particular fleet of aircraft, such as fuel tank thermal effects, fuel tank usage, and performance effects of flammability reduction means. The FTFAM is updated through version 10 in Report No. DOT/FAA/AR05/08.

Because FAA required applicants to use version 10 of the FTFAM, several errors have been discovered in the FTFAM computer model code, and FAA has made improvements to the code to meet specific needs of applicants to assess the flammability of unique fuel tank features. FAA included these corrections and improvements in version 11 of the FTFAM. A summary of the changes is as follows:

- The descent profile was corrected to accurately represent the descent rate that is defined in the regulation.

- The temperature lapse rate calculations were corrected to consistently utilize 3.57 degrees F/1000 feet lapse rate.

- There were additional areas in the code that were corrected or improved and had no impact on the results of the flammability analysis.

For comparative purposes, the overall effect of these changes correcting the errors over 1,000 flights, using standardized inputs, is a Flammability Evaluation Exposure Time of 55.45 percent versus 52.90 percent prior to the change.

FAA has received several requests from applicants to use version 11 of the FTFAM, the download website address<sup>117</sup> and user’s manual for which are available in Report No. DOT/FAA/TC–21/3. This proposed rule would require the use of the methodology in that report.

The proposed rule changes would apply to new type certification programs of transport category airplane designs and to amended or supplemental type certificate programs as determined under § 21.101, “Designation of applicable regulations.” In the future, applicants who want FAA certification of new airplanes under part 25 would need to follow the methods and procedures in Report No. DOT/FAA/TC–21/3 using version 11 of the FTFAM.

3. Advisory Material for FTFAM Proposed Rules

AC 25.981–2A, “Fuel Tank Flammability Reduction Means,” dated September 19, 2008, provides guidance on one acceptable means, but not the only means, of showing compliance with § 25.981, part 26 subpart D, and related airworthiness standards for transport category airplanes about limiting the time a fuel tank may be flammable or mitigation of hazards from flammable fuel air mixtures within fuel tanks. AC 25.981–2A references the FTFAM user’s manual, Report No. DOT/FAA/AR05/08. The revised AC is draft AC 25.981–2B, which would change the Report No. DOT/FAA/AR05/08 reference to Report No. DOT/FAA/TC–21/3, to be consistent with this proposed rule. The draft AC is available in the docket. Comments to the proposed AC may be submitted via the instructions on the “Aviation Safety Draft Documents Open for Comment” web page at [http://www.faa.gov/aircraft/draft\\_docs/](http://www.faa.gov/aircraft/draft_docs/).

*M. Pilot Compartment View—§ 25.773*

1. Overview of Proposed § 25.773

Currently, § 25.773, “Pilot compartment view,” at amendment 25–144, specifies various requirements for pilot compartment (*i.e.*, flightdeck) vision to allow the flightcrew to safely perform any maneuver within the operating limitations of the airplane. Section 25.773(a)(2) requires the flightdeck be free of glare or reflection that could interfere with normal duties of the minimum flightcrew established under § 25.1523, and that this be shown in day and night flight tests under non-precipitation conditions. FAA proposes to revise § 25.773(a)(2) to allow ground tests in lieu of night flight tests for previously certified airplanes, where changes to the flightdeck are not expected to produce an appreciable effect on the pilot compartment view, glare, or reflection. In past airplane certification projects, FAA has made ELOS findings<sup>118</sup> allowing applicants to perform ground tests in lieu of night flight tests, if conditions can be met that simulate a dark flightdeck equivalent to a night environment. Adopting proposed § 25.773(a)(2) would eliminate the need to develop an IP and issue an ELOS finding for future certification projects.

Section 25.773(b)(1) currently requires that the airplane have a means to maintain a clear portion of the windshield during precipitation conditions, sufficient for both pilots to have a sufficiently extensive view along the flight path in normal flight attitudes. To maintain consistency with § 25.773(a)(1) and previously issued SCs that allow a hydrophobic coating in lieu of windshield wipers, FAA is proposing to revise this section to instead require a sufficiently extensive view for all operations within the operating limitations of the airplane, including taxiing, takeoff, approach, and landing.

In addition, FAA is proposing to revise § 25.773(b)(1)(ii) to require the means to maintain a clear portion of the windshield be designed to function, without continuous attention by the crew, in light precipitation conditions at speeds normally encountered during ground operations. The current requirements of § 25.773(b)(1)(ii), which prescribe pilot compartment view requirements in icing conditions, would be maintained, but moved to new § 25.773(b)(1)(iii). In addition, adopting proposed § 25.773(b)(1)(ii) would eliminate the need to develop an IP and issue SCs for use of hydrophobic coatings in lieu of windshield wipers in future airplane certification projects.

## 2. Discussion of Proposed § 25.773

Section 25.773 applies to any installed equipment that might obstruct the pilots' view or produce glare and reflection within the flightdeck. Flightdeck glare and reflections can be introduced by a number of sources including sunlight reflecting from flightdeck displays, instruments, or even the flightcrew's clothing. At night, such sources may include airfield and other external lighting in addition to the flightdeck displays and installed equipment.

FAA has made ELOS findings for applicants seeking to do ground tests in lieu of night flight tests to show compliance with § 25.773(a)(2) for proposed designs on previously certificated airplanes. In these ELOS findings, FAA required applicants to provide a dark flightdeck equivalent to a night environment. For most changes to the flightdeck, a ground test will provide equivalent validation to a night flight to ensure the pilot compartment view meets the requirement of § 25.773(a)(2) in non-precipitation conditions. However, under proposed § 25.773(a)(2), night flight tests would still be required for newly certificated airplanes and for changes to the flight deck that may produce any appreciable effect on the pilot compartment view glare or reflection based on service history or previous flight test results. In addition, if the test pilot notes any significant glare or reflection during the proposed ground test, then further evaluation in a night flight test would be required.

Applicants seeking FAA certification of a new airplane design would be required to comply with the existing night flight tests requirement to establish a baseline for acceptability of pilot compartment vision. For changes to the flightdeck for any previously certificated airplane, the proposed rule would permit applicants to perform a ground test in lieu of a night flight test if they demonstrate, by analysis or similarity, the change has no appreciable effect on the pilot compartment view, glare, or reflection, based on service history or previous flight test results. Changes that introduce no appreciable effect may be reconfiguration or changes to internal lights, alerts or annunciations, hardware, or heads down displays. Night flight tests would still be required for changes to the flightdeck where it would be impractical or impossible to determine the acceptability of glare or reflection from a ground test. Examples of such changes could be installation of flightdeck windshields, transparent

displays, external lighting modifications, exhaust signatures that have the potential to impact views, and any installation involving night vision imaging systems.

In addition, FAA has issued SCs<sup>119</sup> in past airplane certification programs where the applicant proposed hydrophobic windshield coatings rather than mechanical windshield wipers. Currently, § 25.773(b)(1) requires a means to maintain a clear portion of the windshield, sufficient for both pilots to have a sufficiently extensive view along the flight path during precipitation conditions. The regulations require a means to maintain such an area during precipitation in heavy rain at speeds up to 1.5 V<sub>SR1</sub>. Hydrophobic windshield coatings depend to some degree on airflow to maintain a clear vision area. The heavy rain and high-speed conditions specified in the current rule have traditionally been most critical for technologies such as windshield wipers, but do not necessarily represent the limiting condition for this new hydrophobic coating technology. For example, airflow over the windshield, which may be necessary to remove moisture from the windshield, may not be adequate to maintain a sufficiently clear area of the windshield in low-speed flight or during surface operations. Alternatively, airflow over the windshield may be disturbed during such critical times as the approach to land, where the airplane is at a higher-than-normal pitch attitude. In these cases, areas of airflow disturbance or separation on the windshield could cause failure to maintain a clear vision area on the windshield. In addition to meeting the heavy rain and high-speed conditions in the existing regulation, these SCs typically require the applicant to assess more critical operational and environmental conditions and to comply with §§ 25.603, 25.773, 25.1501, and 25.1529 specifically for hydrophobic coatings.

FAA proposes to revise § 25.773(b)(1) to make it consistent with § 25.773(a)(1) by requiring a sufficiently extensive view for all operations within the operating limitations of the airplane, including taxiing, takeoff, approach, and landing, and to add additional light precipitation conditions to § 25.773(b)(1)(ii), making it consistent with previously issued SCs. Light precipitation conditions may include mist, drizzle, and light rain. This proposed rule would eliminate the need to issue SCs for new certification projects that use a hydrophobic windshield coating instead of mechanical windshield wipers. As a result of proposed § 25.773(b)(1)(ii),

FAA proposes to maintain the text, but move the requirements in current § 25.773(b)(1)(ii) and its subparagraphs, which cover consideration of various icing conditions, to § 25.773(b)(1)(iii).

## 3. Advisory Material for Proposed § 25.773

FAA has drafted Policy Statement, PS-AIR-25.773-01, "Night Testing Requirements for Reflection or Glare in the Flightdeck," to provide guidance on ground test conditions that may be used in lieu of night flight tests for certain proposed changes to the flightdeck and specify circumstances that may require further scrutiny of changes during ground tests and lead to further testing (including night flight tests) if there is ambiguity concerning the amount or effects of glare or reflection.

FAA has drafted Policy Statement PS-AIR-25-31, "Use of Hydrophobic Coating in lieu of Windshield Wipers" to provide additional guidance that may be used when hydrophobic coatings are used in lieu of windshield wipers.

These documents are available in the docket. Comments on these proposed policy documents may be submitted via the instructions on the "Aviation Safety Draft Documents Open for Comment" web page at [http://www.faa.gov/aircraft/draft\\_docs/](http://www.faa.gov/aircraft/draft_docs/).

## N. Medical Stretchers—§ 25.785(b)

### 1. Overview of Proposed § 25.785(b)

Currently, § 25.785(b) requires seats and berths to meet the requirements of § 25.562, "Emergency landing dynamic conditions." Section 25.562 specifies dynamic test conditions for assessment of occupant injury, as well as structural criteria. The reason for implementation of § 25.562 was to provide an overall increased level of passenger safety by reducing serious injuries that would affect passengers' ability to evacuate the aircraft in a survivable accident. FAA proposes to revise paragraph (b) of § 25.785, "Seats, berths, safety belts, and harnesses," to except berths intended only for carriage of medical patients (*i.e.*, medical stretchers) from the requirements of § 25.562.

FAA has granted several exemptions<sup>120</sup> to the required emergency landing conditions of § 25.562 to allow installation of medical stretchers. This proposal would (1) eliminate the need to process exemptions and (2) harmonize with the corresponding EASA airworthiness standard.

### 2. Discussion of Proposed § 25.785(b)

As mentioned above, FAA has granted several exemptions to the emergency

landing conditions of § 25.562 to allow installation of medical stretchers. FAA recognizes that stretchers for medical use were not considered in defining § 25.562 in the part 25 amendment 25–64 effort as the test conditions and the injury criteria specified are for seated occupants, not for a non-ambulant person occupying a stretcher. In 2011, EASA proposed to remove this requirement and then published amendment 13 to CS–25 in 2018,<sup>121</sup> which removed this requirement. Though infrequent, there are circumstances where a non-ambulant person needs expedient medical attention and must be transported by air on a medical stretcher. Proposed § 25.785(b) would eliminate the requirement to comply with § 25.562 for berths carrying medical patients and harmonize with the corresponding EASA CS 25.785(b).

#### *O. Passenger Amenities—§ 25.788*

##### 1. Overview of Proposed § 25.788

Currently, part 25 regulations only address the use of glass in windshields, instrument or display transparencies, and window applications.<sup>122</sup> Part 25 regulations do not contain safety standards for installation of showers, large display panels, and large non-structural glass panels in airplane cabins. Proposed § 25.788 would add requirements for showers and large display panels and harmonize with EASA CS 25.788. The proposed rule would also add requirements for installation of large non-structural glass panels consistent with prior SCs<sup>123</sup> issued by FAA and would eliminate the need to develop an IP and issue SCs for future proposed installations.

##### 2. Discussion of Proposed § 25.788

Some proposed executive transport airplane interiors include showers. FAA's existing safety standards do not provide specific requirements or guidance for occupant safety in a shower cubicle. A shower cubicle is a completely enclosed space surrounding the area in the cabin where an occupant can take a shower. The shower cubicle must perform the basic function of retaining the water and mitigating any hazards from the water such as leakage, ventilation, and high humidity and would separate the wet area from any nearby electrical outlets. To provide shower occupants with an ELOS to the level provided by FAA design standards for other areas of the cabin, the proposed § 25.788(a) would address hazards to occupants due to turbulence and decompression and prevent shower occupancy during taxiing, takeoff, and

landings. The proposed rule would require audio and visual “return to seat” indications similar to those required by § 25.791(b) and a means to steady oneself in moderately rough air. To address decompression, the proposed rule would require audio and visual indications of the need for oxygen and revise the language in § 25.1447(c)(6) to provide sufficient outlets and units of dispensing equipment in occupied areas of the cabin. This would include oxygen for shower cubicle occupants. The proposed rule would also require the design to preclude anyone from being trapped inside the shower cubicle and add a requirement for a placard to display the shower is not to be used for stowage of cargo or passenger baggage. In addition, adopting proposed § 25.788(a) would harmonize with the corresponding EASA airworthiness standard.<sup>124</sup>

Manufacturers have installed display panels (*i.e.*, video displays and monitors) in airplanes for many years, but the increasing size of display panels over time has introduced new safety risks. Proposed § 25.788(b) would require any large display panel installed in the passenger compartment to not be a hazard to occupants when submitted to a decompression, any relevant loading conditions for the cabin among the flight and ground load conditions and emergency landing conditions of subpart C of part 25, and any other loading expected in service. Any loading condition that applies a load to an item of mass in the cabin interior would be considered relevant. Adopting proposed § 25.788(b) would harmonize with EASA CS 25.788(b) for large display panels. One means to address the hazards due to the expected loads in service due to possible abuse and impact of the glass are the abuse and impact load tests provided by EASA AMC 25.788(b) or FAA AC 20–168, “Certification Guidance for Installation of Non-Essential, Non-Required Aircraft Cabin Systems and Equipment.” This rulemaking would not change the process for determining compliance or the currently accepted methods of compliance for large displays in AC 20–168. These display panels typically use a protective polycarbonate layer that covers the glass exposed to the cabin.

The proposed § 25.788(c) would apply the requirements of the proposed § 25.788(b) to large non-structural glass panel installations installed in certain areas. The proposed paragraph would require the glass, when fractured, to break only into small pieces with relatively dull edges (such as tempered or toughened glass does) as opposed to sharp or jagged shards (such as ordinary

annealed glass does). In addition, the proposed § 25.788(c) would require the design include a means to retain glass fragments. Compliance with this requirement would be shown concurrently with the proposed requirements of § 25.788(b) by showing any glass fragments are retained under the load conditions specified in § 25.788(b). In 2016, FAA began issuing SCs that required means to retain glass fragments, and applicants to account for the hazards of loose glass fragments in the airplane cabin. For the personal safety of the airplane occupants, FAA proposes to establish a general rule requiring these installations to retain glass fragments rather than fully harmonize with the EASA AMC guidance for allowing expulsion of some glass particles as noted in the advisory material paragraph of this section below. A large non-structural glass panel installation is defined to include the glass itself, the means to retain any broken glass (*e.g.*, lamination, thin film), the surrounding frame or structure holding the glass, and attachments to the airframe structure.

##### 3. Advisory Material for Proposed § 25.788

FAA would consider amendment 28 of CS–25 AMC 25.788(a) and AMC 25.1447(c)(3) as acceptable means of compliance with proposed § 25.788(a) for shower installations, and AMC 25.788(b) amendment 28 as acceptable means of compliance with proposed § 25.788(b) for installation of large display panels.<sup>125</sup> FAA has drafted Change 2 to AC 25–17A to refer to the EASA AMC for guidance. AC 20–168, “Certification Guidance for Installation of Non-Essential, Non-Required Aircraft Cabin Systems and Equipment,” also provides an acceptable means of compliance for large display panels. All of these guidance materials are available in the docket.

For installation of nonstructural glass panels, FAA would consider EASA CS–25 AMC 25.603(a) amendment 28,<sup>126</sup> which is available in the docket, as an acceptable means of compliance with proposed § 25.788(c), except that FAA guidance regarding the strength test is provided in Change 2 to AC 25–17A and replaces that part of the AMC guidance. Comments to the proposed AC may be submitted via the instructions on the “Aviation Safety Draft Documents Open for Comment” web page at [http://www.faa.gov/aircraft/draft\\_docs/](http://www.faa.gov/aircraft/draft_docs/).

##### *P. Ditching Emergency Exits for Passengers—§ 25.801(a)*

Currently, § 25.801(a) prescribes requirements for ditching emergency

exits for passengers. Proposed § 25.801(a) would correct an error created by amendment 25–88 (61 FR 57956, November 8, 1996) when FAA moved “ditching emergency exits for passengers” from § 25.807 paragraph (e) to § 25.807, “Emergency Exits,” paragraph (i). FAA also erred in not moving the cross-reference in § 25.801(a). This proposal would, in § 25.801(a), remove the CFR citation “25.807(e)” and add, in its place, the CFR citation “25.807(i).” There is no substantive change to § 25.801(a).

*Q. Emergency Egress Assist Means and Escape Routes—§ 25.810(a)(1)(ii)*

1. Overview of Proposed § 25.810(a)(1)(ii)

Currently, § 25.810 provides requirements for emergency egress assist means, which assist occupants in descending to the ground from an emergency exit. The requirements include time limits in which the assist means must be automatically erected. Section 25.810(a)(1)(ii) requires, for Type C exits, that the assist means be automatically erected within 10 seconds from the time the opening means of the exit is actuated; for non-Type C exits, it requires assist means be automatically erected within 6 seconds after deployment of the assist means is begun. The beginning of deployment of the assist means can occur any time between the time the opening means of the exit is actuated and the time the exit is fully open. The total time taken for the exit and assist means to become ready for egress, (*i.e.*, the exit is fully open and the assist means is fully erected) is more important for safe evacuation of an airplane than the portion of that time needed to deploy and erect the assist means, but the existing § 25.810(a)(1)(ii) does not provide an option to apply the performance standard for the total time (*i.e.*, 10 seconds) for non-Type C exits. This means there is no allowance for a short aggregate time from exit activation to a fully usable escape system for non-Type C exits.

2. Discussion of Proposed § 25.810(a)(1)(ii)

FAA proposes to revise § 25.810(a)(1)(ii) to include an option for the assist means installed at non-Type C exits to be ready to use within 10 seconds of actuating the exit opening means. The 10-second requirement would be more stringent than the current requirement for non-Type C exits for those exits where deployment of assist means begins more than 4 seconds after exit actuation; therefore,

FAA would retain the current standard in the proposed rule as an option for non-Type C exits.

This proposed rule would harmonize with EASA CS 25.810<sup>127</sup> to add the performance standard for the total time as an option for the non-Type C exits. ARAC recommended FAA harmonize this rule in the ARAC “Transport Aircraft Crashworthiness and Ditching Working Group Report to FAA,” Revision B, dated September 20, 2018.<sup>128</sup> This proposed rule would also eliminate the need for FAA to make ELOS findings for non-Type C exits for which the assist means are ready to use within 10 seconds of actuating the exit opening means.

3. Advisory Material for Proposed § 25.810

FAA considers EASA CS–25, AMC 25.810 amendment 28<sup>129</sup> as acceptable means of compliance with proposed § 25.810. FAA has drafted Change 2 to AC 25–17A, to refer to the EASA AMC for guidance. These documents are available in the docket. Comments to the proposed AC may be submitted via the instructions on the “Aviation Safety Draft Documents Open for Comment” web page at [http://www.faa.gov/aircraft/draft\\_docs/](http://www.faa.gov/aircraft/draft_docs/).

*R. Emergency Exit Access—§ 25.813*

1. Overview of Proposed § 25.813

Currently, § 25.813 prescribes requirements for emergency exit access. Section 25.813(c) provides access requirements for Type III and Type IV exits. FAA proposes to incorporate the terms of commonly issued ELOS findings for passageway size into § 25.813(c). FAA also proposes to harmonize the remainder of § 25.813(c) with EASA CS 25.813(c) and to remove introductory text to § 25.813 inadvertently not removed at amendment 25–88.

2. Discussion of Proposed § 25.813

Compliance with § 25.813(c)(1)(i) requires, for each Type III exit, that for interior arrangements with three-seat (triple seat) rows on the exit side of the aisle, the unobstructed passageway must be at least 20 inches wide, as measured with adjacent seats adjusted to their most adverse positions (*i.e.*, the maximum reclines and breakovers that the configuration physically permits), and the centerlines of the passageways must not be offset more than 5 inches from those of the associated exit.

However, tests conducted by FAA Civil Aerospace Medical Institute (CAMI) on evacuations through Type III exits have shown for interior

arrangements with triple-seat rows, unobstructed passageways 13 inches wide with the centerlines of the passageways offset no more than 6.5 inches from those of the exits, provide evacuation performance essentially equivalent to that obtained with the dimensions specified in § 25.813(c)(1)(i) for triple-seat rows.<sup>130</sup> FAA has issued several ELOS findings<sup>131</sup> to § 25.813(c)(1) based on this research to allow the passageway width and maximum offset to be 13 inches and 6.5 inches, respectively.

In addition, for airplanes with Type III passenger emergency exits, § 121.310(f)(3)(iii) requires airplanes type certificated after January 1, 1958, to meet the requirements of § 25.813(c), effective June 3, 1992, concerning access to those exits. However, § 121.310(f)(3)(iv) provides for the authorization of deviations, if it is determined that special circumstances would make such compliance impractical. The effect of these requirements is that for any airplane operated in part 121 for which FAA has issued an ELOS finding to § 25.813(c) for alternate passageway dimensions, FAA must approve a deviation to allow that operator to operate their airplane.

Proposed § 25.813(c) would replace the existing 20-inch passageway requirement with one of 13 inches where the passageway is bound by three-seat rows and revise the minimum offset in accordance with the CAMI evacuation testing through Type III exits noted above. This would also harmonize with current EASA CS 25.813(c). The proposed § 25.813(c) would remove the need for FAA to issue ELOS findings to § 25.813(c) and deviation letters to the operators to § 121.310(f)(3)(iii) to recognize the part 25 ELOS findings.

FAA also proposes to harmonize the remainder of the section, as well as revise the section title to “Emergency exit access and ease of operation,” with the EASA CS 25.813. This would include changing the applicability of § 25.813(c)(2) from airplanes with passenger seating configurations of 60 or more, to those with 20 or more. This proposal would also add § 25.813(c)(6) through § 25.813(c)(9). EASA added these requirements to CS–25 in amendment 9<sup>132</sup> to require design improvements and improved access to Type III and Type IV passenger emergency exits. Section 25.813(c)(6) would add a requirement for an automatically disposed Type III exit on airplanes with a passenger seating configuration of 41 or more. An automatically disposed exit is a safety enhancement over a plug style exit because the passenger does not have to

spend time determining where to put the exit door after opening it. This saves time and eliminates a potential obstacle to evacuation. Section 25.813(c)(7) would introduce requirements for design of seats and structures bounding the access path to each Type III or Type IV exit to discourage escaping passengers from climbing over seat backs and furniture into the access path and to avoid foot traps and protrusions. Section 25.813(c)(8) would introduce requirements for the design of seats bordering and facing the passageway to each Type III or Type IV exit to avoid any gap that might entrap a foot or other part of a person. Section 25.813(c)(9) would introduce latch design and placarding requirements for items deployable into the passageway to a Type III or Type IV exit. These additional requirements, including automatically disposed Type III exits, would be an enhancement to safety and would result in less possibility of blocked or obstructed passageways to Type III or IV exits.

Harmonization with CS 25.813 would also remove the introductory text to § 25.813, which requires the location of emergency exits afford an effective means of evacuation and be distributed uniformly. This text is redundant to § 25.807(e) and (f) and should have been removed at amendment 25–88 (61 FR 57945, November 8, 1996) when those paragraphs were introduced into part 25, as shown in NPRM 90–4 (**Federal Register**: February 22, 1990 (Volume 55, Number 36)).

### 3. Advisory Material for Proposed § 25.813

FAA considers amendment 28 of EASA CS–25 AMC 25.813, AMC 25.813(c), and AMC 25.813(e) <sup>133</sup> as acceptable means of compliance with proposed § 25.813. FAA has drafted Change 2 to AC 25–17A to refer to the EASA AMC for guidance, and these documents are available in the docket. Comments to the proposed AC may be submitted via the instructions on the “Aviation Safety Draft Documents Open for Comment” web page at [http://www.faa.gov/aircraft/draft\\_docs/](http://www.faa.gov/aircraft/draft_docs/).

### S. Pressurized Cabins—§ 25.841(a) and (d)(1)

#### 1. Overview of Proposed § 25.841(a)

Paragraph (a)(2) of § 25.841, “Pressurized cabins,” at amendment 25–87, requires the airplane be designed so that occupants will not be exposed to a cabin pressure altitude that exceeds 25,000 feet for more than 2 minutes or 40,000 feet for any duration, after decompression from all failures not

shown to be extremely improbable. FAA proposes to revise § 25.841(a)(2) so that these requirements apply only to failures of systems or structure. FAA proposes to revise § 25.841(a)(3) to require the airplane be designed so that, after decompression from any engine failure, occupants will not be exposed to a cabin pressure altitude that exceeds 25,000 feet for more than 3 minutes, 40,000 feet for more than 1 minute, or 45,000 feet for any duration. FAA also proposes to add new paragraph (a)(4) to require airplane manufacturers demonstrate by flight test compliance to paragraphs (a)(2) and (3), and the airplane flight manual include flightcrew procedures and limitations to ensure compliance with proposed paragraphs (a)(2) and (3).

In past airplane certification programs, FAA has granted exemptions <sup>134</sup> from the requirements of § 25.841(a) for certain airplanes proposed to be operated at cruise altitudes above 40,000 feet, provided the manufacturer demonstrate by flight test compliance to the conditions of the exemption and the AFM contained flightcrew procedures for emergency descent in the event of rapid decompression due to an uncontained engine failure, and flight test data showed, after decompression, the cabin airplane pressure altitude would not exceed 25,000 feet for more than 3 minutes, or 40,000 feet for more than 1 minute, or 45,000 feet for any duration. <sup>135</sup> Adopting proposed § 25.841(a) would codify these requirements, thereby relieving the burden on industry to petition for, and FAA to process, exemptions on this topic for new certification programs.

#### 2. Background of Proposed § 25.841(a)

FAA issued amendment 25–87 (61 FR 28684) to § 25.841 to standardize certification of all transport category airplanes proposed to operate at cruise altitudes above 40,000 feet. Prior to amendment 25–87, FAA issued SCs to applicants proposing small transport category airplanes (small business jets) with aft fuselage mounted engine configurations that would be operated at cruise altitudes above 40,000 feet. In contrast, large transport category airplanes with wing-mounted engine configurations had not been able to operate above 40,000 feet due to engine thrust limitations. However, newer engine designs permitted later models to operate above 40,000 feet so FAA decided to propose to revise § 25.841 rather than continue to issue SCs. In developing amendment 25–87, FAA assumed passenger cabins of large transport category airplanes would not

experience rapid decompression because of the large cabin volume, as opposed to smaller executive business jets. However, as airplane fuselages grew in size, so did engine size, and an uncontained engine failure on a large transport category airplane can result in a large hole that would cause the cabin to depressurize rapidly.

FAA tasked ARAC to review § 25.841(a) regarding airplane cabin altitudes resulting from cabin decompression and to determine if revisions were needed to ensure during certain failure conditions the cabin environment was survivable for crew and passengers. <sup>136</sup> The ARAC Mechanical Systems Harmonization Working Group (MSHWG) submitted its report to FAA in 2003 <sup>137</sup> with recommendations on § 25.841(a)(2) and (3). Amendment 25–87 to § 25.841 intended to provide complete protection to all occupants, even those unable to don an oxygen mask properly, from any permanent physiological harm associated with rapid decompression of cabin altitude pressure. However, the MSHWG determined <sup>138</sup> it is neither practical nor physiologically possible to afford this level of protection to all occupants. All occupants are at some level of risk and some occupants are at higher risk (e.g., elderly, the very young, and those occupants with existing medical conditions). <sup>139</sup>

The MSHWG also determined there is nothing distinctive about a particular altitude (e.g., 40,000 feet) in terms of the severity of the exposure and risk to the occupants. Occupants exposed to a 40,000-foot pressure altitude are only slightly less likely to suffer harm than those exposed to 45,000-foot pressure altitude if the exposure is limited to a short duration by the airplane’s rapid descent. Though FAA is unable to quantify the relative risk to the occupants from exposure at these two altitudes, FAA CAMI has recognized this risk is a function of the altitude (higher altitude having greater risk) and duration of exposure (longer duration having greater risk). <sup>140</sup> The MSHWG reviewed information from the National Aviation Safety Data Analysis Center (now Aviation Safety Information Analysis and Sharing (ASIAS) <sup>141</sup>), covering airplane accidents and incidents from 1959 to 2001. FAA extended the search to include accidents and incidents from 2001 through 2006. The MSHWG and FAA found no records of deaths from hypoxia <sup>142</sup> at any altitude due to the type of in-flight rapid decompression events envisioned by amendment 25–87.

The MSHWG and FAA reviews indicate since 1959 through 2006 there have been approximately 3,000 loss-of-cabin-pressure events. The majority of these have been caused by system failures (e.g., cabin pressurization controller failures, valve failures, etc.) and structural failures (e.g., door seal failures, etc.), which have been typically recognized at low altitude within a few minutes after takeoff.<sup>143</sup> Pilot error has also contributed to the number of events. The cabin pressure altitude in most events did not exceed 15,000 feet (the pressure altitude where passenger oxygen masks are deployed), so the occupants were not subjected to exposures above 25,000 feet (an altitude considered physiologically significant). In addition, uncontained engine failures tend to be very rare. A simple calculation<sup>144</sup> shows grouping all engines and transport category airplanes together yields an average probability of an uncontained engine failure at cruise of approximately  $1 \times 10^{-7}$  per engine hour.

In response to FAA Reauthorization Act of 2018 (Pub. L. 115–254), Section 309, Call to Action Airline Engine Safety Review, FAA formed the Engine and Airframe-Engine Integration (EAIE) Review Team in September 2018.<sup>145</sup> EASA was a member of the EAIE Review Team and issued a report summarizing the group activities.<sup>146</sup> Furthermore, upon completion of an internal review of the EAIE data, FAA finds the data substantiate that uncontained engine failures resulting in rapid decompressions are rare events.

Uncontained engine failures occurring at maximum cruise altitude of the airplane remain rare events. New engine designs provide significant improvement to the risk of uncontained engine failures by using higher quality materials and better manufacturing methods. In addition, maintenance inspections use new technologies that can detect smaller cracks or defects in fan, compressor, or turbine disks, thus further reducing the likelihood of engine failure in operation. Because these events are rare, FAA considers the risk versus benefits to be acceptable in allowing high cruise altitude operations. High altitude flight enables passengers to reach their destination more quickly, burns less fuel, and creates less pollution as shown in the ARAC MSHWG report. Though the increased cabin pressure altitude and duration of exposure include an increased level of risk, the level of risk provided by the proposed rule is consistent with exemptions FAA has granted since 2006.

### 3. Discussion of Proposed § 25.841(a)

The proposed changes to § 25.841(a) are based on Policy Memorandum ANM–03–112–16. A draft of this policy was reviewed by the ARAC MSHWG.<sup>147</sup> The MSHWG recommended FAA retain the requirements of § 25.841(a)(2) for all fuselage structure damage considered under § 25.571(b) or (e)(1), and for system failures not shown by the applicant to be extremely improbable.<sup>148</sup> The MSHWG also recommended FAA relax the requirements for engine failures not shown by the applicant to be extremely improbable to allow a longer exposure time to a cabin pressure above 40,000 feet pressure altitude. The proposed changes to § 25.841(a) retain the requirements for systems and structural failures, but also propose new requirements in § 25.841(a)(3) for engine failures not shown by the applicant to be extremely improbable by extending the duration above 40,000 feet pressure altitude to 1 minute.

After the MSHWG issued its recommendations, CAMI conducted an extensive literature review of previous testing and created a physiological model. In addition, CAMI conducted a test as described in report titled, “Human Responses to a Simulated 35,000-Foot Rapid Decompression and the Subsequent Descent Profile Required by FAA Policy.”<sup>149</sup> FAA considered the conclusions of CAMI in creating this proposed rule and advisory material.

The results of the CAMI normobaric<sup>150</sup> rapid decompressions to a simulated altitude of 35,000 feet demonstrated the severity of a rapid decompression. Of the original 35 subjects comprising the dataset, 6 subjects were disqualified after medical screening. Of the 29 remaining subjects, 24 were able to complete the partial pressure of oxygen profile successfully without incapacitation and 5 subjects failed to complete the profile due to incapacitation (manifested by their inability to maintain a mouthpiece seal). FAA acknowledges it is important the traveling public and aviation industry understand the test subjects selected represented a sample of the population that, because of their age and health, were the least likely to suffer permanent physiological harm when exposed to the partial pressure of oxygen profile. The test resulted in several subjects experiencing the deleterious effects of hypoxia.<sup>151</sup> In addition, the test reaffirmed FAA’s position that the risk of fatality from exposure to hypoxia cannot be eliminated for any occupant. These results demonstrate the need for

aircraft manufacturers to ensure their aircraft can descend quickly in the event of a rapid decompression in operation.

Flightcrew must be trained to ensure an immediate response to a decompression event to help optimize occupant survival (refer to § 121.417(b)(3)). Flightcrew training may be different when showing compliance to § 121.417(b)(3)(i) for commercial airplanes configured with a feature,<sup>152</sup> which will perform an automatic emergency descent down to a 10,000-foot pressure altitude or to the minimum safe altitude over terrain.

FAA proposes to revise § 25.841(a)(2) and (3) to accommodate certain design constraints related to engine location (e.g., aircraft stability, fuel consumption, aerodynamic center of gravity, etc.) and add new paragraph (a)(4) to ensure adequate protection to airplane occupants is demonstrated by an airplane flight test. FAA proposes to revise § 25.841(a)(2) to clarify the current cabin pressure altitude and duration of exposure for fuselage structure failures and all system failures not shown to be extremely improbable. The MSHWG recommended, and FAA agreed in Policy Statement ANM–03–112–16, FAA should retain the requirements of § 25.841(a)(2), at amendment 25–87, for all fuselage structures considered under § 25.571(b) or (e)(1) and for system failures not shown to be extremely improbable. Therefore, proposed § 25.841(a)(2) would maintain the current requirements for all fuselage structure damage considered under § 25.571(b) or (e)(1) and all system failures not shown by the applicant to be extremely improbable.<sup>153</sup>

FAA also proposes to revise § 25.841(a)(3) to specify the maximum allowed cabin pressure altitude and duration of occupant exposure for all engine failures not shown to be extremely improbable resulting in decompression. These limits are based on Policy Statement ANM–03–112–16 and subsequent results of testing by CAMI.<sup>154</sup> The proposed cabin pressure-altitude time limits for all engine failures not shown to be extremely improbable are:

- No exposure above a cabin pressure-altitude of 45,000 feet pressure-altitude.
- A maximum of one minute exposure above a cabin pressure-altitude of 40,000 feet pressure-altitude.
- A maximum of 3 minutes above a cabin pressure-altitude of 25,000 feet pressure-altitude.

This proposal would alleviate the need for applicants to petition FAA for an exemption for their proposed designs

to be certified to operate at altitudes up to 45,000 feet. Proposed § 25.841(a)(4) would require airplane manufacturers to demonstrate by flight test that the airplane can meet the conditions of new § 25.841(a)(2) and (a)(3). In addition, it would require the flightcrew procedures and associated limitations addressing compliance to § 25.841(a)(2) and (a)(3) to be included in the AFM. Applicable rapid decompression procedures for the flightcrew must be included in the emergency procedures section of the AFM, in accordance with § 25.1581 for the current regulation and the proposed regulation.

The worst-case rapid decompression events creating the largest holes in the airplane fuselage have originated from uncontained engine failures. In addition, the worst-case decompression events occur very rarely (between once in 10 million and 100 million flight hours),<sup>155</sup> but are not extremely improbable (once in 1 billion flight hours). Proposed § 25.841(a) would provide a mitigation strategy resulting in an acceptable level of risk<sup>156</sup> to occupants from a rapid decompression at cruise altitude. Though the consequences following a rapid decompression at cruise altitude are severe (*i.e.*, fatalities are likely), compliance with the proposed rule should limit the number of fatalities. FAA acknowledges the severity of the cabin pressure environment, but finds it is mitigated by the low probability of a rapid decompression occurring and ensuring the design of the airplane enables a swift descent to lower altitude following the event. The proposed rule is consistent with exemptions granted since 2006, and FAA has found the demonstrated level of safety acceptable.<sup>157</sup>

In proposed § 25.841(a)(2) and (a)(3), FAA would set different regulatory standards to balance public safety with economic costs. As discussed, proposed § 25.841(a)(2) would maintain the current requirements for all fuselage structure damage considered under § 25.571(b) or (e)(1), and all system failures not shown by the applicant to be extremely improbable, while proposed § 25.841(a)(3) would provide relief from the current requirement for engine failures not shown to be extremely improbable. FAA proposes the costs associated with more stringent requirements for engine failures not shown to be extremely improbable outweigh the additional safety benefits that would result from these more stringent requirements. FAA has a statutory obligation per 49 U.S.C. 44701 to impose regulations that best tend to reduce or eliminate accidents in air

transportation. However, higher altitude cruise operations effectuate several benefits to passengers and society at large, including a faster cruise speed and reduction in flight time, a reduction in fuel burn, and a reduction in engine emissions, and proposed § 25.841(a)(3) would provide an acceptable level of safety commensurate with these benefits. In addition, proposed § 25.841(a) is premised on operators fulfilling the required initial and recurrent emergency training provisions in accordance with §§ 121.397, 121.417, and 121.427 for all crewmembers, including training for a rapid decompression and donning of oxygen masks. Proposed § 25.841(a) is also premised on operators and flightcrew members complying with the requirements of §§ 91.211, 121.333, or 135.157, as applicable.

#### 4. Advisory Material for Proposed § 25.841(a)

FAA has drafted AC 25.841–X, “Regulatory Guidance on Compliance with § 25.841(a),” to provide guidance material on one acceptable means, but not the only means, of showing compliance with proposed § 25.841(a). It is available for review in the docket. The AC also provides details from the CAMI normobaric rapid decompression tests. Comments to the proposed AC may be submitted via the instructions on the “Aviation Safety Draft Documents Open for Comment” web page at [http://www.faa.gov/aircraft/draft\\_docs/](http://www.faa.gov/aircraft/draft_docs/).

AC 25–20, “Pressurization, Ventilation and Oxygen Systems Assessment for Subsonic Flight Including High Altitude Operation,” dated September 10, 1996, contains guidance on § 25.841 and other related regulations. FAA has determined that existing AC 25–22, “Certification of Transport Airplane Mechanical Systems,” dated March 14, 2000, provides acceptable guidance to the other regulations addressed in AC 25–20, and as a result FAA would cancel AC 25–20 concurrently with issuance of the final rule and AC 25.841–X.

#### 5. Overview of Proposed § 25.841(d)(1)

Paragraph (d)(1) of § 25.841, “Pressurized cabins,” at amendment 25–151, requires the time when the airplane cabin pressure high altitude warning alert is shifted to a higher level during high elevation airport operations be minimized. However, the current requirements in § 25.841(d)(1) are overly prescriptive, and in developing them, FAA did not consider some airplane operators may perform step-climb and step-cruise after takeoff and perform

step-descent and step-cruise during descent. These types of operation may result in noncompliance with § 25.841(d)(1). Therefore, FAA is proposing to revise § 25.841(d)(1) to a performance-based requirement that still meets the intent of the original requirements.

#### 6. Background of Proposed § 25.841(d)(1)

FAA issued amendment 25–151 (88 FR 44032, July 11, 2023) to § 25.841 to accommodate airplane operations into or out of airports with elevations at or above 8,000 feet above sea level. Prior to this amendment, FAA would document ELOS findings when an airplane manufacturer or modifier proposed to certify airplane cabin pressurization systems used for operations into or out of airports with elevations at or above 8,000 feet. FAA conducted this rulemaking to relieve the burden on industry and FAA resulting from project-specific ELOS requests and petitions for exemption to accommodate operations at high elevation airports for transport category airplanes.

#### 7. Discussion of Proposed § 25.841(d)(1)

FAA has received information from a foreign authority and one airplane manufacturer explaining some airplane operators perform step-climb and step-cruise after takeoff and perform step-descent and step-cruise during descent. In addition, some airplane models may not be able to meet § 25.841(d)(1) at amendment 25–151 because of limitations on the operation of the airplane environmental control pressurization system and physiological limits on acceptable rate of change of cabin pressure. Retaining the regulation without modification would result in airplane manufacturers preparing ELOS requests, which would result in continued burden on industry and FAA.

Therefore, FAA is proposing to revise § 25.841(d)(1) to require that the time in flight the cabin pressure high altitude warning alert is above 10,000 feet cabin pressure altitude is minimized. This revision would eliminate overly prescriptive requirements while retaining the intent of the original requirement. Proposed § 25.841(d)(1) would allow airplane manufacturers flexibility in the design of cabin pressure high altitude warning alerting systems while retaining the requirement that the time in flight where the cabin pressure high altitude warning is above 10,000 feet cabin pressure altitude is minimized.

Section 25.841(c)(2) at amendment 25–151 requires the cabin pressurization system be designed to minimize the

time in flight that occupants may be exposed to cabin pressure altitudes exceeding 8,000 feet. FAA recognizes many variables can affect the time the cabin pressure may exceed 8,000 feet pressure. These variables include the altitude of the high elevation airport, the surrounding terrain around the airport, the response rate of the pressurization system, the airplane climb rate and decent rate, industry recommended physiological constraints,<sup>158</sup> air traffic control directives, and flight planning. Therefore, the time occupants are exposed to cabin pressure altitudes above 8,000 feet pressure altitude will vary. FAA will consider these factors in determining compliance to § 25.841(c) and (d) for operations at high elevation airports.

#### *T. Lavatory Fire Protection—§ 25.854*

##### 1. Overview of Proposed § 25.854

Currently, § 25.854 provides lavatory fire protection for airplanes with a passenger capacity of 20 or more. FAA proposes to harmonize with EASA CS 25.854 by changing the applicability of those requirements to airplanes with a cabin length of 60 feet or more to address proposed larger cabins configured for a passenger capacity of 19 or less. Proposed § 25.854 would ensure only airplanes with limited cabin length, as well as limited passenger capacity, would not be required to comply with the lavatory fire protection requirement.

##### 2. Discussion of Proposed § 25.854

FAA is proposing to add a cabin length limit to the existing passenger capacity limit in order to address proposals for larger cabins configured for passenger capacity of 19 seats or less. Lavatory fires are usually detected by cabin personnel early enough to allow prompt control and extinguishment. The smaller cabin size allows for this detection by its occupants earlier than a larger cabin with few occupants. The proposed cabin size limit is based on the survey of already certified airplanes with 19 seats or less that EASA discusses in their CS 25.854 rule change<sup>159</sup> and will ensure only airplanes with limited cabin length are not included in the lavatory fire protection requirement, as per the initial intent of the rule. FAA proposes the requirements of § 25.854 apply to airplanes with a passenger capacity of 20 or more, or with a cabin length of 60 feet (18.29 meters) or more. These proposed requirements would fully harmonize with the corresponding EASA CS 25.854.

##### 3. Advisory Material for Proposed § 25.854

FAA would consider EASA CS-25 AMC 25.854 amendment 28 as an acceptable means of compliance with proposed § 25.854 for cabin length measurement. FAA has drafted Change 2 to AC 25-17A to refer to the EASA AMC for guidance, and these documents are available in the docket. Comments to the proposed AC may be submitted via the instructions on the “Aviation Safety Draft Documents Open for Comment” web page at [http://www.faa.gov/aircraft/draft\\_docs/](http://www.faa.gov/aircraft/draft_docs/).

#### *U. Operation Without Normal Electrical Power—§§ 25.1351, 25.1352, and 25.1705*

##### 1. Overview of Proposed §§ 25.1351, 25.1352, and 25.1705

Section 25.1351(d), “Operation without normal electrical power,” contains requirements for airplanes using mechanical control cables and linkages for flight control or otherwise do not rely on a continuous source of electrical power for continued operation with normal electrical power inoperative. FAA proposes to move the § 25.1351(d) requirements into new § 25.1352, “Operation without normal electrical power,” and add new requirements for airplanes using electrical and electronic systems to perform critical functions, such as flight controls. As a result of this proposed change, FAA also proposes to revise § 25.1705, “Systems and functions: EWIS,” by adding a reference to § 25.1352.

FAA has issued SCs in past airplane certification programs for airplanes requiring a continuous source of electrical power to maintain safe flight and landing,<sup>160</sup> because § 25.1351(d) does not contain adequate or appropriate safety standards for such airplane designs. Adopting proposed §§ 25.1351, 25.1352, and 25.1705 would eliminate the need for FAA to develop an IP and issue SCs during the certification process.

##### 2. Background of Proposed §§ 25.1351, 25.1352, and 25.1705

###### a. Statement of the Problem

The design of modern transport category airplanes incorporates electrical and electronic systems that perform critical functions. The loss of these functions may result in loss of flight-critical systems. Examples of electrical and electronic systems that perform critical functions include electronic displays, electronic flight control computers and control architecture (e.g., fly-by-wire systems),

and electronic engine controls.

Therefore, to maintain continued safe flight and landing, it is essential airplanes with these types of systems have a continuous source of electrical power, including in failure scenarios when all normal sources of electrical power are inoperative.

The current requirement for operation without normal electrical power is contained in § 25.1351(d). However, this requirement does not adequately address airplane models with electrical and electronic systems that perform critical functions, the loss of which may be catastrophic to the airplane. Since § 25.1351(d) does not contain adequate or appropriate safety standards for these airplane models, FAA issues SCs for each of these models.

###### b. History

Section 25.1351(d) currently requires safe operation in visual flight rule (VFR) conditions for at least 5 minutes after loss of normal electrical power, excluding the battery. In developing the current rule, FAA envisaged a traditional airplane design that uses mechanical control cables and linkages for flight control. These manual controls allow the flightcrew to maintain aerodynamic control of the airplane for an indefinite period of time after loss of all electrical power. Under these conditions, a mechanical flight control system provides the flightcrew with the ability to fly the airplane while attempting to identify the cause of the electrical failure, restart the engine(s) if necessary, and attempt to reestablish some of the electrical power generation capability.

Current § 25.1351(d) does not contain adequate or appropriate safety standards that address fly-by-wire design features. Fly-by wire airplane models include novel or unusual design features that need SCs to address requirements associated with electronic flight-control systems requiring a continuous source of electrical power to maintain safe flight and landing. To maintain the level of safety envisioned by the current rule, the SCs require an airplane design with electrical and electronic systems performing critical functions must not be time-limited in its operation under all reasonably foreseeable conditions, including loss of all normal sources of engine- or APU-generated electrical power. Unless the applicant can show that the non-restorable loss of the engine and APU electrical power sources is extremely improbable, the applicant must demonstrate the airplane is capable of continued safe flight and landing, including steering and braking on the ground for airplanes using steer-

by-wire, brake-by-wire, and fly-by-wire speed brake panels, with the use of its alternative electrical power systems. These electrical power systems must have the capability to power electrical loads, which are essential for continued safe flight and landing, including those required for the maximum length of approved flight diversion. These alternative electrical power sources can include systems such as batteries, ram air turbines, hydrogen fuel cells, or other electrical energy supply devices. Independent power systems, such as a flight control permanent magnet generating system, are also considered an alternative power source.

### 3. Discussion of Proposed §§ 25.1351, 25.1352, and 25.1705

FAA proposes to codify the terms of previously issued SCs for transport airplane designs using electrical systems and electronic systems to perform critical functions and move the current requirements for transport airplane designs utilizing mechanical control cables and linkages for flight controls from § 25.1351(d) into new § 25.1352. FAA is proposing this new regulation to have one regulation that contains requirements specific to operation without normal electrical power. Proposed § 25.1352 will consolidate two different sets of requirements based on the airplane's design and clearly delineate the applicability of these requirements and their associated means of compliance.

Proposed § 25.1352(a) would define alternative electrical power sources for the purpose of compliance with the requirements of § 25.1352. This definition is derived from previous "Operation Without Normal Electrical Power" SCs,<sup>161</sup> which provide examples of alternative power sources. FAA proposes to define alternative power sources as devices designed to provide electrical power when normal electrical power is not available. This definition would encompass any type of electrical energy supply device because FAA anticipates innovations<sup>162</sup> in energy storage, which could have airborne applications for commercial transport airplanes. Using performance-based requirements for electrical energy supply devices would ensure future § 25.1352 would apply to these new technologies.

Proposed § 25.1352(a) describes normal electrical power as power from all sources generated for use during normal operating conditions and specifies normal electrical power does not include alternative power sources. However, an applicant may use the same type of technology as the source of

electrical power during normal operating conditions (*e.g.*, a hydrogen fuel cell system (FCS) for normal electrical power rather than engine-driven generators and a second hydrogen FCS of smaller capacity as an alternative power source rather than a ram air turbine).

Proposed § 25.1352(b) and (c) would define the specific requirements applicable to an airplane's design based on whether the design relies on a continuous source of electrical power to maintain safe operation. The applicability language of proposed § 25.1352(b) and (c) is derived from the previously issued SCs.

Proposed § 25.1352(b) would apply to airplanes that use mechanical control cables and linkages for flight control or otherwise do not rely on a continuous source of electrical power for continued operation. These airplanes would typically comply with current § 25.1351(d) without the need for SCs. Paragraph (b) would include the same requirements as § 25.1351(d), with two minor exceptions. First, FAA has removed the title "Operation without normal electrical power," since these requirements would be moved to proposed § 25.1352. Second, FAA has removed the parenthetical phrase "(electrical power sources excluding the battery)" because alternative electrical power sources would be defined in proposed § 25.1352(a).

Proposed § 25.1352(c) would apply to airplanes that use electrical and electronic systems to perform critical functions, the loss of which may result in loss of flight controls or other critical systems and may be catastrophic to the airplane. These airplane designs need a continuous source of electrical power to maintain safe operation. Today, these airplanes must comply with SCs in order to gain type certification. Paragraph (c)(1) through (7) of proposed § 25.1352 include the same requirements as previously issued SCs with one exception: paragraphs (c)(2)(i) and (c)(4)(ii) of proposed § 25.1352 do not specify an applicant must account for the longest or maximum diversion time, which are terms related to the duration of extended operations (ETOPS). The phrase "continued safe flight and landing," as used throughout proposed § 25.1352(c), includes the duration of the flight, subsequent landing, and rollout; it would apply to all operations, regardless of whether the airplane is operating under an ETOPS approval.

Proposed § 25.1352(c)(1) would require the applicant to use a combination of testing and analysis to show the airplane is capable of

continued safe flight and landing with all normal electrical power sources inoperative. Under § 25.1352(c)(6)(i), this must be done under the assumption the loss of normal electrical power sources occurs during night instrument meteorological conditions at the most critical phase of the flight, relative to the worst possible electrical power distribution and equipment-loads-demand condition. Under § 25.1352(c)(4)(i), when all sources of normal electrical power become inoperative, the proposal would require emergency electrical power to be immediately supplied without the need for flightcrew intervention. This is meant to ensure the airplane can maintain safe flight during the time it takes for the electrical power generation and distribution system to be reconfigured, either automatically or with flightcrew actions, so it can provide the required electrical power from its alternative electrical power sources.

The proposal would require the airplane to provide a flightcrew alert and indication when normal electrical power is not available, with corresponding non-normal procedures in the AFM, which would direct the flightcrew to take appropriate actions. Further, the AFM would also be required to include an operating limitation to direct flightcrew to take appropriate actions to activate the APU after loss of normal engine-driven generated electrical power if the APU is used to satisfy the requirements of § 25.1352(c)(1). The airplane's design must also provide for sufficient electrical power to allow for multiple (*i.e.*, a minimum of two) start attempts of each engine and APU using the alternative electrical power sources.

In addition, in showing capability for continued safe flight and landing, the proposal would require the applicant to account for systems capability, effects on crew workload and operating conditions, and the physiological needs of the passengers and flightcrew when all normal electrical power sources are inoperative. Physiological needs mean those biological requirements necessary for human survival. This means the airplane must provide adequate environmental conditions such as temperature control and oxygen. It also means providing for an adequate amount of operational toilets, as well as any other system required to ensure physiological needs are adequately addressed.

FAA also proposes to revise § 25.1705 by adding new § 25.1705(b)(13) that lists § 25.1352. When § 25.1705 was adopted,<sup>163</sup> it added to the regulations

the concept that electrical wiring interconnection systems (EWIS) associated with systems required for type certification or by operating rules must be considered an integral part of those systems and considered in showing compliance with all applicable requirements. This general requirement, contained in § 25.1705(a), currently applies to the requirements typically contained in SCs addressing “Operation without Normal Electrical Power,” provided § 25.1705 is in the certification basis of the airplane. In addition to this general requirement, § 25.1705(b) lists specific certification rules that the applicant must include consideration of EWIS, which is part of the subject system in demonstrating compliance. This includes § 25.1705(b)(7), which lists § 25.1351. Because FAA is proposing to move the requirements of § 25.1351(d) into new § 25.1352 and codify the usual terms of SCs on this topic, § 25.1705 needs to be revised to reference the new rule as well.

#### V. Equipment Standards for Oxygen Dispensing Units—§ 25.1447

##### 1. Discussion of Proposed § 25.1447

Currently, § 25.1447 prescribes equipment standards for oxygen dispensing units for occupants at their seats. FAA proposes to add a new § 25.1447(c)(6) to require sufficient oxygen outlets in other areas of the cabin which may be occupied by passengers or crew, such as galleys. This proposed rule would ensure occupants not in their seats, in the event of a decompression, have access to oxygen. The proposed rule would harmonize § 25.1447(c)(6) with EASA CS 25.1447(c)(3). Existing differences between other paragraphs of § 25.1447

and EASA CS 25.1447 are not addressed by this proposed rule.

##### 2. Advisory Material for Proposed § 25.1447

FAA would consider EASA CS–25 AMC 25.1447(c)(3) amendment 28 as an acceptable means of compliance with proposed § 25.1447(c)(6). FAA has drafted Change 2 to AC 25–17A, “Transport Airplane Cabin Interiors Crashworthiness Handbook,” to refer to the EASA AMC for guidance, and these documents are available in the docket. Comments to the proposed AC and means of compliance may be submitted via the instructions on the “Aviation Safety Draft Documents Open for Comment” web page at [http://www.faa.gov/aircraft/draft\\_docs/](http://www.faa.gov/aircraft/draft_docs/).

#### IV. Regulatory Notices and Analyses

##### A. Regulatory Impact Analysis

E.O. 12866 (“Regulatory Planning and Review”) and E.O. 13563 (“Improving Regulation and Regulatory Review”) require agencies to regulate in the “most cost-effective manner,” to make a “reasoned determination that the benefits of the intended regulation justify its costs,” and to develop regulations that “impose the least burden on society.” The Office of Management and Budget has determined this proposed rule is not a significant regulatory action as defined in section (3)(f)(1) of E.O. 12866.

FAA expects modernization of airworthiness standards for type certification of transport category airplanes would reduce time to certify and certification costs for manufacturers, modifiers, and FAA while maintaining or increasing safety. FAA expects this reduction in costs and time to certify would also promote innovation by reducing the time and

costs for manufacturers and modifiers to obtain type certification for new or changed products.

By updating current airworthiness standards to reflect new technology and evolving industry needs, FAA anticipates the proposal would reduce the need for exemptions, SCs, and ELOS findings relative to the current regulations. As described in section I.B. of this NPRM, “Background,” each request for an exemption, SC, or ELOS finding requires applicants for type certification to incur costs to generate, analyze, and submit project-specific data and await FAA decisions to be certain of the requirements on their proposed design. For each exemption, SC, or ELOS finding request, FAA must incur costs to evaluate the submitted data and to develop and publish a decision which maintains safety. Reducing the need for these project-specific processes would reduce flow-time and cost relative to the current regulatory baseline for each type certification project for both the applicant and FAA.

This proposed rule would also eliminate certain differences between U.S. and European airworthiness standards. Because U.S. manufacturers and modifiers of transport category airplanes typically sell their products domestically and internationally, harmonizing FAA’s requirements with those of EASA would reduce the cost and complexity of certification by providing them a consistent set of requirements.

Table 2 contains a summary of the expected impacts by proposed area of change. See section III of this NPRM, “Discussion of the Proposal,” for a detailed description of the proposed regulatory changes and their effects.

TABLE 2—SUMMARY OF IMPACTS BY PROPOSED AREA OF CHANGE

| Subject of proposed changes                                                                                                                                    | Impacts                                                                                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Executive Interiors—SFAR No. 109 and Proposed §§ 25.4(d), 25.821, 25.823, 25.825, 25.827, 25.829, 25.830, 25.812(e)(3), 25.812(l)(1), 25.1365, and 25.1583(j). | Cost savings: reduce exemptions and ELOS findings, harmonize with EASA.                            |
| Vibration and Buffeting—§ 25.251(b)                                                                                                                            | Cost savings: reduce ELOS findings.                                                                |
| Rolling Conditions—§ 25.349(a)                                                                                                                                 | Cost savings: reduce SCs.                                                                          |
| Outside View for Flightcrew and Overwing Emergency Exits—§ 25.809(a).                                                                                          | Cost Savings: reduce exemptions, harmonize with EASA.                                              |
| Emergency Exit Marking and Lighting—§§ 25.811(e) and (g) and 25.812(b).                                                                                        | Cost Savings: reduce ELOS findings, harmonize with EASA.                                           |
| Disposal of Combustible Materials—§ 25.853(g)                                                                                                                  | Cost neutral or cost savings: replace prescriptive requirement with performance-based requirement. |
| Reverse Thrust and Propeller Pitch Settings Below the Flight Regime—§ 25.1155.                                                                                 | Harmonize with EASA.                                                                               |
| Cowling and Nacelle Skin—§ 25.1193(e)(3)                                                                                                                       | Cost savings: reduce ELOS findings, harmonize with EASA.                                           |
| Powerplant and Auxiliary Power Unit Instruments—§ 25.1549                                                                                                      | Cost savings: reduce ELOS findings.                                                                |
| Control Markings—§ 25.1555(d)(1)                                                                                                                               | Cost savings: reduce ELOS findings.                                                                |
| Carriage of Authorized Persons on All-Cargo Airplanes—§§ 25.797 and 25.857(e).                                                                                 | Cost savings: reduce exemptions.                                                                   |

TABLE 2—SUMMARY OF IMPACTS BY PROPOSED AREA OF CHANGE—Continued

| Subject of proposed changes                                                                                     | Impacts                                                                                                                                                                                                                                    |
|-----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Fuel Tank Flammability Assessment Method (FTFAM)—§§ 25.5 and 25.981 and Section N25.3 of Appendix N to Part 25. | Cost savings: applicants no longer need paperwork requesting FAA approval to use the 2021 improved analysis software version 11 instead of older version.                                                                                  |
| Pilot Compartment View—§ 25.773 .....                                                                           | Cost savings: reduce SCs and ELOS findings.                                                                                                                                                                                                |
| Medical Stretchers—§ 25.785(b)(3) .....                                                                         | Cost savings: reduce exemptions, harmonize with EASA.                                                                                                                                                                                      |
| Passenger Amenities—§ 25.788 .....                                                                              | Cost Savings: reduce SCs, harmonize with EASA.                                                                                                                                                                                             |
| Ditching Emergency Exits for Passengers—§ 25.801(a) .....                                                       | Regulatory text correction; No substantive change.                                                                                                                                                                                         |
| Emergency Egress Assist Means and Escape Routes—§ 25.810(a)(1)(ii).                                             | Cost savings: reduce ELOS findings, harmonize with EASA.                                                                                                                                                                                   |
| Emergency Exit Access—§ 25.813 .....                                                                            | Cost savings: reduce ELOS findings, harmonize with EASA.                                                                                                                                                                                   |
| Pressurized Cabins—§ 25.841(a) and (d)(1) .....                                                                 | Cost savings: reduce exemptions, reduce ELOS findings, reduce flight time, fuel burn, engine emissions.                                                                                                                                    |
| Lavatory Fire Protection—§ 25.854 .....                                                                         | Harmonize with EASA.                                                                                                                                                                                                                       |
| Operation Without Normal Electrical Power—§§ 25.1351, 25.1352, and 25.1705.                                     | Cost savings: Codifies SC's and consolidates electrical system requirements to address advancements in technology. This reduces the need for SC issuances and associated administrative costs, while maintaining the same level of safety. |
| Equipment Standards for Oxygen Dispensing Units—§ 25.1447 .....                                                 | Harmonize with EASA.                                                                                                                                                                                                                       |

### B. Regulatory Flexibility Act

The Regulatory Flexibility Act (RFA) of 1980, (5 U.S.C. 601–612), as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (Pub. L. 104 121, 110 Stat. 857, March 29, 1996) and the Small Business Jobs Act of 2010 (Pub. L. 111–240,), requires Federal agencies to consider the effects of the regulatory action on small business and other small entities and to minimize any significant economic impact. The term “small entities” comprises small businesses and not-for-profit organizations that are independently owned and operated and are not dominant in their fields, and governmental jurisdictions with populations of less than 50,000.

FAA used Hoovers Online,<sup>164</sup> a subscription-based online database of U.S. entities, to identify 492 manufacturers that could be affected by the proposed rule based on the Small Business Administration 2023 size standard for Aircraft Manufacturing (NAICS 336411) and Other Aircraft Parts and Auxiliary Equipment Manufacturing (NAICS 336413) employment data. The proposed rule would not impose any additional requirements on the regulated industry relative to the baseline, so the compliance costs would be, at most, collectively minimal. Because of the proposed modernization and harmonization of transport category airworthiness standards in this proposal, FAA anticipates industry would realize cost savings from a faster, more efficient type certification process that would require fewer requests for exemptions, special conditions, and equivalent level of safety findings. Therefore, FAA proposes to certify the proposed rule would not have a

significant economic impact on a substantial number of small entities. FAA welcomes comments on this cost assessment and proposed certification.

### C. International Trade Impact Assessment

The Trade Agreements Act of 1979 (Pub. L. 96–39), as amended by the Uruguay Round Agreements Act (Pub. L. 103–465), prohibits Federal agencies from establishing standards or engaging in related activities that create unnecessary obstacles to the foreign commerce of the United States. Pursuant to these Acts, the establishment of standards is not considered an unnecessary obstacle to the foreign commerce of the United States, so long as the standard has a legitimate domestic objective, such as the protection of safety, and does not operate in a manner that excludes imports that meet this objective. The statute also requires consideration of international standards and, where appropriate, they be the basis for U.S. standards.

As the proposed provisions in this rulemaking harmonize with international standards, FAA does not consider this rule as creating an unnecessary obstacle to foreign commerce.

### D. Unfunded Mandates Assessment

The Unfunded Mandates Reform Act of 1995 (2 U.S.C. 1531–1538) governs the issuance of Federal regulations that require unfunded mandates. An unfunded mandate is a regulation that requires a State, local, or Tribal Government or the private sector to incur direct costs without the Federal Government having first provided the funds to pay those costs. FAA

determined the proposed rule would not result in the expenditure of \$193 million or more (\$100,000,000 adjusted for inflation using the most current Implicit Price Deflator for the Gross Domestic Product) by State, local, or Tribal Governments, in the aggregate, or the private sector, in any one year.

### E. Paperwork Reduction Act

The Paperwork Reduction Act of 1995 (44 U.S.C. 3507(d)) requires FAA consider the impact of paperwork and other information collection burdens imposed on the public. FAA has determined there would be no new requirement for information collection associated with this proposed rule.

### F. International Compatibility

In keeping with U.S. obligations under the Convention on International Civil Aviation, it is FAA policy to conform to International Civil Aviation Organization (ICAO) Standards and Recommended Practices to the maximum extent practicable. FAA has reviewed the corresponding ICAO Standards and Recommended Practices and has identified no differences with these proposed regulations.

### G. Environmental Analysis

The Department has analyzed the environmental impacts of this final rule pursuant to the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321 *et seq.*). FAA has determined this rule is categorically excluded pursuant to Paragraph B–2.6(f) of Appendix B to FAA Order 1050.1G, FAA National Environmental Policy Act Implementing Procedures (90 FR 29615, July 3, 2025). Categorical exclusions are categories of actions FAA has determined normally do not significantly affect the quality of

the human environment and therefore do not require either an environmental assessment (EA) or environmental impact statement (EIS). See DOT Order 5610.1D § 9. In analyzing the applicability of a categorical exclusion, FAA must also consider whether extraordinary circumstances are present that would warrant the preparation of an EA or EIS. Id. § 9(b). This rulemaking, which amends various airworthiness regulations to modernize certain certification standards for transport category airplanes and propulsion systems, is categorically excluded pursuant to Paragraph B–2.6(f) of FAA Order 1050.1G: “Regulations, standards, and exemptions (excluding those that if implemented may cause a significant impact on the human environment).” FAA does not anticipate any environmental impacts, and there are no extraordinary circumstances present in connection with this rulemaking.

#### *H. Regulations Affecting Intrastate Aviation in Alaska*

Section 1205 of FAA Reauthorization Act of 1996 (110 Stat. 3213) requires the Administrator, when modifying 14 CFR regulations in a manner affecting intrastate aviation in Alaska, to consider the extent to which Alaska is not served by transportation modes other than aviation, and to establish appropriate regulatory distinctions. Because this proposed rule would apply to the certification of future designs of transport category airplanes and their subsequent operation, it could, if adopted, affect intrastate aviation in Alaska. FAA, therefore, specifically requests comments on whether there is justification for applying the proposed rule differently in intrastate operations in Alaska.

### **V. Executive Order Determinations**

#### *A. E.O. 13132, Federalism*

FAA has analyzed this proposed rule under the principles and criteria of E.O. 13132, Federalism. FAA has determined this action would not have a substantial direct effect on the States, or the relationship between the Federal Government and the States, or on the distribution of power and responsibilities among the various levels of government, and, therefore, would not have federalism implications.

#### *B. E.O. 13175, Consultation and Coordination With Indian Tribal Governments*

Consistent with E.O. 13175, Consultation and Coordination with Indian Tribal Governments,<sup>165</sup> and FAA

Order 1210.20, American Indian and Alaska Native Tribal Consultation Policy and Procedures,<sup>166</sup> FAA ensures Federally Recognized Tribes (Tribes) are given the opportunity to provide meaningful and timely input regarding proposed Federal actions that have the potential to affect uniquely or significantly their respective Tribes. At this point, FAA has not identified any unique or significant effects, environmental or otherwise, on Tribes resulting from this proposed rule.

#### *C. E.O. 13211, Regulations That Significantly Affect Energy Supply, Distribution, or Use*

FAA analyzed this proposed rule under E.O. 13211, Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use (May 18, 2001). FAA has determined it would not be a “significant energy action” under the E.O. and would not be likely to have a significant adverse effect on the supply, distribution, or use of energy.

#### *D. E.O. 13609, Promoting International Regulatory Cooperation*

E.O. 13609, Promoting International Regulatory Cooperation, promotes international regulatory cooperation to (1) meet shared challenges involving health, safety, labor, security, environmental, and other issues and reduce, eliminate, or (2) prevent unnecessary differences in regulatory requirements. FAA has analyzed this proposed action under the policy and agency responsibilities of E.O. 13609. FAA has determined this proposed action would eliminate differences between U.S. aviation standards and those of other civil aviation authorities by harmonizing regulatory requirements to the extent practical.

#### *E. E.O. 14192, Unleashing Prosperity Through Deregulation*

This proposed rule, if finalized as proposed, is expected to be an E.O. 14192 deregulatory action.

### **VI. Additional Information**

#### *A. Comments Invited*

FAA invites interested persons to participate in this rulemaking by submitting written comments, data, or views. FAA also invites comments relating to the economic, environmental, energy, or federalism impacts that might result from adopting the proposals in this document. The most helpful comments reference a specific portion of the proposal, explain the reason for any recommended change, and include supporting data. To ensure the docket does not contain duplicate comments,

commenters should submit only one time if comments are filed electronically, or commenters should send only one copy of written comments if comments are filed in writing.

FAA will file in the docket all comments it receives, as well as a report summarizing each substantive public contact with FAA personnel concerning this proposed rule. Before acting on this proposal, FAA will consider all comments it receives on or before the closing date for comments. FAA will consider comments filed after the comment period has closed if it is possible to do so without incurring expense or delay. FAA may change this proposal in light of the comments it receives.

*Privacy:* In accordance with 5 U.S.C. 553(c), DOT solicits comments from the public to better inform its rulemaking process. DOT posts these comments, without edit, including any personal information the commenter provides, to [www.regulations.gov](http://www.regulations.gov), as described in the system of records notice (DOT/ALL–14 FDMS), which can be reviewed at [www.dot.gov/privacy](http://www.dot.gov/privacy).

#### *B. Confidential Business Information*

Confidential Business Information (CBI) is commercial or financial information that is both customarily and actually treated as private by its owner. Under the Freedom of Information Act (FOIA) (5 U.S.C. 552), CBI is exempt from public disclosure. If your comments responsive to this NPRM contain commercial or financial information that is customarily treated as private, that you actually treat as private, and is relevant or responsive to this NPRM, it is important you clearly designate the submitted comments as CBI. Please mark each page of your submission containing CBI as “PROPIN.” FAA will treat such marked submissions as confidential under the FOIA, and they will not be placed in the public docket of this NPRM. Submissions containing CBI should be sent to James Wilborn, 2200 South 216th Street, Des Moines, WA 98198. Any commentary FAA receives which is not specifically designated as CBI will be placed in the public docket for this rulemaking.

#### *C. Availability of Rulemaking Documents*

A copy of this NPRM, all comments received, any final rule, and all background material may be viewed online at [www.regulations.gov](http://www.regulations.gov) using the docket number listed above. Electronic retrieval help and guidelines are available on the website. It is available

24 hours each day, 365 days each year. An electronic copy of this document may also be downloaded from the Office of the Federal Register's website at [www.federalregister.gov](http://www.federalregister.gov) and the Government Publishing Office's website at [www.govinfo.gov](http://www.govinfo.gov). A copy may also be found at FAA's Regulations and Policies website at [www.faa.gov/regulations\\_policies](http://www.faa.gov/regulations_policies).

Copies may also be obtained by sending a request to the Federal Aviation Administration, Office of Rulemaking, ARM-1, 800 Independence Avenue SW, Washington, DC 20591, or by calling (202) 267-9677. Requests must identify the docket or notice number of this rulemaking.

All documents FAA considered in developing this proposed rule, including economic analyses and technical reports, may be accessed in the electronic docket for this rulemaking.

#### D. Small Business Regulatory Enforcement Fairness Act

The Small Business Regulatory Enforcement Fairness Act of 1996 (Pub. L. 104 121, 110 Stat. 857, March 29, 1996) requires FAA to comply with small entity requests for information or advice about compliance with statutes and regulations within its jurisdiction. A small entity with questions regarding this document may contact its local FAA official, or the person listed under the **FOR FURTHER INFORMATION CONTACT** heading at the beginning of the preamble. To find out more about SBREFA on the internet, visit [www.faa.gov/regulations\\_policies/rulemaking/sbre\\_act/](http://www.faa.gov/regulations_policies/rulemaking/sbre_act/).

#### E. Incorporation by Reference

FAA is incorporating by reference Report No. DOT/FAA/TC-21/3, "Fuel Tank Flammability Assessment Method User's Manual—Updated for Version 11," dated January 2021. Report No. DOT/FAA/TC-21/3. This material serves as a user's manual for the FTFAM to assist the user in its operation and to discuss the permissible changes that may be made to this model specific to a particular fleet of aircraft. This material is available at <https://rosap.ntl.bts.gov/view/dot/57849>.

#### Endnotes

<sup>1</sup> Product means an aircraft, aircraft engine, or aircraft propeller. See 14 CFR 3.5(a) or § 21.1.

<sup>2</sup> The ARAC is a formal standing advisory committee made up of representatives from aviation associations, aviation industry, public interest groups, advocacy groups, and interested members of the public. FAA tasks ARAC to provide advice and

recommendations concerning a full range of aviation-related issues.

<sup>3</sup> An applicant for a type certificate with FAA is a person or entity that seeks approval for the design of an aircraft, aircraft engine, or propeller. The term applicants includes manufacturers and modifiers.

<sup>4</sup> 49 U.S.C. 44701(f).

<sup>5</sup> FAA Order 8110.112A, *Standardized Procedures for Usage of Issue Papers and Development of Equivalent Levels of Safety Memorandums Document Information* (October 3, 2014), is available at [https://www.faa.gov/regulations\\_policies/orders\\_notices/index.cfm/go/document.information/documentid/1025806](https://www.faa.gov/regulations_policies/orders_notices/index.cfm/go/document.information/documentid/1025806).

<sup>6</sup> FAA Order 8110.4C, *Type Certification* (March 28, 2007), is available at [https://www.faa.gov/documentLibrary/media/Order/FAA\\_Order\\_8110\\_4C\\_Chg\\_6.pdf](https://www.faa.gov/documentLibrary/media/Order/FAA_Order_8110_4C_Chg_6.pdf).

<sup>7</sup> The ARAC tasking notice was published in the **Federal Register** at 82 FR 19783 (April 28, 2017).

<sup>8</sup> *ARAC Input to Support Regulatory Reform of Aviation Regulations* (June 8, 2017), is available in the docket for this rulemaking and at [https://www.faa.gov/regulations\\_policies/rulemaking/committees/documents/index.cfm/document/information/documentID/3002](https://www.faa.gov/regulations_policies/rulemaking/committees/documents/index.cfm/document/information/documentID/3002).

<sup>9</sup> *ARAC Input to Support Regulatory Reform of Aviation Regulations—ARAC Addendum Report* (September 12, 2017), is available in the docket for this rulemaking and at [https://www.faa.gov/regulations\\_policies/rulemaking/committees/documents/index.cfm/document/information/documentID/3142](https://www.faa.gov/regulations_policies/rulemaking/committees/documents/index.cfm/document/information/documentID/3142).

<sup>10</sup> NTSB Safety Recommendation A-88-105 (referenced in NTSB/AAR-88/08) and A-94-062 (referenced in NTSB/AAR-94/06) are available in the docket and at <https://data.nts.gov/carol-main-public/basic-search/>.

<sup>11</sup> V<sub>MO</sub>/M<sub>MO</sub> means maximum operating limit speed (§ 1.2).

<sup>12</sup> External modifications are modifications to the external structure of an aircraft for the installation of equipment such as antennas, radomes, cameras, and external stores.

<sup>13</sup> Though this NPRM addresses multiple substantive topics, FAA may adopt these proposed changes in one or more final rules.

<sup>14</sup> An authorized person is a person identified in 14 CFR 121.583(a) who, when authorized by the certificate holder, may be carried aboard an airplane without complying with the passenger-carrying airplane requirements specified in that section.

<sup>15</sup> Though this NPRM addresses multiple substantive topics, FAA may adopt these proposed changes in one or more final rules.

<sup>16</sup> Refer to the *Technical Implementation Procedures for Airworthiness and Environmental Certification* between the Federal Aviation Administration of the United States of America and the European Aviation Safety Agency of the European Union, available at [https://www.faa.gov/aircraft/air\\_cert/international/bilateral\\_agreements/eu/tip](https://www.faa.gov/aircraft/air_cert/international/bilateral_agreements/eu/tip).

<sup>17</sup> *Special Requirements for Private Use Transport Category Airplanes*, 71 FR 21533 (May 9, 2009).

<sup>18</sup> Example exemptions are Exemption No. 17855A, Docket No. FAA-2017-1005 and

Exemption No. 17916, Docket No. FAA-2017-1137. Example ELOS findings are ELOS Memorandum Nos. ST06562WI-T-C-1 and AT10219IB-T-C-8. These documents are available at <https://drs.faa.gov/>.

<sup>19</sup> *ARAC Input to Support Regulatory Reform of Aviation Regulations—ARAC Addendum Report* (September 12, 2017), is available in the docket for this rulemaking and at [https://www.faa.gov/regulations\\_policies/rulemaking/committees/documents/index.cfm/document/information/documentID/3142](https://www.faa.gov/regulations_policies/rulemaking/committees/documents/index.cfm/document/information/documentID/3142).

<sup>20</sup> EASA Task Number RMT.0264 (MDM.066), *Terms of Reference* (February 29, 2012), is available in the docket for this rulemaking and at [https://www.easa.europa.eu/sites/default/files/dfu/ToR%20MDM.066%20\(RMT.0264\).pdf](https://www.easa.europa.eu/sites/default/files/dfu/ToR%20MDM.066%20(RMT.0264).pdf).

<sup>21</sup> EASA CS-25 amendments are available at <https://www.easa.europa.eu/certification-specifications/cs-25-large-aeroplanes>.

<sup>22</sup> See Chapter 7 of the Office of the Federal Register Document Drafting Handbook, Revision 2.1, dated October 2023. This document is available at <https://www.archives.gov/files/federal-register/write/handbook/ddh.pdf>.

<sup>23</sup> See Exemption No. 18891, Docket No. FAA-2020-1185, which is available at <https://drs.faa.gov/>.

<sup>24</sup> EASA NPA 2015-19, *Executive interior accommodation* (December 17, 2015), is available in the docket for this rulemaking and at <https://www.easa.europa.eu/document-library/notices-of-proposed-amendment/npa-2015-19>.

<sup>25</sup> Passenger zone (or zone) is defined in AC 25.807-1, *Uniform Distribution of Exits* (August 13, 1990), and is available at [https://www.faa.gov/documentLibrary/media/Advisory\\_Circular/AC\\_25\\_807-1.pdf](https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_25_807-1.pdf).

<sup>26</sup> EASA NPA 2015-19, *Executive interior accommodation* (December 17, 2015), is available in the docket for this rulemaking and at <https://www.easa.europa.eu/document-library/notices-of-proposed-amendment/npa-2015-19>.

<sup>27</sup> Examples include Exemption No. 10338B, Docket No. FAA-2011-0327, Exemption No. 18007, Docket No. FAA-2017-1046, and Exemption No. 17119A, Docket No. FAA-2016-7819, which are available at <https://drs.faa.gov/>.

<sup>28</sup> Passenger zone (or zone) is defined in AC 25.807-1, *Uniform Distribution of Exits* (August 13, 1990), and is available at [https://www.faa.gov/documentLibrary/media/Advisory\\_Circular/AC\\_25\\_807-1.pdf](https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_25_807-1.pdf).

<sup>29</sup> CS 25.807(e) and 14 CFR 25.807(e) state "Exits must be distributed as uniformly as practical, taking into account passenger seat distribution."

<sup>30</sup> AC 25.807-1, *Uniform Distribution of Exits* (August 13, 1990), is available at [https://www.faa.gov/documentLibrary/media/Advisory\\_Circular/AC\\_25\\_807-1.pdf](https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_25_807-1.pdf).

<sup>31</sup> Examples include Exemption No. 6820A, Docket No. 29253, Exemption No. 18542A, Docket No. FAA-2019-0941 and Exemption No. 10339, Docket No. FAA-2011-0584, which are available at <https://drs.faa.gov/>.

<sup>32</sup> CS 25.853(c) and 14 CFR 25.853(c) state, in pertinent part, ". . . seat cushions, except those on flight crewmember seats, must meet the test requirements of part II of appendix F . . ."

<sup>33</sup> Example ELOS findings are ELOS Memorandum Nos. ST09413CH-T-C-1, ST06562WI-T-C-1, and AT10010IB-T-CI-101, which are available at <https://drs.faa.gov/>.

<sup>34</sup> AC 25-17A, *Transport Airplane Cabin Interiors Crashworthiness Handbook* provides guidance on the extent of “minor obstruction” compliant to § 25.813(c)(2). The AC is available at [https://www.faa.gov/regulations\\_policies/advisory\\_circulars/index.cfm/go/document/information/documentID/74596](https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document/information/documentID/74596).

<sup>35</sup> For more information on type of emergency exits, see 14 CFR 25.807.

<sup>36</sup> Per 14 CFR 25.807(g).

<sup>37</sup> SFAR No. 109 paragraph 6 references § 25.791(a) at amendment 25-72.

<sup>38</sup> Refer to AC 25.785-1B, *Flight attendant seat and torso restraint system installations*. This AC is available at <https://drs.faa.gov/>.

<sup>39</sup> NPRM, *Security Related Considerations in the Design and Operation of Transport Category Airplanes*, 72 FR 630 (January 5, 2007).

<sup>40</sup> PS-ANM-25-03-R1, *Technical Criteria for Approving Side-Facing Seats* (November 5, 2012), is available at <https://drs.faa.gov/>.

<sup>41</sup> EASA AMC 25.1365(b) in CS-25 amendment 28 is available in the docket for this rulemaking and at <https://www.easa.europa.eu/en/document-library/certification-specifications/cs-25-amendment-28>.

<sup>42</sup> Examples include Exemption No. 18020, Docket No. FAA-2018-0579 and Exemption No. 17855, Docket No. FAA-2017-1005, which are available at <https://drs.faa.gov/>.

<sup>43</sup> EASA AMC to appendix S in CS-25 amendment 28 is available in the docket for this rulemaking and at <https://www.easa.europa.eu/en/document-library/certification-specifications/cs-25-amendment-28>.

<sup>44</sup>  $V_{DF}/M_{DF}$  means demonstrated flight diving speed (Per 14 CFR 1.2).

<sup>45</sup>  $V_{MO}/M_{MO}$  means maximum operating limit speed (§ 1.2).

<sup>46</sup> External modifications are modifications to the external structure of an aircraft for the installation of equipment such as antennas, radomes, cameras, and external stores.

<sup>47</sup> Example ELOS findings are ELOS Memorandum Nos. ODA-GED-P360-25.251(b), ST18598CH-T-25.251, and ENV24051-T-25.251, which are available at <https://drs.faa.gov/>.

<sup>48</sup> *ARAC Input to Support Regulatory Reform of Aviation Regulations—ARAC Addendum Report* (September 12, 2017), is available in the docket for this rulemaking and at [https://www.faa.gov/regulations\\_policies/rulemaking/committees/documents/index.cfm/document/information/documentID/3142](https://www.faa.gov/regulations_policies/rulemaking/committees/documents/index.cfm/document/information/documentID/3142).

<sup>49</sup> Page 110 and 118 of *ARAC Input to Support Regulatory Reform of Aviation Regulations—ARAC Addendum Report* (September 12, 2017), is available in the docket for this rulemaking and at [https://www.faa.gov/regulations\\_policies/rulemaking/committees/documents/index.cfm/document/information/documentID/3142](https://www.faa.gov/regulations_policies/rulemaking/committees/documents/index.cfm/document/information/documentID/3142).

<sup>50</sup> Various amounts of aileron deflection are assumed to occur at different airplane speeds.

<sup>51</sup> *ARAC Input to Support Regulatory Reform of Aviation Regulations—ARAC Addendum Report* (September 12, 2017), is available in the docket for this rulemaking and at [https://www.faa.gov/regulations\\_policies/rulemaking/committees/documents/index.cfm/document/information/documentID/3142](https://www.faa.gov/regulations_policies/rulemaking/committees/documents/index.cfm/document/information/documentID/3142).

<sup>52</sup> Example SCs for Design Roll Maneuver are No. 25-609A-SC, Docket No. FAA-2014-1077, No. 25-706-SC, Docket No. FAA-2017-0951, and No. 25-706-SC, Docket No. FAA-2017-0951, which are available in the **Federal Register**.

<sup>53</sup> Page 48 of *ARAC Input to Support Regulatory Reform of Aviation Regulations—ARAC Addendum Report* (September 12, 2017), is available in the docket for this rulemaking and at [https://www.faa.gov/regulations\\_policies/rulemaking/committees/documents/index.cfm/document/information/documentID/3142](https://www.faa.gov/regulations_policies/rulemaking/committees/documents/index.cfm/document/information/documentID/3142).

<sup>54</sup> <https://www.easa.europa.eu/document-library/certification-specifications/cs-25-amendment-13>.

<sup>55</sup> EASA AMC 25.349(a) in CS-25 amendment 28 is available in the docket for this rulemaking and at <https://www.easa.europa.eu/en/document-library/certification-specifications/cs-25-amendment-28>.

<sup>56</sup> Examples of typical exemptions for emergency exit outside view include Exemption No. 17529, Docket No. FAA-2015-0298, and Exemption No. 17122, Docket No. FAA-2016-8692, which are available at <https://drs.faa.gov/>.

<sup>57</sup> 69 FR 62788.

<sup>58</sup> Examples include Exemption No. 10996, Docket No. FAA-2013-0969 and Exemption No. 17529, Docket No. FAA-2015-0298 and Exemption No. 11162, Docket No. FAA-2014-0932, which are available at <https://drs.faa.gov/>.

<sup>59</sup> *ARAC Input to Support Regulatory Reform of Aviation Regulations—ARAC Addendum Report* (September 12, 2017), is available in the docket for this rulemaking and at [https://www.faa.gov/regulations\\_policies/rulemaking/committees/documents/index.cfm/document/information/documentID/3142](https://www.faa.gov/regulations_policies/rulemaking/committees/documents/index.cfm/document/information/documentID/3142).

<sup>60</sup> The report is available in the docket for this rulemaking and at [https://www.faa.gov/regulations\\_policies/rulemaking/committees/documents/index.cfm/document/information?documentID=3743](https://www.faa.gov/regulations_policies/rulemaking/committees/documents/index.cfm/document/information?documentID=3743).

<sup>61</sup> EASA AMC 25.809(a) and AMC 25.809(a)(3) in CS-25 amendment 28 are available in the docket for this rulemaking and at <https://www.easa.europa.eu/en/document-library/certification-specifications/cs-25-amendment-28>.

<sup>62</sup> Examples of ELOS findings for exit marking and lighting include AT08649NY-T-CS-1 and ST05991WI-T-A-1, which are available at <http://drs.faa.gov>.

<sup>63</sup> *ARAC Input to Support Regulatory Reform of Aviation Regulations—ARAC Addendum Report* (September 12, 2017), is available in the docket for this rulemaking and at [https://www.faa.gov/regulations\\_policies/rulemaking/committees/documents/index.cfm/document/information/documentID/3142](https://www.faa.gov/regulations_policies/rulemaking/committees/documents/index.cfm/document/information/documentID/3142).

<sup>64</sup> EASA AMC 25.811(e)(4) and AMC 25.812(b)(1) and AMC 25.812(b)(2) in CS-25

amendment 28 are available in the docket for this rulemaking and at <https://www.easa.europa.eu/en/document-library/certification-specifications/cs-25-amendment-28>.

<sup>65</sup> Sections 121.571(a)(1)(ii) and 91.519(a)(3) require passengers to be briefed on the location of emergency exits.

<sup>66</sup> AD 74-08-09, 39 FR 28229 (August 6, 1974).

<sup>67</sup> AD 74-08-09 R2, 61 FR 32318 (June 24, 1996).

<sup>68</sup> AD 74-08-09 R3, 77 FR 10352 (February 22, 2012).

<sup>69</sup> 45 FR 7750.

<sup>70</sup> *ARAC Input to Support Regulatory Reform of Aviation Regulations—ARAC Addendum Report* (September 12, 2017), is available in the docket for this rulemaking and at [https://www.faa.gov/regulations\\_policies/rulemaking/committees/documents/index.cfm/document/information/documentID/3142](https://www.faa.gov/regulations_policies/rulemaking/committees/documents/index.cfm/document/information/documentID/3142).

<sup>71</sup> **Federal Register** Document No. 2017-21101 (82 FR 45750), Docket No. DOT-OST-2017-0069, <https://www.govinfo.gov/content/pkg/FR-2017-10-02/pdf/2017-21101.pdf>. The A4A comment is found at <https://www.regulations.gov/comment/DOT-OST-2017-0069-2750>.

<sup>72</sup> See 14 CFR 25.853(d), initial amendment to part 25, effective February 1, 1965.

<sup>73</sup> Varig Flight 820, Rio de Janeiro, Brazil, on July 11, 1973. Refer to [https://asn.flightsafety.org/reports/1973/19730711\\_B703\\_PP-VJZ.pdf](https://asn.flightsafety.org/reports/1973/19730711_B703_PP-VJZ.pdf) and <https://asn.flightsafety.org/asndb/330145>.

<sup>74</sup> ARAC Powerplant Installation Harmonization Working Group, *Task 14—Reverse Thrust and Propeller Pitch*, is available in the docket for this rulemaking and at [https://www.faa.gov/regulations\\_policies/rulemaking/committees/documents/media/taepiht14-112699.pdf](https://www.faa.gov/regulations_policies/rulemaking/committees/documents/media/taepiht14-112699.pdf).

<sup>75</sup> *ARAC Input to Support Regulatory Reform of Aviation Regulations* (June 8, 2017), is available in the docket for this rulemaking and at [https://www.faa.gov/regulations\\_policies/rulemaking/committees/documents/index.cfm/document/information/documentID/3002](https://www.faa.gov/regulations_policies/rulemaking/committees/documents/index.cfm/document/information/documentID/3002).

<sup>76</sup> NTSB Aircraft Accident Report NTSB/AAR-88/08 and NTSB/AAR-94/06 are available in the docket and at <https://data.ntsb.gov/carol-main-public/basic-search/>.

<sup>77</sup> AD 91-03-10, 56 FR 3974 (February 1, 1991); AD 94-09-09, 59 FR 22127 (April 29, 1994); AD 94-10-10, 59 FR 26105 (May 19, 1994).

<sup>78</sup> The Fokker F27 Luxair Flight 9642 (2002) and Kish Airlines Flight 7170 (2004) accident reports are available in the docket and at <https://www.skybrary.aero/bookshelf/books/674.pdf> and <https://www.skybrary.aero/bookshelf/books/677.pdf>, respectively.

<sup>79</sup> Lauda Air Flight NG 004, Bangkok, Thailand, May 26, 1991; Gates Learjet 35A, Avon Park, Florida, July 15, 1997.

<sup>80</sup> *Criteria for Assessing Transport Turbojet Fleet Thrust Reverser System Safety*, Rev A (June 1, 1994), is available in the docket for this rulemaking and at [https://www.faa.gov/sites/faa.gov/files/2022-11/task\\_force\\_report.pdf](https://www.faa.gov/sites/faa.gov/files/2022-11/task_force_report.pdf).

<sup>81</sup> The Fokker F27 Luxair Flight 9642 (2002) and Kish Airlines Flight 7170 (2004) accident reports are available in the docket and at <https://www.skybrary.aero/bookshelf/books/674.pdf> and <https://www.skybrary.aero/bookshelf/books/677.pdf>, respectively.

<sup>82</sup> *Id.*

<sup>83</sup> NTSB Safety Recommendation A-88-105 (referenced in NTSB/AAR-88/08) and A-94-062 (referenced in NTSB/AAR-94/06) are available in the docket and at <https://data.ntsb.gov/carol-main-public/basic-search/>.

<sup>84</sup> Notice of new task assignments for the ARAC, 63 FR 509540 (September 23, 1998), available at <https://www.govinfo.gov/content/pkg/FR-1998-09-23/pdf/98-25469.pdf>.

<sup>85</sup> ARAC Recommendations for § 25.1155 can be found in the docket for this rulemaking and at [https://www.faa.gov/regulations\\_policies/rulemaking/committees/documents/media/taepiht14-112699.pdf](https://www.faa.gov/regulations_policies/rulemaking/committees/documents/media/taepiht14-112699.pdf).

<sup>86</sup> EASA CS-25, Initial Issue dated October 17, 2003, available at <https://www.easa.europa.eu/document-library/certification-specifications/cs-25-initial-issue>.

<sup>87</sup> ARAC Input to Support Regulatory Reform of Aviation Regulations—ARAC Addendum Report (September 12, 2017), is available in the docket for this rulemaking and at [https://www.faa.gov/regulations\\_policies/rulemaking/committees/documents/index.cfm/document/information/documentID/3142](https://www.faa.gov/regulations_policies/rulemaking/committees/documents/index.cfm/document/information/documentID/3142).

<sup>88</sup> ARAC Powerplant Installation Harmonization Working Group, § 25.1193(e) Cowl Skin Fire Protection (September 18, 2000), is available in the docket for this rulemaking and at [https://www.faa.gov/regulations\\_policies/rulemaking/committees/documents/media/TAEPihT5-9231998.pdf](https://www.faa.gov/regulations_policies/rulemaking/committees/documents/media/TAEPihT5-9231998.pdf).

<sup>89</sup> Areas that have been designated as fire zones are listed in § 25.1181, *Designated fire zones; regions included*.

<sup>90</sup> Examples include ELOS Memorandum Nos. AT-01-2015-0016-P-06, PS12-0038-P-8, and PS13-1000-P-6, which are available at <https://drs.faa.gov/>.

<sup>91</sup> Policy Statement PS-ANM100-00-113-1034, *Use of ARAC (Aviation Rulemaking Advisory Committee) Recommended Rulemaking Not Yet Formally Adopted by the FAA, as a Basis for Equivalent Level of Safety or Exemption to Part 25* (January 4, 2001), is available in the docket for this rulemaking and at <https://drs.faa.gov>. ARAC reports are available at [http://www.faa.gov/aircraft/air\\_cert/design\\_approvals/transport/transport\\_arac/rulemaking/](http://www.faa.gov/aircraft/air_cert/design_approvals/transport/transport_arac/rulemaking/).

<sup>92</sup> Amendment 25-40 was published in the **Federal Register** at 42 FR 15044 (March 17, 1997).

<sup>93</sup> Examples include ELOS Memorandum Nos. AT-01-2015-0016-P-3 R1 and TXTAV-18571-P-4, which are available at <https://drs.faa.gov/>.

<sup>94</sup> ARAC Input to Support Regulatory Reform of Aviation Regulations—ARAC Addendum Report (September 12, 2017), is available in the docket for this rulemaking and at [https://www.faa.gov/regulations\\_policies/rulemaking/committees/documents/index.cfm/document/information/documentID/3142](https://www.faa.gov/regulations_policies/rulemaking/committees/documents/index.cfm/document/information/documentID/3142).

<sup>95</sup> *AIA Powerplant Indications Task Team Report*, is available in the docket and at [https://www.aia-aerospace.org/wp-content/uploads/AIA-PITT\\_Report.pdf](https://www.aia-aerospace.org/wp-content/uploads/AIA-PITT_Report.pdf).

<sup>96</sup> Examples include ELOS Memorandum Nos. ST06344WI-T-P-1, Rev C and TC-01-2010-0024-P-12, which are available at <https://drs.faa.gov/>.

<sup>97</sup> Examples include ELOS Memorandum Nos. PS06-0496-F-18 dated 11/20/2015; PS06-0496-F-18 dated 8/21/2014; and PS06-0496-F-18 dated 5/9/2013, which are available at <https://drs.faa.gov/>.

<sup>98</sup> ARAC Input to Support Regulatory Reform of Aviation Regulations (June 8, 2017), is available in the docket for this rulemaking and at [https://www.faa.gov/regulations\\_policies/rulemaking/committees/documents/index.cfm/document/information/documentID/3002](https://www.faa.gov/regulations_policies/rulemaking/committees/documents/index.cfm/document/information/documentID/3002).

<sup>99</sup> Authorized persons are persons identified in 14 CFR 121.583(a) who, when authorized by the certificate holder, may be carried aboard an airplane without complying with the passenger-carrying airplane requirements specified in that section.

<sup>100</sup> Examples of previously granted exemptions for carriage of non-crew members on all-cargo airplanes are Docket No. FAA-2019-0565 Exemption No. 18467A, Docket No. FAA-2021-0084 Exemption No. 18917, and Docket No. FAA-2020-0501 Exemption No. 18645. These are available at <https://drs.faa.gov/>.

<sup>101</sup> Flightcrew in § 25.729; crew in § 25.101(h)(1); flight attendants in § 25.1423(g); passengers in § 25.789(a).

<sup>102</sup> Examples of previously granted exemptions for carriage of non-crew members on all-cargo airplanes are Docket No. FAA-2019-0565 Exemption No. 18467A, Docket No. FAA-2021-0084 Exemption No. 18917, and Docket No. FAA-2020-0501 Exemption No. 18645. These are available at <https://drs.faa.gov/>.

<sup>103</sup> Docket No. FAA-2016-9280 Exemption No. 17218, and Docket No. FAA-2019-0531 Exemption No. 18344. These are available at <https://drs.faa.gov/>.

<sup>104</sup> AC 25.785-1B, *Flight Attendant Seat and Torso Restraint System Installations*, defines “near” for flight attendant seats. The AC is available at [https://www.faa.gov/documentLibrary/media/Advisory\\_Circular/AC%2025.785-1B.pdf](https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC%2025.785-1B.pdf).

<sup>105</sup> Docket No. FAA-2023-2034 Exemption No. 22899, and Docket No. FAA-2023-0546 Exemption No. 22540. These are available at <https://drs.faa.gov/>.

<sup>106</sup> Docket No. FAA-2023-2034 Exemption No. 22899, and Docket No. FAA-2023-1260 Exemption No. 22556. These are available at <https://drs.faa.gov/>.

<sup>107</sup> AC 25-17A, *Transport Airplane Cabin Interiors Crashworthiness Handbook* (May 18, 2009).

<sup>108</sup> Docket No. FAA-2024-2459 Exemption No. 234094, Docket No. FAA-2020-0543 Exemption No. 18706, and Docket No. FAA-2017-1156 Exemption No. 17828. These are available at <https://drs.faa.gov/>.

<sup>109</sup> Examples of previously granted exemptions for carriage of non-crew members on all-cargo airplanes that allow access to a Class E cargo compartment are Docket No.

FAA-2019-0565 Exemption No. 18467A, and Docket No. FAA-2020-0501 Exemption No. 18645. These are available at <https://drs.faa.gov/>.

<sup>110</sup> Docket No. FAA-2022-1710 Exemption No. 21812, and Docket No. FAA-2024-2459 Exemption No. 234084. These are available at <https://drs.faa.gov/>.

<sup>111</sup> Docket No. FAA-2022-1710 Exemption No. 21812, and Docket No. FAA-2024-2459 Exemption No. 234084. These are available at <https://drs.faa.gov/>.

<sup>112</sup> AC 25-9A, *Smoke Detection, Penetration and Evacuation Tests and Related Flight Manual Emergency Procedures*, available at [https://www.faa.gov/documentLibrary/media/Advisory\\_Circular/AC\\_25-9A.pdf](https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_25-9A.pdf).

<sup>113</sup> AC 25-9A provides guidance on the conduct of certification tests related to smoke detection, penetration, and evacuation.

<sup>114</sup> Report No. DOT/FAA/TC-21/3, *Fuel Tank Flammability Assessment Method User's Manual—Updated for Version 11*, available at <https://rosap.ntl.bts.gov/view/dot/578494>.

<sup>115</sup> The FTFAM is a FAA-developed computer model designed as a comparative analysis tool to determine airplane fuel tank flammability as a requirement of § 25.981. The model uses Monte Carlo statistical methods to generate flammability data for certain unknown variables over known distributions for a large number of flights.

<sup>116</sup> Amendment 25-125 was published in the **Federal Register** at 73 FR 42444 (July 21, 2008).

<sup>117</sup> <http://www.fire.tc.faa.gov/systems/fuel tank/FTFAM>.

<sup>118</sup> Examples include ELOS Memorandum Nos. SA17261AT-T-F-1 and ST7502CH-T-S-1, which are available at <https://drs.faa.gov/>.

<sup>119</sup> Example SCs are No. 25-579-SC, Docket No. FAA-2015-0177, No. 25-637-SC, Docket No. FAA-2015-6363, and No. 25-599-SC, Docket No. FAA-2014-1075, which are available in the **Federal Register**.

<sup>120</sup> Example exemptions are Exemption No. 8832, Docket No. FAA-2006-25866, Exemption No. 11765, Docket No. FAA-2014-0881, and Exemption No. 14929, Docket No. FAA-2015-5056. These are available at <https://drs.faa.gov/>.

<sup>121</sup> CS-25 amendment 13 is available in the docket for this rulemaking and at <https://www.easa.europa.eu/en/document-library/certification-specifications/cs-25-amendment-13>.

<sup>122</sup> Windshields and windows: §§ 25.773, 25.775, 25.783, 25.843; Instruments: § 25.1543.

<sup>123</sup> Example SCs are No. 25-836-SC, Docket No. FAA-2023-0137, and No. 25-848-SC, Docket No. FAA-2023-2438, which are available in the **Federal Register**.

<sup>124</sup> CS 25.788 at amendment 25-19.

<sup>125</sup> EASA AMC 25.788(a) and AMC 25.1447(c)(3) in CS-25 amendment 28 are available in the docket for this rulemaking and at <https://www.easa.europa.eu/en/document-library/certification-specifications/cs-25-amendment-28>.

<sup>126</sup> EASA AMC 25.603(a) in CS-25 amendment 28 is available in the docket for this rulemaking and at <https://>

[www.easa.europa.eu/en/document-library/certification-specifications/cs-25-amendment-28](http://www.easa.europa.eu/en/document-library/certification-specifications/cs-25-amendment-28).

<sup>127</sup> See CS-25 Amendment 12, dated 13 July 2012, which is available at <https://www.easa.europa.eu/en/document-library/certification-specifications/cs-25-amendment-12>.

<sup>128</sup> Transport Aircraft Crashworthiness and Ditching Working Group Report to FAA. The report is available in the docket for this rulemaking and at [https://www.faa.gov/regulations\\_policies/rulemaking/committees/documents/index.cfm/document/information?documentID=3743](https://www.faa.gov/regulations_policies/rulemaking/committees/documents/index.cfm/document/information?documentID=3743).

<sup>129</sup> EASA AMC 25.810 in CS-25 amendment 28 is available in the docket for this rulemaking and at <https://www.easa.europa.eu/en/document-library/certification-specifications/cs-25-amendment-28>.

<sup>130</sup> Report No. DOT/FAA/AM-95/22, *Aircraft Evacuations Through Type-III Exits I: Effects of Seat Placement at the Exit* (July 1995), available at [https://www.faa.gov/sites/faa.gov/files/data\\_research/research/med\\_humanfacs/oamtechreports/AM95-22.pdf](https://www.faa.gov/sites/faa.gov/files/data_research/research/med_humanfacs/oamtechreports/AM95-22.pdf).

<sup>131</sup> Examples include ELOS Memorandum Nos. PS12-0038-C-1-1 and AT106371B-T-CS-3 Rev 1, which are available at <https://drs.faa.gov/>.

<sup>132</sup> EASA CS-25 amendment 9, dated August 5, 2010, is available at <https://www.easa.europa.eu/document-library/certification-specifications/cs-25-amendment-9#group-easa-related-content>.

<sup>133</sup> EASA AMC 25.813, AMC 25.813(c) and AMC 25.813(e) in CS-25 amendment 28 are available in the docket for this rulemaking and at <https://www.easa.europa.eu/en/document-library/certification-specifications/cs-25-amendment-28>.

<sup>134</sup> Examples of exemptions are Exemption No. 8695, Docket No. FAA-2005-20139, and Exemption No. 10962, Docket No. FAA-2014-0202, which are available at <https://www.drs.faa.gov/>.

<sup>135</sup> Information on how FAA evaluates these exemptions is explained in Policy Memorandum ANM-03-112-16, *Interim Policy on High Altitude Cabin Decompression* (March 24, 2006), which is available in the docket for this rulemaking and at <https://drs.faa.gov>.

<sup>136</sup> The ARAC tasking was published in the **Federal Register** at 66 FR 39074 (July 26, 2001). Part 1 of the task addressed § 25.831(g), and part 2 addressed § 25.841(a). ARAC accepted the task and assigned the task to the Mechanical Systems Harmonization Working Group (MSHWG).

<sup>137</sup> *Mechanical Systems Harmonization Working Group (MSHWG) Final Report on FAR 25.841(a)(2, 3)* (July 24, 2003), is available in the docket and at [https://www.faa.gov/regulations\\_policies/rulemaking/committees/documents/index.cfm/document/information/documentID/429](https://www.faa.gov/regulations_policies/rulemaking/committees/documents/index.cfm/document/information/documentID/429).

<sup>138</sup> Policy ANM-03-112-16 contains this material. The policy was coordinated with CAMI.

<sup>139</sup> Page 23 of the MSHWG Report on 25.841(a)(2)&(3); page 3 of Policy ANM-03-112-16; and page 10 of FAA CAMI Report.

<sup>140</sup> As explained in Policy ANM-03-112-16.

<sup>141</sup> FAA ASIAs system, available at <https://www.asias.faa.gov/>, enables users to perform integrated queries across multiple databases, search an extensive warehouse of safety data, and display pertinent elements in an array of useful formats.

<sup>142</sup> Hypoxia is an insufficient supply of oxygen. Hypoxia results from the reduced oxygen partial pressure in the inspired air caused by the decrease in barometric pressure with increasing altitude, which is a result of rapid decompression of the airplane cabin pressure altitude.

<sup>143</sup> Page 34 of the MSHWG Report refers to these events as “crew management of ECS” and “procedural” in the accompanying figure.

<sup>144</sup> In development of Policy ANM-03-112-16, FAA specialists conducted a survey of all uncontained engine failures of high bypass turbofan engines in commercial part 121 operation that occurred during cruise flight condition (i.e., step-cruise in between climb; maximum cruise altitude). The analysis showed an average probability of an uncontained engine failure at cruise of approximately  $1 \times 10^{-7}$  per engine hour.

<sup>145</sup> Airline Engine Safety Review Report to Congress prepared in Response to Section 309 of the FAA Reauthorization Act of 2018 (Pub. L. 115-254).

<sup>146</sup> The following link is to the EASA Engine and Aircraft Certification Working Group Report that includes data corroborating the conclusions on observed trends: [https://www.easa.europa.eu/sites/default/files/dfu/EACWG\\_final\\_report\\_June\\_2017.pdf](https://www.easa.europa.eu/sites/default/files/dfu/EACWG_final_report_June_2017.pdf).

<sup>147</sup> The ARAC tasking included an assessment of any relevant FAA standards, this was interpreted by Transport Airplane Engine Issues Group (TAEIG) to include any FAA policy guidance.

<sup>148</sup> See [https://www.faa.gov/regulations\\_policies/rulemaking/committees/documents/media/TAEmsh-vhchp-07262001.pdf](https://www.faa.gov/regulations_policies/rulemaking/committees/documents/media/TAEmsh-vhchp-07262001.pdf).

<sup>149</sup> DOT/FAA/AM-15/8, *Human Responses to a Simulated 35,000-Foot Instantaneous Decompression and the Subsequent Descent Profile Required by FAA Policy* (April 2015), is available in the docket and at [https://www.faa.gov/sites/faa.gov/files/data\\_research/research/med\\_humanfacs/oamtechreports/201508.pdf](https://www.faa.gov/sites/faa.gov/files/data_research/research/med_humanfacs/oamtechreports/201508.pdf).

<sup>150</sup> The term normobaric refers to a barometric pressure equivalent to pressure at sea level.

<sup>151</sup> Two of the test subjects needed assistance (artificial ventilation) to recover from exposure to the partial pressure of oxygen profile.

<sup>152</sup> As recommended in the MSHWG Report page 53 and 56. Compliance to the requirements in 14 CFR 121.417(b)(3)(i) for a Rapid Decompression, may be different depending upon the specific automated feature an aircraft manufacturer incorporates into their airplane design.

<sup>153</sup> These requirements for structural failures and system failures are currently in the regulation per amendment 25-87.

<sup>154</sup> DOT/FAA/AM-15/8, *Human Responses to a Simulated 35,000-Foot Instantaneous Decompression and the Subsequent Descent Profile Required by FAA Policy* (April 2015), is available in the docket and at <https://>

[www.faa.gov/sites/faa.gov/files/data\\_research/research/med\\_humanfacs/oamtechreports/201508.pdf](https://www.faa.gov/sites/faa.gov/files/data_research/research/med_humanfacs/oamtechreports/201508.pdf).

<sup>155</sup> See page 13 of Policy ANM-03-112-16 and page 9 of AIA Project Report on High Bypass Ratio Turbine Engine Uncontained Rotor Events and Small Fragment Threat Characterization, 1969-2006, Volume 1, January 2010 available at [https://www.faa.gov/regulations\\_policies/rulemaking/committees/documents/media/App%20B%20-%20Vol1%20AIA%20Rotor%20Burst%20Small%20Fragment%20Committee%20Report%20Final%20r1%20\(2\).pdf](https://www.faa.gov/regulations_policies/rulemaking/committees/documents/media/App%20B%20-%20Vol1%20AIA%20Rotor%20Burst%20Small%20Fragment%20Committee%20Report%20Final%20r1%20(2).pdf).

<sup>156</sup> Policy ANM-03-112-16, which references the ARAC MSHWG Report, states that “an average probability of an uncontained engine failure at cruise [is] approximately  $1 \times 10^{-7}$  per engine hour. New engine designs appear to provide an order of magnitude improvement to this risk. It is because these events are considered rare that FAA considers the risk versus benefits to be acceptable.” In addition, grants of exemption to § 25.841(a)(2), which reference the MSHWG report and Policy ANM-03-112-16, include the following discussion “. . . grouping all engines and transport airplanes together yields an average probability of an uncontained engine failure at cruise altitude of approximately  $1 \times 10^{-7}$  per engine hour. New engine designs appear to reduce this probability by an order of magnitude. We found, as noted in the MSHWG report on § 25.841(a), that no fatalities from hypoxia were due to in-flight rapid decompression events as envisioned by amendment 25-87. The data indicate that decompression is not a significant cause of fatalities. It is because these events are so rare that FAA considers the risk to be acceptable.” Exemptions to 14 CFR 25.841(a) are available at <https://drs.faa.gov/>.

<sup>157</sup> Example exemptions are Exemption No. 10962, Docket No. FAA-2014-0202 and Exemption No. 10228, Docket No. FAA-2010-0766, which are available at <https://drs.faa.gov/>.

<sup>158</sup> SAE ARP1270, Aircraft Cabin Pressurization Criteria.

<sup>159</sup> EASA revised CS 25.854 at amendment 25-19. This is available in the docket for this rulemaking and at <https://www.easa.europa.eu/en/document-library/certification-specifications/cs-25-amendment-19>.

<sup>160</sup> Examples of SCs are Docket No. FAA-2017-0319, SCs No. 25-668-SC; and Docket No. FAA-2015-1819, Special Conditions No. 25-583-SC. These are available in the **Federal Register**.

<sup>161</sup> See, e.g., Special Conditions No. 25-668-SC, Docket No. FAA-2017-0319, available in the **Federal Register**.

<sup>162</sup> FAA is aware of current industry efforts to develop hydrogen fuel cell systems as a means to supply electrical power on aircraft. FAA expects innovation and research could lead to other as-yet-unforeseen technologies for this purpose.

<sup>163</sup> Final rule, *Enhanced Airworthiness Program for Airplane Systems/Fuel Tank Safety (EAPAS/FTS)*, Docket No. FAA-2004-18379, was published in the **Federal Register** at 72 FR 63364 (November 8, 2007).

<sup>164</sup> Accessed January 30, 2025.

<sup>165</sup> 65 FR 67249 (November 6, 2000).

<sup>166</sup> FAA Order No. 1210.20 (January 28, 2004), available at [www.faa.gov/documentLibrary/media/1210.pdf](http://www.faa.gov/documentLibrary/media/1210.pdf).

#### List of Subjects in 14 CFR Part 25

Aircraft, Aviation safety, Incorporation by reference, Reporting and recordkeeping requirements.

#### The Proposed Amendment

For the reasons discussed in the preamble, the Federal Aviation Administration proposes to amend chapter I of title 14, Code of Federal Regulations as follows:

#### PART 25—AIRWORTHINESS STANDARDS: TRANSPORT CATEGORY AIRPLANES

- 1. The authority citation for part 25 continues to read as follows:

**Authority:** 49 U.S.C. 106(f), 40113, 44701, 44702 and 44704; Pub. L. 115–254, 132 Stat 3281 (49 U.S.C. 44903 note).

#### Special Federal Aviation Regulation No. 109 [Removed]

- 2. Remove Special Federal Aviation Regulation No. 109.  
 ■ 3. In § 25.4, add paragraph (d) to read as follows:

#### § 25.4 Definitions.

(d) For purposes of this part, the terms non-commercially operated and low occupancy are defined as follows:

(1) Non-commercially operated airplanes are airplanes that are not offered for common carriage and not operated for hire, with a passenger seating configuration limited in accordance with paragraphs (d)(1)(i) and (d)(1)(ii) of this section. The operators may receive remuneration to the extent consistent with parts 125 and 91, subpart F, of this chapter. The passenger seating configuration must not exceed:

- (i) 19 passengers; or  
 (ii) One-half of the maximum passenger seating capacity of the type certified airplane as indicated in the airplane type certificate data sheet (TCDS), provided that:

(A) The total number of passengers approved for occupancy during taxiing, takeoff, or landing does not exceed 150 per deck; and

(B) The total number of passengers approved for occupancy on a deck during taxiing, takeoff, or landing does also not exceed one-half of the maximum passenger seating capacity for that deck as indicated in the airplane TCDS.

(2) A low occupancy airplane, irrespective of the type of operations

(commercial or non-commercial), is an airplane that has a passenger seating configuration of:

- (i) Not more than 19 passengers; or  
 (ii) Not more than one-third of the maximum passenger seating capacity of the type certified airplane as indicated in the airplane TCDS, provided that:

(A) The total number of passenger seats approved for occupancy during taxiing, takeoff, or landing does not exceed 100 per deck; and

(B) The total number of passenger seats approved for occupancy during taxiing, takeoff, or landing in any individual zone between pairs of emergency exits does not also exceed one-third of the sum of the passenger seat allowances for the emergency exit pairs bounding that zone, using the passenger seat allowance for each emergency exit pair as defined by the applicable certification basis of the airplane. For the purpose of determining compliance with this zonal limitation, in the case of an airplane with deactivated emergency exits, assume that all emergency exits are functional.

- 4. Revise § 25.5 to read as follows:

#### § 25.5 Incorporations by reference.

Certain material is incorporated by reference into this part with the approval of the Director of the Federal Register under 5 U.S.C. 552(a) and 1 CFR part 51. All approved incorporation by reference (IBR) material is available for inspection at the Federal Aviation Administration (FAA) and at the National Archives and Records Administration (NARA). Contact FAA at: Rules and Regulations Group, Federal Aviation Administration, 800 Independence Avenue SW, Washington, DC 20591; (202) 267–8783; [www.faa.gov](http://www.faa.gov). For information on the availability of this material at NARA, visit [www.archives.gov/federal-register/cfr/ibr-locations.html](http://www.archives.gov/federal-register/cfr/ibr-locations.html) or email [fr.inspection@nara.gov](mailto:fr.inspection@nara.gov). The material may be obtained from the following source:

(a) National Technical Information Services (NTIS), 5301 Shawnee Road Alexandria, Virginia 22312; email: [Info@NTIS.gov](mailto:Info@NTIS.gov); website: [www.ntis.gov](http://www.ntis.gov).

(1) Report No. DOT/FAA/TC–21/3, “Fuel Tank Flammability Assessment Method User’s Manual—Updated for Version 11,” dated January 2021, IBR approved for § 25.981 and appendix N to part 25.

(2) [Reserved]

(b) [Reserved]

- 5. In § 25.251, revise paragraph (b) to read as follows:

#### § 25.251 Vibration and buffeting.

(b) Each part of the airplane must be demonstrated in flight to be free from excessive vibration under any appropriate speed and power conditions up to  $V_{DF}/M_{DF}$ . The maximum speeds shown must be used in establishing the operating limitations of the airplane in accordance with § 25.1505. Effects from external modifications to an existing type design may be demonstrated by an acceptable means other than flight test for speeds above  $V_{MO}/M_{MO}$ .

\* \* \* \* \*

- 6. In § 25.349, revise paragraph (a) to read as follows:

#### § 25.349 Rolling conditions.

\* \* \* \* \*

(a) *Maneuvering*. The following conditions, speeds, and flightdeck roll control motions (except as limited by pilot effort) must be considered in combination with an airplane load factor ranging from zero to two-thirds of the positive maneuvering load factor used in design. In evaluating these conditions, the torsional flexibility of the wing must be considered in accordance with § 25.301(b). In addition, these conditions must be investigated assuming rational or conservative yaw control input (pilot or system induced).

(1) Conditions corresponding to steady rolling velocities must be investigated. In addition, conditions corresponding to maximum angular acceleration must be investigated. For the angular acceleration conditions, zero rolling velocity may be assumed in the absence of a rational time history investigation of the maneuver.

(2) At  $V_A$ , sudden movement of the flightdeck roll control up to the limit is assumed. The position of the flightdeck roll control must be maintained until a steady roll rate is achieved, and then must be returned suddenly to the neutral position.

(3) At  $V_C$ , the flightdeck roll control must be moved suddenly and maintained so as to achieve a roll rate not less than that obtained in paragraph (a)(2) of this section. When a steady roll rate is achieved, the roll control must be returned suddenly to the neutral position.

(4) At  $V_D$ , the flightdeck roll control must be moved suddenly and maintained so as to achieve a roll rate not less than one-third of that obtained in paragraph (a)(2) of this section.

\* \* \* \* \*

- 7. In § 25.773, revise paragraphs (a) and (b)(1) to read as follows:

**§ 25.773 Pilot compartment view.**

(a) *Non-precipitation conditions.* For non-precipitation conditions, the following apply:

(1) Each pilot compartment must be arranged to give the pilots a sufficiently extensive, clear, and undistorted view to enable them to perform any maneuvers safely within the operating limitations of the airplane, including taxiing, takeoff, approach, and landing.

(2) Each pilot compartment must be free of glare and reflection that could interfere with the normal duties of the minimum flightcrew (established under § 25.1523). This must be shown in day and night flight tests under non-precipitation conditions. In lieu of night flight tests under the required non-precipitation conditions, ground tests may be used for changes to airplanes previously certificated where changes to the flight deck are not expected to produce any appreciable effect on the pilot compartment view glare or reflection based on service history or previous flight test results.

(b) \* \* \*

(1) The airplane must have a means to maintain a clear portion of the windshield, during precipitation conditions, sufficient for both pilots to have a sufficiently extensive view for all operations within the operating limitations of the airplane, including taxiing, takeoff, approach, and landing. This means must be designed to function, without continuous attention on the part of the crew, in—

(i) Heavy rain at speeds up to 1.5  $V_{SR1}$  with lift and drag devices retracted,

(ii) Light precipitation conditions at speeds normally encountered during ground operations, and

(iii) The icing conditions specified in appendix C to this part and the following icing conditions specified in appendix O to this part, if certification for flight in icing conditions is sought:

(A) For airplanes certificated in accordance with § 25.1420(a)(1), the icing conditions that the airplane is certified to exit safely following detection.

(B) For airplanes certificated in accordance with § 25.1420(a)(2), the icing conditions that the airplane is certified to operate safely in and the icing conditions that the airplane is certified to exit safely following detection.

(C) For airplanes certificated in accordance with § 25.1420(a)(3) and for airplanes not subject to § 25.1420, all icing conditions.

\* \* \* \* \*

■ 8. In § 25.785, revise paragraph (b) to read as follows:

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

\* \* \* \* \*

(b) Each seat, berth, safety belt, harness, and adjacent part of the airplane at each station designated as occupiable during takeoff and landing must be designed so that a person making proper use of these facilities will not suffer serious injury in an emergency landing as a result of the inertia forces specified in §§ 25.561 and 25.562. However, berths only for the carriage of medical patients (*e.g.*, stretchers) need not comply with the requirements of § 25.562.

\* \* \* \* \*

■ 9. Add § 25.788 to read as follows:

**§ 25.788 Passenger amenities.**

(a) *Showers.* If a shower cubicle is installed—

(1) Audio and visual “return to seat” indications must be provided and readily audible and visible to a shower cubicle occupant, and activated at the same time as the signs required by § 25.791(b);

(2) Audio and visual indications about the need for oxygen use must be provided and readily audible and visible to a shower cubicle occupant, and activated in the case of cabin depressurization or deployment of the oxygen-dispensing units in the cabin;

(3) Placards must be installed to indicate that the shower cubicle must not be used for the stowage of cargo or passenger baggage;

(4) There must be means in the shower cubicle to enable persons to steady themselves in moderately rough air; and

(5) The shower cubicle must be designed in a way that precludes anyone from being trapped inside. If a locking mechanism is installed, it must be capable of being unlocked from the inside and the outside without the aid of any tool.

(b) *Large Display Panels.* Any large display panel installed in a passenger compartment must not be a hazard to occupants when submitted to any of the following conditions—

(1) Each relevant flight and ground load condition of subpart C of this part (including the emergency landing conditions prescribed in § 25.561);

(2) Any load to be expected in service; and

(3) A cabin depressurization.

(c) *Large Non-Structural Glass Panels.* In addition to the requirements of paragraph (b) of this section, large non-structural glass panels installed in areas that are approved to be occupied during taxiing, takeoff, or landing, and areas that a person has to enter or pass

through to get to any emergency exit, must be glass that, when fractured, breaks into small pieces with relatively dull edges and must retain glass fragments.

■ 10. Add § 25.797 to read as follows:

**§ 25.797 Requirements for carriage of authorized persons on all-cargo airplanes with Class E cargo compartments.**

(a) The limitations section of the airplane flight manual must:

(1) Prohibit the carriage of persons other than authorized persons identified in § 121.583;

(2) Indicate the maximum number of authorized persons;

(3) Prohibit occupancy of the cargo compartment during taxiing, takeoff, and landing; and

(4) Require a flightcrew member brief each authorized person before each flight on the following:

(i) Appropriate emergency procedures to ensure the safety of the flight,

(ii) The meaning of all alerts required by this section, and

(iii) That access to the Class E cargo compartment is prohibited during taxiing, takeoff, and landing.

(b) In lieu of the lighted sign requirements of § 25.791(b), the airplane must provide a flightcrew-operated alert system to inform the authorized persons when to fasten their seat belts.

(c) In lieu of the emergency exit size requirements of § 25.807(g)(1) and (i)(1), flightcrew exits may be designated for use by 9 or less authorized persons, provided the exit is openable from the inside and the outside. The flightcrew exits must be demonstrated as a usable exit by test.

(d) In lieu of the means to permit viewing of the likely areas of evacuee ground contact requirements of § 25.809(a), for the exits designated for use by authorized persons, a means such as a fuselage-mounted emergency egress light must be installed to light the ground contact area.

(e) In lieu of the assist means requirements of § 25.810(a)(1), for the exits designated for use by authorized persons, approved emergency means to allow rapid evacuation must be provided for each occupant.

(f) If all seats for authorized persons are near the emergency exits, then the following need not be met:

(1) The floor proximity emergency escape path marking requirements of § 25.812(e);

(2) The transverse vertical separation requirements of § 25.812(l)(1); and

(3) The assist space requirements of § 25.813(b).

(g) If an automatically-presented oxygen dispensing system required by

§ 25.1447(c)(1) is not installed, an oxygen mask connected to an oxygen supply source must be provided for each authorized person and located so each authorized person can don the mask and start the flow of oxygen as necessary while seated.

(1) Each such oxygen mask and oxygen supply for use while seated must be sized to provide adequate oxygen for continuous and uninterrupted use during the worst-case flight duration following decompression and meet the minimum mass flow of supplemental oxygen requirements in § 25.1443(c).

(2) If portable oxygen units are installed to allow mobility, the portable oxygen units must meet the performance requirements of:

- (i) § 25.1443(a);
- (ii) § 25.1443(b); or
- (iii) The equipment must be shown to protect the authorized person from hypoxia at an activity level required to return to their seat following a rapid decompression to 25,000 feet cabin altitude.

(3) In lieu of crew determination if oxygen is being delivered to the dispensing units as required by § 25.1449, there must be a means to allow each authorized person to determine whether oxygen is being delivered to their portable oxygen dispensing equipment.

(4) An automatically activated aural alerting system must, in the case of a decompression, notify authorized persons when to don oxygen masks and initiate flow to the masks.

(h) There must be a means to allow authorized persons and the flight deck to communicate.

(1) A public address (PA) system meeting the requirements of § 25.1423 must be installed. The PA system must be audible throughout the occupiable compartments of the airplane and activated from either the flightdeck or from the seating area for the authorized persons.

(2) A means must be installed that provides two-way communication between the seating area for authorized persons and the flightdeck and is within reach of at least one of the authorized persons at their seat. This system must be independent of the PA system except for handsets, headsets, microphones, selector switches, and signaling devices.

(i) If certification permitting access into a Class E cargo compartment in-flight is requested, the compartment must meet the following requirements:

(1) In-flight access to the Class E cargo compartment is limited to a maximum of three authorized persons for the handling of hazardous or perishable

cargo. If animals are carried as cargo, in-flight access is limited to a maximum of one authorized person for every four animals. The placard required by paragraph (k)(1) of this section must state the applicable limit on in-flight access.

(2) Full-face portable oxygen equipment meeting the requirements of paragraph (g)(2) through (4) of this section and the protective breathing equipment requirements of § 25.1439(b)(1), (2), and (4) must be provided for each authorized person outside the compartment.

(j) The following alert systems must be installed, and be recognizable in all accessible areas such as the lavatory, the flight deck, any occupied compartment forward of the Class E cargo compartment, and the Class E cargo compartment at all occupant locations and orientations, during all expected operational conditions, including a rapid decompression where moisture in the air may condense:

(1) In the event of decompression, an automatically activated aural alerting system must notify authorized persons to don oxygen masks and immediately return to their seats, initiate flow to the masks, and ensure that the access provisions necessary to prevent smoke penetration into occupied areas have been secured.

(2) In the event of smoke or fire detection, a visual alerting system must notify authorized persons to don oxygen masks and immediately return to their seats and must ensure that the access provisions necessary to prevent smoke penetration into occupied areas have been secured.

(3) In the event of turbulence and prior to taxiing, takeoff, and landing, regardless of whether handholds are installed to show compliance with § 25.785(j), an alerting system must notify authorized persons to return to their seats immediately and ensure that the access provisions necessary to prevent smoke penetration into occupied areas have been secured.

(k) Placards must be installed in a conspicuous location in the seating area for the authorized persons on or adjacent to the access means to the cargo compartment and must provide the following information:

(1) The limit on the number of authorized persons permitted in-flight access to the cargo compartment.

(2) That occupancy of the cargo compartment is prohibited during taxiing, takeoff, and landing.

(3) That each authorized person must carry a portable oxygen unit with full face mask while inside the cargo compartment.

(4) The actions authorized persons must do in the event of different alerts.

(5) That smoking is not allowed within the cargo compartment.

(6) That the access provisions necessary to prevent smoke penetration into occupied areas must be secured except when entering or leaving the cargo compartment.

(7) That the cargo compartment must not be entered in case of fire or smoke being detected inside that compartment.

(8) That when authorized persons are carried, the seat position within reach of the two-way communication system required by paragraph (h)(2) of this section must be occupied for taxiing, takeoff, and landing.

(l) Flight tests must be conducted in accordance with § 25.855(h) to show compliance with the provisions of § 25.857 concerning the entry of hazardous quantities of smoke into the occupied areas. The test must account for the time to evacuate authorized persons from the main deck cargo compartment through open access provisions necessary to prevent smoke penetration into occupied areas. Occupancy of the main deck Class E cargo compartment must be limited based on the results of these tests, and identified by the placard required in paragraph (k)(1) of this section.

#### § 25.801 [Amended]

■ 11. In § 25.801(a), remove the citation “25.807(e)” and add, in its place, the citation “25.807(i)”.

■ 12. In § 25.809, revise paragraph (a) to read as follows:

#### § 25.809 Emergency exit arrangement.

##### (a) General.

(1) Each emergency exit, including a flightcrew emergency exit, must be a movable door or hatch in the external walls of the fuselage, allowing unobstructed opening to the outside.

(2) Each emergency exit, including a flightcrew emergency exit, must have means to permit viewing of the conditions outside the exit when the exit is closed, in all ambient lighting conditions with the landing gears extended or in any condition of collapse. The viewing means may be on or adjacent to the exit provided no obstructions exist between the exit and the viewing means.

(3) For non-overwing passenger emergency exits, a means must also be provided to permit viewing of the likely areas of evacuee ground contact when the exit is closed with the landing gears extended or in any condition of collapse. Further, the likely areas of evacuee ground contact must be viewable with the exit closed during all

ambient lighting conditions when all landing gears are extended.

\* \* \* \* \*

- 13. In § 25.810, revise paragraph (a)(1)(ii) to read as follows:

**§ 25.810 Emergency egress assist means and escape routes.**

\* \* \* \* \*

- (a) \* \* \*  
(1) \* \* \*

(ii) Except for assisting means installed at Type C exits, it must be automatically erected within 6 seconds after deployment is begun or within 10 seconds from the time the opening means of the exit is actuated. Assisting means installed at Type C exits must be automatically erected within 10 seconds from the time the opening means of the exit is actuated.

\* \* \* \* \*

- 14. In § 25.811, revise paragraphs (e)(2), (e)(2)(i), (e)(4), and (g) to read as follows:

**§ 25.811 Emergency exit markings.**

\* \* \* \* \*

- (e) \* \* \*

(2) Each passenger emergency exit operating handle, and the cover removal instructions if the operating handle is covered, must—

(i) Be self-illuminated with an initial brightness of at least 160 microlamberts (0.51 candela/m<sup>2</sup>), or

- (ii) \* \* \*

- (3) \* \* \*

(4) All Type II and larger passenger emergency exits with a locking mechanism released by motion of a handle must be marked to show the handle's operation by an arrow with a shaft at least 0.75 inches (19 mm) wide, adjacent to the handle, that indicates the full extent and direction of the unlocking motion required. The word "open" must be horizontally situated adjacent to the arrowhead and must be in capital letters at least 1 inch (25 mm) high. The arrow and word "open" must be located on a background that provides adequate contrast.

\* \* \* \* \*

(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" or an approved universal symbolic exit sign. The design of exit signs must be chosen to provide a consistent set throughout the cabin. If an approved universal symbol is used, limitations in the airplane flight manual must require a special emphasis briefing be given to the passengers on the meaning of the symbolic exit signs prior to each flight and prior to each landing, and that appropriate symbolic exit sign information be incorporated into

standard passenger information cards (such as those required by §§ 121.571(b), 135.117(e), and 91.1035(f)) at each passenger seat place that may be occupied for taxiing, takeoff, and landing.

- 15. In § 25.812, revise paragraphs (b)(1), (b)(2), (e)(1), and (e)(2), and add paragraph (e)(3), and revise paragraph (1)(1) as to read follows:

**§ 25.812 Emergency lightning.**

\* \* \* \* \*

- (b) \* \* \*

(1) Airplanes that have a passenger seating configuration, excluding pilot seats, of 10 seats or more must meet the following requirements:

(i) 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 on an illuminated white background or an approved universal symbolic exit sign, of adequate size. These signs must be internally electrically illuminated with the brighter area having a brightness of at least 25 foot lamberts (86 candela/m<sup>2</sup>) and a high-to-low background contrast within the white background of a letter-based sign or green area of an approved universal symbolic exit sign no greater than 3:1. These signs must also have a contrast between the brightest and darkest elements of at least 10:1.

(ii) Each passenger emergency exit sign required by § 25.811(d)(3) must have red letters on a white background or be an approved universal symbolic exit sign, of adequate size. 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 (1.27 candela/m<sup>2</sup>). The colors may be reversed in the case of a sign that is self-illuminated by other than electrical means.

(2) For airplanes that have a passenger seating configuration, excluding pilot seats, of nine seats or less, each sign required by § 25.811(d)(1), (d)(2), and (d)(3) must have red letters on a white background or an approved universal symbolic exit sign, of adequate size. These signs may be internally electrically illuminated, or self-illuminated by other than electrical means, with an initial brightness of at least 160 microlamberts (0.51 candela/m<sup>2</sup>). The colors may be reversed in the case of a sign that is self-illuminated by other than electrical means.

\* \* \* \* \*

- (e) \* \* \*

(1) After leaving the passenger seat, visually identify the emergency escape path along the cabin aisle floor to the

first exits or pair of exits forward and aft of the seat;

(2) Readily identify each exit from the emergency escape path by reference only to markings and visual features not more than 4 feet above the cabin floor; and

(3) In the case of passengers seated in seats authorized for occupancy during taxiing, takeoff, and landing, in a compartment that does not incorporate any part of the main cabin aisle, in lieu of § 25.812(e)(1), egress this compartment and enter the main cabin aisle using only markings and visual features not more than 4 feet above the cabin floor, and proceed to the exits using the marking system necessary to complete the actions as described in § 25.812(e)(1) and (e)(2) above.

\* \* \* \* \*

- (l) \* \* \*

(1) The percentage of electrically-illuminated emergency lights required by § 25.812(a) through (d) or § 25.812(e) that are rendered inoperative, in addition to the lights that are directly damaged by the separation, does not exceed the values set in table 1 to this paragraph:

TABLE 1 TO PARAGRAPH (l)(1)

| Maximum approved seating capacity of the type-certified airplane as indicated in the airplane's type certificate data sheet (TCDS) | Percentage |
|------------------------------------------------------------------------------------------------------------------------------------|------------|
| More than 19 .....                                                                                                                 | 25         |
| 10 to 19 .....                                                                                                                     | 33.33      |
| Less than 10 .....                                                                                                                 | 50         |

\* \* \* \* \*

- 16. In § 25.813, revise the section heading, remove the introductory paragraph for the section, and revise paragraphs (a), (b)(2) through (4), (c), and (f) to read as follows:

**§ 25.813 Emergency exit access and ease of operation.**

(a) There must be a passageway leading from the nearest main aisle to each Type A, Type B, Type C, Type I, or Type II emergency exit and between individual passenger areas. Each passageway leading to a Type A or Type B exit must be unobstructed and at least 36 inches (91 cm) wide. Passageways between individual passenger areas and those leading to Type I, Type II, or Type C emergency exits must be unobstructed and at least 20 inches (50.8 cm) wide. Unless there are two or more main aisles, each Type A or B exit must be located so that there is passenger flow along the main aisle to that exit from both the forward and aft directions. If

two or more main aisles are provided, there must be unobstructed cross-aisles at least 20 inches (50.8 cm) wide between main aisles. There must be—

(1) A cross-aisle that leads directly to each passageway between the nearest main aisle and a Type A or B exit; and

(2) A cross-aisle that leads to the immediate vicinity of each passageway between the nearest main aisle and a Type C, Type I, Type II, or Type III exit; except that when two Type III exits are located within three passenger rows of each other, a single cross-aisle may be used if it leads to the vicinity between the passageways from the nearest main aisle to each exit.

(b) \* \* \*

(1) \* \* \*

(2) For each Type A or Type B exit, assist space must be provided at each side of the exit regardless of whether an assist means is required by § 25.810(a).

(3) For each Type C, Type I, or Type II exit installed in an airplane with seating for more than 80 passengers, an assist space must be provided at one side of the passageway regardless of whether an assist means is required by § 25.810(a).

(4) For each Type C, Type I, or Type II exit, an assist space must be provided at one side of the passageway if an assist means is required by § 25.810(a).

\* \* \* \* \*

(c) The following must be provided for each Type III or Type IV exit:

(1) There must be access from the nearest aisle to each exit.

(2) In addition, for each Type III exit in an airplane that has a passenger seating configuration of 20 or more and that only has seats installed immediately to the forward and aft of the access route(s)—

(i) Except as provided in paragraph (c)(2)(ii) of this section, the access must be provided by an unobstructed passageway that is at least 10 inches (25.4 cm) in width for interior arrangements in which the adjacent seat rows on the exit side of the aisle contain two seats, or 13 inches (33 cm) in width for interior arrangements in which those rows contain three seats. The width of the passageway must be measured with adjacent seats adjusted to their most adverse positions. At least 10 inches (25.4 cm) of the required passageway width must be within the required projected opening width of the exit.

(ii) In lieu of one 10- or 13-inch (25.4- or 33-cm) passageway, there may be two unobstructed passageways that must be at least 6 inches (15.2 cm) in width and lead to an unobstructed space adjacent to each exit. Adjacent exits must not share a common passageway. The width

of the passageways must be measured with adjacent seats adjusted to their most adverse positions. The unobstructed space adjacent to the exit must extend vertically from the floor to the ceiling (or to the bottom of upper sidewall stowage bins), inboard from the exit for a distance not less than the width of the narrowest passenger seat installed on the airplane and from the forward edge of the forward passageway to the aft edge of the aft passageway. The exit opening must be totally within the fore and aft bounds of the unobstructed space.

(3) Each Type III exit in an airplane that has a passenger seating configuration of 20 or more and which has an access route bounded by any item(s) other than only seats (e.g. bulkhead, wall, class divider, curtain) to its forward or aft side, must be provided with an unobstructed passageway that is at least 20 inches (50.8 cm) in width. The width of the passageway must be measured with any adjacent seats, or other movable features, adjusted to their most adverse positions.

(4) In addition to the access—

(i) For airplanes that have a passenger seating configuration of 20 or more, the projected opening of the exit provided may not be obstructed and there must be no interference in opening the exit by seats, berths, or other protrusions (including adjacent seats adjusted to their most adverse positions) for a distance from that exit not less than the width of the narrowest passenger seat installed on the airplane or 15.75 inches (40 cm), whichever is the least.

(ii) For airplanes that have a passenger seating configuration of 19 or less, there may be minor obstructions in this region if there are compensating factors to maintain the effectiveness of the exit.

(5) For each Type III and Type IV exit, there must be placards that—

(i) Are readable by all persons seated adjacent to and facing a passageway to the exit, one in their normal field of view, and one adjacent to or on the exit;

(ii) Accurately state or illustrate the proper method of opening the exit, including the correct use of controls, handles, handholds, etc.; and

(iii) If the exit is a removable hatch, state the weight of the hatch and indicate an appropriate location to place the hatch after removal.

(6) For airplanes with a passenger seating configuration of 41 or more, each Type III exit must be designed such that, when operated to the fully open position, the hatch or door is automatically disposed so that it can neither reduce the size of the exit opening, the passageway(s) leading to

the exit, nor the unobstructed space specified in paragraph (c)(2)(ii) of this section, to below the required minimum dimensions. In the fully open position, it must also not obstruct egress from the exit via the escape route specified in § 25.810(c).

(7) The design of each seat, bulkhead, partition, or other feature bounding the passageway leading to each Type III or Type IV exit, must be such that—

(i) Evacuees are hindered from climbing over in the course of evacuating;

(ii) Any baggage stowage provisions (such as under-seat stowage) would prevent baggage items entering the passageway under the inertia forces of § 25.561(b)(3), unless placards are installed to indicate that no baggage shall be stowed under the seats bounding the passageway; and

(iii) No protrusions (such as coat hooks) could impede evacuation.

(8) The design and arrangement of all seats bordering and facing a passageway to each Type III or Type IV exit, both with and without the bottom cushion in place, must be free from any gap that might entrap a foot or other part of a person standing or kneeling on a seat or moving on or along the seat row.

(9) The latch design of deployable features (such as tables, video monitors, telephones, leg or foot rests) mounted on seats or bulkheads/partitions bordering and facing a passageway to a Type III or Type IV exit, must be such that inadvertent release by evacuating passengers will not occur. The latch design of deployable features must also be such that cabin crew can easily check that the items are fully latched in the stowed position. Placards indicating that each such item must be stowed for taxiing, takeoff, and landing must be installed in the normal field of view of, and be readable by each person seated in each seat bordering and facing a passageway to a Type III or Type IV exit.

\* \* \* \* \*

(f) If it is necessary to pass through a doorway separating any crewmember seat (except those seats on the flightdeck), that is occupiable for takeoff and landing, from any emergency exit, the door must have a means to latch it in the open position. The latching means must be able to withstand the loads imposed upon it when the door is subjected to the ultimate inertia forces, relative to the surrounding structure, listed in § 25.561(b).

■ 17. Add § 25.821 to read as follows:

#### § 25.821 General cabin arrangement.

(a) *Interior Doors on Non-Commercially Operated Airplanes.* For a non-commercially operated airplane,

door installations that result in non-compliance with § 25.813(e) are acceptable, provided that it is ensured by design and procedure that—

(1) Each door is open before the airplane enters any of the taxiing, takeoff, and landing phases;

(2) Each door remains open during taxiing, takeoff, and landing, and during and after a crash landing; and

(3) In the case of any probable failure or jamming of a door in a position other than fully open, any occupant is able, from any compartment separated by that door, to restore in an easy and simple manner a sufficient opening to access the compartment on the other side of the door.

(b) *Interior Doors on Commercially Operated Airplanes.* For a low occupancy airplane having a passenger seating configuration of 19 or less, installation of doors that results in non-compliance with § 25.813(e) is acceptable, provided the requirements of paragraphs (a)(1), (a)(2), and (a)(3) of this section are met, and the following additional requirements are met for each passenger compartment created by a door or doors—

(1) Within the compartment, there is at least one emergency exit above the waterline on each side of the fuselage that meets at least the requirements of a Type IV emergency exit for a compartment with a passenger seating configuration of 9 seats or less, or a Type III emergency exit for a compartment with a passenger seating configuration of 10 seats or more; or

(2) Within the compartment, there is at least one emergency exit above the waterline on one side of the fuselage that meets at least the requirements of a Type IV emergency exit for a compartment with a passenger seating configuration of 9 seats or less, or a Type III emergency exit for a

compartment with a passenger seating configuration of 10 seats or more; and

(i) An occupant of the compartment would not need to go through more than one door to access an emergency exit above the waterline on the other side of the fuselage; and

(ii) The demonstration of compliance with the provisions of paragraph (a)(1) and (a)(2) of this section does not rely on any passenger action, nor involve any flightcrew member leaving their position in the flightdeck.

(c) *Isolated Compartments.* Each cabin compartment isolated from the rest of the cabin such that a fire starting in the compartment would not be directly and quickly detected by the occupants of another compartment, in an airplane that has a passenger seating configuration of 20 or more, or that has

a cabin length of more than 60 feet, must be equipped with a smoke/fire detection system, or equivalent, which allows detection within one minute after the start of a fire and provides a visual indication in the flightdeck, or a visual indication or audible warning in the passenger cabin that would be readily detected by a cabin crewmember. However, if it can be demonstrated that a fire would be directly and quickly detected because the compartment is likely to be occupied for the majority of the flight time, such a system is not required.

(d) [Reserved].

(e) *Distance Between Emergency Exits.* Deactivation of emergency exits that results in non-compliance with § 25.807(f)(4) is acceptable on non-commercially operated airplanes only, provided that—

(1) The number of passenger seats allowed in a zone between two remaining adjacent pairs of emergency exits is limited to one-half of the combined rated capacity of the two pairs of emergency exits (rounded to the nearest whole number);

(2) The number of passenger seats allowed in a zone with only one remaining pair of emergency exits at one end is limited to one-half of the rated capacity of the pair of emergency exits (rounded to the nearest whole number);

(3) The distance from each passenger seat to at least one remaining emergency exit, on each side of the fuselage, remains compatible with easy egress from the airplane; and

(4) A distance of more than 60 feet between adjacent remaining emergency exits is created only once per side of the fuselage on each deck.

■ 18. Add § 25.823 to read as follows:

**§ 25.823 Emergency evacuation and flammability.**

(a) *Flammability Requirements.*

(1) Mattresses of permanent bed installations that are located in compartments isolated from the main passenger cabin by doors, or equivalent means, that would normally be closed during taxiing, takeoff, and landing need not meet the Oil Burner Test requirement of part II of appendix F to part 25, as required by § 25.853(c).

(2) On non-commercially operated airplanes only, compliance with § 25.853(d) need not be demonstrated if it can be shown by test, or a combination of test and analysis, under the conditions specified in appendix J to part 25 that the maximum time for evacuation of all occupants does not exceed 45 seconds.

(b) *Access to Type III and IV Emergency Exits.* Low occupancy

airplanes with a passenger seating configuration of 19 or less, and non-commercially operated airplanes, may have an item deployable into the region defined by § 25.813(c)(4)(i) or § 25.813(c)(1), (c)(2), or (c)(3) that creates an obstruction and leads to non-compliance with one or more of the aforementioned requirements, provided that paragraph (b)(1) or (b)(3) of this section is met:

(1) It is ensured that the item will be safely stowed before entering any of the taxiing, takeoff, approach, and landing phases, by means of a position monitoring and alerting system that, in a timely manner, notifies the flightcrew and compels the passengers to stow the item if it is in a position that creates an obstruction. It must be substantiated that, with the item in its most adverse position(s), the remaining exit is at least as effective as a Type IV emergency exit, unless it can be shown that following any single failure of any item creating the obstruction, an exit at least as effective as a Type IV emergency exit can be obtained by simple and obvious means.

(2) [Reserved].

(3) For airplanes required to have at least one cabin crewmember onboard, the item is intended for use only by a cabin crewmember that has direct view of the deployable item, and can confirm that it is correctly stowed and secured, while the cabin crewmember is seated during taxiing, takeoff, and landing.

■ 19. Add § 25.825 to read as follows:

**§ 25.825 Movement inside cabin during flight.**

(a) *Width of Aisle.* For low occupancy airplanes with a passenger seating configuration of 19 or less, and for non-commercially operated airplanes, the design must be such that the dimensional requirements of § 25.815 can be achieved during all flight phases, except that the width of aisle may be reduced to 0 feet during in-flight operations provided the following additional requirements are met—

(1) All areas of the cabin must be easily accessible by passengers or crew in the event of an emergency situation (e.g., in-flight fire, depressurization);

(2) Placard instructions for restoring the aisle to the taxiing, takeoff, and landing configuration must be provided at the locations where the width of the cabin aisle is reduced; and

(3) Procedures must be established and documented in the airplane flight manual for restoring the aisle width for taxiing, takeoff, and landing.

(b) *Firm Handholds.* In lieu of the requirements of § 25.785(j), if the seatbacks do not provide a firm

handhold, then there must be an acceptable means to enable persons to steady themselves while using the aisles in moderately rough air.

■ 20. Add § 25.827 to read as follows:

**§ 25.827 Markings and placards.**

(a) “No smoking” Placards and Lavatory Ashtrays. For non-commercially operated airplanes, if smoking is prohibited, compliance with § 25.853(g) is not required, and in lieu of the requirements of § 25.791(a) and (d), a reduced number of “No smoking” placards may be provided, in accordance with the following requirements—

(1) A “No smoking” placard must be conspicuously located inside the passenger compartment in the immediate vicinity of every door that can be used as a passenger boarding door; each placard must be clearly legible for passengers entering the airplane; and

(2) The indication that smoking is prohibited must be the subject of a passenger briefing, and the requirement for this briefing must be included in the airplane flight manual (AFM) limitations section.

(b) *Briefing Card and Placards.* For non-commercially operated airplanes, the instructions required by § 25.1541 for setting the cabin in its configuration approved for taxiing, takeoff, and landing, may alternatively be provided by a briefing card and a reduced number of placards where each one refers to the briefing card, provided the following requirements are met—

(1) The detailed minimum instructions to be included in the briefing card must be part of the type design and referred to in the limitations section of the AFM; and

(2) The briefing card must be easily accessible from each passenger seat. A dedicated stowage must be provided to stow the briefing card within easy reach of each seated passenger with their seat belts fastened.

(c) *Seats in Excess and In-Flight Only Seats.*

(1) If the total number of seats approved for occupancy during taxiing, takeoff, and landing is greater than the approved maximum passenger seating capacity, then the difference between these two quantities is defined to be seats in excess. If seats in excess exist, a placard indicating the maximum passenger seating capacity must be installed adjacent to every door that can be used as a passenger boarding door. This placard must be clearly legible for passengers entering the airplane. In addition, a note must be included in the limitations section of the AFM stating

that there are excess seats installed and indicating the maximum passenger seating capacity.

(2) For each seating location available for in-flight use only (including in-flight-only seats, beds, berths, and divans), a placard indicating that the location cannot be occupied during taxiing, takeoff, and landing must be installed such that the placard is legible to the seated occupant.

■ 21. Add § 25.829 to read as follows:

**§ 25.829 Cabin crew direct view.**

In lieu of the requirements of § 25.785(h)(2), to the extent practical without compromising proximity to a required floor level emergency exit, compliance with the following cabin crew direct view requirement may be shown:

(a) For non-commercially operated airplanes, at least half of the installed cabin crewmember seats must face the passenger cabin.

(b) [Reserved].

■ 22. Add § 25.830 to read as follows:

**§ 25.830 Security considerations for non-commercially operated airplanes.**

Non-commercially operated airplanes do not need to comply with the security specifications of § 25.795.

■ 23. In § 25.841, revise paragraphs (a)(2) and (a)(3), add paragraph (a)(4), and revise paragraph (d)(1) to read as follows:

**§ 25.841 Pressurized cabins.**

(a) \* \* \*

(2) The airplane must be designed so that occupants will not be exposed to a cabin pressure altitude that exceeds the following after decompression from any system failure not shown to be extremely improbable, or any structural damage considered under § 25.571(b) or (e)(1):

(i) Twenty-five thousand feet for more than 2 minutes, or

(ii) Forty thousand feet for any duration.

(3) The airplane must be designed so that occupants will not be exposed to a cabin pressure altitude that exceeds the following after decompression from any engine failure not shown to be extremely improbable:

(i) Twenty-five thousand feet for more than 3 minutes,

(ii) Forty thousand feet for more than 1 minute, or

(iii) Forty-five thousand feet for any duration.

(4) Airplane manufacturers must demonstrate by flight test that the airplane can meet the conditions in § 25.841(a)(2) and (a)(3). The flightcrew procedures and associated limitations

that address compliance to § 25.841(a)(2) and (a)(3) must be included in the airplane flight manual.

\* \* \* \* \*

(d) \* \* \*

(1) The time in flight that the cabin pressure high altitude warning alert is above 10,000 feet cabin pressure altitude is minimized;

\* \* \* \* \*

■ 24. In § 25.853, revise paragraph (g) to read as follows:

**§ 25.853 Compartment interiors.**

\* \* \* \* \*

(g) Regardless of whether smoking is allowed in any part of the airplane, lavatories must have an approved means to dispose of lit combustible material safely located conspicuously on or near the entry side of each lavatory door, except that one means may serve more than one lavatory door if the means can be seen readily from the cabin side of each lavatory served.

\* \* \* \* \*

■ 25. In § 25.854, revise the introductory text to read as follows:

**§ 25.854 Lavatory fire protection.**

For airplanes with a passenger capacity of 20 or more, or with a cabin length of 60 feet (18.29 meters) or more:

\* \* \* \* \*

■ 26. In § 25.857, revise paragraphs (e) introductory text and (e)(1) to read as follows:

**§ 25.857 Cargo compartment classification.**

\* \* \* \* \*

(e) *Class E.* A Class E cargo compartment is one on airplanes used for the carriage of cargo and in which—

(1) Authorized persons, as defined in § 121.583, are permitted to be carried in airplanes with Class E cargo compartments, provided that the requirements of § 25.797 are met.

\* \* \* \* \*

■ 27. In § 25.981, revise paragraph (b)(1) to read as follows:

**§ 25.981 Fuel tank explosion prevention.**

\* \* \* \* \*

(b) \* \* \*

(1) Fleet Average Flammability Exposure is determined in accordance with appendix N to this part. The assessment must be done in accordance with the methods and procedures set forth in Report No. DOT/FAA/TC-21/3, “Fuel Tank Flammability Assessment Method User’s Manual—Updated for Version 11,” dated January 2021 (incorporated by reference, see § 25.5).

\* \* \* \* \*

■ 28. Revise § 25.1155 to read as follows:

**§ 25.1155 Reverse thrust and propeller pitch settings below the flight regime.**

Each control for selecting propeller pitch settings below the flight regime (reverse thrust for turbojet-powered airplanes) must have the following:

(a) A means, such as a positive lock or stop, that requires a separate and distinct operation by the flightcrew to displace the control from the flight regime (forward thrust regime for turbojet-powered airplanes), and it must only be possible to make this separate and distinct operation once the control has reached the flight idle position.

(b) A means to prevent both inadvertent and intentional selection or activation of propeller pitch settings below the flight regime, or of reverse thrust for turbojet-powered airplanes, when out of the approved in-flight operating envelope for that function. Override of this means by the flightcrew is prohibited.

(c) A level of reliability such that the loss of the means required by paragraph (b) of this section is remote.

(d) An alert for the flightcrew, in accordance with § 25.1322, when the prevention means required by paragraph (b) of this section is lost.

(e) An alert for the flightcrew, in accordance with § 25.1322, when a flightdeck control is displaced from the flight regime (forward thrust regime for turbojet-powered airplanes) into a position to select propeller pitch settings below the flight regime (reverse thrust for turbojet-powered airplanes) outside the approved in-flight operating envelope. This flightcrew alert need not be provided if the means required by paragraph (b) of this section is a mechanical balk that prevents movement of the control.

■ 29. In § 25.1193, revise paragraph (e)(3) to read as follows:

**§ 25.1193 Cowling and nacelle skin.**

\* \* \* \* \*

(e) \* \* \*  
(3) Have cowling and nacelle skin, in areas subject to flame if a fire starts in an engine fire zone, which comply with the following:

(i) For in-flight operations, cowling and nacelle skin must be fireproof; and  
(ii) For ground operations, cowling and nacelle skin must be:

(A) Fireproof in areas where a skin burnthrough would affect critical areas of the airplane, and

(B) Fire-resistant or compliant with paragraph (e)(1) of this section in areas where a skin burnthrough would not affect critical areas of the airplane.

**§ 25.1351 [Amended]**

■ 30. Amend § 25.1351 by removing paragraph (d).

■ 31. Add § 25.1352 to read as follows:

**§ 25.1352 Operation without normal electrical power.**

(a) For the purposes of this section, normal electrical power is power from all sources generated for use during normal operating conditions. It does not include alternative power sources.

(b) For an airplane design that utilizes mechanical control cables and linkages for flight control, or otherwise does not rely on a continuous source of electrical power for continued operation: The applicant must show by analysis, tests, or both that the airplane can be operated safely in Visual Flight Rules conditions, for a period of not less than 5 minutes, with the normal electrical power inoperative, with critical fuel type (from the standpoint of flameout and restart capability), and with the airplane initially at the maximum certificated altitude. Parts of the electrical system may remain on if—

(1) A single malfunction, including a wire bundle or junction box fire, cannot result in loss of both the part turned off and the part turned on; and

(2) The parts turned on are electrically and mechanically isolated from the parts turned off.

(c) An airplane design that utilizes electrical and electronic systems to perform critical functions, the loss of which may result in loss of flight controls or other critical systems and may be catastrophic to the airplane, must comply with paragraphs (c)(1) through (7) of this section.

(1) The applicant must show by test or a combination of test and analysis that the airplane is capable of continued safe flight and landing with all normal electrical power sources inoperative.

(2) In showing compliance with paragraph (c)(1) of this section, the applicant—

(i) Must account for systems capability, effects on flightcrew workload and operating conditions, and the physiological needs of the crew and passengers;

(ii) Must account for common cause failures, cascading failures, and zonal physical threats; and

(iii) May include a showing of the airplane's ability to restore operation of portions of the normal electrical power generation and distribution system if it can be shown that unrecoverable loss of those portions of the system is extremely improbable. The airplane's design must provide an alternative source of electrical power for the time required to restore the minimum electrical power generation capability required for continued safe flight and landing. The applicant's showing may

exclude the unrecoverable loss of all engines.

(3) Regardless of any electrical generation and distribution system recovery capability shown under paragraph (c)(2) of this section, sufficient electrical system capability must be provided to—

(i) Allow time to descend, with all engines inoperative, at the speed that provides the best glide distance, from the maximum operating altitude to the top of the engine restart envelope; and

(ii) Subsequently allow multiple start attempts of each engine and APU. The airplane's design must provide this capability in addition to the electrical capability required by existing part 25 requirements related to operation with all engines inoperative.

(4) For compliance with paragraph (c)(1) of this section, the airplane emergency electrical power system must be designed to supply—

(i) Electrical power required for immediate safety, which must continue to operate without the need for flightcrew action following the loss of the normal electrical power, for a duration sufficient to allow reconfiguration of the electrical power system to provide a non-time-limited source of electrical power; and

(ii) Electrical power required for continued safe flight and landing.

(5) If the applicant uses APU-generated electrical power to satisfy the requirements of paragraph (c)(1) of this section, and if reaching a suitable runway for landing is beyond the capacity of the alternative power sources, then the APU must be able to be started under any foreseeable flight condition prior to the depletion of the alternative power sources or the restoration of normal electrical power, whichever occurs first. Flight test must demonstrate this capability at the most critical condition.

(i) The applicant must show that the APU will provide adequate electrical power for continued safe flight and landing.

(ii) The airplane must provide an adequate alert and indication of loss of normal electrical power to direct the flightcrew to the non-normal procedures, and the AFM must furnish non-normal procedures that will direct the pilot to take appropriate actions.

(6) As part of showing compliance with paragraphs (c)(2) through (c)(5) of this section, the tests to demonstrate loss of all normal electrical power must also consider the following—

(i) The assumption that the failure condition occurs during night instrument meteorological conditions (IMC) at the most critical phase of the

flight, relative to the worst possible electrical power distribution and equipment-loads-demand condition.

(ii) After the un-restorable loss of normal engine-driven generated electrical power the airplane engine restart capability is provided, and operations continued in IMC.

(iii) The airplane is demonstrated to be capable of continued safe flight and landing. The duration of this capability must be computed based on the maximum diversion time capability for which the airplane is being certified. The applicant must account for airspeed reductions resulting from the associated failure or failures.

(7) The airplane must provide adequate indication of loss of normal electrical power to direct the flightcrew to the non-normal procedures, and the AFM must furnish non-normal procedures that will direct the pilot to take appropriate actions.

■ 32. In § 25.1365, revise paragraph (b) to read as follows:

**§ 25.1365 Electrical appliances, motors, and transformers.**

\* \* \* \* \*

(b) The installation of galleys and cooking appliances must be such as to minimize the risk of overheating, fire, smoke, burns, or spilled liquids, to the airplane, passengers, and crew.

\* \* \* \* \*

■ 33. In § 25.1447, add paragraph (c)(6) to read as follows:

**§ 25.1447 Equipment standards for oxygen dispensing units.**

\* \* \* \* \*

(c) \* \* \*

(6) There must be sufficient outlets and units of dispensing equipment of a type similar to that required by paragraph (c)(1) of this section in all other areas that may be occupied by passengers or flight crewmembers during flight.

■ 34. Revise § 25.1549 to read as follows:

**§ 25.1549 Powerplant and auxiliary power unit operating awareness.**

(a) The powerplant and auxiliary power unit (APU) installation design must provide the flightcrew with the information needed to—

(1) Identify that each powerplant and APU installation is operating within normal limits,

(2) Identify that each powerplant and APU installation is operating outside of normal limits, if any, and

(3) Determine the appropriate actions and corresponding alerting prioritization, if needed, in accordance with the flightcrew alerting requirements of § 25.1322.

(b) The powerplant and APU installation design must provide additional information needed on powerplant and APU operating conditions, if any, for maintenance personnel to evaluate each powerplant and APU installation according to the Instructions for Continued Airworthiness required by §§ 25.1529 and 25.1729.

(c) The flightdeck information required by paragraphs (a) and (b) of this section must—

(1) Be displayed using colors that are consistent with the colors used for normal operation of the other airplane systems when operating within normal limits, and

(2) Meet the flightcrew alerting requirements of § 25.1322 when operating outside of normal limits, if any.

■ 35. In § 25.1555, revise paragraph (d)(1) to read as follows:

**§ 25.1555 Control markings.**

\* \* \* \* \*

(d) \* \* \*

(1) Each emergency control (including each fuel jettisoning and fluid shutoff control) must—

(i) Be colored red; or

(ii) Illuminate red when a condition necessitates its use, and have appropriate safeguards to allow its intended use while preventing unintentional actuation, and not restricting use when needed; and

\* \* \* \* \*

■ 36. In § 25.1583, add paragraph (j) to read as follows:

**§ 25.1583 Operating limitations.**

\* \* \* \* \*

(j) *Limitation for non-commercially operated airplanes.* If the proposed design's compliance with any of the requirements of §§ 25.821 through 25.830 relies on the airplane's limitation to non-commercial operations, this limitation must be included in the Limitations Section of the Airplane Flight Manual.

■ 37. In § 25.1705, add paragraph (b)(13) to read as follows:

**§ 25.1705 Systems and functions: EWIS.**

\* \* \* \* \*

(b) \* \* \*

(13) § 25.1352 Operation without normal electrical power.

■ 38. In section N25.3 of appendix N to part 25, revise paragraphs (a), (b)(5), and (d)(5) to read as follows:

**Appendix N to Part 25—Fuel Tank Flammability Exposure and Reliability Analysis**

\* \* \* \* \*

**N25.3 Fuel Tank Flammability Exposure Analysis**

(a) A flammability exposure analysis must be conducted for the fuel tank under evaluation to determine fleet average flammability exposure for the airplane and fuel types under evaluation. For fuel tanks that are subdivided by baffles or compartments, an analysis must be performed either for each section of the tank, or for the section of the tank having the highest flammability exposure. Consideration of transport effects is not allowed in the analysis. The analysis must be done in accordance with the methods and procedures set forth in Report No. DOT/FAA/TC-21/3, "Fuel Tank Flammability Assessment Method User's Manual—Updated for Version 11," dated January 2021 (incorporated by reference, see § 25.5). The parameters specified in sections N25.3(b) and (c) of this appendix must be used in the fuel tank flammability exposure "Monte Carlo" analysis.

(b) \* \* \*

(5) Airplane Climb and Descent Profiles, as defined in the Report No. DOT/FAA/TC-21/3, "Fuel Tank Flammability Assessment Method User's Manual—Updated for Version 11," dated January 2021 (incorporated by reference in § 25.5).

\* \* \* \* \*

(d) \* \* \*

(5) If an FRM is used that is affected by oxygen concentrations in the fuel tank, the time periods when oxygen evolution from the fuel results in the fuel tank or compartment exceeding the inert level. The applicant must include any times when oxygen evolution from the fuel in the tank or compartment under evaluation would result in a flammable fuel tank. The oxygen evolution rate that must be used is defined in Report No. DOT/FAA/TC-21/3, "Fuel Tank Flammability Assessment Method User's Manual—Updated for Version 11," dated January 2021 (incorporated by reference in § 25.5).

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**Mallory A. Naill,**

*Acting Executive Director, Aircraft Certification Service.*

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