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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Parts 25, 27, 29, 91, 121, 125, and 135

[Docket No.: FAA-2019-0491; Notice No. 19-09]

RIN 2120-AK34

Interior Parts and Components Fire Protection for Transport Category Airplanes

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: The FAA is proposing to amend certain airworthiness regulations for fire protection of interior compartments on transport category airplanes. This proposal would convert those flammability regulations from detailed, prescriptive requirements into simpler, performance-based standards. This proposal would divide these standards into two categories: those designed to protect the airplane and its occupants from the hazards of in-flight fires, and those designed to protect the airplane and its occupants from the hazards caused by post-crash fires. In addition, this proposal would remove test methods from the regulations and allow applicants, in certain cases, to demonstrate compliance either without conducting tests or by providing independent substantiation of the flammability characteristics of a proposed material. This action is necessary to eliminate unnecessary testing, increase standardization, and improve safety. This proposal includes conforming changes to parts 27, 29, 91, 121, 125, and 135.

DATES: Send comments on or before [INSERT DATE **90** DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

ADDRESSES: Send comments identified by docket number FAA-2019-0491 using any of the following methods:

- Federal eRulemaking Portal: Go to <http://www.regulations.gov> and follow the online instructions for sending your comments electronically.
- Mail: Send comments to Docket Operations, M-30; U.S. Department of Transportation (DOT), 1200 New Jersey Avenue SE., Room W12-140, West Building Ground Floor, Washington, DC 20590-0001.
- Hand Delivery or Courier: Take comments to Docket Operations in Room W12-140 of the West Building Ground 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.

Privacy: In accordance with 5 USC 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, as described in the system of records notice (DOT/ALL-14 FDMS), which can be reviewed at www.dot.gov/privacy.

Docket: Background documents or comments received may be read at <http://www.regulations.gov> at any time. Follow the online instructions for accessing the docket or go to the Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue SE., Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

FOR FURTHER INFORMATION CONTACT: For questions concerning this action, contact Jeff Gardlin, AIR-600, Policy and Innovation Division, Aircraft Certification Service, Federal Aviation Administration, 2200 South 216th Street, Des Moines, WA 98198; telephone and fax (206) 231-3146; e-mail Jeff.Gardlin@faa.gov.

SUPPLEMENTARY INFORMATION:

Authority for this Rulemaking

The 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 the agency’s authority.

This rulemaking is issued under the authority described in Subtitle VII, Part A, Subpart III, Section 44701, “General Requirements.” Under that section, the FAA is charged with promoting safe flight of civil aircraft in air commerce by prescribing regulations and minimum standards for the design, material, construction, quality of work, and performance of aircraft that the Administrator finds necessary for safety in air commerce. This regulation is within the scope of that authority. It revises the safety standards for the flammability characteristics, and thus the design, material, and construction, of transport category airplanes.

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I. Overview of the Proposed Rule

This proposed amendment would eliminate and modify certain flammability and fire protection requirements of title 14, Code of Federal Regulations (14 CFR) part 25. The proposed changes would organize these requirements based on the type of fire—in-flight or post-crash—that is likely to affect a given component, part, or material, rather than basing such standards on the part's composition or function. In addition, the proposal would extend the fire protection requirements to any extensively used material¹ located in inaccessible areas.

The FAA proposes to convert the testing methods in appendix F to part 25 from regulations into guidance material. The proposal would also eliminate redundant or non-value-added tests when a more severe test is acceptable.

¹ Extensively used materials, for the purpose of this rulemaking, means any parts or system of parts that could permit a fire to propagate and grow to a hazardous level, for example, air ducting, electrical wiring/sleeving, thermal/acoustic insulation, and composite fuselage structure.

This proposal would replace mandatory testing methods with performance-based standards for flammability and fire protection. This change would improve safety and standardization and would be applicable to materials currently used to construct parts and components as well as to new materials that become available in the future. As discussed in section III.E of the NPRM, all of the proposed changes are interrelated. These proposals to remove or simplify requirements are only possible, from a safety perspective, because of other proposed changes that would compensate for removing requirements.

These revised regulations would affect applicants seeking new type certificates for transport category airplanes. These revised regulations would not apply to transport category airplanes currently in production under existing type certificates, unless the FAA approves a manufacturer's request to comply with an amendment level that incorporates these proposed changes, or a manufacturer triggers the requirement via an application for a significant product-level change under § 21.101.

Over a 19-year period of analysis, the FAA estimates the total present value costs of this proposed rule to be \$71.1 million at a seven percent discount rate, with annualized costs of \$6.9 million due to the extension of fire protection requirements to extensively used material in inaccessible areas. Over the same 19-year period, the FAA estimates the total quantified cost savings of this proposed rule to be \$119.8 million at a seven percent discount rate, with annualized cost savings of \$11.6 million. The cost savings would result from the elimination and streamlining of some tests, which would be made possible by the extension of fire protection requirements to inaccessible areas. Over the same 19-year period, the proposed rule would result in a net cost savings (cost savings minus

costs) of \$48.7 million at a seven percent discount rate, with annualized net cost savings of \$4.8 million. The following table summarizes the costs and cost savings of this proposed rule.

Costs and Savings of the Proposed Rule

	19-Year Total Present Value		Annualized	
	7%	3%	7%	3%
Cost Savings	\$119,848,146	\$178,395,887	\$11,595,669	\$12,454,509
Costs	\$71,105,318	\$80,387,114	\$6,879,654	\$5,612,136
Total Cost Savings	\$48,742,829	\$98,008,773	\$4,716,016	\$6,842,373

Airplane occupant safety benefits were not quantified. However, the proposed new safety requirements to extend the fire protection requirements to any extensively used material located in inaccessible areas would result in a safety benefit by reducing the likelihood of a fatal accident from a fire in an inaccessible area. FAA testing has indicated that typical in-service ducts can quickly spread fire from a small fire source in an inaccessible area, while ducts that would meet the new requirement can resist that small size fire and not propagate flames. Thus, the FAA believes there are safety benefits to this proposed rule in addition to cost savings.

II. Background

A. Statement of the Problem

Current part 25 regulations organize fire protection requirements for components in airplane interior compartments by the function, and sometimes composition, of each component. Appendix F to part 25 details comprehensive, mandatory testing methods. Each part of appendix F provides the test method required for a specific type of part or

material, with the exception of part I, which applies to nearly all parts and materials and contains multiple test methods. While this method of organization is useful in standardizing the applicable tests and ensuring consistency among test results, regardless of the testing facility, it can create difficulties when an applicant wishes to deviate from the detailed test provisions, for example to implement improvements. Also, a given component can be subject to multiple regulatory requirements depending on the component's composition, and the requirements may conflict with one another. In addition, it can be difficult to determine the applicable requirements, especially when applicants propose new components or materials that are not listed in § 25.853 and for which testing methods have not yet been developed. A final problem is that, with the exception of thermal/acoustic insulation and electrical wiring, the current fire protection requirements only apply to components and materials in occupiable areas or cargo compartments. The current requirements do not apply to components, parts, and materials in other areas, even if extensively used, and such components can be critical for fire safety.

B. History

The regulations governing the flammability of materials on transport category airplanes have evolved significantly since their adoption in 1964.² When initially adopted, these regulations mandated the most fire-resistant materials practically available at that time, without consideration of the types of fires to which each material might be exposed. The regulations described flammability requirements in terms of the objective—

² Published in the *Federal Register* on December 24, 1964 (29 FR 18289) and available on the Internet at http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgFinalRule.nsf/861ae0b1f7efc3ee85256453007b0e8a/beee068568b285ea86256cc900543c9f!OpenDocument.

materials had to be at least flash resistant,³ and certain types of parts had to be flame resistant,⁴ a more stringent requirement. Until 1984, FAA flammability regulations only required applicants to demonstrate that proposed materials could resist small ignition sources such as a lit match or cigarette. The flammability requirements only applied to materials in compartments that could be occupied by passengers or crew.

Beginning with the 1984 adoption of improved flammability standards for seat cushions, the FAA revised the flammability requirements for other specific parts and components, including large surface areas, cargo compartment liners, and thermal/acoustic insulation. The FAA also revised and expanded mandatory test methods to ensure consistency in testing methodology and results. The FAA based these revised requirements on the type of fire threat (in-flight and post-crash) expected for a given component. However, the regulations continued to set standards for specific components, based on their function or construction.

Since the adoption of those flammability requirements, research into fire safety identified significant differences between the hazards posed by a post-crash fire and those posed by an in-flight fire.

Post-crash fires, or “fuel fires” since they are primarily fed by spilled aviation fuel, present two primary hazards to the airplane’s occupants. First, a fuel fire can be a significant source of smoke and toxic gases. If these gases enter the cabin, they can cause

³ Flash resistant is defined as having a burn rate of no more than 20 inches per minute when exposed to a Bunsen burner flame. See FAA Flight Standards Service Release No. 453, dated November 9, 1961; and Advisory Circular (AC) 25-17A, Change 1, “Transport Airplane Cabin Interiors Crashworthiness Handbook,” dated May 24, 2016.

⁴ Flame resistant is defined as having a burn rate of no more than 4 inches per minute when exposed to a Bunsen burner flame.

injury and significantly reduce survivability. Second, a fuel fire can ignite cabin materials, which can accelerate the fire's growth. Research⁵ by the FAA has found that the best way to prevent the first hazard—smoke and toxic gases—is to prevent the fire from penetrating the fuselage. The best way to prevent the second hazard—ignition of cabin materials—is to minimize the heat release⁶ of cabin materials, so that they do not contribute significant energy to the fire. Post-crash fires can also reduce the time available for evacuation. The FAA studied the time necessary to complete evacuation and determined that roughly 90 percent of actual evacuations are completed within 5 minutes.⁷ This proposal specifically references that 5-minute time when discussing protection under post-crash fire conditions. Proposed § 25.853(d) would add general flammability requirements to provide occupants time to evacuate during post-crash fires.

In contrast, the primary hazard from in-flight fires is to the continued safe flight and landing of the airplane. In-flight fires have historically only been a direct hazard to continued safe flight and landing when they begin in an area inaccessible to a person with a hand-held fire extinguisher. These areas tend to be in cargo compartments or behind

⁵ See “Application of Full-Scale Fire Tests to Characterize and Improve the Aircraft Postcrash Fire Environment,” Constantine P. Sarkos, International Colloquium on Advances in Combustion Toxicology, April 11-13, 1995, available on the Internet at <https://www.fire.tc.faa.gov/pdf/fsr-0196.pdf>; and FAA Report No. DOT/FAA/AR-TN11/8, “Improvements in Aircraft Fire Safety Derived from FAA Research over the Last Decade,” dated May 2011, available on the Internet at <https://www.fire.tc.faa.gov/pdf/TN11-8.pdf>. Both of these reports are also available in the Docket.

⁶ Heat release is the amount of heat energy created by a material when burned. The maximum heat release occurs when the material is burning most intensely. Also, see “Improved Flammability Standards for Materials Used in the Interiors of Transport Category Airplane Cabins,” published in the *Federal Register* on July 21, 1986 (51 FR 26206) and available on the Internet at http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgFinalRule.nsf/0/E2F0F4B91D02ADFB862568E7005C097C?OpenDocument.

⁷ See FAA Report No. DOT/FAA/AR-09/18, “Determination of Evacuation and Firefighting Times Based on an Analysis of Aircraft Accident Fire Survivability Data,” dated May 2009, available in the Docket and on the Internet at <https://www.fire.tc.faa.gov/pdf/09-18.pdf>.

interior panels, such as sidewalls or ceilings. The principal risk with such fires is that they grow and spread without the ability of the flightcrew to access and combat them, and then degrade critical systems and occupant survivability. The components, parts, and materials with the most potential to contribute to an in-flight fire hazard are the most extensive, including insulation, wiring, air ducts, and structure. FAA research determined that materials that self-extinguish and do not propagate a flame provide an acceptable level of safety. In-flight fires in areas that are readily accessible to a person with a hand-held fire extinguisher are still a concern, but are much less likely to evolve into a threat to the airplane. Therefore, these two types of fires (in-flight and post-crash) require different flammability standards.

Several elements of fire safety research were involved in the development of these flammability requirements. First, the FAA analyzed accident and incident data to identify the nature of the fire and its potential to affect the airplane and its occupants. Next, the threat was replicated (to the extent possible), and detailed measurements were made to characterize the key parameters⁸ of the type of fire and its potential effect on the airplane and occupants. Finally, a laboratory test was developed that correlated with, and was derived from, the type of fire, so that repeatable and reproducible results could be obtained to assess the adequacy of proposed designs. This latter step was an evolutionary process as test protocols (test methods and test equipment) were continuously refined. Once the results for a particular protocol were reliable and repeatable, the FAA selected that test protocol, even though improvements in methods and equipment are expected to

⁸ For example, temperature, radiant heat flux, flame kinetic energy.

continue. A key consideration in this proposal is the availability of approved test methods in advisory material⁹ to support all of the proposed requirements.

C. Aviation Rulemaking Advisory Committee

In light of the problems with the current part 25 regulations previously discussed, the FAA recognized that it needs a new approach to the regulatory structure of flammability requirements. Since amendments to the regulations since the 1980s had been based on an assessment of the type of fire, but not structured that way in the regulatory text, the FAA determined that the regulations should align with the type of fire that could threaten the airplane. However, because of the scope of the change under consideration, the FAA tasked the Aviation Rulemaking Advisory Committee (ARAC)¹⁰ to review the FAA's proposed approach and provide recommendations. ARAC assigned the task to the Materials Flammability Working Group (MFWG) under the Transport Airplane and Engines Issues Group (TAEIG), an ARAC subcommittee. The MFWG reviewed the proposed concept and, in a report¹¹ dated July 2012, recommended its adoption along with several associated advisory circulars (ACs). The MFWG also raised several questions that required FAA resolution prior to rulemaking, including consideration of an approved materials list, availability of advisory material, and means to address so-called rogue failures.

⁹ This advisory material will take the form of several proposed ACs, as discussed in section III.D of this NPRM.

¹⁰ Published in the *Federal Register* on August 27, 2010 (75 FR 52807) and available on the Internet at <https://www.govinfo.gov/content/pkg/FR-2010-08-27/pdf/2010-21333.pdf>.

¹¹ See "Materials Flammability Working Group Report," dated July 9, 2012, available in the Docket and on the Internet at <https://www.fire.tc.faa.gov/materials.asp>.

When drafting the NPRM, the FAA determined that a more comprehensive estimate of costs and benefits was necessary. Therefore, the FAA put the rulemaking project on hold and re-tasked ARAC¹² to provide an estimate of costs and benefits. The FAA provided assumptions to use in making those estimates. ARAC reassigned the task to the MFWG. The MFWG completed the task and submitted a report¹³ in October 2015. This proposal is based on recommendations and information provided in both MFWG reports and addresses the open issues raised by the MFWG.

III. Discussion of the Proposal

The current regulatory structure in the primary regulations that this action proposes to amend, §§ 25.853, 25.855, 25.856, and 25.1713, organizes the flammability requirements by the type of testing required for a specific part or component. Section 25.853 applies to parts and components that are located in compartments that can be occupied by crew or passengers, and requires compliance with the applicable parts of appendix F to part 25. Section 25.855 states similar requirements that are applicable to cargo or baggage compartments; § 25.856 provides requirements for thermal/acoustic insulation materials; and § 25.1713 addresses electrical wiring components. Each of these sections requires compliance with a particular test method in appendix F.

For example, § 25.853(a) requires that all materials used in occupiable compartments meet the test criteria (Bunsen burner) in part I of appendix F to part 25. Section 25.853(d) requires certain interior components, including partitions, ceilings, and

¹² Published in the *Federal Register* on January 20, 2015 (80 FR 2772) and available on the Internet at <https://www.govinfo.gov/content/pkg/FR-2015-01-20/pdf/2015-00749.pdf>.

¹³ See “Materials Flammability Working Group Continuation of Task Report,” dated October 7, 2015, available in the Docket.

wall panels, to also meet the heat release rate (HRR)¹⁴ and smoke emission test requirements in parts IV and V of appendix F. This proposal would eliminate the requirement to meet the tests in part I of appendix F for components required to comply with § 25.853(d), since the Bunsen burner tests do not add any level of safety for components that meet part IV of appendix F.

This proposed amendment would revise § 25.853 to apply to general categories of parts or components rather than to specific items. For example, § 25.853(d)(1) would apply to large surface area components, rather than to partitions, ceilings, and wall panels. It would set performance standards for those components based on the type of fire the component is likely to be exposed to and whether or not its location is accessible during flight.

Stating the requirements as performance standards would make them applicable to parts and materials that are not listed in the current regulations and to new materials in emerging areas of aviation design. These include materials used in inaccessible portions of the fuselage, escape slides, and the use of flammable metals in the cabin.

The mandatory testing methods in appendix F to part 25 would be removed. Instead, appendix F would allow applicants to omit certain tests if the material passes certain more severe tests. Advisory material would provide the details of approved test methods. By moving compliance testing methods to advisory material, applicants would have more flexibility to propose alternative methods, and the FAA would have more flexibility to approve improved testing methods.

¹⁴ The heat release rate test measures both total heat release and peak heat release rate.

This proposal would also standardize the required number of test samples, and pass rate, among the various tests. Proposed § 25.853(b) would require a minimum of three specimen sets for any test used to show compliance.

Because fewer post-crash flammability requirements currently apply to airplanes designed to carry 19 or fewer passengers, many of the proposed simplifications would only apply to larger airplanes. For the same reason, for airplanes designed to carry 19 or fewer passengers, fewer in-flight flammability tests would be eliminated by meeting post-crash flammability test requirements. Thus, applicants for type certification of airplanes with 19 or fewer passengers might not benefit from the same degree of simplified testing, as would applicants seeking approval of larger airplanes.

A. Flammability Testing Requirements

1. Bunsen Burner Test (Current § 25.853(a) and Part I of Appendix F to Part 25)

Sections 25.853 and 25.855 require Bunsen burner testing of all materials used in interior compartments, and in certain parts of cargo compartments, even if an additional, more severe test is required. Bunsen burner tests, detailed in part I of the current appendix F to part 25, have multiple variations that are used to determine the resistance of materials to flame, flame penetration, or flame propagation. Although Bunsen burner tests would be an acceptable means of compliance for several requirements, this proposal would eliminate the requirement for Bunsen burner testing when a required test method simulates a post-crash fire. Bunsen burner testing to address in-flight fire threats would be less frequently required, since extensively used materials would be required to meet a more stringent standard, and materials and parts that are not extensively used may show their in-flight fire resistance by more than one means.

Two other requirements intended to protect the airplane from in-flight fires, proposed § 25.853(c)(1)(i) regarding parts or components that are accessible to the flightcrew during flight, and proposed § 25.853(c)(2)(iv) regarding floor liners in cargo compartments, would require that those parts, components, and materials be self-extinguishing when exposed to a small flame,¹⁵ unless another regulation requires the materials to meet a higher standard, such as a post-crash test. Applicants would typically use the 12-second vertical Bunsen burner test to show that the materials are self-extinguishing. This proposal would eliminate the requirement for materials to pass horizontal Bunsen burner tests because other requirements would ensure acceptable flammability characteristics of any other materials for which that test is currently applied. This includes parts currently listed in appendix F, part I, paragraph (a)(1)(iv) of part 25, such as clear plastic windows and signs, which would fall under one of the proposed requirements for a more stringent test, unless the applicant is able to show the part or material serves a necessary function and has no suitable substitute material.

For post-crash fires on transport category airplanes with 19 or fewer passengers, this proposal would, as a practical matter, retain the requirement, currently in appendix F, part I, paragraph (b)(4) of part 25, that the applicant conduct a 60-second vertical Bunsen burner test for large surface interior materials. That test, unlike the 12-second vertical test, screens out materials, such as certain thermoplastics, that have unacceptable flammability performance, even though the test method is not specifically designed to represent post-crash fires. Because of the greater evacuation capability inherent in these

¹⁵ Represented by a flame from a Bunsen burner.

smaller airplanes, they are not, and would not under this proposal, be subject to the more severe post-crash, fire-based standards for interior materials and lower lobe¹⁶ fire penetration proposed in §§ 25.853(d)(2) and 25.856(b), respectively.

This proposal would also continue to require, in § 25.853(c)(1)(i), that waste receptacles (compartments) and cargo compartment liners resist fire penetration. One means of compliance would continue to be the 45-degree orientation Bunsen burner test, which is currently described in part I of appendix F to part 25, but would be removed from part 25 and made available in guidance material. However, if an applicant proposes to construct waste compartments from the same materials as will be used for other interior features that are required to meet the HRR test,¹⁷ no Bunsen burner test would be required. The fire containment test for the waste compartments would still be required. Most cargo compartment liners, as components in an inaccessible area, would still be required by proposed § 25.853(c)(2) to meet the flammability performance standard currently encompassed by the oil burner test in part III of appendix F. Exceptions would include liners on the floor and certain aspects of Class E cargo compartment liners, which would only need to pass the 45-degree Bunsen burner test, i.e., resist penetration by a small flame (proposed § 25.853(c)(iv)).

Finally, for materials that must be self-extinguishing under current regulations, the FAA has reviewed the detailed pass/fail criteria for the vertical Bunsen burner test in appendix F, part I, paragraph (b)(4) of part 25 and concluded that those criteria could also be simplified. The current pass/fail criteria are regulatory and involve burn length,

¹⁶ For the purpose of this NPRM, “lower lobe” refers to the geometric lower half of the airplane fuselage.

¹⁷ Part 25, appendix F, part IV.

after-flame time, extinguishing time of any drips, and, in some cases, after-glow time. These criteria would no longer be regulatory. Instead, proposed AC 25.853-4X would describe one means of compliance that incorporates only the criteria of burn length and that the material be self-extinguishing. The self-extinguishing criteria would apply to drips as well as the test sample.

2. Oil Burner Test for Seat Cushions (Current § 25.853(c) and Part II of Appendix F to Part 25)

Currently, § 25.853(c) requires that seat cushions, except those on flight crewmember seats, meet the test requirements of part II of appendix F to part 25, which involves the use of an oil burner. The oil burner test for cushions simulates the effect of a post-crash fire by exposing the material to a high-intensity open flame to evaluate its burn resistance and other characteristics.

This proposal would extend this level of flammability performance to any cushion, including flight crewmember seats and mattresses on berths. When the FAA adopted its current flammability rule¹⁸ for seat cushions, the materials available to applicants were limited, and it was not clear that flightcrew could achieve the posture and comfort necessary to safely operate the airplane using materials that complied with the oil burner test. However, since that time, advances in cushion materials have essentially eliminated this issue and any reason for different treatment of flight crewmember seats. Mattresses or other cushions on berths should meet the same standards. The omission of

¹⁸ Published in the *Federal Register* on October 26, 1984 (49 FR 43188) and available on the Internet at http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgFinalRule.nsf/0/31F6F691A3BCE69C86256825004F9E02?OpenDocument.

cushions on berths in the current § 25.853(c) was largely an oversight in the way the FAA worded the rule.¹⁹

Proposed § 25.853(d)(3) would create a performance-based standard for the flammability of seat cushions. In the event that a post-crash fire enters the airplane, the seat cushions would have to resist involvement in that fire, and not propagate it. (Resist, for the purposes of this proposed rule, means to not become involved in a fire to the extent that survivability is adversely affected, commensurate with the historical benefit provided by the oil burner test. Involvement, for the purposes of this proposed rule, means ignition, pyrolysis, or combustion.) Since the oil burner test represents the hazard posed by a post-crash fire, it would continue to be, in most cases, an acceptable test to show compliance with this proposed rule. However, in certain applications, an applicant could show compliance with the HRR test. The oil burner test measures both flame spread and material consumption rates, and the HRR test only measures the latter. Therefore, an applicant's use of the HRR test will generally be limited to designs where flame spread does not affect safety, and would, in most circumstances, apply to small cushions or cushions such as padding on an angled surface. Proposed appendix F to part 25 would allow this substitution of one test method for another.

The proposed revisions to § 25.853 would no longer require cushions to meet a Bunsen burner test because the oil burner test, which most applicants would use to demonstrate the flammability performance of their cushions, is more severe. Although the Bunsen burner test would not be required for seat cushions, applicants could still

¹⁹ Section 25.853(c) specifically referred to "seats," whereas elsewhere in the regulations, seats and berths are both mentioned when requirements apply to both. From a fire safety standpoint, there is no distinction.

choose to generate Bunsen burner test data, where that data may be used to support substitution of upholstery (dress covers) under the provisions of proposed § 25.853(e)(3).

This proposal would also remove the mandatory and detailed testing methods from appendix F to part 25. Instead, AC 25.853-2X, would provide guidance on acceptable tests, including the oil burner test and use of the HRR test.

3. Heat Release Rate Test (Current § 25.853(d) and Part IV of Appendix F to Part 25)

Currently, the requirements to conduct the HRR test, in § 25.853(d) and part IV of appendix F to part 25, apply to specific interior features: interior ceiling and wall panels, partitions, galley structures, large cabinets, and cabin stowage compartments that are in a passenger compartment that may be occupied during takeoff and landing.

This proposal would replace this requirement with performance-based standards in § 25.853(d)(2) applicable to any large²⁰ surface area in the same compartment, based on the type of fire it may be exposed to, and without regard to whether a particular surface is associated with a specific feature. These revisions, therefore, would extend the flammability requirements to all large surface areas within the portions of the fuselage currently covered by the HRR tests. This proposal would remove the details of HRR tests from appendix F to part 25. HRR tests would be one means of compliance, and detailed in proposed AC 25.853-1A.

A design development that the FAA did not anticipate following the 1986 adoption of part IV of appendix F to part 25, which details the HRR test, and a change to

²⁰ For purposes of this proposed rule, “large” excludes surfaces that are less than 1 square foot and includes all surfaces that are 2 square feet and greater, with square footage in between as explained in amendment 25-83 (60 FR 6615, February 2, 1995), which is available on the Internet at <https://www.govinfo.gov/content/pkg/FR-1995-02-02/pdf/95-2114.pdf>.

§ 25.853(a) to require the HRR test (at amendment 25-61²¹), was industry's use of large area panels on seat assemblies.²² Because § 25.853(d) at amendment 25-83²³ (paragraph (a) at amendment 25-61) does not list seats, the FAA has applied special conditions to address fire protection of these large-area parts. The proposed revisions to § 25.853 would eliminate the need for these special conditions, since the revisions would apply to any component or part that is a large surface within the fuselage.

The FAA also proposes, however, that this broader standard only apply to items more than 15 inches above the floor because full-scale fire tests²⁴ show that (with the exception of materials near the fire entry point) the materials very near the floor do not significantly contribute to a post-crash fire until conditions have become non-survivable. Therefore, in order to simplify compliance demonstrations and focus the requirement on the most critical components, proposed § 25.853(d)(2)(i) would only apply to large-surface components and parts that are more than 15 inches from the cabin floor. For example, a kick panel that extends upward from the floor to 16 inches above the floor would be required to pass the HRR test. For airplanes with more than one passenger deck, the 15-inch dimension would apply to each deck separately. The FAA based the 15-inch dimension on test data and the objective of such materials not adversely affecting safety. This provision is relieving and should reduce costs. The proposal to exclude

²¹ Published in the *Federal Register* on July 21, 1986 (51 FR 26206).

²² In this context, seat assemblies include the seat and furniture associated with that seat. The furniture need not be an airplane sidewall or bulkhead to affect the overall post-crash flammability characteristics and therefore should simply be treated as a large surface area.

²³ Published in the *Federal Register* on February 2, 1995 (60 FR 6615) and available on the Internet at <https://www.govinfo.gov/content/pkg/FR-1995-02-02/pdf/95-2570.pdf>.

²⁴ One example is FAA Report No. DOT/FAA/TC-13/52, "Development of a Laboratory-Scale Flammability Test for Magnesium Alloys Used in Aircraft Seat Construction," dated February 2014, available in the Docket and on the Internet at <https://www.fire.tc.faa.gov/pdf/TC-13-52.pdf>.

surfaces 15 inches and below would not apply to large area surfaces on seats because seats could be located in or near a fire's entry point through the fuselage and, therefore, would be more likely to be involved in a post-crash fire. FAA full-scale fire tests have shown that there could be an adverse impact on safety if parts on seats that are less than 15 inches from the floor did not meet the heat release requirements.²⁵

4. Smoke Emissions Test (Current § 25.853(d) and Part V of Appendix F to Part 25)

This proposal would remove the requirement for testing of smoke emissions. The smoke emissions test, detailed in the current part V of appendix F to part 25 that is required by § 25.853(d), measures the smoke emissions characteristics of materials used in cabin components. The smoke emissions test is currently required in addition to the HRR test. The FAA adopted the smoke emissions test requirement at amendment 25-66²⁶ after concluding that smoke may hamper emergency egress and is, therefore, a survivability factor in the event of a fire. Thus, all materials, parts, and components that must meet the HRR test requirements are also required to pass the smoke emissions test in accordance with current § 25.853(d).

However, FAA research data have also shown that, for the materials and configurations typically used in transport category airplanes, the heat release of the materials used drives occupant survivability, rather than the materials' smoke emission.

²⁵ FAA Report No. DOT/FAA/TC-16/42, "A Comparison of Performance of OSU-Compliant Versus Non-OSU-Compliant Thermoplastics Used in the Lower Area of Aircraft Seats during a Simulated Post-Crash Fire Scenario," dated September 2017, available in the Docket and on the Internet at <https://www.fire.tc.faa.gov/pdf/TC-16-42.pdf>.

²⁶ See "Improved Flammability Standards for Materials Used in the Interiors of Transport Category Airplane Cabins," published in the *Federal Register* on August 25, 1988 (53 FR 32564) and available on the Internet at http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgFinalRule.nsf/0/7B29EAF2EAC36594862568FC005465CD?OpenDocument.

Heat release dictates how quickly the conditions progress to flashover.²⁷ Before flashover, conditions are largely survivable. Due to the importance of heat release, the FAA initially adopted regulations (at amendment 25-61) that only contained requirements for the HRR test and did not address smoke emission.

In fact, the data do not correlate smoke emission test results with post-crash survivability as they do with heat release. The FAA is unaware of any data showing that smoke emission testing has contributed to fire safety in an actual accident. Although the rule has been in effect for more than 20 years and has prevented applicants from using certain materials, the FAA has concluded, pursuant to the following discussions, that the smoke emission testing requirement is not adding to post-crash fire safety. The smoke emission requirement may be contributing to in-flight fire safety, but the extent of that contribution is unknown. However, by adding standards for extensively used materials in inaccessible areas, the potential contribution to an in-flight fire from materials that would no longer be subject to the smoke emission requirement will be minimized. For example, the proposal would eliminate the test that measures smoke emissions for certain large surface area parts, such as sidewalls. If a fire was to propagate on ducting behind the sidewall (an inaccessible area), it could spread to a sidewall that had not been tested for smoke emission, and the quantity of smoke could become a risk to continued safe flight and landing. If the ducting met the flammability standard in this proposal, the fire would not reach the sidewall, and the quantity of smoke would be minimal. Thus, the relief in

²⁷ A flashover is the near-simultaneous ignition of all combustible material within an enclosed area.

the smoke emission requirements for sidewalls depends on improving the standards for ducting. This philosophy of interdependency is true throughout the proposal.

The MFWG discussed smoke emission testing at length during its activity leading to this proposal, but the MFWG did not reach a consensus on whether the FAA should retain a requirement for smoke emission testing. Some members were concerned that the removal of the requirement could lead to applicants using materials with excessive smoke emission properties, if those materials offered weight or cost advantages. Other members believed the FAA could eliminate the smoke emission test requirement because smoke emissions had not been correlated to post-crash survivability, and FAA data suggested it was not needed. Also, most airplane manufacturers have their own design standards that include tests for smoke emissions. These internal manufacturer requirements were in place before the FAA adopted the current regulatory requirement; therefore, the FAA expects they would remain in use to some extent if the regulatory requirement were removed. Thus, the FAA anticipates that some of the smoke emission testing that existed before the current regulatory requirement would continue to take place if this proposed amendment removed the regulatory requirement. In other words, manufacturers might choose to maintain the design standards that were in place before amendment 25-66²⁸ was adopted. Amendment 25-66 imposed a certification process that drives costs, in terms of the quantity of tests, the documentation necessary, and the engineering

²⁸ See “Improved Flammability Standards for Materials Used in the Interiors of Transport Category Airplane Cabins,” published in the *Federal Register* on August 25, 1988 (53 FR 32564). Available at http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgFinalRule.nsf/0/7B29EAF2EAC36594862568FC005465CD?OpenDocument.

assessments to identify the correct tests. These costs would be relieved by this proposed rule and are included in the cost savings estimates.

Based on this information, the FAA proposes to remove the requirement for testing of smoke emissions. However, because smoke is an important survivability parameter, and materials that have high smoke emission without significant HRR are theoretically possible, § 25.853 of this proposal would establish a general performance standard that components must maintain occupant survivability during a post-crash fire. One means of showing compliance would be HRR testing, described in chapter A4 of FAA Report No. DOT/FAA/TC-17/55, “Aircraft Materials Fire Test Handbook,” Revision 3, dated June 2019. If data from the HRR testing does not ensure the post-crash fuel fire performance of a given material, an applicant could show compliance via another means. The FAA anticipates, however, that HRR tests will be adequate to determine the post-crash fire performance of components made from materials currently in use such as phenolic, epoxy, and thermoplastic.

5. Oil Burner Test for Cargo Compartment Liners (Current § 25.855(c) and Part III of Appendix F to Part 25)

Proposed § 25.853(c)(2) would set performance standards requiring all Class C, and certain Class E and F, cargo compartment ceiling and sidewall liners to resist penetration by a fire within that compartment and protect the airplane’s structure and critical systems from the effects of those fires. The section on cargo or baggage compartments would include a reference (§ 25.855(c)) requiring compliance with the applicable provisions of § 25.853(c). In addition, as a minor editorial change, this proposal eliminates the term “panels” from “liner panels,” the term used in the current

regulation. Most liners are panels. However, many components serving the role of the cargo compartment liner are not panels, and the term can sometimes be confusing. The proposed rule would simply refer to cargo compartment liners, but there would be no change in the scope of the requirement.

Currently, § 25.855(b) requires any Class B through E, and certain Class F, cargo compartments to have a liner. Section 25.855(c) requires the ceiling and sidewall liner panels of Class C and F cargo compartments to meet the requirements currently in part III of appendix F to part 25, the oil burner test (proving resistance to flame penetration). The requirement for cargo compartment liners to resist fire penetration would be retained, as a performance standard, in § 25.853(c)(2)(ii). Proposed § 25.853(c)(1)(iii) would continue to require Class B cargo compartment liners, as well as any other cargo compartment liners, to resist penetration from a small ignition source. This requirement is currently met using the less severe 45-degree Bunsen burner test required by appendix F, part I, paragraph (a)(2)(ii) of part 25. A Class F cargo compartment is not required to have a liner if it has other means of containing a fire and protecting critical systems and structure, but if it does have a liner, it is currently required by § 25.855(b)(2) to meet the oil burner test like Class C cargo compartments.

With this proposal, all Class E cargo compartment liners necessary to protect critical systems and structure would be required to meet standards identical to those required of Classes C and F, under proposed § 25.853(c)(2)(iii). The FAA's rationale for requiring the same performance of those cargo compartment liners is that any cargo compartment liner necessary to protect the airplane structure or its systems should also protect against in-flight cargo fires.

The oil burner test would continue to be an acceptable means of showing that the liner resists penetration as that test represents the hazard posed by in-flight cargo fires, but this proposal would remove the requirement to pass the test in part III of appendix F to part 25, which would become an optional means of compliance under proposed AC 25.853-1A.

Other methods of meeting the proposed performance standards for Class E cargo compartments could be the use of fire containment covers or containers, or dedicated shrouds to protect flight-critical systems. In such cases, proposed § 25.853(c)(2)(iv) would still require the liner to resist penetration from a small ignition source, which could be shown by passing the 45-degree Bunsen burner test, which also would be described in proposed AC 25.853-1A.

In addition, application of § 25.855(c) has often resulted in multiple tests for a given liner configuration or slight variants of the configuration. This regulation would be replaced by the performance standards discussed previously, and proposed AC 25.855-1X would provide guidance on simplified methods that should reduce the testing required to show compliance.

Lastly, this proposal would eliminate the requirement in § 25.855(d) to test the flammability of materials used in the construction of items such as cargo covers and tiedown equipment within a Class C cargo compartment. Section 25.855(d) currently applies to all other materials used in the construction of the cargo or baggage compartment and requires testing according to part I of appendix F to part 25, the Bunsen burner tests, for any such materials. This proposal would add an exception to § 25.855(d) for materials located entirely within a Class C cargo or baggage compartment. The

rationale for this proposed relief is that Class C compartments are already required by § 25.857(c) to withstand and contain a fire from cargo or baggage of arbitrary flammability characteristics, and these compartments must have a fire suppression system. Materials used within the Class C compartment would be no more flammable than the cargo itself. Since the cargo makes up most of the potential fire load, requiring all of these materials or components to be tested does not add to safety. However, this proposal would not provide similar relief for other classifications of cargo compartments because those compartments use different approaches to fire protection.

These proposed changes would apply to cargo compartments, not cargo containers, even though the National Transportation Safety Board has recommended improved flammability standards for cargo containers. Cargo containers²⁹ are used in a variety of applications, including within Class C cargo compartments. Unlike the cargo compartments that house them, cargo containers are usually not part of the airplane type design, and so are not directly affected by the requirements of part 25. The FAA often approves cargo containers in accordance with Technical Standard Order (TSO) C90d, “Cargo Pallets, Nets and Containers (Unit Load Devices),” which contains minimum performance standards for the container itself, without regard to the type of compartment where the container will be used. The FAA’s analysis of potential regulatory actions with respect to cargo containers is ongoing and independent of this proposal.

²⁹ Cargo containers are portable devices that are carried within airplane cargo compartments to transport cargo or baggage. They are used to facilitate loading and maximize use of space.

6. Radiant Panel Test for Thermal/Acoustic Insulation (Current § 25.856(a) and Part VI of Appendix F to Part 25)

Thermal/acoustic insulation protects the airplane and occupants from temperature and acoustic extremes, and it is often located in places not accessible to the flightcrew during flight. This proposal would remove the requirement for radiant panel testing of thermal/acoustic insulation, currently in § 25.856(a) and part VI of appendix F to part 25. This proposal would instead require that thermal/acoustic insulation comply with proposed § 25.853(c)(2)(i), which would set performance standards for all extensively used parts, components, and assemblies that are not accessible to the flightcrew during flight. The proposed performance is that the parts not propagate the largest fire that, by itself, would not be a hazard to the airplane. The reason this standard was selected, originally by the MFWG, is to prevent the risk that a fire that is any larger would be a hazard to the airplane and its occupants, regardless of the materials used.

One means of showing compliance with the proposed performance standards for inaccessible materials would be the radiant panel test method, which determines the flammability and flame propagation characteristics of thermal/acoustic insulation when it is exposed to both a radiant heat source and a flame. This method would be detailed in proposed AC 25.856-1A.

In contrast, thermal/acoustic insulation that is accessible to the flightcrew during flight would only be required to be self-extinguishing when exposed to a small flame, as set forth in proposed § 25.853(c)(1)(i).

7. Oil Burner Test for Thermal/Acoustic Insulation (Current § 25.856(b) and Part VII of Appendix F to Part 25)

For airplanes with a passenger capacity of 20 or more, this proposal would revise § 25.856(b) to state two performance standards, that thermal/acoustic insulation installed in the lower half of the fuselage resist penetration of a post-crash fuel fire and provide at least 5 minutes of survivability in the occupied portions of the airplane. Section 25.856(b) currently requires that thermal/acoustic insulation installed in the lower half of the fuselage meet the burnthrough resistance (or oil burner) test in part VII of appendix F to part 25 unless the FAA determines that the insulation would not contribute to fire penetration resistance. If thermal/acoustic insulation is not installed, there is currently no requirement that the airplane resist post-crash fire penetration.

The MFWG recommended that the FAA expand the applicability of the burnthrough resistance requirement beyond just insulation, to require a means of providing post-crash fire penetration protection. For some airplane designs, that approach could require some other type of fire barrier, in areas where insulation is not installed, that would have to meet the same performance standards as thermal/acoustic insulation.

The FAA is not proposing to adopt the MFWG recommendation to expand the applicability of the burnthrough resistance requirement. It is difficult to quantify the benefits of requiring a fire penetration barrier, since the majority of in-production airplanes are largely insulated in the lower lobe. Adding a fire barrier to areas not traditionally insulated, such as the wing box or certain cargo areas, would provide some, albeit limited, fire safety benefit. In addition, with the increased use of composite skin structure, some airplane models have fire penetration resistance without using insulation.

However, if the FAA were to separately require fire penetration resistance for the entire lower lobe, applicants would incur substantial development costs, including increased testing, and more significantly, increased airplane weight. The FAA cannot, at present, justify these costs against the potential benefits they would provide. Instead, proposed § 25.856(b) would allow for another means of providing fire penetration resistance, and proposed AC 25.856-2B would address the use of fuselage structure in an equivalent means of providing fire penetration resistance. These provisions should reduce the administrative actions necessary if an applicant chooses to provide a fire penetration barrier by means other than insulation.

8. Radiant Heat Resistance Test for Escape Slides (§ 25.853(d)(5))

Proposed § 25.853(d)(5) would incorporate a requirement from TSO-C69C, “Emergency Evacuation Slides, Ramps, Ramp/Slides, and Slide/Rafts,” for applicants to conduct tests to ensure the continued functioning of escape systems when those systems are exposed to the effects of radiant heat from a post-crash fuel fire. Since all escape slides currently comply with the radiant heat resistance requirement of TSO-C69C, this proposal would add no compliance burden. Compliance with TSO-C69C would also provide the necessary data for compliance with the new part 25 requirement. Proposed AC 25.853-6X would contain details of the radiant heat test method and pass/fail criteria and would include refinements developed since the TSO-C69C was last updated.

9. Fire Containment Compliance of Waste Receptacles (Current § 25.853(h))

The fire containment requirements for waste receptacles would remain the same with this proposal. However, because of the reorganization of § 25.853, this proposal would move the waste receptacle requirements from § 25.853(h) to proposed

§ 25.853(c)(1)(ii). In addition, proposed § 25.853(c)(1)(ii) would require at least one test specimen to show compliance. This change is necessary because proposed § 25.853(b) adds a general test requirement that three specimen sets be used to show compliance with proposed §§ 25.853(c) and (d). Requiring one test specimen for waste receptacles is consistent with the current § 25.853(h), which requires demonstration by test.

Waste receptacles face the threat of an in-flight fire occurring within the receptacle. The current § 25.853(h) addresses this threat, but the requirement does not specify a test method from appendix F to part 25 as do the other paragraphs of the current § 25.853. AC 25-17A, Change 1, “Transport Airplane Cabin Interiors Crashworthiness Handbook,” dated May 24, 2016, currently summarizes an acceptable method of compliance for waste receptacles. This method would be updated in chapter B1 of FAA Report No. DOT/FAA/TC-17/55, in order to reflect current knowledge about in-flight fire sources and typical waste materials.

10. Extensively Used Materials in Inaccessible Areas (Proposed § 25.853(c)(2)(i))

The FAA is proposing new fire safety standards that would apply to all materials that are extensively used within and including the fuselage but are not accessible in flight. Proposed § 25.853(c) would set a performance standard of prohibiting the flammability characteristics of parts, components, and materials involved in an in-flight fire from creating a hazard to the occupants or to the continued safe flight of the airplane. For the purposes of this proposed rule, the “flammability characteristics” of a part, component, or assembly (or the materials from which they are made) are all of the ways those items respond to a particular fire threat. Such flammability characteristics include the material’s

ease of ignition, its tendency to propagate a flame, and its HRR, as well as other parameters correlated with heat release, including the emission of smoke and toxic gases.

Proposed § 25.853(c)(2)(i) would set the performance standard that extensively used parts, components, and assemblies must not propagate the largest fire that, by itself, would not be a hazard to the airplane.

When the FAA adopted the flammability requirements for thermal/acoustic insulation in 2003 (amendment 25-111),³⁰ the FAA's regulatory evaluation estimated that the requirements would mitigate³¹ roughly half the potentially catastrophic in-flight fires that might occur over a 20-year period. In order to more completely address the risk due to in-flight fire, the FAA determined that all extensively used materials in inaccessible areas should have the same level of fire resistance as thermal/acoustic insulation, currently addressed in § 25.856(a). Therefore, proposed § 25.853(c)(2)(i) would set the same performance standard for extensively used parts in inaccessible areas that is in the current § 25.856(a).

To further explain the reason for this proposal, the parts and materials of primary concern in inaccessible areas are electrical wiring, ducting, and composite structure. Each of these is "extensively used," in the meaning set forth in this proposal, and could permit a fire to propagate inside the airplane. Since the areas in question are not accessible by the flightcrew, there is no effective way to fight the fire, so the flammability (flame propagation) resistance of the materials is paramount in in-flight fire safety. This

³⁰ See "Improved Flammability Standards for Thermal/Acoustic Insulation Materials Used in Transport Category Airplanes," published in the *Federal Register* on July 31, 2003 (68 FR 45045) and available on the Internet at <https://www.govinfo.gov/content/pkg/FR-2003-07-31/pdf/03-18612.pdf>.

³¹ I.e., prevent the fire from becoming catastrophic.

proposal would also revise § 25.856(a), which states the requirements for thermal/acoustic insulation, to require the same performance standards as § 25.853(c)(2)(i). This would have the effect of limiting the applicability of the in-flight flame propagation requirement to thermal/acoustic insulation that is located in an area that is inaccessible in flight. Proposed AC 25.853-5X would provide additional detail on the types of components that are affected by this requirement, as well as methods of compliance.

Section 25.1713, “Fire protection: EWIS,” applies to electrical wire and cable wherever it is used. Materials used in any electrical wire and cable insulation, including protective shrouds, are considered extensively used. This proposal would restate the current fire protection requirements relative to whether the wire is installed within or outside the fuselage. For electrical wiring interconnected systems (EWIS) components installed within the fuselage, under proposed § 25.1713(c)(2) the insulation would have to meet the performance standards in proposed § 25.853(c), which includes different standards for installations in areas that are accessible and inaccessible in-flight, and in a post-crash environment. For EWIS installed outside the fuselage, because such areas are inaccessible, proposed § 25.1713(c)(1) would require that such components not propagate the largest fire that, by itself, would not be a hazard to the airplane. This proposal would also add a new paragraph (d) to § 25.853 to require testing, except for wiring installations that would not pose a risk to fire safety. Proposed AC 25.853-5X would provide accepted test methods for showing compliance with the new performance standards.

Other extensively used materials include nonmetallic or flammable metals used in some fuselage construction today. Since the use of these materials in this manner

constitutes a novel or unusual design feature, the FAA has addressed the issue of in-flight fire safety for designs using these materials through special conditions. Those special conditions are intended to ensure that the use of nonmetallic or flammable metal structure does not reduce the level of in-flight fire safety from the level that would have been provided with a traditional metallic fuselage. Proposed § 25.853(a) would include the fuselage in the fire protection requirements regardless of the type of material used in its construction and would eliminate the need for such special conditions. Proposed § 25.853(d)(4) would require that flammable metals used in cabin construction be able to resist a post-crash fire, and that they be readily extinguishable. “Readily extinguishable,” in this instance, means that a fire extinguishing system in common use in aviation (including a hand-held fire extinguisher or airport emergency response) can promptly extinguish the materials, rather than spreading the fire or otherwise making the fire worse.

Under § 25.853(c)(2) of this proposal, the back sides of many existing interior features (e.g., galleys, sidewalls, ceilings) would meet the definition of extensively used and would, therefore, be required to show by test their fire propagation resistance. However, the FAA has assessed the performance of these materials, both in service and in testing. Since the materials’ fire propagation resistance has been satisfactory, and because they are subject to other flammability requirements, the FAA does not see a need to require additional tests for the portion of these parts that face inaccessible areas. Therefore, proposed appendix F to part 25 and proposed AC 25.853-1A would summarize conditions under which methods of compliance other than testing would be acceptable in order to meet the in-flight fire requirements for inaccessible areas.

Proposed § 25.853(c)(2)(v) would require that all other parts, components, and materials located in inaccessible areas be self-extinguishing when exposed to a small flame or electrical arc. However, since these would by definition be components that are not extensively used, an applicant could document a process whereby the flammability of parts used in inaccessible areas is controlled to meet the required level of safety of the proposed rule. Specifically, an applicant could show that its design/production system includes provisions such that parts used in inaccessible areas have only known flammability characteristics, or any parts that do have unknown flammability characteristics are insignificant in the event of a fire. Proposed AC 25.853-1A would discuss this in more detail.

11. Exclusions from Testing (Proposed § 25.853(e))

Proposed § 25.853(e) would allow applicants to substantiate certain components without the testing required by § 25.853(b). Section 25.853(e) would establish five classes of parts that would not require certification testing in order to show compliance. Each individual class would be based on a combination of factors that affect fire safety and complexity of certification. The classes maintain the level of safety provided in the current regulations.

The applicant would have to prove that the part or component meets the criteria of one of the five classes listed in proposed § 25.853(e), in order to obtain the FAA's approval to exempt those parts from testing. Proposed AC 25.853-1A would provide examples that would qualify for this relief and guidance for justifying it.

The classes are as follows:

- Class 1 parts are small (each able to fit, in its entirety, within a cube measuring two inches on each side) and separated from one another so that they will not propagate a fire.
- Class 2 parts are larger than Class 1 parts and are self-extinguishing. These parts would be limited in size to a volume of 113 cubic inches and an exposed area of 200 square inches.
- Class 3 parts are those that the applicant can show, through a method acceptable to the Administrator, are a size, construction, or location that their flammability characteristics do not threaten the airplane or its occupants. By threaten, the FAA means pose a risk to continued safe flight and landing or a hazard to the occupants.
- Class 4 parts are those that are essential to the safety of the airplane, its occupants, or the functionality³² of the airplane and cannot reasonably be made from a material that meets the flammability requirements without compromising the part's integrity or functionality. Although this paragraph provides an exception, the FAA expects the proposed design would come as closely as possible to full compliance, including the use of best available materials and showing that there is no adverse effect on safety.
- Class 5 parts are those that have already passed a more stringent test as outlined in appendix F to part 25.

³² Such necessary functionality does not include entertainment systems but would include lavatories and potable water tanks.

All of these provisions would apply to testing requirements for both the in-flight and post-crash fires.

The FAA is proposing these exceptions because the current general exclusion of small parts from testing requirements in part I of appendix F to part 25 has been problematic. There is currently no definition of small parts in the flammability regulations, only examples. Since testing is not required, the flammability characteristics of those small parts can be unknown. In addition, there is no consideration of accessibility, extensive use, or potential type of fire exposure. Adopting different classes of parts would simplify the requirements and bring standardization to those situations where parts are not tested. Proposed AC 25.853-1A would provide examples that would qualify for this relief and guidance on justifying it.

12. Pass/Fail Criteria

This proposal would remove the detailed pass/fail criteria from appendix F to part 25. Section 25.853(b) of this proposal would define the number of specimen sets required for tests that the applicant uses to show compliance. The applicable proposed AC would provide approved number of passing samples for certain testing methods.

The detailed pass/fail criteria, currently in appendix F to part 25, are specific to the test method. Depending on what the test is measuring, the pass/fail criteria relate to the key parameters of interest (e.g., burn length, extinguishing time, HRR) necessary to meet the level of safety that the requirement. The pass/fail criteria are based on a required number of test samples and the number of samples that meet the specified criteria. All of the current test methods require at least three sets of test samples, which may include more than one specimen depending on the test method.

Some current test methods require the average value of the test results to be at or below a certain level; others require that no sample can fail. For example, the seat cushion test in current appendix F to part 25 requires that two thirds of the test samples meet certain criteria as well as the average of all test samples. One of the key ongoing difficulties with these criteria is how to recover from failure of a single sample, where that sample may be an outlier. For those methods that require an average, simply testing more samples improves the statistical significance of the average, and has generally been acceptable (although the FAA must approve in advance the number of additional samples to be tested). For test methods that do not permit any sample to exceed specified values, a failure of one sample is problematic, since one failure would violate the criteria no matter how many additional samples are tested. Such failures are often attributed to so-called “rogue” samples: samples that have some irregular characteristic that makes their performance unrepresentative of the material (part or component) in general. While rogue samples undoubtedly occur, it is often difficult to pinpoint their cause.

This proposal would address this issue in § 25.853(b) by standardizing the number of samples and required pass rate: 80 percent for every new or improved test method, based on a minimum of three test sample sets. The effect would be that if only three samples are tested, all must pass. If one of the three samples fails, then at least two additional samples would be needed to obtain an 80 percent passing rate. This standard would be effectively relieving for tests on thermal/acoustic insulation and Class C cargo compartment liners because those methods in part III of appendix F to part 25 currently permit no failures. In contrast, this method could be more stringent for Bunsen burner and HRR tests because it could require more samples. The method is similar to the method

currently required for testing seat cushions. However, since this proposal would eliminate many Bunsen burner tests and the test for smoke emissions (all in appendix F), even if an applicant needed additional samples to show compliance, the total number of required tests should be very close to the number required today. Also, samples that are invalidated due to an assignable cause could still be discarded and replaced with new samples.

Most of the test methods currently in use would continue to be acceptable for certification. An applicant could choose to use these existing methods to show compliance with the relevant portions of this proposal. However, the FAA considers the revised versions of these test methods, as documented in FAA Report No. DOT/FAA/TC-17/55, to be more reliable than the previous versions. The only test methods currently required that would not be carried forward under this proposal are the horizontal Bunsen burner test and the test for smoke emissions. If an applicant uses a current test method to comply with a performance standard in this proposal, then the applicant should use existing pass/fail criteria (including all measured parameters). In that case, an applicant would be trading the lower reliability of the older test method against the need to prepare additional test samples. For new tests, such as those for extensively used materials in inaccessible areas, at this time there are no proven optional methods to those presented in the proposed guidance, which includes the 80-percent criteria.

The table below identifies each test method; the current location of the detailed test method in regulatory requirements and non-regulatory procedures; and the location where each test method could be found, in non-regulatory procedures, if this proposal is adopted.

Test Method	Currently Approved (or Required) Procedures	Non-Regulatory Procedures
Bunsen burner	Part I of appendix F to part 25, AMFTH*, Chapters 1-4	AMFTH**, Chapters A1 and A2
Oil burner—seats	Part II of appendix F to part 25, AMFTH*, Chapter 7	AMFTH**, Chapters A5
Oil burner—cargo liner	Part III of appendix F to part 25, AMFTH*, Chapter 8	AMFTH**, Chapters B2
Oil burner—insulation	Part VII of appendix F to part 25	AMFTH**, Chapter A5
Oil burner—Mg alloy	N/A	AMFTH**, Chapter A6
Heat release rate	Part IV of appendix F to part 25, AMFTH*, Chapter 5	AMFTH**, Chapter A4
Radiant heat—escape slide	TSO C69C	AMFTH**, Chapter A2
Radiant panel	Part VI of appendix F to part 25	AMFTH**, Chapter B2
Vertical flame propagation—Wiring	N/A	AMFTH**, Chapter B5
Vertical flame propagation—Ducting	N/A	AMFTH**, Chapter B4
Vertical flame propagation—Composite structure	N/A	AMFTH**, Chapter B3
Fire containment	AMFTH*, Chapter 10	AMFTH**, Chapter B1
* FAA Report No. DOT/FAA/AR-00/12, “Aircraft Materials Fire Test Handbook,” dated April 2000. ** FAA Report No. DOT/FAA/TC-17/55, “Aircraft Materials Fire Test Handbook,” Revision 3, dated June 2019.		

While the previous test methods, as shown in the table above, would continue to be acceptable, the FAA will not continue to refine these methods to improve their repeatability and reproducibility. The FAA’s future focus on refining and improving test methods will be on the new and improved test methods documented in FAA Report No. DOT/FAA/TC-17/55, since these are now the preferred methods and would become the preferred methods of compliance with the performance standards of this proposal.

B. Reorganization of Appendix F to Part 25

1. General Structure

The FAA is proposing to substantively change appendix F to part 25 by removing its many specifications for flammability tests and adding a list of flammability test methods that applicants can use in lieu of other test methods. The FAA would remove and update the detailed testing criteria from the current appendix F, although it would continue to be available in advisory material. This proposal would provide flexibility for applicants in showing compliance with the proposed revisions to the fire protection standards in § 25.853.

Currently, appendix F to part 25 is divided into seven parts, each providing details of different test methods, with variations for specific airplane parts, and acceptable outcomes for each test variation. Because of the importance of maintaining standardization, these test methods are very detailed and, therefore, lengthy. Since appendix F to part 25 is a regulation, applicants must get the FAA's approval to depart from any of the test details. As the test methods have become more complicated and sophisticated over time, following every detail has become more important in obtaining reliable results. Conversely, as technology advances, providing more opportunities to refine and improve the test methods, requests for deviation from appendix F to part 25 have become more frequent. To deal with these requests, the FAA issued a policy statement to permit use of FAA Report No. DOT/FAA/AR-00/12 as an acceptable method of compliance for many of the test methods in appendix F to part 25. The FAA also developed a method for updating the handbook, so that improvements could be implemented quickly and used by industry without extensive administrative burden.

Given this experience, the FAA has determined that the detailed test methods should no longer be regulatory.

In conjunction with this proposal, the detailed test methods would be contained in ACs (see section III.D, “Advisory Materials” of this NPRM), which are easier to update than a regulation and allow for more flexibility as refinements and improvements to the test methods become available. As with any advisory material, the method would not be mandatory, but applicants would have to justify and obtain approval of other compliance methods.

To improve the effectiveness of the handbook approach to compliance, a new document would serve as a compendium of the relevant test methods. The associated ACs would reference this compendium, and the FAA would update it as advances and improvements in test methods and equipment are developed. However, the original version and subsequent versions of the compendium would remain an acceptable method of compliance with these proposed regulations, unless the FAA discovers a deficiency in a given version, or changes the regulatory requirements after notice and comment.

2. Hierarchy of Tests

This proposal would add provisions to appendix F to part 25 that would allow applicants to demonstrate compliance with a requirement in one of the proposed paragraphs of § 25.853 via a test method at least as rigorous as one acceptable for showing compliance with the original requirement. Appendix F to part 25 would contain a table of these performance standards indicating whether showing compliance with one standard would be sufficient to satisfy showing compliance with another. This table would help applicants determine the relative severity of the testing methods that the FAA

would find acceptable for showing compliance and, therefore, would allow applicants to eliminate redundant or non-value-added testing. Since the critical performance parameters (e.g., flame propagation and fire penetration) differ according to the type of fire (in-flight or post-crash fuel fire), the proposed revisions to appendix F to part 25 would clarify which types of compliance tests the FAA would find acceptable as substitutions for a given type of fire threat.

This would allow a successful result on other, more stringent, testing to prove that a given material will not pose a hazard in that type of fire. For example, appendix F to part 25 would allow applicants to use a successful HRR test to show compliance with the requirement to pass a Bunsen burner test, or to use a post-crash fire test method, coupled with experience for certain classes of materials, to show compliance with an otherwise required in-flight fire test method. The FAA has determined that, for certain classes of materials, complying with one requirement provides sufficient data to show compliance with another, subject to certain conditions. Each instance where compliance with the post-crash requirements is sufficient to meet the in-flight requirement would be discussed in more detail in proposed AC 25.853-1A.

An example of the allowable use of a post-crash requirement to meet an in-flight requirement would be for the back sides of the large interior surfaces (sidewalls, ceilings, floors, galleys, etc.) not exposed to the cabin. As discussed previously, these surfaces would be subject to proposed § 25.853(c)(2), which would require that, for in-flight fires, extensively used materials in inaccessible areas not propagate the largest fire that, by itself, would not be a hazard to the airplane. The vertical flame propagation test is currently the expected means of compliance to this standard. However, with the

exception of floor panels, the types of materials used for these applications have not been a safety concern for in-flight fires, and these materials would still have to meet the stringent requirements related to heat release for the post-crash environment. With the proposed hierarchy table in appendix F to part 25, if these materials pass the HRR tests, they would not also have to pass the vertical flame propagation test.

The same allowance is true for the back side of cargo compartment liners, even though they are subject to a different probable type of fire threat (post-crash fuel fires) and required by appendix F to be tested using the oil burner test. Although the oil burner and vertical flame propagation tests are not universal substitutes for each other, the materials on the back of cargo compartment liners have exhibited satisfactory behavior in the presence of in-flight fires, as demonstrated by FAA testing, and should not require further testing by the vertical flame propagation test. Should new materials be developed whose performance in an in-flight fire has not been established, then the proposed rule would provide the means to address and allow them, and both test methods may be necessary to demonstrate that compliance. This would be indicated in the note to the table in proposed appendix F to part 25.

As a final note, the FAA recognizes that its current regulations provide flexibility for an applicant via the repeated provision allowing “other approved test methods.” However, this provision does not adequately address the need for consistency in test methods because it is optional, and each applicant could seek approval of a unique alternative method. This can result in the same material passing one applicant’s test and failing another, even though both test methods could be approved by the FAA. The FAA

expects that this proposal would provide the same level of flexibility, but increased consistency over time as consensus on testing methods develops.

C. Conformal and Editorial Changes

Special Federal Aviation Regulation (SFAR) 109 to part 25 also requires compliance with certain paragraphs of § 25.853 that would be changed by this proposal. Consequently, the FAA would modify SFAR 109 so that those requirements continue after § 25.853 is amended.

Certain sections of 14 CFR parts 27 and 29, for normal and transport category rotorcraft, currently require testing in accordance with appendix F to part 25. Although this proposal would remove those testing requirements from appendix F for transport category airplanes, the FAA does not propose to remove or change those requirements for normal and transport category rotorcraft. Therefore, this proposal would add an amendment level to the appendix F references in §§ 27.1365, 29.853, and 29.1359 to continue those requirements after appendix F is amended.

The proposed rule would also remove certain testing requirements regarding average burn length from paragraphs (a)(1) and (a)(2) of § 29.853 because those requirements are redundant with current appendix F to part 25.

Operational rules in certain sections of 14 CFR parts 91, 121, 125, and 135 also currently require testing in accordance with §§ 25.853 and 25.856 and appendix F to part 25. The FAA proposes to add the phrase “or as subsequently amended” to §§ 91.613, 121.312, 121.314, 125.113, 135.169, and 135.170, so that airplanes approved in accordance with the amendment resulting from this proposal would be able to comply

with the operational rules. The “or” in that phrase serves the purpose of making compliance with this proposal or a later amendment optional.

In addition, appendix L to part 121 contains information regarding referenced sections of part 25 that have subsequently changed through amendments. Appendix L would also be updated to conform to this proposal.

These changes to parts 25, 27, 29, 91, 121, 125, and 135 would have no substantive impact on safety or the cost of compliance.

This proposal also contains some editorial changes to existing regulatory language, where that language does not reflect how the rule is applied, or its intent. Specifically, current § 25.853(e) excepts certain compartments from compliance with § 25.853(d) if they are isolated by a door that would be closed during an emergency landing condition. In practice, this exception has been applied when such compartments are isolated by a door that is closed for taxi, takeoff, and landing, in general. The proposal is changed accordingly and will have no impact on the requirement. The proposal moves this exception in § 25.853(e) for parts inside of compartments isolated from the main passenger cabin to a new § 25.853(d)(2)(ii).

Current § 25.853(h) requires that disposal receptacles be made from materials that are “fire resistant.” The term “fire resistant” is defined in 14 CFR part 1 as having properties equivalent to aluminum alloy appropriate for the purpose. In practice, the means of compliance has been by meeting the test method specified in current part I of appendix F for Class B cargo compartment liners, which is to resist penetration by a small flame. The proposal would state the requirement in that way to avoid any

ambiguity regarding the level of protection required. This will also have no impact since it aligns the rule language with how the requirement has historically been actually met.

This proposal contains only minor editorial changes to the requirements related to smoking in § 25.853(f) and (g). The requirements would remain the same, but the paragraphs would be renumbered and restated for clarity.

D. Advisory Material

The FAA is developing six new ACs and revising three ACs that will be published for public comment concurrently with this NPRM. These proposed ACs can be found in the same public docket as this NPRM. The draft ACs would provide guidance for acceptable means, but not the only means, of showing compliance with proposed §§ 25.853, 25.855, and 25.856. The FAA will accept public comments on the following proposed ACs on the “Aviation Safety Draft Documents Open for Comment” Web page at http://www.faa.gov/aircraft/draft_docs/:

1. AC 25.853-1A, “Flammability Requirements for Transport Category Airplanes.”
2. AC 25.853-2X, “Flammability Requirements for Aircraft Seat Cushions.”
3. AC 25.853-3X, “Flammability Testing Requirements for Commonly Constructed Parts, Construction Details, and Materials Used on Transport Category Airplanes.”
4. AC 25.853-4X, “Vertical Bunsen Burner Tests.”
5. AC 25.853-5X, “Flammability Requirements for Materials in Inaccessible Areas of Transport Category Airplanes.”

6. AC 25.853-6X, “Flammability Requirements for Escape System Materials for Transport Category Airplanes.”

7. AC 25.855-1X, “Flammability Requirements of Cargo Liners for Transport Category Airplanes.”

8. AC 25.856-1A, “Thermal/Acoustic Insulation Flame Propagation Test Method Details.”

9. AC 25.856-2B, “Fuselage Burnthrough Protection.”

The FAA is also revising Report No. DOT/FAA/AR-00/12 to update the test methods contained within this report, as described previously. This interim report will be published concurrently with this NPRM as FAA Report No. DOT/FAA/TC-17/55, and it can be found in the same public docket as this NPRM.

E. Application of §§ 21.17

This proposal would revise the flammability standards for transport category airplanes, but would not impose any requirements to retrofit existing airplanes or conduct a production-cut in on new airplanes. Since this proposal would simplify or remove some of the flammability requirements, some applicants may wish to use the standards of this proposal instead of an earlier amendment level. Applicants may elect to apply the later amendment under § 21.17 or seek exceptions in accordance with § 21.101.

Section 21.17(e) permits an applicant for a type certificate to elect compliance with an amendment effective after the date of application, as long as all “directly related” amendments, as determined by the FAA, are complied with as well.

The FAA has considered which regulatory amendments must be regarded as “directly related” and, therefore, applied together under § 21.17. An analysis of what is

“directly related” requires examination of which provisions have been made more flexible and which have been made more stringent because these factors are often causally related. In some areas, the additional flexibility is the result of a requirement that has become more stringent. The primary areas of increased flexibility are the proposed removal of the testing requirements in appendix F, and the proposed removal of the smoke emission requirement. The removal of the appendix F testing requirements is only possible, from a safety perspective, because of the additional performance standards for inaccessible areas. The main area where requirements would become more stringent is extensively used components in inaccessible regions of the airplane. These areas are mainly threatened by in-flight fires, although improved flammability resistance of materials can also benefit post-crash safety. Therefore, the FAA considers the entire proposal to be interrelated, such that all the proposed changes could be characterized as “directly related” to each other. However, the FAA expects that a practical application of the “directly related” provision could simplify compliance under § 21.17 and maximize safety, as discussed below.

Among those components that would be subjected to new test methods under this proposal, composite fuselage structure is already subject to meeting special conditions, and this proposal would codify the requirements in those conditions. Also, aviation-grade electrical wiring is for the most part already compliant with the proposed flammability requirements. Ducting is one area, however, where many of the currently used parts would not meet the proposed requirement for extensively used materials in inaccessible areas, and where a significant safety benefit would accrue from the higher standard. The type of fire that primarily threatens ducting is in-flight. However, accidents have shown

that ducting can spread and intensify post-crash fires. Thus, the safety improvement that would result from applying the proposed standards to ducts would enhance fire safety with regard to both types of fire, and the FAA considers this safety enhancement integral to the proposed changes that would reduce or eliminate other testing.

Therefore, an applicant that elects compliance with the amendment level that results from this proposal, in order to take advantage of the provisions that reduce or eliminate tests, would also have to ensure that ducting complies with the new standards proposed in § 25.853(c)(2).

The exception to the requirement to apply directly related changes when an applicant elects compliance with the later amendment would be the substitution of tests in proposed appendix F to part 25. Such substitution is already allowed under the current flammability rules, which repeatedly allow applicants to show compliance by “other equivalent method.” Applicants could apply proposed appendix F to part 25 to models approved under earlier certification bases without affecting safety and without applying other portions of the proposal. An applicant’s selection of the amendment that most materially contributes to safety could eliminate the need to run multiple tests on many parts with the recognition that some tests are sufficiently stringent that they would satisfy the concerns addressed by other tests. Substituting some tests would neither eliminate the need to conduct smoke emissions tests, nor alter the applicability of current requirements. Proposed appendix F to part 25 would simply permit substitution of one test method for another, where the substitute method has been determined to be more stringent.

- Example 1: An applicant for a supplemental type certificate desires to use only the new appendix F that would result from this proposal. In this case, the

applicant would be limited to applying the hierarchy of appendix F, and no other relief.

- Example 2: An applicant for a change to a type certificate (either through amended or supplemental type certification) desires to elect compliance with the entire amendment that results from this proposal. The applicant must comply with § 25.853(c)(2)(i) as it pertains to air ducting, even if the air ducting is unchanged or not affected by the proposed design change. Any other provision of the proposed rule could then be included at the applicant's choosing.

F. Application of §§ 21.101

Section 21.101(a) requires design change applicants to meet the standards in effect on the date of application that are applicable to the change and areas affected by the change, unless exceptions are requested and are granted under the provisions of § 21.101(b). Section 21.101(b) allows the applicant to show compliance with an earlier amendment level for changes found to be not significant, or found to not materially contribute to safety, or found to be impractical. The FAA does not regard any of the standards proposed here as impractical. The degree to which application of these standards would “materially contribute to safety” will depend on the current design.

As discussed previously, acceptable wiring would be documented in proposed AC 25.853-5X and include wiring already widely used by applicants; the safety of composite fuselage structure will have been covered by special conditions; and ducting may comply with these proposed standards, even though certification testing has not been performed. In those cases, an applicant may be able to argue that including the later amendment would not materially contribute to safety, but that use of other provisions

(e.g., those that would eliminate tests) of the proposal would provide significant benefits to the applicant. In that case, the FAA agrees that compliance with the later amendment could be acceptable to eliminate tests, provided improved design features used to justify the exception are a condition of the certification basis in the “Additional Design Requirements and Conditions” section of the type certificate data sheet.

The following examples illustrate how this could work in practice:

- Example 1: An applicant for a significant product-level change seeks exception, under § 21.101(b), from the amendment that results from this proposal on the basis that full compliance would not materially contribute to safety. As discussed above, an exception would have to be based on substantial compliance with this proposal, such that few components are not in compliance, and they would not be significant from a fire safety standpoint.
- Example 2: An applicant applies for a fuselage length change. The change is considered a significant product-level change per the guidance in AC 21.101-1B. AC 21.101-1B also states that the simultaneous introduction of a new cabin interior is considered related since occupant safety considerations are impacted by a cabin length change. The FAA considers this proposed amendment to be directly related to occupant safety. As such, for a fuselage change, this proposed amendment would be an applicable requirement for the airplane (e.g., changed and unchanged areas of the airplane would need to meet the requirement). The applicant may request an exception under § 21.101 by showing compliance with this proposal to a substantial extent, such that the few parts not in compliance would not be significant from a fire safety standpoint.

IV. Regulatory Notices and Analyses

A. Regulatory Evaluation

Changes to Federal regulations must undergo several economic analyses. First, Executive Order 12866 and Executive Order 13563 direct that each Federal agency shall propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs. Second, the Regulatory Flexibility Act of 1980 (Public Law 96-354) requires agencies to analyze the economic impact of regulatory changes on small entities. Third, the Trade Agreements Act (Public Law 96-39 as amended) prohibits agencies from setting standards that create unnecessary obstacles to the foreign commerce of the United States. In developing U.S. standards, the Trade Agreements Act requires agencies to consider international standards and, where appropriate, that they be the basis of U.S. standards. Fourth, the Unfunded Mandates Reform Act of 1995 (Public Law 104-4) requires agencies to prepare a written assessment of the costs, benefits, and other effects of proposed or final rules that include a Federal mandate likely to result in the expenditure by State, local, or tribal governments, in the aggregate, or by the private sector, of \$100 million or more annually (adjusted for inflation with base year of 1995). This portion of the preamble summarizes the FAA's analysis of the economic impacts of this proposed rule. We suggest readers seeking greater detail read the full regulatory evaluation, a copy of which we have placed in the docket for this rulemaking.

In conducting these analyses, FAA has determined that this proposed rule: (1) has benefits that justify its costs; (2) is not an economically "significant regulatory action" as defined in section 3(f) of Executive Order 12866; (3) is not "significant" as defined in

DOT's Regulatory Policies and Procedures; (4) would not have a significant economic impact on a substantial number of small entities; (5) would not create unnecessary obstacles to the foreign commerce of the United States; and (6) would not impose an unfunded mandate on State, local, or tribal governments, or on the private sector by exceeding the threshold identified above. These analyses are summarized below.

1. Summary of Costs and Benefits

By extending fire protection requirements to any extensively used material located in inaccessible areas the proposal is likely to be beneficial by reducing the likelihood of a fatal accident. Over a 19-year period of analysis, the FAA estimates the total present value cost savings of this proposed rule to be \$119.8 million at a seven percent discount rate, with annualized cost savings of \$11.6 million. The cost savings would result from the elimination and streamlining of some tests, which would be made possible by the extension of fire protection requirements to inaccessible areas. Over the same 19-year period, the FAA estimates the total present value costs of this proposed rule to be \$71.1 million at a seven percent discount rate, with annualized costs of \$6.9 million due to the extension of fire protection requirements to extensively used material in inaccessible areas. A full explanation of how these costs and cost savings were estimated may be found in the regulatory impact assessment accompanying this NPRM. The present value net cost savings (cost savings minus cost) is \$48.7 million, with annualized net cost savings of \$4.7 million. The following table summarizes the costs and cost savings of this proposed rule.

Summary of Costs and Cost Savings (2016 \$)

	19-Year Total Present Value		Annualized	
	7%	3%	7%	3%
Cost Savings	\$119,848,146	\$178,395,887	\$11,595,669	\$12,454,509
Costs	\$71,105,318	\$80,387,114	\$6,879,654	\$5,612,136
Total Net Cost Savings	\$48,742,828	\$98,008,773	\$4,716,015	\$6,842,373

2. Who is Potentially Affected by this Proposed Rule?

Manufacturers of part 25 transport category airplanes would be potentially affected by the proposed rule.

3. Assumptions:

- Totals converted to 2016 constant dollars.³³
- Time horizon for analysis 19 years.³⁴
- Fifty percent of the current \$42.8 million annual costs for smoke emissions testing is incurred by domestic airplane manufacturers.³⁵
- Cost savings from eliminating smoke emissions tests would increase linearly to the level of the current cost savings over 25 years.³⁶
- Large transport category aircraft.³⁷
 - One manufacturer.

³³ Calculations were presented in 2015 dollars because most cost estimates were received in 2015 but totals were then converted to 2016 dollars to be compliant with OMB guidance implementing Executive Order 13771.

³⁴ A 19-year time horizon was chosen to be inclusive of the 19-year production cycle for large and the 15-year production cycle for small transport category airplanes.

³⁵ Fifty percent is an estimate of the share of the worldwide transport airplane market held by U.S. manufacturers.

³⁶ Based on manufacturers recommendation in MFWG Report.

³⁷ Based on FAA analysis of Boeing data, OAG Aviation Solutions Fleet Database, FAA Type Certificate Data Sheet database.

- Four type certificates.
- Twenty-seven airplanes produced annually.
- Nineteen-year production period.
- Small transport category aircraft.³⁸
 - One manufacturer.
 - Three type certificates.
 - Twenty-one airplanes produced annually.
 - Fifteen-year production cycle.

4. Benefits of this Rule

The proposed new safety requirements to extend the fire protection requirements to any extensively used material³⁸ located in inaccessible areas would result in a safety benefit by reducing the likelihood of a fatal accident from a fire in an inaccessible area. This benefit was not quantified. Even though there has fortunately not been a catastrophic in-flight fire of a passenger carrying airplane since the Swissair accident in 1998, the continued occurrence of in-flight fire incidents and the growing number of devices using lithium ion batteries increase the risk of a catastrophic accident, a risk that this proposal would reduce.

5. Costs of this Proposed Rule

Over a 19-year period of analysis, the FAA estimates the total present value costs of this proposed rule to be \$71.1 million at a seven percent discount rate, with annualized

³⁸ Extensively used materials, for the purpose of this rulemaking, means any parts or system of parts that could permit a fire to propagate and grow to a hazardous level, for example, air ducting, electrical wiring/sleeving, thermal/acoustic insulation, and composite fuselage structure.

costs of \$6.9 million, which would result from extending the standards developed for thermal/acoustic insulation to all extensively used materials in inaccessible areas. A full explanation of how these costs were estimated may be found in the regulatory impact assessment accompanying this NPRM.

Over the same 19-year period, the FAA estimates the total quantified cost savings of this proposed rule to be \$119.8 million at a seven percent discount rate, with annualized cost savings of \$11.6 million. The cost savings would result from the elimination and streamlining of some tests, which would be made possible by the extension of fire protection requirements to inaccessible areas. The total net cost savings of the proposed rule at a seven percent discount rate would be \$48.7 million, with annualized net cost savings of \$4.7 million.

6. Minimal to No Cost Provisions Including Conforming Changes

Numerous provisions within this proposal would result in minimal to no cost to possibly small cost savings. These include provisions that continue to accept previous test methods or current systems in addition to proposing new ones, those that maintain current requirements or current practice, and small edits to maintain consistency with the current rule.

Also included are conforming changes to parts 27, 29, 121, 125, 135, and appendix L to part 121. These sections make reference to, or require testing in accordance with, certain sections of appendix F to part 25. Because sections of appendix F would be removed, some changes refer to the new location of the requirements. The proposed changes to these parts also include language to operating requirements. This new language would give operators the choice of meeting the proposed requirements, or

complying with the old requirements. For airplanes type certificated in accordance with the proposed requirements, this change would enable them to be in compliance with the operating rules, while allowing aircraft manufactured under existing type certificates and the current fleet to comply with the old requirements. Therefore, this proposed rule would impose no retrofit requirements on the current fleet or a production cut-in to aircraft manufactured under existing type certificates. Consequently, these provisions would impose minimal to no cost.

B. Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 (Public Law 96-354) (RFA) establishes “as a principle of regulatory issuance that agencies shall endeavor, consistent with the objectives of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of the businesses, organizations, and governmental jurisdictions subject to regulation. To achieve this principle, agencies are required to solicit and consider flexible regulatory proposals and to explain the rationale for their actions to assure that such proposals are given serious consideration.” The RFA covers a wide range of small entities, including small businesses, not-for-profit organizations, and small governmental jurisdictions.

Agencies must perform a review to determine whether a rule would have a significant economic impact on a substantial number of small entities. Under Section 603 of the RFA, the FAA has prepared an initial regulatory flexibility analysis addressing the following:

- A description of the reasons why the action by the agency is being considered.
- A succinct statement of the objectives of, and legal basis for, the proposed rule.

- A description and, where feasible, an estimate of the number of small entities to which the proposed rule will apply.
- A description of the projected reporting, recordkeeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities that would be subject to the requirement and the types of professional skills necessary for preparation of the report or record.
- An identification, to the extent practicable, of all relevant federal rules that may duplicate, overlap, or conflict with the proposed rule.
- A description of any significant alternatives to the proposed rule that accomplish the stated objectives of applicable statutes, and that minimize any significant economic impact of the proposed rule on small entities.

1. A Description of the Reasons Why the Action by the Agency is Being Considered

The FAA is publishing this proposed rule to simplify flammability regulations and provide a higher level of safety for transport category airplanes. The current regulations are complicated, sometimes conflicting, sometimes redundant, occasionally incomplete, and may be obsolete for dealing with present-day airplanes. Simplifying these regulations can lead to cost savings.

A key safety benefit of this proposed rule is the extension of fire protection requirements to any extensively used material located in inaccessible areas. FAA research found airplanes are at risk due to flammable materials in inaccessible areas. FAA testing has indicated that typical in-service ducts can quickly spread fire from a small fire source in an inaccessible area, while ducts that would meet the new requirement can resist that small size fire and not propagate flames. Also, due to the rapidly increasing number of

events due to lithium battery fires, the chances of a lithium battery fire in the cabin getting to an inaccessible area are increasing.

2. A Succinct Statement of the Objectives of, and Legal Basis for, the Proposed Rule

The 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 the agency's authority.

This rulemaking is issued under the authority described in Subtitle VII, Part A, Subpart III, Section 44701, "General Requirements." Under that section, the FAA is charged with promoting safe flight of civil aircraft in air commerce by prescribing regulations and minimum standards for the design, material, construction, quality of work, and performance of aircraft that the Administrator finds necessary for safety in air commerce. This regulation is within the scope of that authority. It revises the safety standards for the flammability characteristics, and thus the design, material, and construction, of transport category airplanes.

3. Description and, Where Feasible, an Estimate of the Number of Small Entities to Which the Proposed Rule Would Apply

This proposed rule would affect U.S. manufacturers of part 25 transport category airplanes requesting a new type certificate. According to the small business administration, the size standard for aircraft manufacturers (NAICS code 336411) to be considered a small business is 1,500 employees or less. None of the manufacturers who manufacture transport category airplanes have fewer than 1,500 employees; therefore, none of them are small businesses.

The proposed rule might also indirectly affect businesses that modify transport category airplanes. At this time, the FAA has not identified any affected small entities without larger U.S. or foreign ownership or business relationships. The FAA requests comments on this finding.

4. A Description of the Projected Reporting, Recordkeeping, and Other Compliance Requirements of the Proposed Rule, including an Estimate of the Classes of Small Entities that Will be Subject to the Requirement and the Types of Professional Skills Necessary for Preparation of the Report or Record

Requirements are governed by 14 CFR part 21 and are not changing with this proposal. Applicants are required to show compliance under § 21.20, and this will continue to apply. Therefore, the proposed rule would not impose additional reporting, recordkeeping, or other compliance requirements on small entities.

5. An Identification, to the Extent Practicable, of All Relevant Federal Rules that May Duplicate, Overlap, or Conflict with the Proposed Rule

There are no federal rules that may duplicate, overlap, or conflict with this proposal.

6. A Description of any Significant Alternatives to the Proposed Rule

The FAA considered two alternatives to the proposed rule. The first alternative was to not make any changes to the fire protection requirements. This would leave in place complicated, conflicting, redundant, occasionally incomplete, and obsolete regulations. Cost savings would not be achieved. This alternative would also not extend fire protection requirements to extensively used materials located in inaccessible areas. This would leave airplanes at risk due to flammability materials in inaccessible areas.

The FAA also considered making only some of the proposed changes; however, this would provide limited benefit and no safety improvement. This is because the

significant safety improvements facilitate the significant simplifications in the proposal. Without the safety enhancements, the amount of simplification would be limited. If the FAA proposed only the safety enhancements, the resulting cost would be difficult to quantitatively balance against the resulting safety improvement. The proposal intends to achieve a significant reduction in costs and simplify the requirements, while substantively improving safety.

The FAA expects this proposed rule would not result in a significant economic impact on a substantial number of small entities. The FAA requests comments on this finding.

C. International Trade Impact Assessment

The Trade Agreements Act of 1979 (Public Law 96-39), as amended by the Uruguay Round Agreements Act (Public Law 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, that they be the basis for U.S. standards.

The FAA has assessed the potential effect of this proposed rule and determined that it does not exclude imports that meet the safety objective. As a result, this proposed rule is not considered as creating an unnecessary obstacle to foreign commerce.

The proposed rule would impose the same costs and cost savings on domestic and international manufacturers selling airplanes to airlines that wish to operate within the United States because U.S.-registered transport category airplanes must comply with part 25 in order to be operated within the United States. Therefore, the same cost relief would accrue to all manufacturers selling airplanes to airlines operating within the U.S. However, the effect this proposed rule would have on sales of domestically produced airplanes relative to airplanes produced by foreign companies to airlines operating abroad and not in the U.S. might be either an advantage due to cost savings or a disadvantage due to increased costs, depending on the standards to which foreign airplanes are manufactured.

D. Unfunded Mandates Assessment

Title II of the Unfunded Mandates Reform Act of 1995 (Pub. L. 104-4) requires each Federal agency to prepare a written statement assessing the effects of any Federal mandate in a proposed or final agency rule that may result in an expenditure of \$100 million or more (in 1995 dollars) in any one year by State, local, and tribal governments, in the aggregate, or by the private sector; such a mandate is deemed to be a “significant regulatory action.” The FAA currently uses an inflation-adjusted value of \$155.0 million in lieu of \$100 million.

This proposed rule does not contain such a mandate; therefore, the requirements of Title II of the Act do not apply.

E. Paperwork Reduction Act

The Paperwork Reduction Act of 1995 (44 U.S.C. 3507(d)) requires that the FAA consider the impact of paperwork and other information collection burdens imposed on

the public. The FAA has determined that 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. The FAA has determined that there are no ICAO Standards and Recommended Practices that correspond to these proposed regulations.

G. Environmental Analysis

FAA Order 1050.1E identifies FAA actions that are categorically excluded from preparation of an environmental assessment or environmental impact statement under the National Environmental Policy Act in the absence of extraordinary circumstances. The FAA has determined this rulemaking action qualifies for the categorical exclusion identified in paragraph 5-6.6 and involves no extraordinary circumstances.

V. Executive Order Determinations

A. Executive Order 13132, Federalism

The FAA has analyzed this proposed rule under the principles and criteria of Executive Order 13132, "Federalism." The agency has determined that 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. Executive Order 13211, Regulations that Significantly Affect Energy Supply, Distribution, or Use

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

C. Executive Order 13609, International Cooperation

Executive Order 13609, “Promoting International Regulatory Cooperation,” promotes international regulatory cooperation to meet shared challenges involving health, safety, labor, security, environmental, and other issues and to reduce, eliminate, or prevent unnecessary differences in regulatory requirements. The FAA has analyzed this action under the policies and agency responsibilities of Executive Order 13609, and has determined that this action would have no effect on international regulatory cooperation.

D. Executive Order 13771, Reducing Regulation and Controlling Regulatory Costs

Executive Order 13771 titled “Reducing Regulation and Controlling Regulatory Costs,” directs that, unless prohibited by law, whenever an executive department or agency publicly proposes for notice and comment or otherwise promulgates a new regulation, it shall identify at least two existing regulations to be repealed. In addition, any new incremental costs associated with new regulations shall, to the extent permitted by law, be offset by the elimination of existing costs. Only those rules deemed significant under section 3(f) of Executive Order 12866, “Regulatory Planning and Review,” are subject to these requirements.

As determined in section IV.A, above, this is not a significant rule under Executive Order 12866. Accordingly, this rule is not subject to the requirements of Executive Order 13771.

VI. Additional Information

A. Comments Invited

The FAA invites interested persons to participate in this rulemaking by submitting written comments, data, or views. The agency 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 send only one copy of written comments, or if comments are filed electronically, commenters should submit only one time.

The 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 rulemaking. Before acting on this proposal, the FAA will consider all comments it receives on or before the closing date for comments. The FAA will consider comments filed after the comment period has closed if it is possible to do so without incurring expense or delay. The agency may change this proposal in light of the comments it receives.

Proprietary or Confidential Business Information: Commenters should not file proprietary or confidential business information in the docket. Such information must be sent or delivered directly to the person identified in the FOR FURTHER

INFORMATION CONTACT section of this document, and marked as proprietary or confidential. If submitting information on a disk or CD ROM, mark the outside of the disk or CD ROM, and identify electronically within the disk or CD ROM the specific information that is proprietary or confidential.

Under 14 CFR 11.35(b), if the FAA is aware of proprietary information filed with a comment, the agency does not place it in the docket. It is held in a separate file to which the public does not have access, and the FAA places a note in the docket that it has received it. If the FAA receives a request to examine or copy this information, it treats it as any other request under the Freedom of Information Act (5 U.S.C. 552). The FAA processes such a request under Department of Transportation procedures found in 49 CFR part 7.

B. Availability of Rulemaking Documents

An electronic copy of rulemaking documents may be obtained from the Internet by—

1. Searching the Federal eRulemaking Portal (<http://www.regulations.gov>);
2. Visiting the FAA's Regulations and Policies web page at http://www.faa.gov/regulations_policies; or
3. Accessing the Government Printing Office's web page at <http://www.gpo.gov/fdsys/>.

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) 267-9680. Commenters must identify the docket or notice number of this rulemaking.

All documents the FAA considered in developing this proposed rule, including economic analyses and technical reports, may be accessed from the Internet through the Federal eRulemaking Portal referenced in item (1) above.

List of Subjects

14 CFR Part 25

Aircraft, Aviation safety, Reporting and recordkeeping requirements

14 CFR Part 27

Aircraft, Aviation safety

14 CFR Part 29

Aircraft, Aviation safety

14 CFR Part 91

Air carrier, Air taxis, Air traffic control, Aircraft, Airmen, Airports, Alaska, Aviation safety, Canada, Charter flights, Cuba, Drug traffic control, Ethiopia, Freight, Incorporation by reference, Iraq, Mexico, Noise control, North Korea, Political candidates, Reporting and recordkeeping requirements, Somalia, Syria, Transportation

14 CFR Part 121

Air carriers, Aircraft, Airmen, Alcohol abuse, Aviation safety, Charter flights, Drug abuse, Drug testing, Reporting and recordkeeping requirements, Safety, Transportation

14 CFR Part 125

Aircraft, Airmen, Aviation safety, Reporting and recordkeeping requirements

14 CFR Part 135

Air taxis, Aircraft, Airmen, Alcohol abuse, Aviation safety, Drug abuse, Drug testing, Reporting and recordkeeping requirements

The Proposed Amendment

In consideration of the foregoing, the Federal Aviation Administration proposes to amend chapter 1 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), 106(g), 40113, 44701, 44702 and 44704.

2. Amend Special Federal Aviation Regulation No. 109 to part 25 by revising paragraphs 12 and 14(e) to read as follows:

Special Federal Aviation Regulation No. 109

* * * * *

12. Materials for Compartment Interiors. An applicant must comply with the applicable provisions of § 25.853, except that demonstration of compliance with § 25.853(d)(2) is not required if the applicant can show by test, or a combination of test and analysis, that the maximum time for evacuation of all occupants does not exceed 45 seconds under the conditions specified in appendix J to part 25.

* * * * *

14. * * *

(e) The surfaces of the galley surrounding the cooktop that would be exposed to a fire on the cooktop surface or in cookware on the cooktop must be constructed of

materials that comply with the flammability requirements of § 25.853(c)(2)(ii). This requirement is in addition to the flammability requirements typically required of the materials in these galley surfaces. During the selection of these materials, an applicant must account for the flammability characteristics of the materials to ensure these characteristics will not be adversely affected by the use of cleaning agents and utensils used to remove cooking stains.

* * * * *

3. Revise § 25.853 to read as follows:

§ 25.853 Interior parts and components fire protection.

(a) General. Each airplane part, component, and assembly must protect the airplane and its occupants from in-flight and post-crash fire threats. For the purposes of this section an airplane part, component, or assembly is one that is located within, and including, the fuselage.

(b) Testing. Except as provided in paragraph (e) of this section, an applicant must conduct tests to show compliance with paragraphs (c) and (d) of this section. Except as provided in paragraph (c)(1)(ii) of this section, for any tests used to show compliance, the applicant must use a minimum of three specimen sets.

(c) In-flight requirements. During an in-flight fire, the flammability characteristics of each part, component, and assembly must not present a hazard to the occupants and must not prevent the continued safe flight and landing of the airplane.

(1) Accessible areas. (i) Each part, component, and assembly that is accessible to the flightcrew during flight must be self-extinguishing when exposed to a small flame.

(ii) Each receptacle used for the disposal of flammable waste material must be fully enclosed, constructed of materials that resist penetration from a small ignition source, and must contain fires likely to occur in it under normal use. At least one test must show the capability of the receptacle to contain those fires under all probable conditions of wear, misalignment, and ventilation expected in service.

(iii) Each ceiling and sidewall liner of a Class B cargo compartment must resist penetration by a small flame.

(2) Inaccessible areas. (i) Each extensively used airplane part, component, and assembly that is not accessible to the flightcrew during flight but that could be subjected to an in-flight fire must not propagate the largest fire that, by itself, would not be a hazard to the airplane.

(ii) Each ceiling and sidewall liner of a Class F cargo compartment, if installed to meet the requirements of § 25.855(b)(2), and of a Class C cargo compartment must resist penetration by a fire within that compartment and must protect the airplane's structure and critical systems from the effects of that fire.

(iii) Each ceiling and sidewall liner of a Class E cargo compartment must resist penetration by a fire within that compartment and must protect the airplane's structure and critical systems from the effects of that fire, unless the design provides a means other than a liner that protects the airplane's structure and critical systems from the effects of that fire.

(iv) The floor liner of any class of cargo compartment, and any ceiling and sidewall liner of a Class E cargo compartment, must resist penetration by a small flame.

(v) All other parts, components, and assemblies that are not accessible by the flightcrew during flight must be self-extinguishing when exposed to a small flame or electrical arc.

(d) Post-crash requirements. During a post-crash fuel fire, the flammability characteristics of each part, component, and assembly must maintain survivable cabin conditions for enough time to allow evacuation.

(1) For airplanes with a passenger capacity of 19 or less, each large surface in the passenger cabin must be self-extinguishing when exposed to a small flame for at least 60 seconds.

(2) For airplanes with a passenger capacity of 20 or more, each large surface in the passenger cabin must resist involvement in a post-crash fuel fire that has entered the fuselage, except:

(i) A large surface, no part of which is more than 15” above the floor, need not comply with paragraph (d)(2) of this section if it is located in such a manner that it would not be directly exposed to the effects of a post-crash fuel fire.

(ii) A large surface in the interior of a compartment other than a cargo or baggage compartment need not comply with paragraph (d)(2) of this section if the interior of the compartment is isolated from the main passenger cabin by doors or equivalent means that would normally be closed during taxi, takeoff, and landing.

(3) Each cushion used to support the occupant of a seat or berth must resist involvement in a post-crash fuel fire that has entered the airplane, and must not propagate that fire.

(4) In addition to resisting involvement in a post-crash fuel fire that has entered the airplane, each flammable metal must be readily extinguishable.

(5) The design must ensure the continued function of all escape systems when those systems are exposed to the effects of radiant heat from a post-crash fuel fire.

(e) Exceptions. A part, component, and assembly does not require testing to meet the requirements specified in paragraph (c) or (d) of this section if it meets the criteria of at least one of the following classes:

(1) Class 1. Parts, components, and assemblies that would each fit within a cube measuring two inches on each side and are sufficiently separated from the same type of part, component, or assembly such that collectively they will not propagate a fire.

(2) Class 2. Parts, components, and assemblies that are not extensively used, are made from materials that are self-extinguishing, do not individually exceed a volume of 113 cubic inches, have an exposed surface area not exceeding 200 square inches, and do not propagate a flame vertically.

(3) Class 3. Parts, components, and assemblies that applicants can show, through a method acceptable to the Administrator, are a size, construction, or location that their flammability characteristics do not threaten the airplane or its occupants.

(4) Class 4. Parts, components, and assemblies that are essential to the safety of the airplane, its occupants, or the functionality of the airplane and cannot reasonably be constructed of a less flammable material without compromising the integrity or functionality of that part, component, or assembly.

(5) Class 5. Parts, components, and assemblies that have successfully met one or more of the alternate requirements, including any applicable conditions, set forth in appendix F to part 25.

(f) Smoking. (1) Smoking is not allowed in lavatories. If smoking is allowed in any area occupied by the crew or passengers, an adequate number of self-contained, removable ashtrays must be provided in designated smoking sections for all seated occupants.

(2) Regardless of whether smoking is allowed in any other part of the airplane, lavatories must have self-contained, removable ashtrays located conspicuously on or near the entry side of each lavatory door, except that one ashtray may serve more than one lavatory door if the ashtray can be seen readily from the cabin side of each lavatory served.

4. Amend § 25.855 by revising paragraphs (c) and (d) to read as follows:

§ 25.855 Cargo or baggage compartments.

* * * * *

(c) Cargo compartment liners must comply with the applicable provisions of § 25.853.

(d) All other materials used in the construction of the cargo or baggage compartment, other than material located entirely within a Class C cargo or baggage compartment, must be self-extinguishing when exposed to a small flame.

* * * * *

5. Revise § 25.856 to read as follows:

§ 25.856 Thermal/Acoustic insulation materials.

(a) All thermal/acoustic insulation material installed in inaccessible areas of the fuselage must comply with § 25.853(c)(2)(i) unless it qualifies for one of the exceptions in § 25.853(e).

(b) For airplanes with a passenger capacity of 20 or more, all thermal/acoustic insulation materials installed in the lower half of the airplane fuselage must resist penetration of a post-crash fuel fire and provide a minimum of 5 minutes survivability in the occupied portions of the airplane, unless the applicant provides an equivalent means of post-crash fire penetration protection. This requirement does not apply to thermal/acoustic insulation installations that the Administrator finds would not contribute to fire penetration resistance. For the purposes of this paragraph, thermal/acoustic insulation materials include the means of fastening the materials to the fuselage.

6. Amend § 25.1713 by revising paragraph (c) and adding paragraph (d) to read as follows:

§ 25.1713 Fire protection: EWIS.

* * * * *

(c) All insulation on electrical wire and electrical cable, and all materials used to provide additional protection for that wire and cable:

(1) If installed in any area outside of the fuselage, must not propagate the largest fire that, by itself, would not be a hazard to the airplane, and

(2) If installed in any area within the fuselage, must meet the requirements of § 25.853(c), unless it meets the requirements of paragraph (c)(1) of this section.

(d) To show compliance with paragraph (c) of this section, an applicant must conduct tests, unless the applicant can show that the insulation and materials are of a size, location, and quantity that their flammability characteristics do not threaten the airplane or its occupants. For any tests used to show compliance, the applicant must use a minimum of three specimen sets.

7. Revise appendix F to part 25 to read as follows:

Appendix F to Part 25—Flammability Test Hierarchy.

Applicants may substitute compliance with the standards in the first row of the table below by meeting the standards in the first column, as indicated at the appropriate intersection, subject to the noted conditions:

	Standard:					
	In-flight accessible; small flame resistance § 25.853 (c)(1)(i)	Post-crash <20; small ignition resistance § 25.853 (d)(1)	In-flight cargo liner; small flame penetration resistance § 25.853 (c)(1)(iii)	In-flight inaccessible; fire propagation § 25.853 (c)(2)(i)	In-flight cargo liner fire penetration resistance § 25.853 (c)(2)(ii)/(iii)	Seat cushion fire resistance § 25.853 (d)(3)
Substitution:						
Post-crash <20; small ignition resistance § 25.853(d)(1)	Yes	No	No	No	No	No
In-flight inaccessible; fire propagation § 25.853(c)(2)(i)	Yes	Yes	No	No	No	No
Post-crash ≥20; large surface fire resistance § 25.853(d)(2)	Yes	Yes	No	Note 1	No	Note 2
Seat cushion fire resistance § 25.853(d)(3)	Yes	Yes	No	No	No	No
Post-crash ≥20; fire penetration resistance § 25.853(b)(2)	Yes	Yes	Yes	No	Yes	No
In-flight cargo liner fire penetration resistance § 25.853(c)(2)(ii)/(iii)	Yes	Yes	Yes	Note 3	No	No
Notes: 1. When the facesheet on the back (inaccessible) side of the large surface is of the same material system as the facesheet on the front side. 2. When the cushion does not directly support the occupant and can be tested in its actual thickness. 3. When the back side of the liner is made from glass fiber reinforced epoxy and phenolic resin.						

PART 27—AIRWORTHINESS STANDARDS: NORMAL CATEGORY ROTORCRAFT

8. The authority citation for part 27 continues to read as follows:

Authority: 49 U.S.C. 106(f), 106(g), 40113, 44701-44702, 44704.

9. Amend § 27.1365 by revising paragraph (c) to read as follows:

§ 27.1365 Electric cables.

* * * * *

(c) Insulation on electrical wire and cable installed in the rotorcraft must be self-extinguishing when tested in accordance with appendix F, part I(a)(3), of part 25 of this chapter at amendment 25-138.

PART 29—AIRWORTHINESS STANDARDS: TRANSPORT CATEGORY ROTORCRAFT

10. The authority citation for part 29 continues to read as follows:

Authority: 49 U.S.C. 106(f), 106(g), 40113, 44701-44702, 44704.

11. Amend § 29.853 by revising paragraphs (a) and (b) to read as follows:

§ 29.853 Compartment interiors.

* * * * *

(a) The materials (including finishes or decorative surfaces applied to the materials) must meet the following test criteria as applicable:

(1) Interior ceiling panels, interior wall panels, partitions, galley structure, large cabinet walls, structural flooring, and materials used in the construction of stowage compartments (other than underseat stowage compartments and compartments for stowing small items such as magazines and maps) must be self-extinguishing when tested vertically in accordance with the applicable portions of appendix F to part 25 of this chapter at amendment 25-138, or other approved equivalent methods.

(2) Floor covering, textiles (including draperies and upholstery), seat cushions, padding, decorative and non-decorative coated fabrics, leather, trays and galley furnishings, electrical conduit, thermal and acoustical insulation and insulation covering, air ducting joint and edge covering, cargo compartment liners, insulation blankets, cargo covers, and transparencies, molded and thermoformed parts, air ducting joints, and trim

strips (decorative and chafing) that are constructed of materials not covered in paragraph (a)(3) of this section, must be self-extinguishing when tested vertically in accordance with the applicable portion of appendix F to part 25 of this chapter at amendment 25-138, or other approved equivalent methods.

(3) Acrylic windows and signs, parts constructed in whole or in part of elasto-metric materials, edge lighted instrument assemblies consisting of two or more instruments in a common housing, seat belts, shoulder harnesses, and cargo and baggage tiedown equipment, including containers, bins, pallets, etc., used in passenger or crew compartments, may not have an average burn rate greater than 2.5 inches per minute when tested horizontally in accordance with the applicable portions of appendix F to part 25 of this chapter at amendment 25-138, or other equivalent methods that the Administrator approves.

(4) Except for electrical wire and cable insulation, and for small parts (such as knobs, handles, rollers, fasteners, clips, grommets, rub strips, pulleys, and small electrical parts) that the Administrator finds would not contribute significantly to the propagation of a fire, materials in items not specified in paragraph (a)(1), (2), or (3) of this section may not have a burn rate greater than 4 inches per minute when tested horizontally in accordance with the applicable portions of appendix F to part 25 of this chapter at amendment 25-138, or other equivalent methods that the Administrator approves.

(b) In addition to meeting the requirements of paragraph (a)(2) of this section, seat cushions, except those on flight crewmember seats, must meet the test requirements of part II of appendix F to part 25 of this chapter at amendment 25-138, or equivalent.

* * * * *

12. Amend § 29.1359 by revising paragraph (c) to read as follows:

§ 29.1359 Electrical system fire and smoke protection.

* * * * *

(c) Insulation on electrical wire and cable installed in the rotorcraft must be self-extinguishing when tested in accordance with appendix F, part I(a)(3), of part 25 of this chapter at amendment 25-138.

PART 91—GENERAL OPERATING AND FLIGHT RULES

13. The authority citation for part 91 continues to read as follows:

Authority: 106(f), 106(g), 1155, 40101, 40103, 40105, 40113, 40120, 44101, 44111, 44701, 44704, 44709, 44711, 44712, 44715, 44716, 44717, 44722, 46306, 46315, 46316, 46504, 46506-46507, 47122, 47508, 47528-47531, 47534, Pub. L. 114-190, 130 Stat. 615 (49 U.S.C. 44703 note); articles 12 and 29 of the Convention on International Civil Aviation (61 Stat. 1180), (126 Stat. 11).

14. Amend § 91.613 by revising paragraphs (b)(1) introductory text and (b)(2) to read as follows:

§ 91.613 Materials for compartment interiors.

* * * * *

(b) * * *

(1) For airplanes manufactured before September 2, 2005, when thermal/acoustic insulation is installed in the fuselage as replacements after September 2, 2005, the insulation must meet the flame propagation requirements of § 25.856 of this chapter, effective September 2, 2003, or as subsequently amended, if it is:

* * * * *

(2) For airplanes manufactured after September 2, 2005, thermal/acoustic insulation materials installed in the fuselage must meet the flame propagation

requirements of § 25.856 of this chapter, effective September 2, 2003, or as subsequently amended.

PART 121—OPERATING REQUIREMENTS: DOMESTIC, FLAG, AND SUPPLEMENTAL OPERATIONS

15. The authority citation for part 121 continues to read as follows:

Authority: 106(f), 106(g), 40103, 40113, 40119, 41706, 42301 preceding note added by Pub. L. 112-95, sec. 412, 126 Stat. 89, 44101, 44701-44702, 44705, 44709-44711, 44713, 44716-44717, 44722, 44729, 44732; 46105; Pub. L. 111-216, 124 Stat. 2348 (49 U.S.C. 44701 note); Pub. L. 112-95 126 Stat 62 (49 U.S.C. 44732 note).

16. Amend § 121.312 by revising paragraphs (b) introductory text, (e)(1) introductory text, and (e)(2) and (3) to read as follows:

§ 121.312 Materials for compartment interiors.

* * * * *

(b) Seat cushions. Seat cushions, except those on flight crewmember seats, in each compartment occupied by crew or passengers, must comply with the requirements pertaining to seat cushions in § 25.853(c) effective on November 26, 1984; or in § 25.853(d) effective on [EFFECTIVE DATE OF FINAL RULE]; or as subsequently amended, on each airplane as follows:

* * * * *

(e) * * *

(1) For airplanes manufactured before September 2, 2005, when thermal/acoustic insulation is installed in the fuselage as replacements after September 2, 2005, the insulation must meet the flame propagation requirements of § 25.856 of this chapter, effective September 2, 2003, or as subsequently amended, if it is:

* * * * *

(2) For airplanes manufactured after September 2, 2005, thermal/acoustic insulation materials installed in the fuselage must meet the flame propagation requirements of § 25.856 of this chapter, effective September 2, 2003, or as subsequently amended.

(3) For airplanes with a passenger capacity of 20 or greater, manufactured after September 2, 2009, thermal/acoustic insulation materials installed in the lower half of the fuselage must meet the flame penetration resistance requirements of § 25.856 of this chapter, effective September 2, 2003, or as subsequently amended. If the airplane's type design was approved based on a finding of equivalent level of safety to § 25.856 in accordance with § 21.21(b)(1) of this chapter, the certificate holder is in compliance with this section of this part as long as the aircraft conforms to the approved type design.

17. Amend § 121.314 by revising paragraph (a)(2) to read as follows:

§ 121.314 Cargo and baggage compartments.

* * * * *

(a) * * *

(2) Materials that meet the test requirements of part 25, appendix F, part III of this chapter effective on June 16, 1986; or the test requirements of § 25.853(c)(2)(ii) of this chapter effective on [EFFECTIVE DATE OF FINAL RULE]; or as subsequently amended; or

* * * * *

18. Revise appendix L to part 121 to read as follows:

APPENDIX L TO PART 121—TYPE CERTIFICATION REGULATIONS MADE PREVIOUSLY EFFECTIVE

(a) Appendix L lists regulations in this part that require compliance with standards contained in superseded type certification regulations that continue to apply to certain transport category airplanes. The table below sets out citations to the current CFR section, applicable aircraft, superseded type certification regulation and applicable time periods, and the CFR edition and *Federal Register* documents where the regulation having prior effect is found. Copies of all superseded regulations may be obtained at the Federal Aviation Administration Law Library, Room 924, 800 Independence Avenue SW., Washington, DC.

Part 121 Section	Applicable Aircraft	Provisions: CFR/FR References
§ 121.312(a)(1)(i)	Transport category; or nontransport category type certificated before January 1, 1965; passenger capacity of 20 or more; manufactured prior to August 20, 1990	Heat release rate testing. 14 CFR 25.853(d)(2) effective [effective date of final rule]: 14 CFR parts 1 to 59, Revised as of January 1, [Federal Register revision year], and amended by Amdt. [amendment level and Federal Register citation and publication date of final rule]. Formerly 14 CFR 25.853(d) effective March 6, 1995: 14 CFR parts 1 to 59, Revised as of January 1, 1995, and amended by Amdt. 25-83, 60 FR 6623, February 2, 1995. Formerly 14 CFR 25.853(a-1) effective August 20, 1986: 14 CFR parts 1 to 59, Revised as of January 1, 1986.
§ 121.312(a)(1)(ii)	Transport category; or nontransport category type certificated before January 1, 1965; passenger capacity of 20 or more; manufactured after August 19, 1990	Heat release rate testing. 14 CFR 25.853(d)(2) effective [effective date of final rule]: 14 CFR parts 1 to 59, Revised as of January 1, [insert Federal Register revision year], and amended by Amdt. [amendment level and Federal

Part 121 Section	Applicable Aircraft	Provisions: CFR/FR References
		<p>Register citation and publication date of final rule]. Formerly 14 CFR 25.853(d) effective March 6, 1995: 14 CFR parts 1 to 59, Revised as of January 1, 1995, and amended by Amdt. 25-83, 60 FR 6623, February 2, 1995. Formerly 14 CFR 25.853(a-1) effective September 26, 1988: 14 CFR parts 1 to 59, Revised as of January 1, 1988, and amended by Amdt. 25-66, 53 FR 32584, August 25, 1988. Smoke testing. 14 CFR 25.853(d) effective March 6, 1995: 14 CFR parts 1 to 59, Revised as of January 1, 1995, and amended by Amdt. 25-83, 60 FR 6623, February 2, 1995. Formerly 14 CFR 25.853(a-1) effective September 26, 1988: 14 CFR parts 1 to 59, Revised as of January 1, 1988, and amended by Amdt. 25-66, 53 FR 32584, August 25, 1988.</p>
§ 121.312(a)(2)(i)	Transport category; or nontransport category type certificate before January 1, 1965; application for type certificate filed prior to May 1, 1972; substantially complete replacement of cabin interior on or after May 1, 1972	Provisions of 14 CFR 25.853 in effect on April 30, 1972: 14 CFR parts 1 to 59, Revised as of January 1, 1972.
§ 121.312(a)(3)(i)	Transport category type certificated after January 1, 1958; nontransport category type certificated after January 1, 1958, but before January 1, 1965; passenger capacity of 20 or more; substantially complete replacement of the cabin interior on or after March 6, 1995	Heat release rate testing. 14 CFR 25.853(d) in effect March 6, 1995: 14 CFR parts 1 to 59, Revised as of January 1, 1995; and amended by Amdt. 25-83, 60 FR 6623, February 2, 1995. Formerly 14 CFR 25.853(a-1) in effect August 20, 1986: 14 CFR parts 1 to 59, Revised as of January 1, 1986.
§ 121.312(a)(3)(ii)	Transport category type certificated after January 1, 1958; nontransport category type certificated after January 1, 1958, but before January 1,	Heat release rate testing. 14 CFR 25.853(d)(2) effective [effective date of final rule]: 14 CFR parts 1 to 59, Revised as of January 1, [Federal Register revision year],

Part 121 Section	Applicable Aircraft	Provisions: CFR/FR References
	1965; passenger capacity of 20 or more; substantially complete replacement of the cabin interior on or after August 20, 1990	<p>and amended by Amdt. [amendment level and Federal Register citation and publication date of final rule].</p> <p>Formerly 14 CFR 25.853(d) effective March 6, 1995: 14 CFR parts 1 to 59, Revised as of January 1, 1995, and amended by Amdt. 25-83, 60 FR 6623, February 2, 1995.</p> <p>Formerly 14 CFR 25.853(a-1) effective September 26, 1988: 14 CFR parts 1 to 59, Revised as of January 1, 1988, and amended by Amdt. 25-66, 53 FR 32584, August 25, 1988.</p> <p>Smoke testing. 14 CFR 25.853(d) effective March 6, 1995; 14 CFR parts 1 to 59, Revised as of January 1, 1995; and amended by Amdt. 25-83, 60 FR 6623, February 2, 1995.</p> <p>Formerly 14 CFR 25.853(a-1) effective September 26, 1988: 14 CFR parts 1 to 59, Revised as of January 1, 1988, and amended by Amdt. 25-66, 53 FR 32584, August 25, 1988.</p>
§ 121.312(b)(1) and (2)	Transport category airplane type certificated after January 1, 1958; nontransport category airplane type certificated after December 31, 1964	<p>Seat cushions. 14 CFR 25.853(d)(3) effective [effective date of final rule]: 14 CFR parts 1 to 59, Revised as of January 1, [Federal Register revision year], and amended by Amdt. [amendment level and Federal Register citation and publication date of final rule].</p> <p>Formerly 14 CFR 25.853(c) effective November 26, 1984: 14 CFR parts 1 to 59, Revised as of January 1, 1984, and amended by Amdt. 25-59, 49 FR 43188, October 26, 1984.</p>
§ 121.312(c)	Airplane type certificated in accordance with SFAR No. 41; maximum certificated takeoff weight in excess of 12,500 pounds	<p>Compartment interior requirements. 14 CFR 25.853(a) in effect March 6, 1995: 14 CFR parts 1 to 59, Revised as of January 1, 1995, and amended by Amdt. 25-83, 60 FR 6623, February 2, 1995.</p>

Part 121 Section	Applicable Aircraft	Provisions: CFR/FR References
		Formerly 14 CFR 25.853(a), (b-1), (b-2), and (b-3) in effect on September 26, 1978: 14 CFR parts 1 to 59, Revised as of January 1, 1978.
§ 121.314(a)	Transport category airplanes type certificated after January 1, 1958	Class C or D cargo or baggage compartment definition. 14 CFR 25.853(c)(2)(ii) effective [effective date of final rule] (part III of appendix F no longer exists): 14 CFR parts 1 to 59, Revised as of January 1, [Federal Register revision year], and amended by Amdt. [amendment level and Federal Register citation and publication date of final rule]. Formerly 14 CFR 25.857 effective June 16, 1986, 14 CFR parts 1 to 59, Revised January 1, 1997, and amended by Amdt 25-60, 51 FR 18243, May 16, 1986.

(b) For the purposes of compliance with the sections of 14 CFR part 25 referenced in the table in paragraph (a) of this appendix, findings of equivalent level of safety in accordance with § 21.21(b)(1) of this chapter are considered to satisfy the referenced requirement.

PART 125—CERTIFICATION AND OPERATIONS: AIRPLANES HAVING A SEATING CAPACITY OF 20 OR MORE PASSENGERS OR A MAXIMUM PAYLOAD CAPACITY OF 6,000 POUNDS OR MORE; AND RULES GOVERNING PERSONS ON BOARD SUCH AIRCRAFT

19. The authority citation for part 125 continues to read as follows:

Authority: 106(f), 106(g), 40113, 44701-44702, 44705, 44710-44711, 44713, 44716-44717, 44722.

20. Amend § 125.113 by revising paragraphs (c)(1) introductory text and (c)(2) to read as follows:

§ 125.113 Cabin interiors.

* * * * *

(c) * * *

(1) For airplanes manufactured before September 2, 2005, when thermal/acoustic insulation is installed in the fuselage as replacements after September 2, 2005, the insulation must meet the flame propagation requirements of § 25.856 of this chapter, effective September 2, 2003, or as subsequently amended, if it is:

* * * * *

(2) For airplanes manufactured after September 2, 2005, thermal/acoustic insulation materials installed in the fuselage must meet the flame propagation requirements of § 25.856 of this chapter, effective September 2, 2003, or as subsequently amended.

PART 135—OPERATING REQUIREMENTS: COMMUTER AND ON DEMAND OPERATIONS AND RULES GOVERNING PERSONS ON BOARD SUCH AIRCRAFT

21. The authority citation for part 135 continues to read as follows:

Authority: 106(f), 106(g), 40113, 41706, 44701-44702, 44705, 44709, 44711-44713, 44715-44717, 44722, 44730, 45101-45105; Pub. L. 112-95, 126 Stat. 58 (49 U.S.C. 44730).

22. Amend § 135.169 by revising paragraph (d)(1)(ii) to read as follows:

§ 135.169 Additional airworthiness requirements.

* * * * *

(d) * * *

(1) * * *

(ii) Materials that meet the test requirements of part 25, appendix F, part III of this chapter effective on June 16, 1986; or the test requirements of § 25.853(c)(2)(ii) of this chapter effective on [EFFECTIVE DATE OF FINAL RULE]; or as subsequently amended; or

* * * * *

23. Amend § 135.170 by revising paragraphs (b)(2), (c)(1) introductory text, and (c)(2) to read as follows:

§ 135.170 Materials for compartment interiors.

* * * * *

(b) * * *

(2) For airplanes type certificated after January 1, 1958, seat cushions, except those on flight crewmember seats, in any compartment occupied by crew or passengers must comply with the requirements pertaining to fire protection of seat cushions in § 25.853(c) effective November 26, 1984; or in § 25.853(d) effective on [EFFECTIVE DATE OF FINAL RULE]; or as subsequently amended.

(c) * * *

(1) For airplanes manufactured before September 2, 2005, when thermal/acoustic insulation is installed in the fuselage as replacements after September 2, 2005, the insulation must meet the flame propagation requirements of § 25.856 of this chapter, effective September 2, 2003, or as subsequently amended, if it is:

* * * * *

(2) For airplanes manufactured after September 2, 2005, thermal/acoustic insulation materials installed in the fuselage must meet the flame propagation requirements of § 25.856 of this chapter, effective September 2, 2003, or as subsequently amended.

Issued under the authority provided by 49 U.S.C. 106(f), 44701(a), and 44703 in Washington, DC, on June 12, 2019.

Chris Carter,

Acting Executive Director, Aircraft Certification Service.
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