

(e) Payment will be made only to the person or persons specified in the court order. However, if the court order specifies a third-party mailing address for the payment, the TSP will mail to the address specified any portion of the payment that is not transferred to a traditional IRA, Roth IRA, or eligible employer plan.

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## DEPARTMENT OF TRANSPORTATION

### Federal Aviation Administration

#### 14 CFR Part 25

[Docket No.: FAA-2014-1027; Amdt. No. 25-146]

RIN 2120-AK24

#### Transport Airplane Fuel Tank and System Lightning Protection

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

**ACTION:** Final rule.

**SUMMARY:** The FAA is amending certain airworthiness regulations for transport category airplanes regarding lightning protection of fuel systems. This action is relieving in several ways. It removes the requirement for manufacturers to provide triple-redundant fault tolerance in lightning protection. It removes regulatory inconsistency by establishing a single standard for lightning protection of both fuel tank structure and fuel tank systems. It establishes a performance-based standard that the design and installation of fuel systems prevent catastrophic fuel vapor ignition caused by lightning and its effects. This performance-based standard allows applicants to choose how to provide the required level of safety. This action requires airworthiness limitations to preclude the degradation of design features that prevent catastrophic fuel vapor ignition caused by lightning. Its intended effects are to align airworthiness standards with industry's and the FAA's understanding of lightning, and to address issues of inconsistency and impracticality that applicants experienced with previous lightning protection regulations.

**DATES:** Effective November 19, 2018.

**ADDRESSES:** For information on where to obtain copies of rulemaking documents and other information related to this final rule, see "How To Obtain Additional Information" in the

**SUPPLEMENTARY INFORMATION** section of this document.

**FOR FURTHER INFORMATION CONTACT:** For questions concerning this action, contact Stephen Slotte, Airplane and Flight Crew Interface Section, AIR-671, Transport Standards Branch, Policy and Innovation Division, Aircraft Certification Service, Federal Aviation Administration, 2200 South 216th Street, Des Moines, WA 98198; telephone and fax (206) 231-3163; email [steve.slotte@faa.gov](mailto:steve.slotte@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 promulgated 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 and performance of aircraft that the Administrator finds necessary for safety in air commerce. This regulation is within the scope of that authority. It prescribes revised safety standards for the design and operation of transport category airplanes.

##### I. Overview of Final Rule

The FAA is amending the airworthiness regulations in title 14, Code of Federal Regulations (14 CFR) part 25 related to the lightning protection of fuel systems<sup>1</sup> (including fuel tank structure<sup>2</sup> and fuel tank systems<sup>3</sup>). This amendment removes the requirement for prevention of lightning ignition sources from § 25.981(a)(3), "Fuel tank ignition prevention," at amendment 25-102 and modifies § 25.954, "Fuel system lightning protection." The modification to § 25.954 creates a performance-based standard that provides definitions for "critical lightning strike" and "fuel systems;" requires catastrophic fuel vapor ignition due to lightning and its

<sup>1</sup> Fuel system, in the context of this final rule, includes any component within either the fuel tank structure or the fuel tank systems and any airplane structure or system components that penetrate, connect to, or are located within a fuel tank.

<sup>2</sup> Fuel tank structure, in the context of this final rule, includes structural members of the fuel tank such as airplane skins, access panels, joints, ribs, spars, stringers, and associated fasteners, brackets, coatings, and sealant.

<sup>3</sup> Fuel tank systems, or systems, in the context of this final rule, include tubing, components, and wiring that penetrate, connect to, or are located within a fuel tank.

effects to be extremely improbable; and requires applicants to add airworthiness limitations to the airplane's Instructions for Continued Airworthiness (ICA) to prevent catastrophic fuel vapor ignition caused by lightning. These changes align the rule with the current understanding of lightning-related risk, fuel tank flammability exposure, and current airplane design practices. It also revises the title of § 25.981 to "Fuel tank explosion prevention."

This amendment removes lightning from the ignition sources regulated by § 25.981(a)(3). Inclusion of lightning in that section has resulted in applicants showing that compliance was impractical, leading them to seek exemptions to compliance with § 25.981 for fuel tank structure and systems. The FAA has granted several exemptions for fuel tank structure and systems. The FAA agrees, however, with the Large Airplane Fuel System Lightning Protection Aviation Rulemaking Committee (Lightning ARC)<sup>4</sup> that common regulatory treatment of structure- and systems-related lightning protection in the fuel system is appropriate. Applicants have also requested that the FAA develop special conditions to allow the consideration of fuel tank flammability and the probability of lightning strikes when meeting the requirement that a fuel tank explosion caused by lightning be extremely improbable. This amendment removes the necessity for such special conditions by incorporating such considerations into the rule.

To maintain the integrity of lightning protection features of airplanes, this amendment adds a new paragraph (d) to § 25.954 and amends part 25, appendix H, section H25.4(a) to require applicants to establish airworthiness limitations to protect the continued function of the lightning protection features of fuel tank structure and fuel systems.

This rule applies to applications for new type certificates, and applications for amended or supplemental type certificates on significant product-level change projects in which § 25.954, "Fuel system lightning protection," is applicable to the changed area.

##### II. Background

###### A. Statement of the Problem

Section 25.954, adopted in 1967, required protection of the airplane from the effects of lightning, regardless of the likelihood that lightning would strike the airplane. The regulation did not acknowledge that lightning protection

<sup>4</sup> See the "Large Airplane Fuel System Lightning Protection Rulemaking Recommendations" report, May 2011, available in the docket.

features, or other features, could fail or become ineffective. The regulation also did not require evaluation of probabilities of failures affecting lightning protection features, nor did it require maintenance actions to ensure the continued effectiveness of design features that prevent catastrophic fuel vapor ignition.

Compliance with § 25.981(a)(3), at amendment 25–102,<sup>5</sup> required the assumption that lightning would strike the airplane (*i.e.*, that the probability of lightning was one) and that the design provide fail-safe ignition prevention means to preclude ignition sources from being present in fuel tanks when component failures, malfunctions, or lightning strikes occur. This typically resulted in the need for triple-redundant lightning ignition protection features because some structural failures may have long latency periods.<sup>6</sup> The FAA found, however, that for lightning protection, providing triple-redundant features is not always practical. This impracticality has led applicants to apply for exemptions and special conditions to ensure the design and maintenance actions provide for, and maintain, an acceptable level of safety. However, the processing and issuance of these exemptions and special conditions has created an administrative burden on industry and the FAA.

### B. Related Actions

On May 26, 2009, the FAA issued a policy memorandum to standardize the process for granting exemptions and issuing special conditions for fuel tank structure lightning protection. FAA Policy Memorandum ANM–112–08–002, “Policy on Issuance of Special Conditions and Exemptions Related to Lightning Protection of Fuel Tank Structure,” defined alternative methods that could be applied through special conditions or exemptions to some areas of structural designs where compliance with § 25.981(a)(3) was impractical. This policy allowed the applicant’s risk assessment to account for the reduced likelihood of the simultaneous occurrence of a critical lightning strike and a fuel tank being flammable. The policy explained the level of safety intended by § 25.981(a)(3) for fuel tank structure, and provided guidance for alternatives to compliance that still achieve that level of safety.

On June 24, 2014, the FAA superseded that policy memorandum with Policy Statement PS–ANM–25.981–02, “Policy on Issuance of Special Conditions and Exemptions Related to Lightning Protection of Fuel Tank Structure and Systems,” expanding the scope of the policy to include systems. The policy statement provided guidance for approval of special conditions and exemptions for lightning protection features in fuel tank structure and fuel systems with respect to § 25.981(a)(3).

The revisions to § 25.981(a)(3) in this amendment should eliminate the need to issue such special conditions and exemptions. However, some of the information in that policy statement will remain in Advisory Circular (AC) 25.981–1D, “Fuel Tank Ignition Source Prevention Guidelines,”<sup>7</sup> for this rule because the FAA expects that the information will continue to be useful in ensuring the level of safety required by the amended § 25.954 for fuel tank structure and systems.

The final rule will maintain the level of safety established by these policies. It codifies these policies into a performance-based rule that allows the applicant to choose the means of compliance.

### C. Summary of the NPRM

On December 9, 2014, the FAA issued a notice of proposed rulemaking (NPRM) to amend §§ 25.954 and 25.981 and appendix H to part 25. The **Federal Register** published NPRM Notice No. 14–09, Docket No. FAA–2014–1027, on December 18, 2014. In the NPRM, the FAA proposed the following changes:

#### 1. “Fuel System Lightning Protection,” (§ 25.954)

- Consolidate the requirements for the prevention of fuel vapor ignition due to lightning, currently in §§ 25.954 and 25.981, into § 25.954;
- Retain and renumber the existing rule text;
- Add lightning-induced or conducted electrical transients<sup>8</sup> to the lightning effects that applicants must consider;
- Add a new performance-based standard to require that a catastrophic fuel tank explosion be extremely improbable when taking into account the risk of failures, probability of a

critical lightning strike, and fuel tank flammability exposure;

- Add maintenance requirements to maintain the integrity of lightning protection features during the airplane service life; and
- Define critical lightning strike and fuel system.

#### 2. “Fuel Tank Ignition Prevention,” (§ 25.981)

- Remove the requirement to prevent lightning ignition sources and instead refer applicants to § 25.954 for lightning protection requirements;
- Clarify that the applicant must provide critical design control configuration limitations (CDCCLs) to identify critical design features in addition to inspections or other procedures; and
- Change the title to “Fuel tank explosion prevention.”

#### 3. “Instructions for Continued Airworthiness,” Appendix H to Part 25

- Add a new paragraph to make mandatory any inspection and test procedures that are needed to sustain the integrity of the lightning protection design features used to show compliance with § 25.954; and
- Add a new section to require applicants to develop ICA that protect the lightning protection features required by § 25.954.

The FAA proposed these changes based on recommendations from the Lightning ARC. The comment period closed on March 18, 2015.

## III. Discussion of the Final Rule and Public Comments

The FAA received comments from eight (8) manufacturers and one (1) industry group. All of the commenters generally supported the proposed amendments. Some of the comments suggested changes.

In the discussion below, some comments identify paragraph designations of the rules as proposed in the NPRM. In this final rule, the FAA is revising and reorganizing some of those paragraphs, so paragraph references in the comments may be different from their designation in the final rule. This section references each paragraph according to its designation in this final rule, with the NPRM paragraph designation noted in brackets when there has been a change.

### A. “Fuel System Lightning Protection” (§ 25.954)

With some differences from what the FAA proposed in the NPRM, this amendment requires that the design and installation of the airplane fuel system

<sup>5</sup> See 66 FR 23086 (May 7, 2001), “Transport Airplane Fuel Tank System Design Review, Flammability Reduction, and Maintenance and Inspection Requirements.”

<sup>6</sup> In this context, latency period means the time interval between a failure and the discovery of that failure.

<sup>7</sup> AC 25.981–1D is available in the docket and on the internet at [http://www.faa.gov/regulations\\_policies/advisory\\_circulars/](http://www.faa.gov/regulations_policies/advisory_circulars/).

<sup>8</sup> As used in this discussion, a transient is a brief electrical disturbance on wiring and equipment caused by the intense voltage, current, and electromagnetic fields associate with lightning.

prevent catastrophic fuel vapor ignition due to lightning and its effects. This final rule removes “corona and streamering at fuel vent outlets” as a lightning effect that applicants must consider, and adds “lightning-induced or conducted electrical transients” to the non-exclusive list of lightning effects against which the fuel system must be protected. This amendment adds definitions for “critical lightning strike” and “fuel system” to ensure common understanding and consistent application of those terms.

To comply with the revised § 25.954, this amendment requires applicants to show that catastrophic fuel vapor ignition is extremely improbable, taking into account flammability, critical lightning strikes, and failures within the fuel system.

To protect those features of the airplane that prevent catastrophic fuel vapor ignition due to lightning, this amendment adds a requirement that the type design include CDCCLs identifying those features and providing information to protect them. To ensure the continued effectiveness of those features, the rule requires that the type design specify necessary inspections and test procedures, intervals between repetitive inspections and tests, and mandatory replacement times. The rule also requires the applicant to include information regarding CDCCLs and methods for ensuring continued effectiveness of lightning protection features in the Airworthiness Limitations section (ALS) of the ICA.

The following is a discussion of comments the FAA received on the changes to § 25.954 as they were proposed in the NPRM.

#### 1. Definitions

The NPRM proposed adding definitions of “critical lightning strike” and “fuel system” to § 25.954(d). This final rule revises these definitions and moves them to paragraph (a) of the section.

The AE–2 and WG–31 Lightning Committees (SAE Lightning Group) supported the proposed definition of “fuel system.” However, the FAA determined that the inclusion of the word “other” in the definition, “A fuel system includes any component within either the fuel tank structure or the fuel tank systems, and any *other* airplane structure or system components that penetrate, connect to, or are located within a fuel tank,” could be misinterpreted to exclude basic structure, such as wings, in the context of the definition. Therefore, the definition of fuel system in the final rule does not include “other.”

The proposed definition of a “critical lightning strike” was “. . . a lightning strike that attaches to the airplane in a location that affects a failed feature or a structural failure, and the amplitude of the strike is sufficient to create an ignition source when combined with that failure.” The SAE Lightning Group requested changes to this definition for clarity. The commenter requested that the term “failed feature” be changed to “failed protection feature,” but did not provide a rationale. The commenter also stated that it is unnecessary to list structural failures separately. The commenter further stated that the inclusion of “a failed [protection] feature” already includes structural failures, which otherwise could result in an ignition source. The commenter also suggested revising the definition to, “A critical lightning strike is a lightning strike that attaches to the airplane in a location that affects a failed protection feature with characteristics that could create an ignition source when combined with that failure.”

The FAA partially agrees with the SAE Lightning Group’s requests. The FAA modified the definition of critical lightning strike by deleting “the amplitude of the strike is sufficient,” but did not replace that text with “characteristics that could,” as the commenter recommended. The definition is clear without either of those phrases. The FAA also did not replace “failed feature” with “failed protection feature,” or delete the phrase “structural failure.” To address the comments, we have revised the definition by removing the phrase “failed feature” and stating instead that, “A critical lightning strike is a lightning strike that attaches to the airplane in a location that, when combined with the failure of any design feature or structure, could create an ignition source.”

In this revised definition, a “design feature” means any feature specifically designed for lightning protection or any other design feature whose failure, when combined with a lightning strike, could cause ignition. An example of a design feature that is specifically designed for lightning protection is a metal foil layer installed between the laminate layers of a composite wing. An example of a design feature that is not specifically designed for lightning protection but whose failure, when combined with a lightning strike, could cause ignition is a swaged fitting on a hydraulic tube located within the fuel tank. Structural failures that could create an ignition source in the event of a lightning strike must also be addressed and, therefore, the final definition

includes “any design feature or structure.”

Related to the definition of critical lightning strike, the NPRM stated that a critical lightning strike occurs “on the order of once every 100,000 hours of airplane operation.” The SAE Lightning Group commented that the location of the lightning’s attachment to the airplane, whether the strike’s amplitude is sufficient to create an ignition source, and the effect of a failed feature or structural failure are all design-dependent. The SAE Lightning Group also commented that compliance with § 25.954 would require use of a strike rate of 1 in 100,000 hours. The commenter suggested that the FAA should allow applicants to identify how often a critical lightning strike might occur relative to their designs.

The intent of the statement in the NPRM that a critical lightning strike occurs once per 100,000 hours was to provide a general understanding of their average rate of occurrence. It was not intended as a rate to be used in demonstrating compliance. The FAA agrees with the SAE Lightning Group that the actual rate of a critical strike would be based on an applicant’s analysis of the specific airplane design features, which include additional factors such as location of the strike, characteristics of the lightning strike, failure of design features and structure, and specific ignition source thresholds for each feature failure and failure mode.

Related to this same discussion in the NPRM, Parker Aerospace (“Parker”) requested that the FAA add a paragraph to § 25.954 that describes all of the conditions and guidance regarding probabilities that the applicant must consider, such as flammability exposure and failure latency of inerting systems. The FAA disagrees with Parker’s request. Rather than make such conditions and guidance on probabilities mandatory via a new paragraph in § 25.954, such guidance is included in AC 25.954–1, “Transport Airplane Fuel System Lightning Protection.”<sup>9</sup> The AC discusses the probability for different airplane composite tank structures and threat levels.

#### 2. Relationship of § 25.954 to §§ 25.901 and 25.1309

The SAE Lightning Group suggested that the FAA clearly state that the revised § 25.954 takes precedence over the general requirements of §§ 25.901,

<sup>9</sup> AC 25.954–1 is available in the docket and on the internet at [http://www.faa.gov/regulations\\_policies/advisory\\_circulars/](http://www.faa.gov/regulations_policies/advisory_circulars/).

“Installation” (“Subpart E—Powerplant”), and 25.1309, “Equipment, systems, and installations.” The FAA disagrees. Section 25.954 does not supersede the requirements of § 25.901 or § 25.1309. However, compliance with § 25.954 may assist applicants in showing compliance with other regulations.

### 3. Lightning Effects

The NPRM proposed adding “lightning-induced or conducted electrical transients” to the lightning effects in § 25.954(b) [paragraph (a) in the NPRM] that applicants must ensure will not cause ignition of fuel vapor within the fuel system. The SAE Lightning Group recommended that, rather than adding to the existing list of lightning threats in the rule, the FAA delete the list of lightning effects. Instead, the SAE Lightning Group recommended that the rule include a more general and inclusive reference to lightning that requires that the airplane be protected against catastrophic effects from lightning. The SAE Lightning Group suggested that the list may not be complete and may be inconsistent with lightning environments defined in the industry documents accepted by the FAA in AC 20–155A, “Industry Documents to Support Aircraft Lightning Protection Certification.” In contrast, Parker supported keeping the text as proposed, including “lightning-induced or conducted electrical transients.”

The FAA disagrees with the SAE Lightning Group’s suggestion to include only a general lightning requirement. Relying on guidance material to detail the lightning effects that applicants must consider could result in some applicants not addressing all effects. However, the FAA recognizes that the list of effects, as proposed, could be misinterpreted as an exhaustive list. Therefore, the FAA added “including” to the text that introduces the list to clarify that the list is not exhaustive. The FAA agrees to limit, in § 25.954(b), the type of fuel vapor ignition that must be prevented to “catastrophic” events. This change will make the requirement consistent with Policy Statement PS–ANM–25.981–02, which states that “the fuel tank structure and systems must be designed and installed to prevent catastrophic fuel vapor ignition due to lightning.” This change also makes § 25.954(b) consistent with § 25.581, which requires that the airplane be protected against “catastrophic” effects from lightning. Thus, § 25.954(b) now states, “The design and installation of a fuel system must prevent catastrophic

fuel vapor ignition due to lightning and its effects, including . . . .”

The SAE Lightning Group recommended the removal of “corona and streamering at fuel vent outlets” from the list of lightning effects because that term is inconsistent with the terminology in the industry guidance material recommended by AC 20–155A. The FAA agrees and has removed this term from the final rule.

### 4. Fault-Tolerant Design

Regarding § 25.954(c) [paragraph (b) in the NPRM], the SAE Lightning Group requested that the FAA require that catastrophic fuel vapor ignition due to lightning be prevented by demonstrating that the fuel system ignition source protection design is fault tolerant, or for designs that are not fault tolerant, by showing catastrophic fuel vapor ignition to be extremely improbable, taking into account flammability, critical lightning strikes, and failures in the fuel system. The SAE Lightning Group argued that the proposed broader requirement to show that catastrophic ignition is extremely improbable, without requiring a fault tolerant design, would be costly and would negate the savings to industry stated in the regulatory evaluation. In a related comment, Bombardier S.A. (Bombardier) requested that “fault tolerant” be defined to clarify if it is equivalent to single fault tolerance and the type of compliance that the FAA would expect, numerical analysis or qualitative. Although the term was not used in the proposed rule (and is not in the final rule), Bombardier suggested more clarity was needed in the rule and supporting guidance.

The FAA agrees that fuel systems designed with reliable fault-tolerant ignition source protection features should comply with the requirement that catastrophic fuel vapor ignition be extremely improbable. As used in this context, a fault-tolerant fuel system design is a design that precludes ignition sources in the fuel system even when a fault is present; “reliable” means the ability to maintain the effectiveness of the protection features over the service life of the individual airplane.

However, the FAA disagrees that fault tolerance should be required because fault tolerance is only one possible means of compliance with the requirement that catastrophic fuel vapor ignition be extremely improbable. The use of a full-time flammability control system (e.g., fuel system inerting) exceeding the current part 25 flammability reduction means (FRM) performance standard could be another means of compliance. If the FAA

limited the requirement to fault tolerance as requested by the SAE Lightning Group, such a design approach, or others as technology progresses, would not be allowed.

Regardless of the design approach chosen by the applicant to prevent lightning-induced catastrophic fuel vapor ignition, a safety analysis will be necessary to demonstrate extreme improbability. The complexity of the analysis can range from a relatively simple assessment to establish any maintenance requirements for reliable fault-tolerant ignition protection features, to a more in-depth analysis if non-fault-tolerant design features are used. For reliable fault-tolerant features, this analysis would be substantially less costly than traditional methods for showing that catastrophic failures are extremely improbable. The supporting AC 25.954–1 provides guidance on methods for both fault-tolerant and FRM compliance approaches, including the necessary safety assessment, which could be numerical, qualitative, or a combination of the two.

The FAA disagrees with Bombardier’s request to define fault-tolerant in § 25.954. Since a fault-tolerant design is not a requirement for compliance with this rule, there is no need to provide a regulatory definition. However, the supporting AC 25.954–1 includes the definition for fault-tolerant design noted earlier in this section (4. Fault-Tolerant Design), “A fault-tolerant fuel system design is a design that precludes ignition sources in the fuel system even when a fault is present.”

Therefore, this amendment retains the requirement in § 25.954(c) that catastrophic fuel vapor ignition be extremely improbable, and clarifies its relationship with paragraph (b). The revised § 25.954(c) states, “To comply with paragraph (b) of this section, catastrophic fuel vapor ignition must be extremely improbable, taking into account flammability, critical lightning strikes, and failures within the fuel system.”

The SAE Lightning Group also commented that the FAA should revise the regulatory evaluation if the FAA does not adopt the SAE Lightning Group’s recommendation to replace the requirement of extreme improbability with fault tolerance. The commenter argued that the requirement to show that fuel tank ignition is extremely improbable would be costly and negate the savings to industry shown in the regulatory evaluation. The SAE Lightning Group did not submit any supporting financial data.

The FAA does not agree that the requirement to show that fuel tank

ignition is extremely improbable would be costly and negate the savings to industry. In general, an applicant that can show its design is reliably fault-tolerant will not need to conduct an extensive safety analysis. The requirement to develop airworthiness limitations for critical lightning protection features will result in the need for the applicant to assess the reliability of the features and provide appropriate maintenance tasks to achieve an acceptable level of reliability.

In addition, this rule allows both fault-tolerant and non-fault-tolerant design approaches. Under the rule, the fuel system must prevent catastrophic fuel vapor ignition due to lightning. To comply with this requirement, catastrophic fuel vapor ignition must be extremely improbable. If an applicant's design achieves this requirement through the use of fault-tolerant design, the safety analysis (§ 25.1309) to support the design will not have to be as extensive as one that would be necessary to support a non-fault-tolerant design. As a result, the rule allows industry the flexibility to select the means of compliance based on design approach, safety analysis, and costs. Therefore, the FAA determined that the regulatory evaluation did not need to be revised as a result of this comment.

#### 5. Flammability Reduction Means (FRM) as a Means of Compliance

The SAE Lightning Group, Bombardier, and Parker all commented on the discussion of fuel tank flammability reduction in the NPRM and asked for clarification of how flammability reduction could be used as a means of compliance with § 25.954.

Boeing stated that the majority of the NPRM discussion of fuel tank FRM was unnecessary because applicants could infer that the FAA would relax the requirement for providing fault tolerance if the FAA allowed FRM as a sole means of compliance. Boeing did not agree that the FAA should accept controlling fuel tank flammability as the primary means for preventing a fuel tank explosion without providing fault-tolerant lightning protection features.

As discussed in the previous section (4. Fault-Tolerant Design), the FAA does not agree that the lightning protection requirement in § 25.954 should dictate the use of fault-tolerant ignition protection features in the design without allowing the use of flammability control means. As explained in the NPRM, the intent of the amendment to § 25.954 is to require the design to take into account the likelihood of a critical lightning strike,

the fuel tank being flammable, and the creation of an ignition source due to the failure of fuel system or structural lightning protection features. If designers develop a full-time fuel tank flammability control system that prevents the fuel tanks from being flammable during all foreseeable operating conditions and all phases of airplane operation (including descent), resulting in the probability of a fuel tank explosion being extremely improbable, this could achieve the level of safety that § 25.954 requires, and could be used as a means of compliance without the need for fault-tolerant lightning protection features. While fuel tank flammability control system technology has not evolved to a state where flammability control can replace the need for fault-tolerant ignition prevention, the FAA's goal is to develop rules that are performance-based, and in this case, to allow designers to comply via the use of flammability control when the technology is adequately developed. Allowing the use of fuel tank FRM for demonstrating compliance with the rule could offer designers the opportunity to reduce the number of fault-tolerant features and mandatory maintenance actions.

#### 6. CDCCLs

Section 25.954(d) [paragraph (c) in the NPRM] requires that the type design include CDCCLs identifying those design features that prevent catastrophic fuel vapor ignition caused by lightning and providing information to protect them. To ensure the continued effectiveness of those features, paragraph (d) also requires that the type design include inspections and test procedures, intervals between repetitive inspections and tests, and mandatory replacement times. This paragraph also requires applicants to place all this information in the ALS of the ICA.

The SAE Lightning Group proposed that CDCCLs be included as cautions<sup>10</sup> in the airplane maintenance manual, not as airworthiness limitations in the ALS of the ICA. The SAE Lightning Group suggested that, as proposed, the requirement would create a burden on the airlines because the ALS documents are not used by the airline mechanics, and therefore the CDCCL information must be duplicated and links created for the information in both the ALS documents and the maintenance documents used by the mechanics. The

<sup>10</sup> Cautions in an airplane maintenance manual call attention to methods and procedures that must be followed to avoid damage to equipment (ATA iSpec 2200, *Information Standards for Aviation Maintenance*, published by Airlines for America, 2014).

commenter stated that if the FAA does not agree with this approach, then only critical information necessary to demonstrate compliance, along with CDCCLs, should be included as airworthiness limitations, and proposed that the regulatory text be amended to reflect this request. The SAE Lightning Group did not define what it considered critical information.

The FAA disagrees with the SAE Lightning Group's request to move the CDCCLs from the ALS of the ICA to the Cautions section of the maintenance manual. CDCCLs provide information that is essential for protecting the design features that are critical for preventing fuel tank explosions. The Caution section of the maintenance manual is not mandatory for U.S. operators, and therefore CDCCLs need to be included in the ALS of the ICA, which is mandatory.

The SAE Lightning Group commented that, since the Lightning ARC study and report in 2011, the use of Air Transport Association (ATA) Maintenance Steering Group (MSG)-3<sup>11</sup> processes has not been effective in establishing maintenance requirements for lightning protection features and does not take into consideration the many factors that are critical for certification. This can create conflicting or duplicate fuel tank entry requirements. To eliminate this potential duplication, the SAE Lightning Group stated that industry now recommends that maintenance practices for both fault-tolerant and non-fault-tolerant protection features be established via the type certification process only, and that the ATA MSG-3 process should not be used for this purpose.

Airbus and Airlines for America disagreed with the request to establish maintenance practices for both fault-tolerant and non-fault-tolerant protection features via the type certification process. Both commenters proposed that the FAA require airworthiness limitations and CDCCLs for only non-fault-tolerant design features. Both commenters stated that an airworthiness limitation requirement for fault-tolerant design features could be a disincentive to develop fault-tolerant designs and may increase the burden on operators unnecessarily. As an alternative, they proposed reliance on the current ATA MSG-3 process for establishing maintenance programs for

<sup>11</sup> ATA MSG-3 is a maintenance steering group composed of regulatory authorities, operators, and manufacturers that, through a process, develop documents that present a methodology for developing scheduled maintenance tasks and intervals for aircraft structure, systems, and components.

fault-tolerant design features. Airbus also suggested that operational rules and guidance could be established to prevent tasks identified through the ATA MSG-3 process from being deleted in service.

The FAA agrees with the SAE Lightning Group that all maintenance practices for both fault-tolerant and non-fault-tolerant protection features be established via the type certification process and not through the ATA MSG-3 process. Using the certification process will ensure that applicants develop necessary maintenance actions to maintain the integrity of lightning ignition source protection features. As all maintenance actions necessary to ensure the integrity of lightning ignition source protection features will be addressed by compliance with section H25.4(a)(5), the ICA requirement in the proposed section H25.X is not necessary and has been deleted from the final rule. This is discussed further in the discussion regarding appendix H.

The FAA disagrees with Airbus' and Airlines for America's proposal to rely on the ATA MSG-3 process for development of maintenance actions for fault-tolerant design features. U.S. operators are not required to adopt the ATA MSG-3 developed maintenance program, but they are required to include all airworthiness limitations in their maintenance program.<sup>12</sup> Therefore, airworthiness limitations are needed to ensure an operator's maintenance program includes all tasks determined by the safety analysis, performed as part of the system's certification activity, to be critical. The safety analysis may show that some fault-tolerant features are life-limited or require periodic inspection, so mandatory maintenance tasks established through engineering review and approval would be needed. Therefore, the FAA did not change this rule as a result of these comments.

The SAE Lightning Group also stated that the reference to § 25.1729 in § 25.954(d) is not within the scope of this rule and requested that it be removed. The FAA agrees and removed that reference from the final rule.

Embraer suggested that § 25.954(d) include the same requirement that is in § 25.981(d). Section 25.981(d) requires the type design to include visible means for identifying critical features in areas where foreseeable maintenance actions, repairs, or alterations may compromise the CDCCLs. Embraer stated that this would harmonize both requirements.

The FAA does not agree. Because of the large number and multiple types of bonding features used for fuel tank and

system lightning protection, it is not practical to require installation of visible means of identification for all lightning-related CDCCLs. However, all critical lightning protection features identified as CDCCLs must be included in the ALS of the ICA. Although the FAA made minor editorial changes<sup>13</sup> to the final § 25.954(d), the requirement that the type design include CDCCLs is adopted as proposed.

#### B. "Fuel Tank Explosion Protection" (§ 25.981)

Section 25.981 requires that the airplane design protect the fuel tank and fuel tank system against ignition from all sources. This amendment adds an exception to § 25.981(a)(3) to remove lightning as an ignition source from the scope of this section and refers applicants to § 25.954 for lightning protection requirements.

Paragraph (d) of § 25.981 requires applicants to establish CDCCLs, inspections, or other procedures to ensure fuel tank safety. This amendment revises paragraph (d) to clarify that applicants must provide CDCCLs to identify critical design features, in addition to inspections or other procedures. The FAA received the following comments on the proposed changes to this section.

##### 1. Consistency of Language

Boeing suggested that the FAA expand the applicability of § 25.981(d) to include the fuel tank system, in addition to the fuel tank, to be consistent with § 25.981(a). Paragraph (a) of § 25.981 requires ignition source prevention in the "fuel tank or fuel tank system."

The FAA agrees and revised the final rule to add, ". . . or fuel tank system according to paragraph (a) of this section. . . ." This addition makes it consistent with § 25.981(a).

Boeing proposed that § 25.981(d) refer to paragraph (b) of that section in addition to the references to paragraphs (a) and (c) of that section because mandatory maintenance required by paragraph (d) should also apply to flammability reduction means.

The FAA agrees, and this amendment includes a reference to paragraph (b) in § 25.981(d).

<sup>13</sup> The FAA deleted "on how" in the first sentence of the paragraph, ". . . (CDCCLs) identifying those features and providing information on how to protect them," and added "used in demonstrating compliance to paragraph (b) of this section" in the second sentence, ". . . and mandatory replacement times for those design features used in demonstrating compliance to paragraph (b) of this section."

##### 2. CDCCL Visible Means

Boeing requested that the FAA revise § 25.981(d) to delete the requirement for placement of visible means, limit that placement to areas where the means would be "practical and meaningful," or provide more clear guidance. Boeing stated that, as proposed, the regulation provides no practical way to fully comply with the requirement to provide visible means of identifying CDCCL. Boeing argued that, "While it may be easy to pick the color of external fuel quantity wiring, much of the fuel tank design for ignition prevention is basic to airplane design, such as bonding, grounding, sealing, etc. There is no practical way to color code or otherwise identify these design features."

The FAA partially agrees. The intent is not to require markings in all locations—only in those locations where foreseeable errors due to maintenance actions, repairs, or alterations may compromise critical features. This is not a new requirement with this amendment. However, this amendment deletes the example of visible means (color coding of wire to identify separation limitation), and it removes the requirement of identifying visible means as CDCCLs, both of which had been added at amendment 25-125. AC 25.981-1D provides additional guidance.

#### C. "Instructions for Continued Airworthiness" (Appendix H to Part 25)

With some differences from what the FAA proposed in the NPRM, this amendment adds a new paragraph, (a)(5), to section H25.4 of appendix H to part 25. This paragraph requires any mandatory replacement times, inspection intervals, related inspection and test procedures, and CDCCLs for lightning protection features approved under § 25.954 to be included in the ALS of the ICA.

The SAE Lightning Group proposed revisions to the airworthiness limitation requirements of section H25.4(a)(5) by adding the phrases "critical design configuration control limitations" and "fault tolerant and non-fault tolerant." The commenter stated that the revisions would align this paragraph with the SAE Lightning Group's requested changes to § 25.954 regarding fault-tolerant and non-fault tolerant designs. The commenter also requested deletion of the proposed section H25.X, stating that the MSG-3 process has been shown to be ineffective for maintenance inspections and procedures that are critical to fuel tank systems lightning protection.

<sup>12</sup> Section H25.4(a) and 14 CFR 91.403(c).

Although Airbus was a participant in the SAE Lightning Group, it disagreed with the above comments on section H25.4(a)(5) because it makes reference to the ALS as being the only means to develop the ICA for both fault-tolerant and non-fault tolerant lightning protection features. Airbus suggested instead that the FAA limit the applicability of section H25.4(a)(5) to non-fault-tolerant lightning protection features rather than to all lightning protection features. Airbus also asked that the FAA delete the reference to sampling programs in section H25.X. Airbus stated that sampling programs are typically managed by the type certificate applicant, not the operator of the airplane that uses the ICA to develop their maintenance programs.

The FAA partially agrees with the SAE Lightning Group's proposed changes. The FAA does not agree to the proposed changes to section H25.4(a)(5) as the FAA did not adopt the SAE Lightning Group's requested changes to § 25.954, with the exception of deleting reference to § 25.1729. However, the FAA did add the term "critical design configuration control limitations" to the final section H25.4(a)(5). Thus, section H25.4(a)(5) now states, "Each mandatory replacement time, inspection interval, and related inspection and test procedure, and each critical design configuration control limitation for each lightning protection feature approved under § 25.954."

The FAA agrees with the request to delete the proposed new section H25.X because all necessary maintenance actions for ensuring the integrity of lightning ignition source protection features will be addressed by compliance with section H25.4(a)(5). Therefore, the ICA requirement in the proposed section H25.X is not necessary, so that section is not included in the final rule. This also addresses Airbus's request to delete the reference to sampling programs in section H25.X. The FAA disagrees with Airbus's request to add the phrase "non-fault-tolerant" to section H25.4(a)(5) because all necessary maintenance actions, both fault-tolerant and non-fault-tolerant, must be included in the ALS as required by section H25.4(a)(5).

#### D. Miscellaneous Comments

##### 1. Hazards of Electrostatic Charge

An individual suggested that the FAA revise §§ 25.954 and 25.981 to include a requirement for fuel system design features to mitigate the hazards of electrostatic charge. The commenter stated that these design features would also have a role in lightning protection.

Section 25.899 specifically addresses electrostatic charge, and § 25.981 addresses all ignition sources, which would include electrostatic charge. Lightning is the only exception, and it is now addressed by § 25.954. Adding a specific requirement for electrostatic charge to §§ 25.954 and 25.981 would be redundant and may cause confusion. Therefore, the FAA did not revise the rules because of this comment.

##### 2. Regulatory Evaluation

Boeing requested that the FAA explain the assumption made in paragraph IV.A.3 of the NPRM preamble, "Regulatory Notices and Analyses, Regulatory Evaluation, Assumptions and Data Sources," that computational weights of composite wing airplanes would change from current approximate 15%–25% level linearly increasing to 50% level for a ten-year production cycle.

The FAA clarified the information with the major manufacturer that had provided the data during the development of the NPRM regulatory evaluation. The assumption is more correctly stated that the weighted production rate of composite wing airplanes is estimated at 15%–25% of total production at the beginning of the 10-year production cycle, increasing linearly to 50% at the end of the cycle.

#### 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 (Pub. L. 96–354) requires agencies to analyze the economic impact of regulatory changes on small entities. Third, the Trade Agreements Act (Pub. L. 96–39) prohibits agencies from setting standards that create unnecessary obstacles to the foreign commerce of the United States. In developing U.S. standards, this Trade 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 (Pub. L. 104–4) requires agencies to prepare a written assessment of the costs, benefits, and other effects of 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 final 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 final 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) will not have a significant economic impact on a substantial number of small entities; (5) will not create unnecessary obstacles to the foreign commerce of the United States; and (6) will 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. Total Benefits and Costs of This Rule

This final rule will be relieving for both government and industries with the estimated net benefits. The FAA assesses cost savings based on resources saved for reducing regulatory burden on both industry and the FAA. This rule results in cost savings by reducing the number of exemptions and special conditions.

Over a 10-year period, the average total present value savings to manufacturers and the FAA are about \$29.03 million at a 7% discount rate with annualized savings of about \$4.13 million. The lower and the higher estimates of the total present value savings are \$16.17 million and \$41.93 million at a 7% discount rate, with annualized savings of \$2.30 million and \$5.97 million, respectively. The final rule will maintain achieved safety levels related to fuel tank structure and system lightning protection commensurate with the current requirements.

*Parties Potentially Affected by this Rulemaking will be:*

- Part 25 airplane manufacturers.
- Operators of part 25 airplanes.
- The Federal Aviation Administration.

*Assumptions and Data Sources.*

- Data related to industry savings mainly come from airplane manufacturers.
- Data related to requests for exemptions and special conditions come from FAA internal data sources and the judgments of agency subject matter experts.

- The FAA would process 4 special conditions and 7 exemptions in the next 10 years in the absence of this rule.<sup>14</sup>

- Domestic airplane manufacturers would petition for two special conditions and three exemptions before reaching their cost-benefit steady-state.<sup>15</sup>

- While foreign manufacturers may benefit also from this final rule, cost savings directly attributable to foreign entities are not included in this analysis.

- For the final rule, the FAA estimates cost savings from avoided petitions for exemption and special conditions occur at the beginning of a 10-year production cycle.

- Projected impacts on manufacturers and the government are for a 10-year period associated with one production cycle.

- All monetary values are expressed in 2016 dollars.

#### B. Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 (Pub. L. 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 will have a significant economic impact on a substantial number of small entities. If the agency determines that it will, the agency must prepare a regulatory flexibility analysis as described in the RFA.

However, if an agency determines that a rule is not expected to have a significant economic impact on a substantial number of small entities, section 605(b) of the RFA provides that the head of the agency may so certify and a regulatory flexibility analysis is not required. The certification must include a statement providing the factual basis for this determination, and the reasoning should be clear.

This final rule amends certain airworthiness regulations that were not

always practical for transport category airplanes regarding lightning protection of fuel tanks and systems. This final rule provides burden relief and savings to airplane manufacturers, who are large entities. Therefore, as provided in section 605(b), the head of the FAA certifies that this final rule will not have a significant economic impact on a substantial number of small entities and also certifies that a regulatory flexibility analysis is not required. The FAA solicited comments in the NPRM and did not receive comments with regard to this certification. Therefore, the FAA Administrator certifies that this rule does not have a significant economic impact on a substantial number of small entities.

#### C. International Trade Impact Assessment

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

#### 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 million in lieu of \$100 million. This final 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 is no new requirement for information collection associated with this final 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 regulations.

#### G. Environmental Analysis

FAA Order 1050.1F 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 final rule under the principles and criteria of Executive Order 13132, Federalism. The agency determined that this action will 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, does not have Federalism implications.

##### B. Executive Order 13211, Regulations That Significantly Affect Energy Supply, Distribution, or Use

The FAA analyzed this final 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 is not a “significant energy action” under the executive order and it is not likely to have a significant adverse effect on the supply, distribution, or use of energy.

<sup>14</sup> FAA internal data source and the judgment of agency subject matter experts.

<sup>15</sup> See footnote 14.

*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*

This final rule is considered an E.O. 13771 deregulatory action. Details on the estimated cost savings of this rule can be found in the rule's economic analysis.

**VI. How To Obtain Additional Information**

*A. Rulemaking Documents*

An electronic copy of a rulemaking document 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/](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 (identified by notice, amendment, or docket number of this rulemaking) to the Federal Aviation Administration, Office of Rulemaking, ARM-1, 800 Independence Avenue SW, Washington, DC 20591, or by calling (202) 267-9680.

*B. Comments Submitted to the Docket*

Comments received may be viewed by going to <http://www.regulations.gov> and following the online instructions to search the docket number for this action. Anyone is able to search the electronic form of all comments received into any of the FAA's dockets by the name of the individual submitting the comment (or signing the comment, if submitted on behalf of an association, business, labor union, etc.).

*C. Small Business Regulatory Enforcement Fairness Act*

The Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996 requires FAA to comply with small entity requests for information or

advice about compliance with statutes and regulations within its jurisdiction. A small entity with questions regarding this document, may contact its local FAA official, or the person listed under the **FOR FURTHER INFORMATION CONTACT** heading at the beginning of the preamble. To find out more about SBREFA on the internet, visit [http://www.faa.gov/regulations\\_policies/rulemaking/sbre\\_act/](http://www.faa.gov/regulations_policies/rulemaking/sbre_act/).

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

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

**The Amendment**

In consideration of the foregoing, the Federal Aviation Administration amends chapter I of title 14, Code of Federal Regulations as follows:

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

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

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

- 2. Revise § 25.954 to read as follows:

**§ 25.954 Fuel system lightning protection.**

(a) For purposes of this section—  
 (1) A critical lightning strike is a lightning strike that attaches to the airplane in a location that, when combined with the failure of any design feature or structure, could create an ignition source.

(2) A fuel system includes any component within either the fuel tank structure or the fuel tank systems, and any airplane structure or system components that penetrate, connect to, or are located within a fuel tank.

(b) The design and installation of a fuel system must prevent catastrophic fuel vapor ignition due to lightning and its effects, including:

(1) Direct lightning strikes to areas having a high probability of stroke attachment;

(2) Swept lightning strokes to areas where swept strokes are highly probable; and

(3) Lightning-induced or conducted electrical transients.

(c) To comply with paragraph (b) of this section, catastrophic fuel vapor ignition must be extremely improbable, taking into account flammability, critical lightning strikes, and failures within the fuel system.

(d) To protect design features that prevent catastrophic fuel vapor ignition caused by lightning, the type design must include critical design configuration control limitations

(CDCCLs) identifying those features and providing information to protect them. To ensure the continued effectiveness of those design features, the type design must also include inspection and test procedures, intervals between repetitive inspections and tests, and mandatory replacement times for those design features used in demonstrating compliance to paragraph (b) of this section. The applicant must include the information required by this paragraph in the Airworthiness Limitations section of the Instructions for Continued Airworthiness required by § 25.1529.

- 3. Amend § 25.981 by revising the section heading and paragraphs (a)(3) and (d) to read as follows:

**§ 25.981 Fuel tank explosion prevention.**

(a) \* \* \*

(3) Except for ignition sources due to lightning addressed by § 25.954, demonstrating that an ignition source could not result from each single failure, from each single failure in combination with each latent failure condition not shown to be extremely remote, and from all combinations of failures not shown to be extremely improbable, taking into account the effects of manufacturing variability, aging, wear, corrosion, and likely damage.

\* \* \* \* \*

(d) To protect design features that prevent catastrophic ignition sources within the fuel tank or fuel tank system according to paragraph (a) of this section, and to prevent increasing the flammability exposure of the tanks above that permitted in paragraph (b) of this section, the type design must include critical design configuration control limitations (CDCCLs) identifying those features and providing instructions on how to protect them. To ensure the continued effectiveness of those features, and prevent degradation of the performance and reliability of any means provided according to paragraphs (a), (b), or (c) of this section, the type design must also include necessary inspection and test procedures, intervals between repetitive inspections and tests, and mandatory replacement times for those features. The applicant must include information required by this paragraph in the Airworthiness Limitations section of the Instructions for Continued Airworthiness required by § 25.1529. The type design must also include visible means of identifying critical features of the design in areas of the airplane where foreseeable maintenance actions, repairs, or alterations may compromise the CDCCLs.

■ 4. In appendix H to part 25, section H25.4, add new paragraph (a)(5) to read as follows:

**Appendix H to Part 25—Instructions for Continued Airworthiness**

\* \* \* \* \*

H25.4 Airworthiness Limitations section.

(a) \* \* \*

(5) Each mandatory replacement time, inspection interval, and related inspection and test procedure, and each critical design configuration control limitation for each lightning protection feature approved under § 25.954.

\* \* \* \* \*

Issued under authority provided by 49 U.S.C. 106(f), 44701(a), and 44703 in Washington, DC, on September 6, 2018.

**Carl Burleson,**

*Acting Deputy Administrator.*

[FR Doc. 2018–20174 Filed 9–19–18; 8:45 am]

**BILLING CODE 4910–13–P**

**DEPARTMENT OF HEALTH AND HUMAN SERVICES**

**Food and Drug Administration**

**21 CFR Part 172**

[Docket No. FDA–2017–F–3717]

**Food Additives Permitted for Direct Addition to Food for Human Consumption; Vitamin D<sub>3</sub>**

**AGENCY:** Food and Drug Administration, HHS.

**ACTION:** Final rule.

**SUMMARY:** The Food and Drug Administration (FDA or we) is amending the food additive regulation for vitamin D<sub>3</sub> to replace the current Reference Daily Intake (RDI) percentage values of calcium in 100 percent fruit juices and fruit juice drinks with absolute values and to update the reference for vitamin D<sub>3</sub> specifications. We are taking this action in response to a food additive petition filed by the Juice Products Association.

**DATES:** This rule is effective September 20, 2018. Submit either electronic or written objections and requests for a hearing on the final rule by October 22, 2018. The Director of the Federal Register approves the incorporation by reference of certain publications listed in the rule as of September 20, 2018. See the **ADDRESSES** section and the **OBJECTIONS** section IX of this document for further information on filing objections.

**ADDRESSES:** You may submit objections and requests for a hearing as follows. Please note that late, untimely filed

objections will not be considered. Electronic objections must be submitted on or before October 22, 2018. The <https://www.regulations.gov> electronic filing system will accept objections until midnight Eastern Time at the end of October 22, 2018. Objections received by mail/hand delivery/courier (for written/paper submissions) will be considered timely if they are postmarked or the delivery service acceptance receipt is on or before that date.

**Electronic Submissions**

Submit electronic objections in the following way:

- **Federal eRulemaking Portal:** <https://www.regulations.gov>. Follow the instructions for submitting comments. Objections submitted electronically, including attachments, to <https://www.regulations.gov> will be posted to the docket unchanged. Because your objection will be made public, you are solely responsible for ensuring that your objection does not include any confidential information that you or a third party may not wish to be posted, such as medical information, your or anyone else's Social Security number, or confidential business information, such as a manufacturing process. Please note that if you include your name, contact information, or other information that identifies you in the body of your objection, that information will be posted on <https://www.regulations.gov>.

- If you want to submit an objection with confidential information that you do not wish to be made available to the public, submit the objection as a written/paper submission and in the manner detailed (see “Written/Paper Submissions” and “Instructions”).

**Written/Paper Submissions**

Submit written/paper submissions as follows:

- **Mail/Hand Delivery/Courier (for written/paper submissions):** Dockets Management Staff (HFA–305), Food and Drug Administration, 5630 Fishers Lane, Rm. 1061, Rockville, MD 20852.

- For written/paper objections submitted to the Dockets Management Staff, FDA will post your objection, as well as any attachments, except for information submitted, marked and identified, as confidential, if submitted as detailed in “Instructions.”

**Instructions:** All submissions received must include the Docket No. FDA–2017–F–3717 for “Food Additives Permitted for Direct Addition to Food for Human Consumption; Vitamin D<sub>3</sub> Final Rule.” Received objections, those filed in a timely manner (see **ADDRESSES**), will be placed in the docket

and, except for those submitted as “Confidential Submissions,” publicly viewable at <https://www.regulations.gov> or at the Dockets Management Staff between 9 a.m. and 4 p.m., Monday through Friday.

- **Confidential Submissions—**To submit an objection with confidential information that you do not wish to be made publicly available, submit your objections only as a written/paper submission. You should submit two copies total. One copy will include the information you claim to be confidential with a heading or cover note that states “THIS DOCUMENT CONTAINS CONFIDENTIAL INFORMATION.” We will review this copy, including the claimed confidential information, in our consideration of comments. The second copy, which will have the claimed confidential information redacted/blacked out, will be available for public viewing and posted on <https://www.regulations.gov>. Submit both copies to the Dockets Management Staff. If you do not wish your name and contact information to be made publicly available, you can provide this information on the cover sheet and not in the body of your comments and you must identify this information as “confidential.” Any information marked as “confidential” will not be disclosed except in accordance with 21 CFR 10.20 and other applicable disclosure law. For more information about FDA’s posting of comments to public dockets, see 80 FR 56469, September 18, 2015, or access the information at: <https://www.gpo.gov/fdsys/pkg/FR-2015-09-18/pdf/2015-23389.pdf>.

**Docket:** For access to the docket to read background documents or the electronic and written/paper comments received, go to <https://www.regulations.gov> and insert the docket number, found in brackets in the heading of this document, into the “Search” box and follow the prompts and/or go to the Dockets Management Staff, 5630 Fishers Lane, Rm. 1061, Rockville, MD 20852.

**FOR FURTHER INFORMATION CONTACT:** Judith Kidwell, Center for Food Safety and Applied Nutrition (HFS–265), Food and Drug Administration, 5001 Campus Dr., College Park, MD 20740–3835, 240–402–1071.

**SUPPLEMENTARY INFORMATION:**

**I. Background**

In the **Federal Register** of July 26, 2017 (82 FR 34615), amended August 22, 2017 (82 FR 39711), we announced that we filed a food additive petition (FAP 7A4818) submitted on behalf of the Juice Products Association by Hogan