

[Federal Register, Volume 89 Number 191 (Wednesday, October 2, 2024)]

[Rules and Regulations]

[Pages 80077-80080]

From the Federal Register Online via the Government Publishing Office [www.gpo.gov]

[FR Doc No: 2024-22802]

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## **DEPARTMENT OF TRANSPORTATION**

### **Federal Aviation Administration**

#### **14 CFR Part 39**

**[Docket No. FAA-2024-2317; Project Identifier AD-2024-00468-T; Amendment 39-22856; AD 2024-19-14]**

**RIN 2120-AA64**

### **Airworthiness Directives; The Boeing Company Airplanes**

#### **AGENCY:**

Federal Aviation Administration (FAA), DOT.

#### **ACTION:**

Final rule; request for comments.

#### **SUMMARY:**

The FAA is adopting a new airworthiness directive (AD) for certain The Boeing Company Model 777-200, 777-200LR, 777-300ER, and 777F series airplanes. This AD was prompted by a report of potential latent failures of the lightning protection features for the engine fuel feed system. This AD requires repetitive inspections and bond resistance measurement of the bonding jumpers on the first fuel feed tube installed immediately forward of the wing front spar at each of the two engine locations, and applicable corrective actions. The FAA is issuing this AD to address the unsafe condition on these products.

#### **DATES:**

This AD is effective October 17, 2024.

The Director of the Federal Register approved the incorporation by reference of a certain publication listed in this AD as of October 17, 2024.

The FAA must receive comments on this AD by November 18, 2024.

#### **ADDRESSES:**

You may send comments, using the procedures found in [14 CFR 11.43](#) and [11.45](#), by any of the following methods:

- *Federal eRulemaking Portal*: Go to *regulations.gov*. Follow the instructions for submitting comments.
- *Fax*: 202-493-2251.
- *Mail*: U.S. Department of Transportation, Docket Operations, M-30, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue SE, Washington, DC 20590.
- *Hand Delivery*: Deliver to Mail address above between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

*AD Docket*: You may examine the AD docket at *regulations.gov* by searching for and locating Docket No. FAA-2024-2317; or in person at Docket Operations between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this final rule, any comments received, and other information. The street address for Docket Operations is listed above.

*Material Incorporated by Reference*:

- For Boeing material identified in this AD, contact Boeing Commercial Airplanes, Attention: Contractual & Data Services (C&DS), 2600 Westminister Blvd., MC 110-SK57, Seal Beach, CA 90740-5600; telephone 562-797-1717; website *myboeingfleet.com*.
- You may view this material at the FAA, Airworthiness Products Section, Operational Safety Branch, 2200 South 216th St., Des Moines, WA. For information on the availability of this material at the FAA, call 206-231-3195. It is also available at *regulations.gov* under Docket No. FAA-2024-2317.

**FOR FURTHER INFORMATION CONTACT:**

Samuel Dorsey, Aviation Safety Engineer, FAA, 2200 South 216th St, Des Moines, WA 98198; phone: 206-231-3415; email: [Samuel.J.Dorsey@faa.gov](mailto:Samuel.J.Dorsey@faa.gov).

**SUPPLEMENTARY INFORMATION:**

**Comments Invited**

The FAA invites you to send any written data, views, or arguments about this final rule. Send your comments to an address listed under the **ADDRESSES** section. Include Docket No. FAA-2024-2317 and Project Identifier AD-2024-00468-T at the beginning of your comments. The most helpful comments reference a specific portion of the final rule, explain the reason for any recommended change, and include supporting data. The FAA will consider all comments received by the closing date and may amend this final rule because of those comments.

Except for Confidential Business Information (CBI) as described in the following paragraph, and other information as described in [14 CFR 11.35](#), the FAA will post all comments received, without change, to *regulations.gov*, including any personal information you provide. The agency will also post a report summarizing each substantive verbal contact received about this final rule.

**Confidential Business Information**

CBI is commercial or financial information that is both customarily and actually treated as private by its owner. Under the Freedom of Information Act (FOIA) ([5 U.S.C. 552](#)), CBI is exempt from public disclosure. If your comments responsive to this AD contain commercial or financial information that is customarily treated as private, that you actually treat as private, and that is relevant or responsive to this AD, it is important that you clearly designate the submitted comments as CBI. Please mark each page of your submission containing CBI as “PROPIN.” The FAA will treat such marked submissions as confidential under the FOIA, and they will not be placed in the public docket of this AD. Submissions containing CBI should be sent to Samuel Dorsey, Aviation Safety Engineer, FAA, 2200 South 216th St, Des Moines, WA 98198; phone: 206-231-3415; email: [Samuel.J.Dorsey@faa.gov](mailto:Samuel.J.Dorsey@faa.gov). Any commentary that the FAA receives that is not specifically designated as CBI will be placed in the public docket for this rulemaking.

## Background

In 2023, the FAA received reports of latent failures of the lightning protection features for the engine fuel feed system on Boeing Model 747 airplanes. Subsequent analysis has shown that similar failures are expected to be present on Model 777 airplanes.

The electrical bonding of the engine fuel feed tube penetrating the fuel tanks of Boeing Model 777 airplanes and other Boeing airplane models is the primary design feature to prevent the development of an ignition source inside the fuel tank during a lightning strike to the engine nacelle. The fuel feed lightning protection features include the spar bulkhead fitting that redirects the majority of current during a lightning event. Separate bonding jumpers outside and inside the fuel tank provide additional electrical paths for current from lightning strikes. An additional non-bonding feature, an encapsulation seal over the spar fitting inside the fuel tank, provides additional protection from sparking at that location.

In related rulemaking, the FAA issued AD 2023-23-14, Amendment 39-22616 ([88 FR 83494](#), November 30, 2023) (AD 2023-23-14), to address this unsafe condition on Model 747 airplanes.

From analysis of reports submitted in connection with AD 2023-23-14, Boeing and the FAA have determined that Model 777 airplanes are likely to experience similar encapsulation and bonding failures to those seen on Model 747 airplanes. On Model 747 airplanes, the bonding jumper outside the fuel tank is failing at an excessive rate in addition to the known degradation of the primary electrical bonding path through the spar fitting. Furthermore, multiple failures of the spar fitting's encapsulation have been reported. Model 777 airplanes are expected to be affected to a similar or somewhat lesser degree. While no reports of failed encapsulations or jumper bonds have been received for Model 777 airplanes, these features are generally only inspected and/or replaced conditionally, and they share substantial similarity to Model 747 airplanes. The fuel feed line encapsulation seals are located inside the fuel tank and therefore would generally not be inspected closely unless there was a specific maintenance concern with the fuel feed fitting. Poor electrical bonding would not be expected to be detected during on-condition maintenance as electrical bonding is a function of the installation, and the relevant component would likely be removed without a resistance measurement. Upon replacement, the component installation would be measured and adjusted as necessary to meet the relevant bonding requirements in the Instructions for Continued Airworthiness.

The spar fitting's encapsulation is designed to isolate any sparks or arcing generated at the bulkhead fitting during a lightning strike because of failed electrical bonds from flammable fuel vapors in the

tank. This fitting, including the in-tank coupler connecting the fuel feed line to the fitting, is the most probable location for sparking when electrical bonding is poor. Therefore, an unreliable encapsulation significantly increases the risk of a fuel tank explosion following a lightning strike to the engine nacelle on an airplane with poor electrical bonding. Analysis has shown that at least a subset of the encapsulation failures seen on Model 747 airplanes is expected on Model 777 airplanes.

Model 777 airplanes are equipped with bonding jumpers connecting the fuel feed line to the airplane structure at two locations on each wing: immediately forward of the front spar, and in the upper portion of the engine strut area. These jumpers provide an alternative lightning current path to the airplane structure, reducing current passed into the fuel tank. However, airplanes produced with General Electric Company GE90 series engines were designed without the additional bonding jumper installation in the engine strut area that would otherwise sufficiently reduce the risk of a lightning strike that would result in the unsafe condition. The FAA may issue further rulemaking to address all Model 777 airplanes including those powered by Pratt & Whitney and Rolls-Royce engines.

A lightning strike to an engine nacelle combined with a latent failure of the lightning protection features for the engine fuel feed system, if not addressed, could result in the potential for ignition sources inside fuel tanks. This condition, in combination with flammable fuel vapors, if not addressed, could result in a fuel tank explosion and consequent loss of the airplane. The FAA is issuing this AD to address the unsafe condition on these products.

### **FAA's Determination**

The FAA is issuing this AD because the agency has determined the unsafe condition described previously is likely to exist or develop in other products of the same type design.

### **Material Incorporated by Reference Under [1 CFR Part 51](#)**

The FAA reviewed Boeing Multi Operator Message MOM-MOM-24-0463-01B, dated September 4, 2024. The material specifies procedures for inspecting and measuring the bond resistance of the bonding jumpers on the first fuel feed tube installed immediately forward of the wing front spar at each of the two engine locations, which includes the following actions:

- repetitive detailed inspections of the two fuel feed tube saddle clamps to detect contact between the saddle clamps' metal components with the fuel tube;
- repetitive detailed inspections of the engine fuel feed tube to wing structure bonding jumpers and tube clamps immediately forward of the wing front spar for damage to the bonding jumpers or any loose bonding jumper lugs or tube clamps; and
- repetitive measurement of the electrical bonding resistance between the wing structure and engine fuel feed tube.

The material also specifies procedures for applicable corrective actions, which include the following:

- reworking of the bonding jumper or saddle clamp installation;
- replacing saddle clamps whose metal contacts the fuel tube;
- cleaning and replacing damaged bonding jumpers and related hardware; and
- contacting Boeing for repair instructions if any resistance measurement exceeds specified limits and doing the repair instructions.

This material is reasonably available because the interested parties have access to it through their normal course of business or by the means identified in the **ADDRESSES** section.

## **AD Requirements**

This AD requires accomplishing the actions specified in the material already described, except for any differences identified as exceptions in the regulatory text of this AD and except as discussed under “Difference Between this AD and the Referenced Material.”

For information on the procedures, see this material at *regulations.gov* under Docket No. FAA-2024-2317.

## **Interim Action**

The FAA considers this AD to be an interim action. The manufacturer is currently developing a more comprehensive inspection that will address both out-of-tank and in-tank lightning protection features. Once this inspection is developed, approved, and available, the FAA might consider additional rulemaking.

## **Justification for Immediate Adoption and Determination of the Effective Date**

Section 553(b) of the Administrative Procedure Act (APA) ([5 U.S.C. 551 et seq.](#)) authorizes agencies to dispense with notice and comment procedures for rules when the agency, for “good cause,” finds that those procedures are “impracticable, unnecessary, or contrary to the public interest.” Under this section, an agency, upon finding good cause, may issue a final rule without providing notice and seeking comment prior to issuance. Further, section 553(d) of the APA authorizes agencies to make rules effective in less than thirty days, upon a finding of good cause.

An unsafe condition exists that requires the immediate adoption of this AD without providing an opportunity for public comments prior to adoption. The FAA has found that the risk to the flying public justifies forgoing notice and comment prior to adoption of this rule because a lightning strike to an engine nacelle combined with latent failures of the lightning protection features for the engine fuel feed system could result in the potential for ignition sources inside fuel tanks. This condition, in combination with flammable fuel vapors could result in a fuel tank explosion and consequent loss of the airplane. Accordingly, notice and opportunity for prior public comment are impracticable and contrary to the public interest pursuant to [5 U.S.C. 553\(b\)](#).

The compliance time in this AD is shorter than the time necessary for the public to comment and for publication of the final rule. In addition, the FAA finds that good cause exists pursuant to [5 U.S.C. 553\(d\)](#) for making this amendment effective in less than 30 days, for the same reasons the FAA found good cause to forgo notice and comment.

## **Regulatory Flexibility Act**

The requirements of the Regulatory Flexibility Act (RFA) do not apply when an agency finds good cause pursuant to [5 U.S.C. 553](#) to adopt a rule without prior notice and comment. Because the FAA has

determined that it has good cause to adopt this rule without notice and comment, RFA analysis is not required.

### Costs of Compliance

The FAA estimates that this AD affects 174 airplanes of U.S. registry. The FAA estimates the following costs to comply with this AD:

#### Estimated Costs

Action	Labor cost	Parts cost	Cost per product	Cost on U.S. operators
Inspection and measurement	3 work-hours × \$85 per hour = \$255 per inspection cycle	\$0	\$255 per inspection cycle	\$44,370 per inspection cycle.

The FAA estimates the following costs to do any on-condition actions that would be required based on the results of the inspection and measurement. The FAA has no way of determining the number of aircraft that might need these actions:

#### On-Condition Costs

Action	Labor cost	Parts cost	Cost per product
Replacing saddle clamp	0.5 work-hour × \$85 per hour = \$42.50	\$3	\$45.50
Reworking bonding jumper installation	1.0 work-hour × \$85 per hour = \$85	0	85
Replacing bonding jumper	1.0 work-hour × \$85 per hour = \$85	3	88

The FAA has received no definitive data on which to base the cost estimates for the on-condition repair specified in this AD.

### Authority for This Rulemaking

Title 49 of the United States Code specifies the FAA's authority to issue rules on aviation safety. 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.

The FAA is issuing this rulemaking under the authority described in Subtitle VII, Part A, Subpart III, Section 44701: General requirements. Under that section, Congress charges the FAA with promoting safe flight of civil aircraft in air commerce by prescribing regulations for practices, methods, and

procedures the Administrator finds necessary for safety in air commerce. This regulation is within the scope of that authority because it addresses an unsafe condition that is likely to exist or develop on products identified in this rulemaking action.

## Regulatory Findings

This AD will not have federalism implications under [Executive Order 13132](#). This AD will not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.

For the reasons discussed above, I certify that this AD:

- (1) Is not a “significant regulatory action” under [Executive Order 12866](#), and
- (2) Will not affect intrastate aviation in Alaska.

## List of Subjects in [14 CFR Part 39](#)

- Air transportation
- Aircraft
- Aviation safety
- Incorporation by reference
- Safety

## The Amendment

Accordingly, under the authority delegated to me by the Administrator, the FAA amends [14 CFR part 39](#) as follows:

### PART 39—AIRWORTHINESS DIRECTIVES

1. The authority citation for part 39 continues to read as follows:

**Authority:** [49 U.S.C. 106\(g\)](#), [40113](#), [44701](#).

#### [§.39.13](#) [Amended]

2. The FAA amends § 39.13 by adding the following new airworthiness directive:

**2024-19-14 The Boeing Company:** Amendment 39-22856; Docket No. FAA-2024-2317; Project Identifier AD-2024-00468-T.

#### (a) Effective Date

This airworthiness directive (AD) is effective October 17, 2024.

#### (b) Affected ADs

None.

### **(c) Applicability**

This AD applies to The Boeing Company Model 777-200, 777-200LR, 777-300ER, and 777F series airplanes, certificated in any category, with General Electric Company (GE) GE90-76B, GE90-85B, GE90-90B, GE90-94B, GE90-110B1, and GE90-115B model turbofan engines installed.

### **(d) Subject**

Air Transport Association (ATA) of America Code 28, Fuel.

### **(e) Unsafe Condition**

This AD was prompted by a report of potential latent failures of the lightning protection features for the engine fuel feed system. The FAA is issuing this AD to address such latent failures. A lightning strike to an engine nacelle combined with latent failures of the lightning protection features for the engine fuel feed system, if not addressed, could result in the potential for ignition sources inside fuel tanks, which, in combination with flammable fuel vapors, could result in a fuel tank explosion and consequent loss of the airplane.

### **(f) Compliance**

Comply with this AD within the compliance times specified, unless already done.

### **(g) Required Actions**

Except as specified by paragraph (h) of this AD: Within 90 days after the effective date of this AD, or within 1 year after the date of issuance of the original airworthiness certificate or original export certificate of airworthiness, whichever comes later, do detailed inspections and measure the bond resistance of the bonding jumpers on the fuel feed tube installed immediately forward of the wing front spar at each of the two engine locations, and do all applicable corrective actions, in accordance with the Part 2 of the Work Instructions of Boeing Multi Operator Message MOM-MOM-24-0463-01B, dated September 4, 2024. All applicable corrective actions must be done before further flight. Repeat the inspections and bonding resistance measurement thereafter at intervals not to exceed 1 year.

### **(h) Exception to Service Information Specifications**

(1) Where Boeing Multi Operator Message MOM-MOM-24-0463-01B, dated September 4, 2024, specifies contacting Boeing for instructions if a bonding resistance measurement continues to exceed specified limits after multiple failed corrective action attempts, this AD requires doing a repair before further flight using a method approved in accordance with the procedures specified in paragraph (i) of this AD.

(2) Boeing Multi Operator Message MOM-MOM-24-0463-01B, dated September 4, 2024, refers to Aircraft Illustrated Parts Catalogue (AIPC) AIPC 28-11-51-01 in several places; however, the correct AIPC reference is AIPC 28-11-51-02.

### **(i) Alternative Methods of Compliance (AMOCs)**

(1) The Manager, AIR-520, Continued Operational Safety Branch, FAA, has the authority to approve AMOCs for this AD, if requested using the procedures found in [14 CFR 39.19](#). In accordance with [14 CFR 39.19](#), send your request to your principal inspector or responsible Flight Standards Office, as appropriate. If sending information directly to the manager of the certification office, send it to the attention of the person identified in paragraph (j) of this AD. Information may be emailed to [AMOC@faa.gov](mailto:AMOC@faa.gov).

(2) Before using any approved AMOC, notify your appropriate principal inspector, or lacking a principal inspector, the manager of the responsible Flight Standards Office.

(3) An AMOC that provides an acceptable level of safety may be used for any repair, modification, or alteration required by this AD if it is approved by The Boeing Company Organization Designation Authorization (ODA) that has been authorized by the Manager, AIR-520, Continued Operational Safety Branch, FAA, to make those findings. To be approved, the repair method, modification deviation, or alteration deviation must meet the certification basis of the airplane, and the approval must specifically refer to this AD.

#### **(j) Related Information**

For more information about this AD, contact Samuel Dorsey, Aviation Safety Engineer, FAA, 2200 South 216th St., Des Moines, WA 98198; phone: 206-231-3415; email: [Samuel.J.Dorsey@faa.gov](mailto:Samuel.J.Dorsey@faa.gov).

#### **(k) Material Incorporated by Reference**

(1) The Director of the Federal Register approved the incorporation by reference of the material listed in this paragraph under [5 U.S.C. 552\(a\)](#) and [1 CFR part 51](#).

(2) You must use this material as applicable to do the actions required by this AD, unless the AD specifies otherwise.

(i) Boeing Multi Operator Message MOM-MOM-24-0463-01B, dated September 4, 2024.

(ii) [Reserved]

(3) For Boeing material identified in this AD, contact Boeing Commercial Airplanes, Attention: Contractual & Data Services (C&DS), 2600 Westminister Blvd., MC 110-SK57, Seal Beach, CA 90740-5600; telephone 562-797-1717; website [myboeingfleet.com](http://myboeingfleet.com).

(4) You may view this material at the FAA, Airworthiness Products Section, Operational Safety Branch, 2200 South 216th St., Des Moines, WA. For information on the availability of this material at the FAA, call 206-231-3195.

(5) You may view this material at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, visit [www.archives.gov/federal-register/cfr/ibr-locations](http://www.archives.gov/federal-register/cfr/ibr-locations) or email [fr.inspection@nara.gov](mailto:fr.inspection@nara.gov).

Issued on September 20, 2024.

Peter A. White,

Deputy Director, Integrated Certificate Management Division, Aircraft Certification Service.

[[FR Doc. 2024-22802](#) Filed 9-30-24; 11:15 am]

BILLING CODE 4910-13-P