[4910-13-P]

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA-2016-9073; Product Identifier 2015-NM-062-AD; Amendment 39-19836; AD 2020-03-11]

RIN 2120-AA64

Airworthiness Directives; The Boeing Company Airplanes

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: The FAA is adopting a new airworthiness directive (AD) for certain Boeing Model 707 airplanes and Model 720 and 720B series airplanes. This AD was prompted by the FAA's analysis of the Model 707 and 720 fuel system reviews conducted by the manufacturer. This AD requires modifying the fuel quantity indicating system (FQIS) to prevent development of an ignition source inside the center fuel tank due to electrical fault conditions. The FAA is issuing this AD to address the unsafe condition on these products.

DATES: This AD is effective [INSERT DATE 35 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

ADDRESSES:

Examining the AD Docket

You may examine the AD docket on the Internet at https://www.regulations.gov by searching for and locating Docket No. FAA-2016-9073; 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, the regulatory evaluation, any comments received, and other information. The address for Docket Operations is U.S. Department

of Transportation, Docket Operations, M-30, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue SE., Washington, DC 20590.

FOR FURTHER INFORMATION CONTACT: Jon Regimbal, Aerospace Engineer, Propulsion Section, FAA, Seattle ACO Branch, 2200 South 216th St., Des Moines, WA 98198; phone and fax: 206-231-3557; email: Jon.Regimbal@faa.gov.

SUPPLEMENTARY INFORMATION:

Discussion

The FAA issued a notice of proposed rulemaking (NPRM) to amend 14 CFR part 39 by adding an AD that would apply to certain Boeing Model 707 airplanes and Model 720 and 720B series airplanes. The NPRM published in the Federal Register on September 23, 2016 (81 FR 65577). The NPRM was prompted by the FAA's analysis of the Model 707 and 720 fuel system reviews conducted by the manufacturer. The NPRM proposed to require modifying the FQIS to prevent development of an ignition source inside the center fuel tank due to electrical fault conditions.

The FAA is issuing this AD to address ignition sources inside the center fuel tank, which, in combination with flammable fuel vapors, could result in a fuel tank explosion and consequent loss of the airplane.

Comments

The FAA gave the public the opportunity to participate in developing this final rule. The following presents the comments received on the NPRM and the FAA's response to each comment.

Request to Withdraw NPRM: No Unsafe Condition

Boeing requested that the FAA withdraw the NPRM. Boeing reported that its safety analysis indicated that the FQIS on the Model 707/720 airplane does not have an unsafe condition. Boeing noted that three fuel-tank safety-related actions, including changes to the lightning shielding of the FQIS wires in the wing leading edge area, are

required by AD 2007-23-12, Amendment 39-15258 (72 FR 63800, November 13, 2007; corrected January 10, 2008 (73 FR 1816)) ("AD 2007-23-12"). Boeing pointed out that AD 2007-23-12 requires operators to perform a survey of the fuel system wiring configurations on its airplanes. (That AD also requires operators to report the results of the surveys and discrepancies found.) Boeing stated that no operator has reported any discrepancy, and no operator has requested service information to support any changes related to fuel tank safety.

The FAA disagrees with the commenter's request. Boeing did not provide specific details about the type of assessment that was performed (total fleet risk, average risk per flight hour, peak individual flight risk, etc.). Based on Boeing's fuel system safety assessment submitted in response to Special Federal Aviation Regulation No. 88 ("SFAR 88") of 14 CFR part 21, the FAA has determined that there is an unsafe condition due to the potential for a fuel tank ignition source to occur from the FQIS due to its design architecture, component design details, and installation design details. The FAA's determination was made in accordance with the guidance contained in FAA Policy Memorandum ANM100-2003-112-15, "SFAR 88-Mandatory Action Decision Criteria," dated February 25, 2003[1]. Under that policy, an ignition source that can occur in a high-flammability fuel tank, due to a combination of a preexisting failure that can exist undetected for multiple flights and one additional failure, is an unsafe condition requiring corrective action. High-flammability fuel tanks are defined in the policy as fuel tanks with a fleet average flammability greater than 7 percent as calculated in accordance with 14 CFR Appendix N to part 25. At the time of the unsafe condition determination in April 2003, Boeing acknowledged that the Model 707/720 center fuel tank was a high-flammability fuel tank. The Boeing SFAR 88 report for the Model 707/720 showed that a

[1] http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgPolicy.nsf/0/dc94c3a46396950386256d5e006aed11/$FILE/Feb2503.pdf

combination of an in-tank wire fault or contamination condition (which can remain latent for multiple flights) and a hot short outside of the tank between the affected FQIS tank circuit and other aircraft power wiring cobundled with FQIS tank circuit wiring could result in an ignition source in the fuel tank. That combination of failures was classified by the FAA as a "known combination of failures" under the criteria in the policy memorandum due to the similarity of the Model 707/720 FQIS system architecture and design details to those of the Boeing Model 747 airplane involved in the TWA Flight 800 catastrophic fuel tank explosion accident in 1996. The National Transportation Safety Board (NTSB) concluded that an FQIS failure combination as described above was the most likely cause of that accident.[2] The addition of lightning shields required by AD 2007-23-12 is unrelated to the unsafe condition that prompted this AD, and was instead driven by a concern that a critical lightning strike could cause an ignition source in the tank via FQIS wiring. The FAA has therefore determined that it is necessary to issue this final rule as proposed.

Request to Withdraw NPRM: No Passenger Airplanes Affected

Boeing requested that the FAA withdraw the NPRM because none of the four affected U.S.-registered airplanes are passenger airplanes, and the world fleet size and fleet operational exposure for these airplanes continue to decline with time. Boeing stated that its safety assessment, using methodologies "recognized by the FAA," shows that the vulnerability of the Model 707/720 FQIS to a latent failure plus a single failure does not present an unsafe condition. Boeing concluded that requiring the proposed actions will not promote air safety and instead will add unnecessary cost to operators.

The FAA disagrees with the commenter's request. The FAA has not limited its actions related to fuel tank safety to passenger airplanes. The FAA has determined that an

[2] NTSB Aviation Accident Report AAR-00-03
https://www.ntsb.gov/investigations/AccidentReports/Reports/AAR0003.pdf

unsafe condition exists using the decision criteria in FAA Policy Memorandum PS-ANMl00-2003-112-15. The FAA assumes that in citing assessment methodologies recognized by the FAA, Boeing is referring to having performed an assessment of the total fleet risk for the Model 707/720 fleet that showed a very low likelihood of a fuel tank ignition event in the remaining life of that fleet. However the FAA's unsafe condition determination was calculated using the decision criteria in FAA Policy Memorandum ANMl00-2003-112-15. This determination was not driven by a fleet risk assessment. A latent in-tank failure that provides a conductive path or reduces dielectric strength of the tank wiring or components, combined with an external wiring system failure that conducts power onto the tank wiring, could create an ignition source in the fuel tank. That combination of failures was classified as a "known combination of failures" under the criteria in the policy memo due to the similarity of the Model 707/720 FQIS system architecture and design details to those of the Model 747 airplane involved in the catastrophic fuel tank explosion. The NTSB concluded that an FQIS failure combination as described above was the most likely cause of that accident. The FAA therefore considers it necessary to address this unsafe condition. The per-airplane cost is expected to be similar to the cost of the actions required for Model 737 and 747 airplanes in AD 99-03-04, Amendment 39-11018 (64 FR 4959, February 2, 1999) ("AD 99-03-04"); and AD 98-20-40, Amendment 39-10808 (63 FR 52147, September 30, 1998) ("AD 98-20-40"). Therefore, the FAA has made no changes to this final rule as a result of this comment.

Request to Withdraw NPRM: Extremely Remote Likelihood of Unsafe Condition

Boeing requested that the FAA withdraw the NPRM. Boeing considered the likelihood of an undetected latent electrical fault condition of the FQIS to be extremely remote, due to the FQIS architecture. Boeing added that the existing Model 707/720 FQIS design uses a three-wire system that goes directly from the fuel tank to the flight

deck indication. Boeing stated that an electrical fault of an in-tank component causes the FQIS to provide a fault indication to the flight crew, so the failure is not latent.

The FAA disagrees with the commenter's request. The agency contacted Boeing to resolve the apparent conflict between this comment and the company's previously submitted SFAR 88 reports. In the SFAR 88 reports for Model 707/720 airplanes, Boeing stated that a latent in-tank failure condition could not be claimed to be extremely remote, and acknowledged that the system does not comply with the requirements of 14 CFR 25.981(a)(3) related to a latent failure plus a single failure. (Extremely remote qualitatively means that the condition would occur no more than a few times in the total fleet life. In numerical probability analysis, a condition that has a probability on the order of 1 in 10 million flight hours or less is considered extremely remote.) However, the comment that Boeing submitted to the NPRM stated that a latent in-tank failure was extremely remote.

A meeting with representatives from the FAA and Boeing was held February 15, 2019, to clarify Boeing's position. (A record of that meeting has been posted to the AD docket.) Boeing explained that it had intended to convey in its comment that the estimated probability for the initial failure that creates a latent in-tank loss of dielectric strength, resistive current path, or short condition is extremely remote. Boeing acknowledged that when the estimated probability of that failure initiation is multiplied by the average latency period, the probability of a latent in-tank failure existing in any given flight hour is not extremely remote.

Given this clarification, Boeing's comment was consistent with the conclusions of its SFAR 88 reviews. The FQIS does not provide a fault indication to the flight crew other than unusual readings or a zero reading provided by a tank gage if a hard short to ground or power occurs. In addition, even if such a fault is noted by the flight crew, the approved Master Minimum Equipment List for the Model 707/720 airplane allows

operators to fly for up to ten days in that condition, without disconnecting the FQIS for the affected tank, with provisions for extending beyond the ten days. The FAA therefore does not agree that a latent failure of in-tank wiring or components, such that an ignition source could occur if an external hot short occurs, is extremely remote. Therefore, the FAA has made no changes to this final rule as a result of this comment.

Request to Revise Cost Estimate

Boeing requested that if the NPRM is not withdrawn, the FAA revise the cost estimate to reflect the cost of developing a design solution for the center wing tank FQIS. Boeing expected that a small number of airplanes would actually be modified, so the cost of developing a design solution would be spread over a small number of airplanes, resulting in a significant per-airplane cost. Boeing did not provide any specific cost information or describe the actual modifications for which they provided cost comments.

The FAA disagrees with the commenter's request to revise the cost estimate. The FAA based the cost estimate for Model 707/720 passenger airplanes on the inflation-adjusted estimated costs for installation of transient suppression devices on the Model 747 airplane as required by AD 98-20-40. The FAA considers that the transient suppression design solutions, if not the actual parts, developed for Model 737 and 747 airplanes in response to AD 99-03-04 and AD 98-20-40 will be applicable to the Model 707/720 airplane due to the similarity of those models' FQIS designs. The FAA agrees that the nonrecurring design development costs associated with any necessary model-specific design activity will be spread over fewer airplanes, resulting in higher per-airplane costs. However, the FAA increased the cost estimate in the NPRM to reflect that increased cost to the existing fleet. Boeing did not propose any specific alternative cost figures to be substituted for the FAA estimate. The one affected U.S. passenger airplane in operation at the time the NPRM was published has been removed from service. The remaining U.S. airplanes are an experimental research airplane and privately owned

military contract aerial refuelers. For those airplanes, the operators have the potential to use the Alternative Methods of Compliance (AMOC) approval process to propose alternative approaches to address the unsafe condition using operational or utilization restrictions. The FAA has made no changes to this final rule as a result of this comment.

Conclusion

The FAA reviewed the relevant data, considered the comments received, and determined that air safety and the public interest require adopting this final rule as proposed, except for minor editorial changes. The FAA has determined that these minor changes:

- Are consistent with the intent that was proposed in the NPRM for addressing the unsafe condition; and
- Do not add any additional burden upon the public than was already proposed in the NPRM.

Costs of Compliance

The FAA estimates that this AD affects three airplanes of U.S. registry: two cargo/tanker airplanes and one experimental airplane. The FAA estimates the following costs to comply with this AD:

Estimated costs: Required actions

Action	Labor cost	Parts cost	Cost per product	Cost on U.S. operators
Modification	600 work-hours X $85 per hour = $51,000	$150,000	$201,000	$603,000

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,

(2) Will not affect intrastate aviation in Alaska, and

(3) Will not have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

List of Subjects in 14 CFR Part 39

Air transportation, Aircraft, Aviation safety, Incorporation by reference, Safety.

Adoption of 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 (AD):

2020-03-11 The Boeing Company: Amendment 39-19836 ; Docket No. FAA-2016-9073; Product Identifier 2015-NM-062-AD.

(a) Effective Date

This AD is effective [INSERT DATE 35 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

(b) Affected ADs

None.

(c) Applicability

This AD applies to The Boeing Company Model 707-100 long body, -200, -100B long body, -100B short body, -300, -300B, -300C, and -400 series airplanes; and Model 720 and 720B series airplanes; certificated in any category; excluding airplanes equipped with a flammability reduction means (FRM) approved by the FAA as compliant with the Fuel Tank Flammability Reduction (FTFR) requirements of 14 CFR 25.981(b) or 14 CFR 26.33(c)(1).

(d) Subject

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

(e) Unsafe Condition

This AD was prompted by the FAA's analysis of the Model 707/720 fuel system reviews conducted by the manufacturer. The FAA is issuing this AD to address ignition sources inside the center fuel tank, 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) Modification

Within 60 months after the effective date of this AD, modify the fuel quantity indicating system (FQIS) to prevent development of an ignition source inside the center fuel tank due to electrical fault conditions, using a method approved in accordance with the procedures specified in paragraph (h) of this AD.

(h) Alternative Methods of Compliance (AMOCs)

(1) The Manager, Seattle ACO 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 local Flight Standards District 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 (i) of this AD. Information may be emailed to: 9-ANM-Seattle-ACO-AMOC-Requests@faa.gov.

(2) Before using any approved AMOC, notify your appropriate principal inspector, or lacking a principal inspector, the manager of the local flight standards district office/certificate holding district 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, Seattle ACO 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.

(i) Related Information

For more information about this AD, contact Jon Regimbal, Aerospace Engineer, Propulsion Section, FAA, Seattle ACO Branch, 2200 South 216th St., Des Moines, WA 98198; phone and fax: 206-231-3557; email: Jon.Regimbal@faa.gov.

(j) Material Incorporated by Reference

None.

Issued on February 3, 2020.

Lance T. Gant, Director,
Compliance & Airworthiness Division,
Aircraft Certification Service.
[FR Doc. 2020-02667 Filed: 2/11/2020 8:45 am; Publication Date: 2/12/2020]