



DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA-2020-1179; Project Identifier AD-2020-00818-E; Amendment 39-21638; AD 2021-14-11]

RIN 2120-AA64

Airworthiness Directives; General Electric Company Turbofan Engines

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: The FAA is adopting a new airworthiness directive (AD) for certain General Electric Company (GE) CF6-80A and CF6-80C2 model turbofan engines. This AD was prompted by an inspection by the manufacturer that revealed cracking of the high-pressure turbine (HPT) rotor stage 1 disk. This AD requires visual inspection and fluorescent penetrant inspection (FPI) of the HPT thermal shield and, if cracking is detected, removal from service of the HPT thermal shield, HPT rotor stage 1 disk and HPT rotor stage 2 disk. 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: For service information identified in this final rule, contact General Electric Company, 1 Neumann Way, Cincinnati, OH 45215; phone: (513) 552-3272; email: aviation.fleetsupport@ae.ge.com; website: www.ge.com. You may view this service information at the FAA, Airworthiness Products Section, Operational Safety Branch, 1200 District Avenue, Burlington, MA 01803. For information on the availability of this material at the FAA, call (781) 238-7759. It is also available at <https://www.regulations.gov> by searching for and locating Docket No. FAA-2020-1179.

Examining the AD Docket

You may examine the AD docket at <https://www.regulations.gov> by searching for and locating Docket No. FAA-2020-1179; 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 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: Kevin M. Clark, Aviation Safety Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA 01803; phone: (781) 238-7088; fax: (781) 238-7199; email: Kevin.M.Clark@faa.gov.

SUPPLEMENTARY INFORMATION:

Background

The FAA issued a notice of proposed rulemaking (NPRM) to amend 14 CFR part 39 by adding an AD that would apply to all General Electric Company (GE) CF6-80A, CF6-80A1, CF6-80A2, CF6-80A3, CF6-80C2A1, CF6-80C2A2, CF6-80C2A3, CF6-80C2A5, CF6-80C2A5F, CF6-80C2A8, CF6-80C2B1, CF6-80C2B1F, CF6-80C2B1F1, CF6-80C2B1F2, CF6-80C2B2, CF6-80C2B2F, CF6-80C2B3F, CF6-80C2B4, CF6-80C2B4F, CF6-80C2B5F, CF6-80C2B6, CF6-80C2B6F, CF6-80C2B6FA, CF6-80C2B7F, CF6-80C2B8F, CF6-80C2D1F, CF6-80C2K1F, and CF6-80C2L1F model turbofan engines. The NPRM published in the *Federal Register* on February 22, 2021 (86 FR 10496). The NPRM was prompted by an inspection by the manufacturer that revealed cracking of the HPT rotor stage 1 disk caused by increased stress on the HPT rotor stage 1 disk as a result of flange-to-flange cracking on the HPT thermal shield. In the NPRM, the FAA proposed to require visual inspection and FPI of the HPT thermal shield and, if cracking is detected, removal from service of the HPT thermal shield, HPT rotor stage 1 disk and HPT rotor stage 2 disk. The FAA is issuing this AD to address the unsafe condition on these products.

Discussion of Final Airworthiness Directive

Comments

The FAA received comments from five commenters. The commenters were Atlas Air, Boeing Commercial Airplanes (Boeing), Delta Air Lines (Delta), United Airlines

(United) and the Air Line Pilots Association, International (ALPA). The following presents the comments received on the NPRM and the FAA's response to each comment.

Request to Update Shop Manual

Atlas Air requested that the FAA revise GE CF6-80C2, ESM 72-53-05, High Pressure Turbine (HPT) Rotor Thermal Shield – Inspection to add the proposed requirement to remove from service the HPT thermal shield, the HPT rotor stage 1 disk, and the HPT rotor stage 2 disk from service if a crack is found, since the thermal shield can be sent to different vendors outside the engine shop. Delta also suggested that the technical data within the Engine Shop Manual (ESM) should be updated to ensure inspection requirements are equivalent across all tasks within the ESM.

The FAA disagrees. Requiring updates to the ESM is unnecessary to correct the unsafe condition identified in this AD. The visual and FPI inspections in the required actions of this AD are the necessary actions to correct the unsafe condition. Operators, at their discretion, may work with the original equipment manufacturer to suggest changes to the ESM to include the inspections required by this AD.

Request to Revise References to Engine Manual

Boeing requested that the FAA update reference to the service information in the Related Service Information section of the NPRM by referencing Revision 90 of the GE CF6-80A Engine Manual and Revision 91 of the CF6-80C2 Engine Manual. These revisions of the respective engines manuals include updated procedures regarding HPT rotor Stage 1 and Stage 2 disk serviceability for these model engines with respect to HPT thermal shield inspection findings.

The FAA agrees and has updated the Related Service Information section of this AD as suggested by the commenter.

Request to Clarify Inspection Instructions

Delta requested that the FAA clarify that the mandated visual and FPI inspections should be accomplished in accordance with the engine manual for the affected engine models.

The FAA disagrees. Operators may use any approved method to perform the

visual and FPI inspections required by this AD.

Request to Clarify Engine Applicability

United requested that the FAA remove CF6-80C2B8F model turbofan engines from the applicability of this AD. United commented that two HPT thermal shield configurations exist, part number (P/N) 2787M85P01 and P/N 9315M41P20. Neither of these configurations are applicable to the R88DT HPT rotor installed on CF6-80C2B8F model turbofan engines. United requested that if the FAA considers the CF6-80C2B8F turbofan engine model affected by this AD, then the applicable engine manual should be updated to reflect the inspections required by this AD.

The FAA agrees. This AD is not applicable to the R88DT HPT rotor installed on CF6-80C2B8F model turbofan engines because that rotor configuration does not have an affected thermal shield. The FAA added the applicable part numbers for HPT thermal shields installed on CF6-80A and CF6-80C2 model turbofan engines to the applicability paragraph of this AD.

Support for the NPRM

ALPA supported the NPRM without change.

Conclusion

The FAA reviewed the relevant data, considered any comments received, and determined that air safety requires adopting this AD as proposed. Accordingly, the FAA is issuing this AD to address the unsafe condition on these products. Except for minor editorial changes and any other changes described previously, this AD is adopted as proposed in the NPRM. None of the changes will increase the economic burden on any operator.

Related Service Information

The FAA reviewed ESM 72-53-00 High Pressure Turbine Rotor Assembly – Disassembly (CF6-80A ESM 72-53-00), dated February 15, 2020 from the GE CF6-80A Engine Manual GEK72501 - Rev 90, dated February 15, 2021. CF6-80A ESM 72-53-00 describes procedures for the removal of the HPT thermal shield, the HPT rotor stage 1 disk, and the HPT rotor stage 2 disk installed on CF6-80A model turbofan engines.

The FAA also reviewed ESM 72-53-00 High Pressure Turbine Rotor Assembly – Disassembly (CF6-80C2 ESM 72-53-00), dated December 1, 2019 from the GE CF6-80C2 Engine Manual GEK92451 - Rev 91, dated December 1, 2020. CF6-80C2 ESM 72-53-00 describes procedures for the removal of the HPT thermal shield, the HPT rotor stage 1 disk, and the HPT rotor stage 2 disk installed on CF6-80C2 model turbofan engines.

Costs of Compliance

The FAA estimates that this AD affects 1,084 engines installed on 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
Perform FPI and visual inspection of HPT thermal shield	2 work-hours x \$85 per hour = \$170	\$0	\$170	\$184,280

The FAA estimates the following costs to do any necessary replacements that would be required based on the results of the inspection. The agency has no way of determining the number of aircraft that might need these replacements.

On-condition costs

Action	Labor Cost	Parts Cost	Cost per product
Replace HPT thermal shield	2 work-hours x \$85 per hour = \$170	\$209,600	\$209,770
Replace HPT rotor stage 1 disk	2 work-hours x \$85 per hour = \$170	\$799,700	\$799,870
Replace HPT rotor stage 2 disk	2 work-hours x \$85 per hour = \$170	\$364,600	\$364,770

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.

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:

2021-14-11 General Electric Company: Amendment 39-21638; Docket No. FAA-2020-1179; Project Identifier AD-2020-00818-E.

(a) Effective Date

This airworthiness directive (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 General Electric Company (GE) CF6-80A, CF6-80A1, CF6-80A2, CF6-80A3, CF6-80C2A1, CF6-80C2A2, CF6-80C2A3, CF6-80C2A5, CF6-80C2A5F, CF6-80C2A8, CF6-80C2B1, CF6-80C2B1F, CF6-80C2B1F1, CF6-80C2B1F2, CF6-80C2B2, CF6-80C2B2F, CF6-80C2B3F, CF6-80C2B4, CF6-80C2B4F, CF6-80C2B5F, CF6-80C2B6, CF6-80C2B6F, CF6-80C2B6FA, CF6-80C2B7F, CF6-80C2B8F, CF6-80C2D1F, CF6-80C2K1F, and CF6-80C2L1F model turbofan engines with an installed thermal shield having one of the following part numbers: 2787M85P01, 9315M41P09, 9315M41P13, 9315M41P14, 9315M41P15, 9315M41P16, 9315M41P20, 9348M13P01, 9367M63P01, 9367M63P02, 9367M63P03, 9367M63P04, 9367M63P05, 9367M63P06, 9367M63P07, or 9315M41P20.

(d) Subject

Joint Aircraft System Component (JASC) Code 7250, Turbine Section.

(e) Unsafe Condition

This AD was prompted by an inspection by the manufacturer that revealed cracking of the high-pressure turbine (HPT) rotor stage 1 disk, caused by initial flange-to-flange cracking on the HPT thermal shield between the HPT rotor stage 1 disk and the HPT rotor stage 2 disk. The FAA is issuing this AD to prevent failure of the HPT rotor stage 1 disk and the HPT rotor stage 2 disk. The unsafe condition, if not addressed, could result in uncontained release of the HPT rotor stage 1 and stage 2 disks, damage to the engine, and damage to the airplane.

(f) Compliance

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

(g) Required Actions

(1) After the effective date of this AD, at every piece-part exposure of the HPT rotor stage 1 disk, HPT rotor stage 2 disk, or the HPT thermal shield, perform a visual inspection and a fluorescent penetrant inspection of the HPT thermal shield.

(2) During any inspection required by paragraph (g)(1) of this AD, if a crack extending through either the forward or aft flange of the HPT thermal shield is detected, remove the HPT thermal shield, the HPT rotor stage 1 disk, and the HPT rotor stage 2 disk from service.

(h) Installation Prohibition

Do not install onto any engine an HPT rotor stage 1 disk or HPT rotor stage 2 disk that was removed from service due to the requirements of paragraph (g)(2) of this AD.

(i) Definition

For the purpose of this AD, “piece-part exposure” is when the HPT rotor stage 1 disk, HPT rotor stage 2 disk, or HPT thermal shield is separated from their mating rotor parts within the HPT rotor module.

(j) Alternative Methods of Compliance (AMOCs)

(1) The Manager, ECO 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 ECO Branch, send it to the attention of the person identified in Related Information. You may email your request to: ANE-AD-AMOC@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.

(k) Related Information

For more information about this AD, contact Kevin M. Clark, Aviation Safety Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA 01803; phone: (781) 238-7088; fax: (781) 238-7199; email: Kevin.M.Clark@faa.gov.

(I) Material Incorporated by Reference

None.

Issued on June 25, 2021.

Lance T. Gant, Director,
Compliance & Airworthiness Division,
Aircraft Certification Service.

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