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## **DEPARTMENT OF TRANSPORTATION**

### **Federal Aviation Administration**

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

**[Docket No. FAA-2016-5307; Directorate Identifier 2016-NE-08-AD; Amendment 39-18658; AD 2016-19-09]**

**RIN 2120-AA64**

#### **Airworthiness Directives; General Electric Company Turbofan Engines**

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

**ACTION:** Final rule.

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**SUMMARY:** We are adopting a new airworthiness directive (AD) for all General Electric Company (GE) GE90-76B, GE90-77B, GE90-85B, GE90-90B, and GE90-94B turbofan engines with high-pressure compressor (HPC) stage 8-10 spool, part numbers (P/Ns) 1694M80G04, 1844M90G01, or 1844M90G02, installed. This AD was prompted by reports of cracks found on the seal teeth of the HPC stage 8-10 spool. This AD requires eddy current inspections (ECIs) or fluorescent penetrant inspections (FPIs) of the HPC stage 8-10 spool seal teeth and removing from service those parts that fail inspection. We are issuing this AD to prevent failure of the HPC stage 8-10 spool, uncontained rotor release, damage to the engine, and damage to the airplane.

**DATES:** This AD is effective November 4, 2016.

**ADDRESSES:** For service information identified in this final rule, contact General Electric Company, GE-Aviation, Room 285, 1 Neumann Way, Cincinnati, OH 45215, phone: 513-552-3272; email: aviation.fleetsupport@ge.com. You may view this service information at the FAA, Engine & Propeller Directorate, 1200 District Avenue, Burlington, MA. For information on the availability of this material at the FAA, call 781-238-7125. It is also available on the Internet at <http://www.regulations.gov> by searching for and locating Docket No. FAA-2016-5307.

#### **Examining the AD Docket**

You may examine the AD docket on the Internet at <http://www.regulations.gov> by searching for and locating Docket No. FAA-2016-5307; or in person at the Docket Management Facility between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this AD, the regulatory evaluation, any comments received, and other information. The address for the Docket Office (phone: 800-647-5527) is Document Management Facility, 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:** John Frost, Aerospace Engineer, Engine Certification Office, FAA, 1200 District Avenue, Burlington, MA 01803; phone: 781-238-7756; fax: 781-238-7199; email: john.frost@faa.gov.

## **SUPPLEMENTARY INFORMATION:**

### **Discussion**

We issued a notice of proposed rulemaking (NPRM) to amend 14 CFR part 39 by adding an AD that would apply to all GE GE90-76B, GE90-77B, GE90-85B, GE90-90B, and GE90-94B turbofan engines with HPC stage 8-10 spool, P/Ns 1694M80G04, 1844M90G01, or 1844M90G02, installed. The NPRM published in the Federal Register on April 11, 2016 (81 FR 21286). The NPRM was prompted by reports of cracks found on the seal teeth of the HPC stage 8-10 spool during shop visits. The cracks initiated due to higher than intended temperatures at the seal teeth and damage to seal teeth coating from heavy rubs into the honeycomb. GE is developing a modification to address the unsafe condition.

The NPRM proposed to require ECIs or FPIs of the HPC stage 8-10 spool seal teeth and removing from service those parts that fail inspection. We are issuing this AD to prevent failure of the HPC stage 8-10 spool, uncontained rotor release, damage to the engine, and damage to the airplane.

### **Comments**

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

### **Support of the NPRM as Written**

Boeing and United Airlines support the NPRM as written.

### **Request To Clarify Performance of ECI and FPI**

Nao Seto requested that the FAA clarify with which service information the ECI and FPI will be performed.

We agree. We added a statement to compliance paragraph (e) in this AD indicating the GE service documents in which guidance can be found for performing the ECI and the FPI.

### **Request To Clarify Supplementary Information**

General Electric Aviation requested that the Discussion paragraph be changed to read as follows: "Based on recent testing, change the root cause of crack initiation from that of degraded surface properties caused by an alloy depletion zone (ADZ) to cracks initiated due to higher than intended temperatures at the seal teeth and damage to seal teeth coating from heavy rubs into the honeycomb." Recent testing and analysis have shown that the temperatures in the seal teeth are higher than design intent. This elevated temperature increases the stress in the region of the seal teeth, aligning with the cracking observed. GE also completed testing to determine the impact of alloy depletion zone on material capability. Testing showed material capability was not impacted.

We agree. We oversaw the recent testing and analysis which supports the requested change. We changed the Discussion paragraph of this AD accordingly.

## **Request To Add Ultrasonic Inspection (USI) to the Compliance**

GE requested that USI be added to the Compliance section as an alternate inspection method. Additionally, GE requested that we revise the Related Information paragraph (h)(2) of this AD by updating the service information to revision 1 based on the qualifying USI procedure.

We disagree. USI procedures are not an acceptable alternative to the existing ECI and FPI procedures specified in this AD. A USI is not a viable procedure for compliance at this time, therefore, we are not updating the service information in paragraph (h)(2) to Revision 1. We may consider an AMOC after sufficient substantiated data is presented to the FAA. We did not change this AD.

## **Conclusion**

We reviewed the relevant data, considered the comments received, and determined that air safety and the public interest require adopting this AD as proposed.

## **Related Service Information**

We reviewed GE Service Bulletins SB 72-1141 R00, dated December 2, 2015; and SB 72-1142 R00, dated November 30, 2015. The service information describes procedures for inspecting the HPC stage 8-10 spool seal teeth.

## **Costs of Compliance**

We estimate that this AD affects 54 engines installed on airplanes of U.S. registry. We also estimate that it will take about 1 hour per engine to comply with this AD. The average labor rate is \$85 per hour. We estimate 14 parts will fail inspection at a pro-rated cost of \$400,000 per part. Based on these figures, we estimate the total cost of this AD to U.S. operators to be \$5,604,590.

## **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.

We are 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) Is not a "significant rule" under DOT Regulatory Policies and Procedures (44 FR 11034, February 26, 1979),

(3) Will not affect intrastate aviation in Alaska to the extent that it justifies making a regulatory distinction, and

(4) 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):



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**2016-19-09 General Electric Company:** Amendment 39-18658; Docket No. FAA-2016-5307; Directorate Identifier 2016-NE-08-AD.

**(a) Effective Date**

This AD is effective November 4, 2016.

**(b) Affected ADs**

None.

**(c) Applicability**

This AD applies to General Electric Company (GE) GE90-76B, GE90-77B, GE90-85B, GE90-90B, and GE90-94B turbofan engines with a high-pressure compressor (HPC) stage 8-10 spool, part numbers 1694M80G04, 1844M90G01, or 1844M90G02, installed.

**(d) Unsafe Condition**

This AD was prompted by reports of cracks found on the seal teeth of the HPC stage 8-10 spool. We are issuing this AD to prevent failure of the HPC stage 8-10 spool, uncontained rotor release, damage to the engine, and damage to the airplane.

**(e) Compliance**

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

(1) Perform an eddy current inspection (ECI) or fluorescent penetrant inspection (FPI) of the seal teeth of the HPC stage 8-10 spool as follows:

(i) For HPC stage 8-10 spools with fewer than 11,000 cycles since new (CSN) on the effective day of this AD, inspect at the next shop visit after reaching 6,000 CSN, not to exceed 12,500 CSN.

(ii) For HPC stage 8-10 spools with 11,000 CSN or more on the effective day of this AD, inspect within the next 1,500 cycles in service.

(iii) Thereafter, inspect the seal teeth of the HPC stage 8-10 spool at each shop visit.

(2) Remove from service any HPC stage 8-10 spool that fails the ECI or FPI required by paragraph (e)(1) of this AD and replace with a part eligible for installation.

(3) Guidance on performing the ECI and the FPI can be found in GE Service Bulletins (SBs) SB 72-1141 R00, dated December 2, 2015 and SB 72-1142 R00, dated November 30, 2015.

**(f) Definition**

For the purpose of this AD, an engine shop visit is the induction of an engine into the shop for maintenance during which the compressor discharge pressure seal face is exposed.

**(g) Alternative Methods of Compliance (AMOCs)**

The Manager, Engine Certification Office, FAA, may approve AMOCs for this AD. Use the procedures found in 14 CFR 39.19 to make your request. You may email your request to: ANE-AD-AMOC@faa.gov.

**(h) Related Information**

(1) For more information about this AD, contact John Frost, Aerospace Engineer, Engine Certification Office, FAA, 1200 District Avenue, Burlington, MA 01803; phone: 781-238-7756; fax: 781-238-7199; email: john.frost@faa.gov.

(2) GE SB 72-1141, R00, dated December 2, 2015 and GE SB 72-1142, R00, dated November 30, 2015, which are not incorporated by reference in this AD, can be obtained from GE, using the contact information in paragraph (h)(3) of this AD.

(3) For service information identified in this AD, contact General Electric Company, GE-Aviation, Room 285, 1 Neumann Way, Cincinnati, OH 45215, phone: 513-552-3272; email: aviation.fleetsupport@ge.com.

(4) You may view this service information at the FAA, Engine & Propeller Directorate, 1200 District Avenue, Burlington, MA. For information on the availability of this material at the FAA, call 781-238-7125.

**(i) Material Incorporated by Reference**

None.

Issued in Burlington, Massachusetts, on September 26, 2016.  
Colleen M. D'Alessandro,  
Manager, Engine & Propeller Directorate,  
Aircraft Certification Service.