



DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA-2023-0663; Project Identifier AD-2023-00020-E; Amendment 39-22534; AD 2023-17-08]

RIN 2120-AA64

Airworthiness Directives; General Electric Company 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) Model GEnx-1B and GEnx-2B engines. This AD was prompted by a manufacturer investigation that revealed that certain stages 6-10 compressor rotor spools and forward seals were manufactured from powder metal material suspected to contain iron inclusion. This AD requires the replacement of the affected stages 6-10 compressor rotor spools and forward seals. 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].

The Director of the Federal Register approved the incorporation by reference of certain publications listed in this AD as of [INSERT DATE 35 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

ADDRESSES:

AD Docket: You may examine the AD docket at [regulations.gov](https://www.regulations.gov) by searching for and locating Docket No. FAA-2023-0663; 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.

Material Incorporated by Reference:

- For GE service information identified in this final rule, contact General Electric Company, 1 Neumann Way, Cincinnati, OH 45215; phone: (513) 552-3272; email: aviation.fleetsupport@ge.com; website: geaviation.com/support.

- 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 (817) 222-5110. It is also available at regulations.gov by searching for and locating Docket No. FAA-2023-0663.

FOR FURTHER INFORMATION CONTACT: Alexei Marqueen, Aviation Safety Engineer, FAA, 2200 South 216th Street, Des Moines, WA 98198; phone: (781) 238-7178; email: alexei.t.marqueen@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 certain GE Model GEnx-1B64/P2, GEnx-1B67/P2, GEnx-1B70/75/P2, GEnx-1B70/P2, GEnx-1B70C/P2, GEnx-1B74/75/P2, GEnx-1B76/P2, GEnx-1B76A/P2, and GEnx-2B67/P engines. The NPRM published in the *Federal Register* on April 13, 2023 (88 FR 22383). The NPRM was prompted by a report from the manufacturer of the detection of iron inclusion in a high-pressure turbine stage 2 disk manufactured from the same powder metal material used to manufacture certain stages 6-10 compressor rotor spools and forward seals. A manufacturer investigation determined that the iron inclusion was introduced during the manufacturing process from raw material filtering screens that had degraded, and certain stages 6-10 compressor rotor spools and forward seals manufactured using the same process may have reduced material properties and a lower fatigue life capability due to the iron inclusion. Further investigation by the manufacturer identified additional degraded filtering screens which had the potential to increase the population of parts that were subjected to iron inclusion during manufacturing. As a result of its investigation, GE published service information that specifies procedures for the removal and replacement

of certain stages 6-10 compressor rotor spools and forward seals. In the NPRM, the FAA proposed to require removal of the affected stages 6-10 compressor rotor spools and forward seals and replacement with a part eligible for installation. 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 three commenters. The commenters were the Airline Pilots Association, International (ALPA), American Airlines (AA), and United Airlines. AA requested changes to the NPRM. ALPA supported the NPRM without change. United Airlines reviewed the NPRM but did not include any additional comments. The following presents the comments received on the NPRM and the FAA's response to each comment.

Request for Guidance on Thrust Limit

AA requested that the FAA provide guidance on which thrust limit to apply for engines with multiple thrust ratings. AA also asked if the FAA's intention is to set the thrust limit based on the thrust rating at removal, or if the expectation is to apply the lowest limit that the engine operated under. AA noted that it has a spool operating where the proposed AD limit would be 6,200 cycles, but it previously operated at a higher thrust rating such that the limit was 1,000 cycles less.

The FAA agrees to clarify. The intention of the thrust limit is for operators to remove the affected stages 6-10 compressor rotor spool or affected forward seal from service at the next piece-part exposure, or no later than the cyclic thresholds listed in the applicable service bulletins that are incorporated by reference. The FAA notes that since multiple thrust ratings are listed in the service bulletins, the intent is to set the cyclic removal threshold based on the thrust rating that is applicable at the time the AD is issued, not at the lowest thrust rating that a part has ever operated under. The FAA did not change this AD as a result of this comment.

Request to Update Service Bulletin Shorthand

AA requested that the FAA add the revision levels to the shorthand reference of each service bulletin in paragraph (g) and (h) of this AD. AA noted that -1B operators do

not have access to -2B bulletins, and vice versa, so -1B operators will not be notified if the -2B service bulletin is revised, and will not be able to confirm that the information between the two service bulletins continues to match.

The FAA agrees and has revised the shorthand reference for each applicable service bulletin to include the revision level in paragraphs (c), (g) and (h) of this AD.

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 under 1 CFR Part 51

The FAA reviewed GE GENx-1B Service Bulletin 72-0515, R00, dated January 31, 2023. The FAA also reviewed GE GENx-2B Service Bulletin 72-0452, R00, dated January 31, 2023. This service information specifies procedures for removal and replacement of the stages 6-10 compressor rotor spool and forward seal. These documents are distinct since they apply to different engine models. This service information 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.

Interim Action

The FAA considers this AD to be an interim action. If final action is later identified, the FAA might consider additional rulemaking.

Costs of Compliance

The FAA estimates that this AD affects 13 engines installed on airplanes of U.S. registry. The FAA estimates that 9 of the 13 engines will require replacing the stages 6-10 compressor rotor spool and 4 of the 13 engines will require replacing the forward seal.

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
Replace stages 6-10 compressor rotor spool	8 work-hours x \$85 per hour = \$680	\$841,088	\$841,768	\$7,575,912
Replace forward seal	8 work-hours x \$85 per hour = \$680	\$389,976	\$390,656	\$1,562,624

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:

2023-17-08 General Electric Company: Amendment 39-22534; Docket No. FAA-2023-0663; Project Identifier AD-2023-00020-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) Model GENx-1B64/P2, GENx-1B67/P2, GENx-1B70/75/P2, GENx-1B70/P2, GENx-1B70C/P2, GENx-1B74/75/P2, GENx-1B76/P2, GENx-1B76A/P2, and GENx-2B67/P engines with an installed:

(1) Stages 6-10 compressor rotor spool having a part number (P/N) and serial number (S/N) listed in paragraph 4, Appendix - A, Table 1 of GE GENx-1B Service Bulletin 72-0515, R00, dated January 31, 2023 (GENx-1B 72-0515 R00); or

(2) Forward seal having a P/N and S/N listed in paragraph 4, Appendix - A, Table 2 of GENx-1B 72-0515 R00; or

(3) Stages 6-10 compressor rotor spool having a P/N and S/N listed in paragraph 4, Appendix - A, Table 1 of GE GENx-2B Service Bulletin 72-0452, R00, dated January 31, 2023. (GENx-2B 72-0452 R00); or

(4) Forward seal having a P/N and S/N listed in paragraph 4, Appendix - A, Table 2 of GENx-2B 72-0452 R00.

(d) Subject

Joint Aircraft System Component (JASC) Code 7230, Turbine Engine Compressor Section; 7250, Turbine Section.

(e) Unsafe Condition

This AD was prompted by a manufacturer investigation that revealed certain stages 6-10 compressor rotor spools and forward seals were subject to iron inclusion introduced during the manufacturing process. The FAA is issuing this AD to prevent fracture and potential uncontained failure of certain stages 6-10 compressor rotor spools and forward seals. The unsafe condition, if not addressed, could result in uncontained debris release, damage to the engine, and damage to the aircraft.

(f) Compliance

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

(g) Required Actions

(1) For affected Model GENx-1B engines, at the next piece-part exposure after the effective date of this AD, or before the affected stages 6-10 compressor rotor spool reaches the cyclic removal threshold listed in paragraph 4., Appendix - A, Table 1 of GENx-1B 72-0515 R00, whichever occurs first, remove the affected stages 6-10 compressor rotor spool from service and replace with a part eligible for installation.

(2) For affected Model GENx-1B engines, at the next piece-part exposure after the effective date of this AD, or before the affected forward seal exceeds the cyclic removal threshold listed in paragraph 4., Appendix - A, Table 2 of GENx-1B 72-0515 R00, whichever occurs first, remove the affected forward seal from service and replace with a part eligible for installation.

(3) For affected Model GENx-2B engines, at the next piece-part exposure after the effective date of this AD, or before the affected stages 6-10 compressor rotor spool exceeds the cyclic removal threshold listed in paragraph 4., Appendix - A, Table 1 of GENx-2B 72-0452 R00, whichever occurs first, remove the affected stages 6-10 compressor rotor spool from service and replace with a part eligible for installation.

(4) For affected Model GENx-2B engines, at the next piece-part exposure after the effective date of this AD, or before the affected forward seal exceeds the cyclic removal threshold listed in paragraph 4., Appendix - A, Table 2 of GENx-2B 72-0452 R00, whichever occurs first, remove the affected forward seal from service and replace with a part eligible for installation.

(h) Definitions

(1) For the purpose of this AD, a “part eligible for installation” is any stages 6-10 compressor rotor spool or forward seal with a P/N and S/N not listed in paragraph 4, Appendix - A, Table 1 or paragraph 4, Appendix - A, Table 2 of GENx-1B 72-0515 R00 or GENx-2B 72-0452 R00.

(2) For the purpose of this AD, “piece-part exposure” is when the affected part is removed from the engine.

(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 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 (j) of this AD and email 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.

(j) Related Information

For more information about this AD, contact Alexei Marqueen, Aviation Safety Engineer, FAA, 2200 South 216th Street, Des Moines, WA 98198; phone: (781) 238-7178; email: alexei.t.marqueen@faa.gov.

(k) Material Incorporated by Reference

(1) The Director of the Federal Register approved the incorporation by reference (IBR) of the service information listed in this paragraph under 5 U.S.C. 552(a) and 1 CFR part 51.

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

(i) General Electric Company (GE) GENx-1B Service Bulletin 72-0515, R00, dated January 31, 2023.

(ii) GE GENx-2B Service Bulletin 72-0452, R00, dated January 31, 2023.

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

(4) You may view this service information at 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 (817) 222-5110.

(5) You may view this service information that is incorporated by reference at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, email: fr.inspection@nara.gov, or go to: www.archives.gov/federal-register/cfr/ibr-locations.html.

Issued on August 24, 2023.

Victor Wicklund, Deputy Director,
Compliance & Airworthiness Division,
Aircraft Certification Service.

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