

**DEPARTMENT OF TRANSPORTATION****Federal Aviation Administration****14 CFR Part 39**

[Docket No. FAA-2022-0160; Project Identifier AD-2022-00009-E; Amendment 39-22150; AD 2022-17-12]

RIN 2120-AA64

**Airworthiness Directives; CFM International, S.A. Turbofan Engines**

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

**ACTION:** Final rule.

**SUMMARY:** The FAA is adopting a new airworthiness directive (AD) for certain CFM International, S.A. (CFM) LEAP-1A model turbofan engines. This AD was prompted by reports of two in-flight shutdowns (IFSDs) and subsequent investigation by the manufacturer that revealed cracks in the high-pressure turbine (HPT) rotor stage 1 blades. This AD requires initial and repetitive borescope inspections (BSIs) of the HPT rotor stage 1 blades. Depending on the results of the BSIs, this AD requires either additional BSIs at reduced intervals or replacement of the HPT rotor stage 1 blades. This AD also requires sending the inspection results to CFM if any unserviceable finding is found. The FAA is issuing this AD to address the unsafe condition on these products.

**DATES:** This AD is effective October 6, 2022.

The Director of the Federal Register approved the incorporation by reference of a certain publication listed in this AD as of October 6, 2022.

**ADDRESSES:** For service information identified in this final rule, contact CFM International, S.A., Aviation Operations Center, 1 Neumann Way, M/D Room 285, Cincinnati, OH 45125; phone: (877) 432-3272; email: [aviation.fleetsupport@ge.com](mailto:aviation.fleetsupport@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 (817) 222-5110. It is also available at [www.regulations.gov](http://www.regulations.gov) by searching for and locating Docket No. FAA-2022-0160.

**Examining the AD Docket**

You may examine the AD docket at [www.regulations.gov](http://www.regulations.gov) by searching for and locating Docket No. FAA-2022-0160; 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:**

Mehdi Lamnyi, Aviation Safety Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA 01803; phone: (781) 238-7743; email: [Mehdi.Lamnyi@faa.gov](mailto:Mehdi.Lamnyi@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 CFM LEAP-1A23, LEAP-1A24, LEAP-1A24E1, LEAP-1A26, LEAP-1A26CJ, LEAP-1A26E1, LEAP-1A29, LEAP-1A29CJ, LEAP-1A30, LEAP-1A32, LEAP-1A33, LEAP-1A33B2, and LEAP-1A35A (LEAP-1A) model turbofan engines. The NPRM published in the **Federal Register** on March 21, 2022 (87 FR 15896). The NPRM was prompted by reports of two single-engine IFSDs on airplanes powered by LEAP-1A model turbofan engines, operating extensively in the Middle East and North Africa (MENA) region. A post-flight BSI of the HPT module revealed that the engine failures were due to cracks in the HPT rotor stage 1 blades. After investigation, the manufacturer determined that engines operating in the MENA region are susceptible to accelerated HPT rotor stage 1 blade deterioration and airfoil distress due to the build-up of dust. In the NPRM, the FAA proposed to require initial and repetitive BSIs of the HPT rotor stage 1 blades and HPT stator stage 1 nozzle set and, depending on the results of the inspections, additional BSIs at reduced intervals or replacement of the HPT rotor stage 1 blades or HPT stator stage 1 nozzle set. In the NPRM, the FAA proposed to require a BSI of the HPT rotor stage 1 blades and HPT stator stage 1 nozzle set installed on the sister engine of the same airplane if certain criteria are met. In the NPRM, the FAA also proposed to require sending the inspection results to CFM if any unserviceable finding is found. 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 Air Line Pilots Association,

International (ALPA), CFM, and an individual commenter. The following presents the comments received on the NPRM and the FAA's response to each comment.

**Support for the AD**

ALPA expressed support for the AD as written.

**Use of a Proprietary Ground Operation System as an Alternate Means of Compliance**

An individual commenter stated that using a specific ground operation taxi system could provide an alternate means of compliance for this AD. The commenter reasoned that limiting engine operation during ground operations would increase the interval between inspections from 150 cycles to 450 cycles and from 300 cycles to 900 cycles. The commenter also stated that use of this ground operation taxi system would reduce costs on operators, result in fuel burn reduction, and reduce carbon emissions.

The FAA did not change this AD as a result of this comment. The compliance timing for the actions required by this AD are based on the accumulated number of takeoffs and flight cycles, not on engine operating hours. In addition, it has not been demonstrated that variation in operation of the engine on the ground and during taxi has any impact on the unsafe condition addressed by this AD.

**Availability of Revised Service Information**

CFM commented that revised service information, CFM Service Bulletin (SB) LEAP-1A-72-00-0461-01A-930A-D, Issue 003-00, dated July 13, 2022, has been published. CFM identified that this revised service information removes references to the HPT stator stage 1 nozzle set, adds an inspection credit for the engines for which the conditional inspection of the sister engine installed on the same airplane is applicable, updates the BSI guidance for the HPT stator stage 1 blades, and removes the requirement to share all videos and images with CFM.

In response to this comment, the FAA revised this AD to reference CFM SB LEAP-1A-72-00-0461-01A-930A-D, Issue 003-00, dated July 13, 2022. The FAA also removed all references to the HPT stator stage 1 nozzle set and associated SB paragraph references as proposed in the NPRM. The FAA has also added paragraph (i), Credit for Previous Actions, to this AD to provide credit for the initial BSI required by paragraph (g)(1)(i) or (2)(i) of this AD if the initial BSI was performed before the

effective date of this AD using CFM SB LEAP-1A-72-00-0461-01A-930A-D, Issue 002-00, dated December 21, 2021.

**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 CFM SB LEAP-1A-72-00-0461-01A-930A-D, Issue 003-00, dated July 13, 2022. This service information specifies procedures for performing a BSI of the HPT rotor stage 1 blades for LEAP-1A model turbofan engines operating in the MENA region, performing all applicable corrective actions, and reporting any unserviceable HPT rotor stage 1 blade findings to CFM.

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 **ADDRESSES**.

**Interim Action**

The FAA considers this AD to be an interim action. The inspection reports that are required by this final rule will enable the manufacturer to obtain better insight into the nature, cause, and extent of the cracking, and eventually to develop final action to address the unsafe condition. Once final action has been identified, the FAA might consider additional rulemaking.

**Costs of Compliance**

The FAA estimates that this AD affects 0 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
BSI the HPT rotor stage 1 blades .....	4 work-hours × \$85 per hour = \$340 .....	\$0	\$340	\$0

The FAA estimates the following costs to do any necessary reporting and 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 the HPT rotor stage 1 blades .....	150 work-hours × \$85 per hour = \$12,750 .....	\$988,200	\$1,000,950
BSI the HPT rotor stage 1 blades (on the sister engine).	4 work-hours × \$85 per hour = \$340 .....	0	340
Report BSI results to CFM .....	1 work-hour × \$85 per hour = \$85 .....	0	85

**Paperwork Reduction Act**

A federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a penalty for failure to comply with a collection of information subject to the requirements of the Paperwork Reduction Act unless that collection of information displays a currently valid OMB Control Number. The OMB Control Number for this information collection is 2120-0056. Public reporting for this collection of information is estimated to take approximately 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. All responses to this collection of information are mandatory. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to: Information Collection Clearance

Officer, Federal Aviation Administration, 10101 Hillwood Parkway, Fort Worth, TX 76177-1524.

**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:

**2022-17-12 CFM International, S.A.:**  
Amendment 39-22150; Docket No. FAA-2022-0160; Project Identifier AD-2022-00009-E.

**(a) Effective Date**

This airworthiness directive (AD) is effective October 6, 2022.

**(b) Affected ADs**

None.

**(c) Applicability**

This AD applies to CFM International, S.A. (CFM) LEAP-1A23, LEAP-1A24, LEAP-1A24E1, LEAP-1A26, LEAP-1A26CJ, LEAP-1A26E1, LEAP-1A29, LEAP-1A29CJ, LEAP-1A30, LEAP-1A32, LEAP-1A33, LEAP-1A33B2, and LEAP-1A35A model turbofan engines with an installed high-pressure turbine (HPT) rotor stage 1 blade, having part number (P/N) 2747M92P01, P/N 2553M91G03, P/N 2553M91G05, P/N 2553M91G06, P/N 2553M91G07, or P/N 2553M91G08 that has accumulated more than 800 Middle East and North Africa (MENA) takeoffs.

**(d) Subject**

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

**(e) Unsafe Condition**

This AD was prompted by reports of two in-flight shutdowns and subsequent investigation by the manufacturer that revealed cracks in the HPT rotor stage 1 blades. The FAA is issuing this AD to prevent failure of the HPT rotor stage 1 blades. The unsafe condition, if not addressed, could result in failure of the engine, in-flight shutdown, loss of thrust control, and loss of the airplane.

**(f) Compliance**

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

**(g) Required Actions**

(1) *Group 1 Engines: Borescope Inspection (BSI) of HPT Rotor Stage 1 Blades*

For Group 1 engines with an affected HPT rotor stage 1 blade installed:

(i) Within 100 flight cycles (FCs) after accumulating 800 MENA takeoffs on the HPT rotor stage 1 blade, before the HPT rotor stage 1 blade accumulates 1,750 cycles since new (CSN), or within 100 FCs after the effective date of this AD, whichever occurs later, perform an initial BSI of the HPT rotor stage 1 blades in accordance with the Accomplishment Instructions, paragraphs 5.E.(1)(c), of CFM Service Bulletin LEAP-1A-72-00-0461-01A-930A-D, Issue 003-00, dated July 13, 2022 (the SB).

(ii) Thereafter, at intervals not to exceed 150 FCs since the last BSI, perform a repetitive BSI of the HPT rotor stage 1 blades in accordance with the Accomplishment Instructions, paragraphs 5.E.(1)(c), of the SB.

(2) *Group 2 Engines: BSI of HPT Rotor Stage 1 Blades*

For Group 2 engines with an affected HPT rotor stage 1 blade installed:

(i) Within 100 FCs after accumulating 800 MENA takeoffs on the HPT rotor stage 1 blade, before the HPT rotor stage 1 blade accumulates 2,600 CSN, or within 100 FCs after the effective date of this AD, whichever occurs later, perform an initial BSI of the HPT rotor stage 1 blades in accordance with the Accomplishment Instructions, paragraphs 5.E.(1)(c), of the SB.

(ii) Thereafter, at intervals not to exceed 300 FCs since the last BSI, perform a repetitive BSI of the HPT rotor stage 1 blades in accordance with the Accomplishment Instructions, paragraphs 5.E.(1)(c), of the SB.

(3) *BSI Results Disposition*

Based on the results of the BSI required by paragraph (g)(1) or (2) of this AD, as applicable, either re-inspect or replace the HPT rotor stage 1 blades set using the criteria, compliance times, and procedures referenced in the Accomplishment Instructions, paragraph 5.E.(1)(f), of the SB.

(4) *Conditional Inspection of the Sister Engine on the Same Airplane*

(i) Based on the BSI results disposition required by paragraph (g)(3) of this AD, if re-inspection or replacement of the HPT rotor stage 1 is required within 50 FCs based on the criteria, compliance times, and procedures referenced in the Accomplishment Instructions, paragraph 5.E.(1)(f), of the SB, then perform the actions required in paragraph (g)(4)(ii) of this AD.

(ii) Within 5 FCs after performing the inspection required by paragraph (g)(1) or (2) of this AD, as applicable, either inspect or replace the HPT rotor stage 1 blades on the sister engine using the procedures and compliance times in the Accomplishment Instructions, paragraph 5.E.(1)(g), of the SB. Where the SB specifies to remove the engine, this AD requires replacement of the HPT rotor stage 1 blades.

(5) *Reporting Requirements*

If, during any inspection required by paragraph (g)(1), (2), (3), or (4) of this AD, as applicable, any HPT unserviceable finding is found on an engine as identified in the Accomplishment Instructions, paragraph 5.E.(1)(f) of the SB, within 30 days of performing the inspection, report the HPT rotor stage 1 blade unserviceable finding to CFM in accordance with the

Accomplishment Instructions, paragraph 5.E.(1)(f)1, of the SB.

**Note 1 to paragraph (g):** The Accomplishment Instructions in paragraph 5.E.(1)(f) of the SB reference applicable aircraft maintenance manual tasks for procedures and compliance times for the actions required by paragraphs (g)(3) through (5) of this AD.

**(h) Definitions**

(1) Group 1 engines are CFM LEAP-1A29, LEAP-1A29CJ, LEAP-1A30, LEAP-1A32, LEAP-1A33, LEAP-1A33B2, and LEAP-1A35A model turbofan engines.

(2) Group 2 engines are CFM LEAP-1A23, LEAP-1A24, LEAP-1A24E1, LEAP-1A26, LEAP-1A26CJ, and LEAP-1A26E1 model turbofan engines.

(3) For the purpose of this AD, a “MENA takeoff” is any takeoff accomplished in the MENA region, as defined in the Planning Information, paragraph 3.D., of the SB.

(4) For the purpose of this AD, “sister engine” refers to the other engine installed on the same airplane.

**(i) Credit for Previous Actions**

You may take credit for the initial BSI required by paragraph (g)(1)(i) or (2)(i) of this AD if you performed the initial BSI before the effective of this AD using CFM Service Bulletin LEAP-1A-72-00-0461-01A-930A-D, Issue 002-00, December 21, 2021.

**(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 certification office, send it to the attention of the person identified in paragraph (k) of this AD and email to: [ANE-AD-AMOC@faa.gov](mailto: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 Mehdi Lamnyi, Aviation Safety Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA 01803; phone: (781) 238-7743; email: [Mehdi.Lamnyi@faa.gov](mailto:Mehdi.Lamnyi@faa.gov).

**(l) 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) CFM Service Bulletin LEAP-1A-72-00-0461-01A-930A-D, Issue 003-00, dated July 13, 2022.

(ii) [Reserved]

(3) For service information identified in this AD, contact CFM International, S.A.,

Aviation Operations Center, 1 Neumann Way, M/D Room 285, Cincinnati, OH 45125; phone: (877) 432-3272; email: [aviation.fleetsupport@ge.com](mailto:aviation.fleetsupport@ge.com).

(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](mailto:fr.inspection@nara.gov), or go to: [www.archives.gov/federal-register/cfr/ibr-locations.html](http://www.archives.gov/federal-register/cfr/ibr-locations.html).

Issued on August 12, 2022.

**Gaetano A. Sciortino,**

*Deputy Director for Strategic Initiatives, Compliance & Airworthiness Division, Aircraft Certification Service.*

[FR Doc. 2022-18923 Filed 8-31-22; 8:45 am]

**BILLING CODE 4910-13-P**

**DEPARTMENT OF TRANSPORTATION**

**Federal Aviation Administration**

**14 CFR Part 39**

[Docket No. FAA-2022-0290; Project Identifier AD-2021-01266-T; Amendment 39-22109; AD 2022-14-04]

**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 The Boeing Company Model 787-8, 787-9, and 787-10 airplanes. This AD was prompted by a report from Boeing that Rolls-Royce Deutschland Ltd & Co KG (RRD) discovered a design issue in the engine fuel feed system, which could result in fuel flow restrictions to both engines when ice that has

accumulated in the airplane fuel feed system suddenly releases into the engines. This AD requires revising the existing airplane flight manual (AFM) to update the limitations on minimum fuel temperatures. The FAA is issuing this AD to address the unsafe condition on these products.

**DATES:** This AD is effective October 6, 2022.

**ADDRESSES:**

**Examining the AD Docket**

You may examine the AD docket at [www.regulations.gov](http://www.regulations.gov) by searching for and locating Docket No. FAA-2022-0290; 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:** Tak Kobayashi, Aerospace Engineer, Propulsion Section, FAA, Seattle ACO Branch, 2200 South 216th St., Des Moines, WA 98198; phone and fax: 206-231-3553; email: [Takahisa.Kobayashi@faa.gov](mailto:Takahisa.Kobayashi@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 The Boeing Company Model 787-8, 787-9, and 787-10 airplanes. The NPRM published in the **Federal Register** on April 14, 2022 (87 FR 22158). The NPRM was prompted by a report from Boeing that RRD discovered a design issue in the engine fuel feed system, which could result in fuel flow restrictions to both engines when ice that has accumulated in the airplane fuel feed system suddenly releases into the engines. In the NPRM,

the FAA proposed to require revising the existing AFM to update the limitations on minimum fuel temperatures. The FAA is issuing this AD to address possible fuel flow restrictions to both engines, which could result in loss of dual engine thrust control and reduced controllability of the airplane.

**Discussion of Final Airworthiness Directive**

**Comments**

The FAA received no comments on the NPRM or on the determination of the cost to the public.

**Conclusion**

The FAA reviewed the relevant data and determined that air safety requires adopting this AD as proposed. Except for minor editorial changes, this AD is adopted as proposed in the NPRM. None of the changes will increase the economic burden on any operator.

**Interim Action**

The FAA considers this AD interim action. Boeing is currently working with RRD to develop updated electronic engine control (EEC) software, which will change the engine oil temperature amber line indicated in the engine indication and crew alerting system (EICAS). This change will ensure that, before takeoff, the engine oil temperature would be warm enough to operate the engine with cold fuel. The updated EEC software combined with the action required by this AD will address the unsafe condition identified in this AD. Once this software is developed, approved, and available, the FAA might consider additional rulemaking.

**Costs of Compliance**

The FAA estimates that this AD affects 14 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
Revising the existing AFM .....	1 work-hour × \$85 per hour = \$85 .....	\$0	\$85	\$1,190

**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