



[4910-13-P]

**DEPARTMENT OF TRANSPORTATION**

**Federal Aviation Administration**

**14 CFR Part 39**

**[Docket No. FAA-2019-1093; Product Identifier AD-2019-00144-E]**

**RIN 2120-AA64**

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

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

**ACTION:** Notice of proposed rulemaking (NPRM).

**SUMMARY:** The FAA proposes to adopt a new airworthiness directive (AD) for all CFM International S.A. (CFM) LEAP-1B21, -1B23, -1B25, -1B27, -1B28, -1B28B1, -1B28B2, -1B28B2C, -1B28B3, -1B28BBJ1, and -1B28BBJ2 model turbofan engines.

This proposed AD was prompted by reports of two new unsafe conditions and the need to supersede corrective actions for two previously addressed unsafe conditions. The FAA proposes to supersede AD 2018-25-09 and AD 2019-12-01, which apply to the affected LEAP-1B model turbofan engines. Since the FAA issued the ADs, the FAA received information and analysis indicating that supersedure of these ADs is warranted.

**DATES:** The FAA must receive comments on this proposed AD by [INSERT DATE 20 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

**ADDRESSES:** You may send comments, using the procedures found in 14 CFR 11.43 and 11.45, by any of the following methods:

- Federal eRulemaking Portal: Go to <http://www.regulations.gov>. Follow the instructions for submitting comments.
- Fax: 202-493-2251.

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

- Hand Delivery: Deliver to Mail address above between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

For service information identified in this NPRM, contact CFM International Inc., Aviation Operations Center, 1 Neumann Way, M/D Room 285, Cincinnati, OH, 45125; phone: 877-432-3272; fax: 877-432-3329; email: aviation.fleetsupport@ge.com. You may view this service information at the FAA, Engine and Propeller Standards 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 on the Internet at <https://www.regulations.gov> by searching for and locating Docket No. FAA-2019-1093.

### **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-2019-1093; 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 NPRM, the regulatory evaluation, any comments received, and other information. The street address for Docket Operations is listed above. Comments will be available in the AD docket shortly after receipt.

**FOR FURTHER INFORMATION CONTACT:** Christopher McGuire, Aerospace Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA, 01803; phone: 781-238-7120; fax: 781-238-7199; email: [chris.mcguire@faa.gov](mailto:chris.mcguire@faa.gov).

### **SUPPLEMENTARY INFORMATION:**

#### **Comments Invited**

The FAA invites you to send any written relevant data, views, or arguments about this proposed AD. Send your comments to an address listed under the ADDRESSES

section. Include “Docket No. FAA-2019-1093; Product Identifier AD-2019-00144-E” at the beginning of your comments. The FAA specifically invites comments on the overall regulatory, economic, environmental, and energy aspects of this NPRM. The FAA will consider all comments received by the closing date and may amend this NPRM because of those comments.

The FAA understands that CFM has communicated with affected operators regarding the proposed corrective actions for these unsafe conditions. As a result, affected operators are already aware of the proposed corrective actions and in some cases, have already begun implementation. Therefore, the FAA has determined that a 20-day comment period is appropriate given the particular circumstances related to the proposed corrections of these unsafe conditions on the CFM LEAP-1B model turbofan engines.

Except for Confidential Business Information (CBI) as described in the following paragraph, and other information as described in 14 CFR 11.35, the FAA will post all comments received, without change, to <https://www.regulations.gov>, including any personal information you provide. The FAA will also post a report summarizing each substantive verbal contact received about this proposed AD.

### **Confidential Business Information**

Confidential Business Information (CBI) is commercial or financial information that is both customarily and actually treated as private by its owner. Under the Freedom of Information Act (FOIA) (5 U.S.C. 552), CBI is exempt from public disclosure. If your comments responsive to this NPRM contain commercial or financial information that is customarily treated as private, that you actually treat as private, and that is relevant or responsive to this NPRM, it is important that you clearly designate the submitted comments as CBI. Please mark each page of your submission containing CBI as “PROPIN.” The FAA will treat such marked submissions as confidential under the FOIA, and they will not be placed in the public docket of this NPRM. Submissions containing

CBI should be sent to Christopher McGuire, Aerospace Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA, 01803. Any commentary that the FAA receives which is not specifically designated as CBI will be placed in the public docket for this rulemaking.

### **Discussion**

The FAA has received reports of two new unsafe conditions affecting CFM LEAP-1B model turbofan engines: (1) increased fuel flow through certain fuel nozzles due to fuel nozzle coking, potentially causing distress to the static structures of the high-pressure turbine (HPT) and in-flight shutdown (IFSD) of one or more engines; and (2) the potential for undetected subsurface anomalies formed during the manufacturing process that could result in uncontained failure of the HPT stage 2 disk. To address the newly identified unsafe conditions, the FAA is proposing this AD.

Further, the FAA received additional information related to the unsafe conditions addressed by AD 2018-25-09 and AD 2019-12-01 regarding: (1) icing in the pressure sensor lines, potentially causing inaccurate pressure sensor readings and loss of thrust control; and (2) inadequate oil flow to the radial drive shaft (RDS) bearing, which can cause failure of the bearing and IFSD of one or more engines.

Thus, this AD would also supersede the two previously issued ADs addressing icing in the pressure sensor lines and inadequate oil flow to the RDS bearing.

### **Unsafe Conditions – Fuel Nozzle Coking and Subsurface Material Anomalies**

The FAA has received reports of unsafe conditions on the CFM LEAP-1B model turbofan engine related to fuel nozzle coking and to subsurface anomalies that can be present in the HPT stage 2 disk. The FAA has not previously issued an AD on these unsafe conditions on the CFM LEAP-1B model turbofan engine.

### *Fuel Nozzle Coking*

Two LEAP-1B model turbofan engines have experienced fuel nozzle coking which led to distress of HPT static structures. On one of these engines, fuel nozzle coking and subsequent HPT static structure distress led to turbine center frame (TCF) burn-through, and an engine IFSD while the aircraft was engaged in a ferry flight. Fuel nozzle coking can lead to failure of the HPT static structures, TCF case burn-through, and in-flight shutdown of one or more engines, loss of thrust control, and damage to the airplane.

### *Subsurface Material Anomalies*

During a broad investigation by CFM into melt-related material anomalies, a subsurface anomaly was found in a part manufactured from the same material as the LEAP-1B HPT stage 2 disk. This type of subsurface anomaly has the potential to cause failure of the LEAP-1B HPT stage 2 disk. CFM introduced enhanced inspections to prevent failure of the HPT stage 2 disk which can lead to uncontained engine failure, loss of thrust control, and damage to the airplane.

The FAA reviewed CFM's assessment of the unsafe conditions and the proposed corrective actions and agrees with its conclusions. Updating the Airworthiness Limitations Section (ALS) of the Engine Shop Manual and the continuous airworthiness maintenance program for the affected LEAP-1B model turbofan engines would be the most effective way to address these unsafe conditions pertaining to fuel nozzle coking and subsurface material anomalies. These ALS updates would require a one-time inspection of the HPT stage 2 disk for subsurface anomalies and engine condition monitoring or repetitive inspections of the HPT static structures for fuel nozzle coking.

### **ADs Being Superseded: AD 2018-25-09 and AD 2019-12-01**

The FAA is proposing to supersede AD 2018-25-09 and AD 2019-12-01. The FAA issued AD 2018-25-09, Amendment 39-19520 (83 FR 63559, December 11, 2018),

(“AD 2018-25-09”), for all CFM LEAP-1B21, -1B23, -1B25, -1B27, -1B28, -1B28B1, -1B28B2, -1B28B2C, -1B28B3, -1B28BBJ1, and -1B28BBJ2 turbofan engines. The FAA issued AD 2019-12-01, Amendment 39-19656 (84 FR 28202, June 18, 2019), (“AD 2019-12-01”), for certain CFM LEAP-1B21, -1B23, -1B25, -1B27, -1B28, -1B28B1, -1B28B2, -1B28B3, -1B28B2C, -1B28BBJ1, and -1B28BBJ2 model turbofan engines.

*AD 2018-25-09 -- Icing in Pressure Sensor Lines*

The FAA issued AD 2018-25-09 to prevent icing in the pressure sensor lines and inaccurate pressure sensor readings that could result in failure of one or more engines, loss of thrust control, and loss of the airplane. AD 2018-25-09 required removing certain electronic engine control (EEC) systems operation (OPS) and engine health monitoring (EHM) software and installing versions eligible for installation. AD 2018-25-09 resulted from six aborted takeoffs on the similarly-designed CFM LEAP-1A model turbofan engine after those engines did not advance to the desired takeoff fan speed due to icing in the pressure sensor line.

Since the FAA issued AD 2018-25-09, the FAA received reports of two temporary loss of thrust control events caused by icing in the pressure sensor lines. Both events occurred on affected CFM turbofan engines with the EEC OPS and EHM software installed per AD 2018-25-09. After further investigation, the operators found water and ice in the pressure sensor lines, which prevented the pressure sensor from accurately measuring the pressure. As a result, the previous CFM EEC OPS and EHM software update mandated by AD 2018-25-09 would be further modified by this AD to detect and accommodate a frozen pressure sensor and to prevent loss of thrust control from occurring.

*AD 2019-12-01 – RDS Bearing Failure*

The FAA issued AD 2019-12-01 to prevent failure of the RDS bearing, which could result in failure of one or more engines, loss of thrust control, and loss of the

airplane. AD 2019-12-01 required initial and repetitive inspections of the TGB scavenge screens and, depending on the results of the inspection, possible removal of the engine from service. AD 2019-12-01 resulted from multiple reports of IFSDs due to RDS bearing failure.

Since the FAA issued AD 2019-12-01, further investigation by CFM identified an additional contributing factor to the cause of the RDS failures. Insufficient oil supply to the radial shaft bearing and rivet fatigue of the cage assembly are the primary contributing factors to these bearing failures. The inspections that would be mandated by this proposed update to the ALS have a time-based limit and include in-service limits for the affected bearings. Even though the ALS changes would be applicable to all LEAP-1B engines, the requirements in the ALS for the RDS inspections would apply only to the engines affected by AD 2019-12-01.

#### **Related Service Information under 1 CFR part 51**

The FAA reviewed ALS data module, CFM LEAP-1B-05-21-03-01A-281B-C, Issue 002, dated January 9, 2020; and ALS data module, CFM LEAP-1B-05-29-00-01A-281B-C, Issue 001, dated January 9, 2020. CFM LEAP-1B-05-21-03-01A-281B-C describes procedures for an ultrasonic inspection of the HPT stage 2 disk. CFM LEAP-1B-05-29-00-01A-281B-C, describes procedures for inspection of the RDS bearing; monitoring and inspections of the fuel nozzle; and the required version of EEC system software. 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.

#### **FAA's Determination**

The FAA is proposing this AD because the agency evaluated all the relevant information and determined the unsafe conditions described previously are likely to exist or develop in other products of the same type design.

## Proposed AD Requirements

This proposed AD would require revising the ALS of the applicable CFM LEAP-1B Engine Shop Manual and the operator's approved continuous airworthiness maintenance program.

## Costs of Compliance

The FAA estimates that this proposed AD affects 162 engines installed on airplanes of U.S. registry.

The FAA estimates the following costs to comply with this proposed AD:

### Estimated costs

Action	Labor cost	Parts cost	Cost per product	Cost on U.S. operators
Update ALS	4 work-hours X \$85 per hour = \$340	\$0	\$340	\$55,080
TGB Screen Inspection	1 work-hour X \$85 per hour = \$85	\$0	\$85	\$13,770
HPT stage 2 Disk Inspection	6 work-hours X \$85 per hour = \$510	\$0	\$510	\$82,620
Fuel Nozzle Inspection	6 work-hours X \$85 per hour = \$510	\$0	\$510	\$82,620
Pressure Sub-system Software Upgrade	0.5 work-hours X \$85 per hour = \$42.50	\$0	\$42.50	\$6,885
RDS Borescope Inspection	2 work-hours X \$85 per hour = \$170	\$0	\$170	\$27,540

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

**On-condition costs**

<b>Action</b>	<b>Labor cost</b>	<b>Parts cost</b>	<b>Cost per product</b>
RDS Replacement	200 work-hours X \$85 per hour = \$17,000	\$30,500	\$47,500
HPT stage 2 Disk Replacement	1 work-hour X \$85 per hour = \$85	\$225,000	\$225,085
Replace Set of Fuel Nozzles	40 work-hours X \$85 per hour = \$3,400	\$120,000	\$123,400

**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.

This AD is issued in accordance with authority delegated by the Executive Director, Aircraft Certification Service, as authorized by FAA Order 8000.51C. In accordance with that order, issuance of ADs is normally a function of the Compliance

and Airworthiness Division, but during this transition period, the Executive Director has delegated the authority to issue ADs applicable to engines, propellers, and associated appliances to the Manager, Engine and Propeller Standards Branch, Policy and Innovation Division.

### **Regulatory Findings**

The FAA has determined that this proposed AD would not have federalism implications under Executive Order 13132. This proposed AD would 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 the proposed regulation:

- (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 Proposed Amendment**

Accordingly, under the authority delegated to me by the Administrator, the FAA proposes to amend 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:

a. Removing airworthiness directive (AD) 2018-25-09, Amendment 39-19520 (83 FR 63559, December 11, 2018), and AD 2019-12-01, Amendment 39-19656 (84 FR 28202, June 18, 2019); and

b. Adding the following new AD:

**CFM International S.A.:** Docket No. FAA-2019-1093; Product Identifier AD-2019-00144-E.

**(a) Comments Due Date**

The FAA must receive comments on this AD action by [INSERT DATE 20 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

**(b) Affected ADs**

This AD replaces AD 2018-25-09, Amendment 39-19520 (83 FR 63559, December 11, 2018), and AD 2019-12-01, Amendment 39-19656 (84 FR 28202, June 18, 2019).

**(c) Applicability**

This AD applies to all CFM International S.A. (CFM) LEAP-1B21, -1B23, -1B25, -1B27, -1B28, -1B28B1, -1B28B2, -1B28B3, -1B28B2C, -1B28BBJ1, and -1B28BBJ2 model turbofan engines.

**(d) Subject**

Joint Aircraft System Component (JASC) Code, 7200 (Turbine/Turboprop).

**(e) Unsafe Condition**

(1) This AD was prompted by multiple reports of engine in-flight shutdowns (IFSDs) and defects in the related applicable systems and one report of a melt-related defect of the high-pressure turbine (HPT) stage 2 disk material. The FAA is issuing this AD to prevent:

(i) increased fuel flow through certain fuel nozzles leading to distress of the HPT static structures and IFSD of one or more engines;

(ii) undetected subsurface anomalies formed during the manufacturing process that could lead to uncontained HPT disk failure;

(iii) icing in the pressure sensor lines, inaccurate pressure sensor readings and loss of thrust control; and

(iv) inadequate oil flow to the radial drive shaft (RDS) bearing, failure of the bearing, and IFSD of one or more engines.

(2) These unsafe conditions, if not addressed, could result in IFSD or failure of one or more engines, 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**

Within 15 days after the effective date of this AD, revise the Airworthiness Limitations Section (ALS) of the applicable CFM LEAP-1B Engine Shop Manual and the operator's existing approved continuous airworthiness maintenance program by inserting the following changes:

(1) paragraph 6.B.(2) of the CFM Engine Shop Manual (ESM) Data Module LEAP-1B-05-21-03-01A-281B-C, Issue 002, dated January 9, 2020; and

(2) paragraphs 6.B.(1), 6.B.(2), and 6.C.(1) of the CFM ESM Data Module LEAP-1B-05-29-00-01A-281B-C, Issue 001, dated January 9, 2020.

**(h) No Alternative Procedures or Intervals**

After the revisions required by paragraph (g) of this AD have been made, no alternative inspections, procedures, or intervals may be used unless approved as an alternative method of compliance in accordance with the procedures specified in paragraph (i) of this AD.

**(i) 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 (j)(1) of this AD. 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.

**(j) Related Information**

(1) For more information about this AD, contact Christopher McGuire, Aerospace Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA, 01803; phone: 781-238-7120; fax: 781-238-7199; email: chris.mcguire@faa.gov.

(2) For service information identified in this AD, contact CFM International Inc., Aviation Operations Center, 1 Neumann Way, M/D Room 285, Cincinnati, OH, 45125; phone: 877-432-3272; fax: 877-432-3329; email: aviation.fleetsupport@ge.com. You may view this referenced service information at the FAA, Engine & Propeller Standards Branch, 1200 District Avenue, Burlington, MA, 01803. For information on the availability of this material at the FAA, call 781-238-7759.

Issued in Burlington, Massachusetts, on January 15, 2020.

Robert J. Ganley,  
Manager, Engine & Propeller Standards Branch,  
Aircraft Certification Service.

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