

## DEPARTMENT OF TRANSPORTATION

### Federal Aviation Administration

#### 14 CFR Part 39

[Docket No. FAA-2009-1100; Directorate Identifier 2009-NE-37-AD; Amendment 39-16441; AD 2010-20-07]

RIN 2120-AA64

**Airworthiness Directives; International Aero Engines AG V2500-A1, V2522-A5, V2524-A5, V2525-D5, V2527-A5, V2527E-A5, V2527M-A5, V2528-D5, V2530-A5, and V2533-A5 Turbofan Engines**

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

**ACTION:** Final rule.

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**SUMMARY:** The FAA is adopting a new airworthiness directive (AD) for all International Aero Engines AG (IAE) V2500-A1, V2525-D5 and V2528-D5 turbofan engines and certain serial numbers (S/Ns) of IAE V2522-A5, V2524-A5, V2527-A5, V2527E-A5, V2527M-A5, V2530-A5, and V2533-A5 turbofan engines. For certain S/Ns of V2500-A1, V2522-A5, V2524-A5, V2527-A5, V2527E-A5, V2527M-A5, V2530-A5, and V2533-A5 series turbofan engines, this AD requires initial and repetitive on-wing ultrasonic inspections of the high-pressure compressor (HPC) stage 3 to 8 drum for cracks. As mandatory terminating action to the repetitive inspections, this AD requires removal from service of the fully silver plated nuts attaching the HPC stage 3 to 8 drum to the HPC stage 9 to 12 drum, removal of silver residue from the HPC stage 3 to 8 drum, and fluorescent penetrant inspection (FPI) of the stage 3 to 8 drum within a specified time. For all other engines, this AD requires removal from service of the fully silver plated nuts attaching the HPC stage 3 to 8 drum to the HPC stage 9 to 12 drum, removal of silver residue from the HPC stage 3 to 8 drum, and FPI of the HPC stage 3 to 8 drum at the next drum piece-part exposure. This AD results from reports of 39 HPC stage 3 to 8 drums found cracked since March 2009. We are issuing this AD to prevent uncontained failure of the HPC stage 3 to 8 drum, which could result in damage to the airplane.

**DATES:** This AD becomes effective November 1, 2010. The Director of the Federal Register approved the incorporation by reference of certain publications listed in the regulations as of November 1, 2010.

**ADDRESSES:** You can get the service information identified in this AD from International Aero Engines AG, 400 Main Street, East Hartford, CT 06108; telephone: (860) 565-5515; fax: (860) 565-5510.

The Docket Operations office is located at Docket Management Facility, U.S. Department of Transportation, 1200 New Jersey Avenue, SE., West Building Ground Floor, Room W12-140, Washington, DC 20590-0001.

**FOR FURTHER INFORMATION CONTACT:** Mark Riley, Aerospace Engineer, Engine Certification Office, FAA, Engine and Propeller Directorate, 12 New England Executive Park, Burlington, MA 01803; e-mail: mark.riley@faa.gov; telephone (781) 238-7758, fax (781) 238-7199.

**SUPPLEMENTARY INFORMATION:** The FAA proposed to amend 14 CFR part 39 with a proposed AD. The proposed AD applies to all IAE V2500-A1, V2525-D5 and V2528-D5 turbofan engines and certain S/Ns of IAE V2522-A5, V2524-A5, V2527-A5, V2527E-A5, V2527M-A5, V2530-A5, and V2533-A5 turbofan engines. We published the proposed AD in the Federal Register on February 12, 2010 (75 FR 6860). That action proposed to require:

- For certain S/Ns of IAE V2500-A1, V2522-A5, V2524-A5, V2527-A5, V2527E-A5, V2527M-A5, V2530-A5, and V2533-A5 turbofan engines:
  - Initial and repetitive on-wing ultrasonic inspections of HPC stage 3 to 8 drums for cracks; and
  - As mandatory terminating action to the repetitive ultrasonic inspections, within 27 months from the effective date of this AD, removal from service of the fully silver plated nuts attaching the HPC stage 3 to 8 drum to the HPC stage 9 to 12 drum, removal of silver residue from the HPC stage 3 to 8 drums, and FPI of the HPC stage 3 to 8 drums.
- For all other engines, at the next piece-part exposure of the HPC stage 3 to 8 drum, removal from service of the fully silver plated nuts attaching the HPC stage 3 to 8 drum to the HPC stage 9 to 12 drum, removal of silver residue from the HPC stage 3 to 8 drums, and FPI of the HPC stage 3 to 8 drums.

### Examining the AD Docket

You may examine the AD docket on the Internet at <http://www.regulations.gov>; or in person at the Docket Operations office 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 street address for the Docket Operations office (telephone (800) 647-5527) is provided in the ADDRESSES section. Comments will be available in the AD docket shortly after receipt.

### Comments

We provided the public the opportunity to participate in the development of this AD. We have considered the comments received.

### Request To Mandate Inspection of Group B and Group C Engines

One commenter, Airbus, requests that we mandate inspection for the S/N engines identified in Group B and Group C of IAE Service Bulletin (SB) No. V2500-ENG-72-0594, Revision 5, as these engines may have operated in a similar environment as the Group A engines.

We do not agree. Engines identified in Groups B and C have not exhibited cracking similar to that seen in engines listed in Groups A and D. Therefore, it is not appropriate to mandate inspections on Group B or C engines at this time. We did not change the AD.

## **Claim That Root Cause Is Not Yet Determined**

Airbus claims that the proposed AD would mandate the inspection only on engines identified in IAE SB No. V2500-ENG-72-0594 (Groups A and D) and IAE SB No. V2500-ENG-72-0603 (Group A) without determining root cause. To properly identify the suspect population, determining the root cause of the HPC stage 3-8 drum cracking is required.

We do not agree. While we do not yet know the specific root cause of the contamination causing the corrosion cracking of the HPC stage 3-8 drum, we do know that engines specified in IAE SB No. V2500-ENG-72-0594 (Groups A and D) and IAE SB No. V2500-ENG-72-0603 (Group A) may exhibit HPC stage 3-8 drum corrosion cracking. We did not change the AD.

## **Request To Include a Fleetwide Introduction of a Final Fix**

Airbus requests that the proposed AD should include a fleet-wide introduction of the final fix (nuts modification), and in the interim, the ultrasonic inspection, to correct the cause of HPC stage 3-8 drum cracking for the entire V2500 fleet.

We partially agree. Paragraph (f)(4)(i) of this AD requires that all operators of engines requiring these repetitive ultrasonic inspections remove the fully silver plated nuts, P/N AS44862, or equivalent, that attach the HPC stage 3 to 8 drum to the HPC stage 9 to 12 drum, within 27 months after the effective date of the AD. Paragraph (g) of this AD also requires those operators of all other affected engines to remove the fully silver plated nuts at the next piece-part exposure of the HPC stage 3-8 drum after the effective date of the AD. Ultrasonic inspection(s) per IAE SB No. V2500-ENG-72-0594 (Groups A and D) and IAE SB No. V2500-ENG-72-0603 only affect certain engines and are not required for the entire fleet. We did not change the AD.

## **Claim That Proposed AD Is Less Restrictive Than IAE SB**

Airbus claims that the proposed AD is less restrictive than the IAE service bulletins, and it does not recommend immediate action for V2500-A5 drums above 7,545 cycles-since-new and for V2500-A1 drums above 10,305 cycles-since-new. It therefore does not meet the criteria for maximum allowable individual risk per flight.

We do not agree. All "high cycle" HPC stage 3 to 8 drums in the field that required inspections at reduced thresholds, as referenced in the IAE SBs, have already been inspected. Therefore, an equivalent level of fleet risk is maintained for the AD action, and meets FAA criteria. We did not change the AD.

## **FAA Should Mandate the Nut Removal for the Complete V2500 Fleet**

Airbus states that the proposed AD does not put a compliance date for removal of the fully plated silver nuts for the complete V2500 fleet. Removal of the fully silver plated nuts should be mandated for the complete V2500 fleet.

We agree that the fully silver plated nuts should be removed from service for the entire V2500 fleet. However, all engines do not need to be retrofitted before a specific compliance date. V2500 engines that have been determined to require repetitive ultrasonic inspections are at an elevated risk level, and therefore require removal of the fully silver plated nuts within a specified time period to prevent corrosion and potential failure of the HPC 3-8 drum. The remaining V2500 engines that do not require repetitive ultrasonic inspections have been determined to be at a much lower risk level, and therefore, are only required to have the fully silver plated nuts removed at the next piece part exposure. We did not change the AD.

## **Request To Reference the Latest Service Bulletins**

IAE and Japan Airlines request that we reference the latest revisions of the service bulletins, which are IAE SB No. V2500-ENG-72-0594, Revision 6, IAE SB No. V2500-ENG-72-0603, Revision 2, and V2500-ENG-72-0601, Revision 2, as they have been updated to include additional engine S/Ns and other clarification changes.

We agree. We changed the AD to reference the revised service bulletins.

## **Request To Correct Typos in the Proposed AD**

Two commenters request that we change the following:

Paragraph (f)(4) should be revised from "HPC Stage 8 to 12 drum" to "HPC Stage 3 to 8 drum".

Paragraphs (f)(1), (f)(4)(ii), and (g)(2) should be revised from "using paragraph 3 of the Accomplishment Instructions of" to "using the paragraph 3 Accomplishment Instructions of".

We partially agree. We agree that paragraph (f)(4) should be revised from "HPC Stage 8 to 12 drum" to "HPC Stage 3 to 8 drum," We changed the AD.

We also agree that our reference in paragraphs (f)(1), (f)(4)(ii), and (g)(2) should be revised, but not as recommended. We changed paragraphs (f)(1), (f)(4)(ii), and (g)(2) from "using paragraph 3 of the Accomplishment Instructions of" to "use IAE SB No. V2500-ENG-72-0601, Revision 2, dated April 12, 2010, Accomplishment Instructions, paragraph 3."

## **Material Incorporated by Reference Section Missing From Proposed AD**

One commenter states that paragraphs (f)(1), (f)(4)(ii), and (g)(2) require ultrasonic inspection and cleaning to be performed using the Accomplishment Instructions of specified revisions of IAE SBs V2500-ENG-72-0594, V2500-ENG-603, and V2500-ENG-72-0601. These SBs should be listed in the Material Incorporated by Reference section, which is missing from the NPRM.

We agree. This Final Rule AD includes the Material Incorporated by Reference section, which includes those SBs.

## **Request To Revise the Relevant Service Information**

IAE commented to revise the last sentence of the "Relevant Service Information" in the preamble of the AD to change: "\* \* \* 27 months from the effective date of the proposed AD" to "27 months after the effective date of this AD". The commenter states that this could be interpreted incorrectly as 27 months from February 12, 2010 (date of the NPRM).

We do not agree that the compliance date could be misinterpreted. Paragraph (4) of this AD correctly states "27 months after the effective date of this AD." We did not change the AD.

## **Request To Revise the Mandatory Terminating Action Compliance Time**

IAE requests that we revise the mandatory terminating action compliance time of "27 months after the effective date of this AD" to a calendar end date of October 31, 2012, to be consistent with the IAE risk assessment.

We do not agree. Due to the uncertainty of the actual publication date of the AD, revising the mandatory terminating action from 27 months after the effective date of this AD to a calendar date of October 31, 2012, may result in a compliance time that is more restrictive than what was proposed in the NPRM. We did not change the AD.

## **Request To Revise the Definition of Piece-Part Exposure**

IAE requests that we revise the AD to change paragraph (i) of the definition of piece-part exposure for the HPC stage 3 to 8 drum from "removal of the drum from the engine and removal of all blades from the drum" to "separation of the rotating drum hardware from the static cases and removal of all blades from the HPC stage 3 to 8 drum". IAE is concerned that confusion could occur with the current statement.

We do not agree. The current description is accurate. We did not change the AD.

## **Request To Eliminate the Mandatory Terminating Action**

One commenter requests that we revise paragraph (f)(4) of the AD to eliminate the 27-month mandatory terminating action requirement to remove the fully silver plated nuts that attach the HPC stage 3 to 8 drum to the HPC stage 9 to 12 drum. The commenter states that performing repetitive ultrasonic inspections will provide an acceptable level of safety, and that incorporation of the 27-month mandatory terminating action requirement is an unacceptable cost burden to operators.

We do not agree. We have determined that removal of the fully silver plated nuts within 27 months from the effective date of the AD is required to maintain an acceptable level of safety. We did not change the AD.

## **Conclusion**

We have carefully reviewed the available data, including the comments received, and determined that air safety and the public interest require adopting the AD with the changes described previously. We have determined that these changes will neither increase the economic burden on any operator nor increase the scope of the AD.

## **Costs of Compliance**

We estimate that this AD will affect 848 IAE V2500-A1, V2522-A5, V2524-A5, V2525-D5, V2527-A5, V2527E-A5, V2527M-A5, V2528-D5, V2530-A5, and V2533-A5 turbofan engines installed on airplanes of U.S. registry. We estimate that 29 of these engines will require ultrasonic inspections, and that it will take about 3 work-hours per engine to perform one ultrasonic inspection. We estimate that it will take about 2 work-hours per engine to perform the FPI of the HPC stage 3 to 8 drum, and that the average labor rate is \$85 per work-hour. We also estimate that removal of silver residue from the engine will cost about \$2,600 per engine. Required parts will cost about \$795 per engine. Based on these figures, we estimate the total cost of the AD to U.S. operators to be \$3,030,515.

## **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

We have determined that 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); 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.

We prepared a summary of the costs to comply with this AD and placed it in the AD Docket. You may get a copy of this summary at the address listed under ADDRESSES.

## 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 Federal Aviation Administration 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:





**2010-20-07 International Aero Engines AG:** Amendment 39-16441. Docket No. FAA-2009-1100; Directorate Identifier 2009-NE-37-AD.

**Effective Date**

- (a) This airworthiness directive (AD) becomes effective November 1, 2010.

**Affected ADs**

- (b) None.

**Applicability**

- (c) This AD applies to:

- (1) All International Aero Engines AG (IAE) V2500-A1 turbofan engines; and
- (2) All IAE V2525-D5 and V2528-D5 turbofan engines; and
- (3) IAE V2522-A5, V2524-A5, V2527-A5, V2527E-A5, V2527M-A5, V2530-A5, and V2533-A5 turbofan engines with serial numbers (S/Ns) up to and including V13181, and with S/Ns from V15000 up to and including V15245.
- (4) These engines are installed on, but not limited to, Airbus A319, A320, and A321, and McDonnell Douglas MD-90 airplanes.

**Unsafe Condition**

- (d) This AD results from reports of 39 high-pressure compressor (HPC) stage 3 to 8 drums found cracked since March 2009. We are issuing this AD to prevent uncontained failure of the HPC stage 3 to 8 drum, which could result in damage to the airplane.

**Compliance**

- (e) You are responsible for having the actions required by this AD performed within the compliance times specified unless the actions have already been done.

**Engines Requiring Ultrasonic Inspections of the HPC Stage 3 to 8 Drum**

- (f) For IAE V2522-A5, V2524-A5, V2527-A5, V2527E-A5, V2527M-A5, V2530-A5, and V2533-A5 turbofan engines with S/Ns in "Group A" or "Group D" in IAE Service Bulletin (SB) No. V2500-ENG-72-0594, Revision 6, dated April 12, 2010, and for V2500-A1 turbofan engines with S/Ns in "Group A" in IAE SB No. V2500-ENG-72-0603, Revision 2, dated March 17, 2010, do the following:

- (1) Perform an initial ultrasonic inspection of the HPC stage 3 to 8 drum using IAE SB No. V2500-ENG-72-0594, Revision 6, dated April 12, 2010, Accomplishment Instructions, paragraph 3, or IAE SB No. V2500-ENG-72-0603, Revision 2, dated March 17, 2010, Accomplishment Instructions, paragraph 3, before accumulating 5,200 cycles-since-new (CSN) or within 500 cycles from the effective date of this AD, whichever occurs later.

(2) Thereafter, perform repetitive ultrasonic inspections of the HPC stage 3 to 8 drum for cracks within every 500 cycles-since-last-inspection.

(3) If cracks or crack indications are identified, remove the drum from service before further flight.

### **Mandatory Terminating Action**

(4) As mandatory terminating action to the repetitive inspections required by this AD, at the next engine shop visit, but no later than 27 months after the effective date of this AD, do the following before returning any HPC stage 3 to 8 drum to service:

(i) Remove from service fully silver plated nuts, part number (P/N) AS44862 or equivalent, that attach the HPC stage 3 to 8 drum to the HPC stage 9 to 12 drum.

(ii) Remove the silver residue from the HPC stage 3 to 8 drum using the IAE SB No. V2500-ENG-72-0601, Revision 2, dated April 12, 2010, Accomplishment Instructions, paragraph 3. Drums cleaned before the effective date of this AD using engine manual task 72-41-11-110-001 satisfy this requirement.

(iii) Fluorescent penetrant inspect (FPI) the HPC stage 3 to 8 drum for cracks, and remove from service any drum found cracked. You can find guidance on performing an FPI of the HPC stage 3 to 8 drum in IAE engine manual task 72-41-11-200-001.

(iv) Installation of a zero-time HPC stage 3 to 8 drum or a drum that has never operated with fully silver plated nuts, P/N AS44862 or equivalent, that attach the HPC stage 3 to 8 drum to the HPC stage 9 to 12 drum eliminates the need for the cleaning and FPI required by paragraphs (f)(4)(ii) and (f)(4)(iii) of this AD.

### **All Other Engines**

(g) For all other engines, at the next piece-part exposure of the HPC stage 3 to 8 drum after the effective date of this AD, do the following before returning the drum to service:

(1) Remove from service fully silver plated nuts, P/N AS44862 or equivalent, that attach the HPC stage 3 to 8 drum to the HPC stage 9 to 12 drum.

(2) Remove the silver residue from the HPC stage 3 to 8 drum using IAE SB No. V2500-ENG-72-0601, Revision 2, dated April 12, 2010, Accomplishment Instructions, paragraph 3. Drums cleaned before the effective date of this AD using engine manual task 72-41-11-110-001 satisfy this requirement.

(3) FPI the HPC stage 3 to 8 drum for cracks, and remove from service any drum found cracked. You can find guidance on performing an FPI of the HPC stage 3 to 8 drum in IAE engine manual task 72-41-11-200-001.

(4) Installation of a zero-time HPC stage 3 to 8 drum or a drum that has never operated with fully silver plated nuts, P/N AS44862 or equivalent, that attach the HPC stage 3 to 8 drum to the HPC stage 9 to 12 drum eliminates the need for the cleaning and FPI required by paragraphs (g)(2) and (g)(3) of this AD.

### **Definitions**

(h) For the purpose of this AD, an engine shop visit is the induction of an engine into the shop for maintenance involving the separation of a pair of major mating engine flanges, except that the separation of engine flanges solely for the purposes of transportation without subsequent engine maintenance is not an engine shop visit.

(i) For the purpose of this AD, piece-part exposure is removal of the HPC stage 3 to 8 drum from the engine and removal of all blades from the drum.



## Previous Credit

(j) Initial or repetitive ultrasonic inspections of the HPC stage 3 to 8 drum using IAE SB No. V2500-ENG-72-0594, Revision 3, dated August 7, 2009, or Revision 4, dated October 13, 2009, or Revision 5, dated November 23, 2009, before the effective date of this AD, meets the inspection requirements of paragraphs (f)(1) through (f)(3) of this AD.

(k) Initial or repetitive ultrasonic inspections of the HPC stage 3 to 8 drum using IAE SB No. V2500-ENG-72-0603, Original Issue, dated November 24 2009, or Revision 1, dated December 18, 2009, before the effective date of this AD, meets the inspection requirements of paragraphs (f)(1) through (f)(3) of this AD.

## Alternative Methods of Compliance (AMOCs)

(l) The Manager, Engine Certification Office, has the authority to approve AMOCs for this AD if requested using the procedures found in 14 CFR 39.19.

## Related Information

(m) Contact Mark Riley, Aerospace Engineer, Engine Certification Office, FAA, Engine and Propeller Directorate, 12 New England Executive Park, Burlington, MA 01803; e-mail: mark.riley@faa.gov; telephone (781) 238-7758, fax (781) 238-7199, for more information about this AD.

(n) Contact International Aero Engines AG, 400 Main Street, East Hartford, CT 06108; telephone: (860) 565-5515; fax: (860) 565-5510, for a copy of the service information referenced in this AD.

## Material Incorporated by Reference

(o) You must use the service information specified in the following Table 1 to perform the inspections and silver residue removal required by this AD. The Director of the Federal Register approved the incorporation by reference of the documents listed in the following Table 1 in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Contact International Aero Engines AG, 400 Main Street, East Hartford, CT 06108; telephone: (860) 565-5515; fax: (860) 565-5510, for a copy of this service information. You may review copies at the FAA, New England Region, 12 New England Executive Park, Burlington, MA; or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call (202) 741-6030, or go to: <http://www.archives.gov/federal-register/cfr/ibr-locations.html>.

**Table 1 – Incorporation by Reference**

<b>International Aero Engines Service Bulletin No.</b>	<b>Page</b>	<b>Revision</b>	<b>Date</b>
V2500-ENG-72-0594	ALL	6	April 12, 2010
Total Pages: 61			
V2500-ENG-72-0601	ALL	2	April 12, 2010
Total Pages: 9			

Issued in Burlington, Massachusetts, on September 15, 2010.

Robert J. Ganley,  
Acting Manager, Engine and Propeller Directorate,  
Aircraft Certification Service.

SUPERSEDED